OMB No. 0925-0001 and 0925-0002 (Rev. 03/2020 Approved Through 02/28/2023)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Todd A. Ricketts

eRA COMMONS USER NAME (credential, e.g., agency login): ricketta

POSITION TITLE: Professor and Vice Chair of Graduate Studies

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

| INSTITUTION AND LOCATION | DEGREE(if applicable) | Completion DateMM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| University of Iowa, Iowa City, IA | B.A. | 05/1989 | Sp & Hearing Sciences |
| University of Iowa, Iowa City, IA | M.A. | 05/1991 | Sp & Hearing Sciences |
| University of Iowa, Iowa City, IA | Ph.D. | 12/1995 | Sp & Hearing Sciences |
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1. **Personal Statement**

The goal of improving the overall listening experience of individuals with hearing loss has been a central objective in my work to date. I have completed several studies examining how hearing aida and specific types of signal processing interact with environments and individual listener’s hearing abilities to affect performance and perception as well as ways signal processing can be enhanced and/or modified to limit important distortions. I have a broad background in psychoacoustics, acoustics, instrumentation, hearing aids and cochlear implants including serving as PI, co-PI or co-investigator on more than 50 past research projects that were funded through a range of sources including NIDRR (DOE), NSF, NIH, PCORI and industry sources. Most recently I have been focused on individualizing amplification selection and adjustment in a cost-effective manner. My past work has resulted in more than 70 peer reviewed publications. Over the past two decades I have served as the primary or secondary research mentor for several clinical (Au.D.) and Ph.D. students.

**B. Positions and Honors
Positions and Employment**

1995-1996 Visiting Assistant Professor, Department of Speech Pathology & Audiology, University of Iowa

1996-1999 Assistant Professor, Department of Audiology & Speech Sciences, Purdue University

1999-2003 Assistant Professor, Department of Hearing & Speech Sciences, Vanderbilt University

1999- Co-Director, Vanderbilt Hands-on Hearing Aid Workshops

1999-2006 Guest Faculty, College of Extended Learning, Doctor of Audiology Program, Central Michigan University

2000-2004 Editor-in-Chief, *Trends in Amplification*

2003 Vice Chair, Vanderbilt University Institutional Review Board: Behavioral Science Committee

2003-2011 Chair, Vanderbilt University Institutional Review Board: Behavioral Science Committee

2004-2014 Associate Professor, Department of Hearing & Speech Sciences, Vanderbilt University

2011-2016 Director of Graduate Studies, Department of Hearing & Speech Sciences, Vanderbilt University

2013-2017 Associate Editor, Journal of Speech Language and Hearing Research

2014- Professor, Department of Hearing & Speech Sciences, Vanderbilt University Medical Center

2017- Vice-Chair of Graduate Studies, Department of Hearing & Speech Sciences, Vanderbilt University Medical Center

2014- American National Standards Institute, Alternate voting representative for the American Academy of Audiology

2018- S3 Committee Vice Chair, American National Standards Institute

**Honors**

1997 The Purdue University chapter of the National Student Speech-Hearing Language Association Faculty Teaching Award: Outstanding Professor

1999 The Purdue University chapter of the National Student Speech-Hearing Language Association Faculty Teaching Award: Outstanding Professor

2001 Named “Outstanding Professor” by the Vanderbilt Audiology Graduating Class (2001).

2003 Mentor for Kiara Ebinger, “Does ECAP correlate with performance in CI recipients?”, The American Academy of Audiology Student Research Forum Award winner.

2006 Named Fellow of the American Speech Language Hearing Association

2008 Editors Award from the American Journal of Audiology for “Ricketts TA, Galster, JA & Tharpe, AM (2007). Directional Benefit in Simulated Classroom Environments. American Journal of Audiology, 16(2), 130-144.

2009 Mentor for Erin Picou, National Institute of Health Student Poster Award for “Speech recognition and subjective ratings with wireless speech transmission.” Poster presented at the American Auditory Society, Scottsdale, AZ.

2010 Mentor for Erin Picou, National Institute of Health Student Poster Award for “Listening Effort, visual Cues and Individual Variability.” Poster presented at Academy Research Conference, San Diego, CA.

2011 Mentor for Hannah Kim, Jerger Awards for Excellence in Student Research for, “Test-Retest Reliability of Open Hearing Aid Fittings in Children”. Poster presented at the 2011 AudiologyNow! Conference, Chicago IL

2014-2017 Board of Directors, American Academy of Audiology

2018 Elected as a Distinguished Scholar and Fellow of the National Academies of Practice

2018 Nominated and elected to the International Collegium of Rehabilitative Audiologist (ICRA)

2018 Co-Mentor for Carlos R. Benítez-Barrera, Jerger Awards for Excellence in Student Research for, “Auditory Cortical Responses of Children Under a Simulated Remote Microphone System Condition”. Poster presented at the 2018 American Academy of Audiology Conference, Nashville TN.

**C. Contributions to Science**

1. While speech recognition abilities are typically viewed as paramount when considering receptive communication, there is increased interest in how extra-perceptual factors, like listening effort, affect the total communication experience. Further, how factors such as hearing loss and specific hearing aid processing interventions impact listening effort are also of interest because the consequences of sustained increases in listening effort may be substantial, including mental fatigue, communicative disengagement, decreased physical well-being, and reduced academic/vocational involvement. Our work in this area has increased our understanding of how changes in the secondary task in a dual task paradigm can affect the sensitivity of objective measures of listening effort as a function of age (Picou & Ricketts 2014). In addition, we have shown that speech recognition, subjective listening effort and objective listening effort are distinct constructs (Picou & Ricketts, 2018) and that unilateral and bilateral beamformers can further improve listening effort (Picou & Ricketts, 2017; 2019). I served as co-investigator or primary investigator on all of these studies.
2. Picou, E. M. & **Ricketts, T.A.** (2014). The effect of changing the secondary task in dual-task paradigms for measuring listening effort. *Ear Hear, 35,* 611-622.
3. Picou, E.M. & **Ricketts, T.A.** (2018). The relationship between speech recognition, behavioral listening effort, and subjective ratings. *Int J Audiol* 57, 457 – 467.*Int J Audiol, 57*, 457-467.
4. Picou, E. M. & **Ricketts, T. A**. (2017). How directional microphones affect speech recognition, listening effort, and localization for listeners with moderate-to-severe hearing loss. *Int J Audiol*. 56, 909–918.
5. Picou, E. M., & **Ricketts, T. A.** (2019). An Evaluation of Hearing Aid Beamforming Microphone Arrays in a Noisy Laboratory Setting. *J Am Acad* Audiol 30(2), 131-144.
6. Microphone-based hearing aid technologies are the only methods that have been consistently shown to improve the speech recognition in noise for these patients. When I began work in this area, there was limited published data regarding the benefits and limitations of directional microphone technology for listeners in realistic listening environments, or how these benefits were affected by other hearing aid features or individual listener characteristics. My work in this area has significantly contributed to our understanding of how directional microphone interacts with patient and environmental factors, which has significant influence in hearing aid design and clinical practice. For example, my work demonstrating how microphone port angle and venting affect hearing aid directivity informed manufacturers about design improvements and informed clinicians about hearing aid coupling (Ricketts 2000). In addition, my work demonstrating how gain equalization in directional hearing aids differentially affected speech recognition and audible microphone noise informed manufacturers and clinicians about optimizing low frequency gain when directional microphones are activated (Rickets & Henry 2002). Furthermore, my work demonstrating how patient position directly affects speech recognition performance with directional microphones informed clinical practice and patient counselling regarding optimizing hearing aid benefit (Henry & Ricketts 2003; Ricketts & Hornsby 2003). I served as primary investigator on all of these studies.
7. **Ricketts, T.A.** (2000). Directivity quantification in hearing aids: Fitting and measurement effects. *Ear Hear, 21,* 45-58.
8. **Ricketts, T.A.** & Henry, P. (2002). Gain equalization in directional hearing aids. *Am J Audiol, 11,* 29-41.
9. Henry P & **Ricketts T.A.** (2003). The effect of head angle on auditory and visual input for directional and omnidirectional hearing aids. *Am J Audiol, 12,* 41-51.
10. **Ricketts, T.A.** and Hornsby, B.W.Y. (2003). Distance and reverberation effects on directional benefit. *Ear Hear, 24,* 472-84.
11. Children with hearing loss can be deprived of important speech information in school environments due to listening in adverse situations typical of classrooms. This deprivation often results in difficulties with communication and academic achievement, as well as psychosocial and emotional problems. My work in this area has demonstrated how microphone settings (e.g. directional, omnidirectional, asymmetric) can lead to either improvements or decrements in speech recognition in noise (Ricketts & Picou, 2013). In addition, they highlight how some microphone technologies can be detrimental in situations where overhearing is required (Ricketts et al 2007). Together, this work significantly contributed to our understanding of how microphone settings can interact with patient factors and specific school listening environments providing evidenced-based recommendations for use of directional microphone hearing aids in school aged children (Ricketts & Galster 2008; Ricketts et al 2017). Further, the finding that school environments can have poor signal-to-noise ratios informed manufacturers and led to hearing aid designs in which the aggressiveness of directional switching could be modified. I served as primary investigator on all of these studies.
12. **Ricketts T.A.**, Galster, J.A. & Tharpe, A.M. (2007). Directional Benefit in Simulated Classroom Environments. *Am J Audiol, 16*, 130-144.
13. **Ricketts TA** & Galster, J.A. (2008). Head Angle and Elevation in Classroom Environments: Implications for Amplification. *J Speech Lang Hear Res, 51*, 516-525.
14. **Ricketts, T.A**., & Picou, E.M. (2013). Speech recognition for bilaterally asymmetric and symmetric hearing aid microphone modes in simulated classroom environments. *Ear Hear, 34*, 601-609.
15. **Ricketts, T.A**., Picou, E.M. & Galster, J.A., (2017). Directional microphone hearing aids in school environments: Working toward optimization. *J Speech Lang Hear Res, 60,* 263-75.
16. For people with permanent hearing loss, especially the type that is acquired as a result of noise exposure or aging, there is no medical cure. Instead, the most common remediation is hearing aid provision. Therefore, it is important that we understand all of the benefits and limitations of hearing aids for listeners’ total communication experience in order to optimize selection and adjustment and enhanced use counselling for patients. Our work in this area has led to a number of evidenced-based clinical recommendations relative to use, configuration and adjustment of specific hearing aid technologies and the related counseling including: 1) Increased our understanding of the types of environments for which bilateral beamforming is effective at improving speech understanding and the environments for which use of this technology should be avoided (Picou et al 2014); 2) How the magnitude of benefits which result from using a second hearing aid depend on degree of hearing loss (Ricketts et al 2019); and, 3) The relative impact of hearing loss and the wireless streaming configuration on benefits from these technologies (Picou et al 2011, 2013). I served as principle or co-principle investigator on all of these studies.
17. Picou, E.M. & **Ricketts, T.A.** (2011). Comparison of wireless and acoustic hearing aid-based telephone listening strategies. *Ear Hear, 32,* 209 – 220.
18. Picou, E.M. & **Ricketts, T.A**. (2013). Efficacy of hearing-aid based telephone strategies for listeners with moderate-to-severe hearing loss. *J Am Acad Audiol, 24,* 59 - 70.
19. Picou, E.M., Aspell, E. & **Ricketts, T.A**. (2014). Potential benefits and limitations of three types of directional processing in hearing aids. *Ear Hear, 35,* 339 - 352.
20. **Ricketts, T.A.,** Picou, E.M.; Shehorn, J. & Dittberner, A.B. (2019). Degree of hearing loss affects bilateral hearing aid benefits in ecologically relevant laboratory conditions. J Speech Lang Hear Res, 62, 3834-3850.
21. One potential method for increasing speech recognition performance in noise and localization accuracy through cochlear implants is bilateral implantation. In collaboration with colleagues, the potential benefits and limitations of bilateral cochlear implants and factors underlying limitations were explored. My contributions included all aspects of this work; however, I was the lead contributor regarding speech recognition evaluations and interactions with signal processing. Our work in this area demonstrated significant bilateral advantages related to speech recognition in complex environments (Ricketts et al 2006; Sladen & Ricketts 2015) and localization in the horizontal plane (Grantham et al 2007). Further, we demonstrated that, while experience generally improved performance, it had a negligible effect on the magnitude of bilateral benefits. Further, we identified limited interaural time difference cues as a key factor limiting performance. In addition, we demonstrated how front end compression processing further distorted interaural level difference cues also degrading localization performance (Grantham et al 2008). I served as co-principle investigator on all of these studies.
22. **Ricketts T.A.,** Grantham D.W., Ashmead D.H., Haynes D.S. & Labadie R.F. (2006). Speech recognition for unilateral and bilateral cochlear implant modes in the presence of uncorrelated noise sources. *Ear Hear*, *27*, 763-773.
23. Grantham D.W., Ashmead D.H., **Ricketts T.A**., Labadie R. & Haynes D.S. (2007). Horizontal-plane localization of noise and speech signals by post-lingually deafened adults fitted with bilateral cochlear implants. *Ear Hear, 28*, 524-41.
24. Grantham D.W., Ashmead D.H., **Ricketts T.A.**, Labadie R. & Haynes D.S. (2008). Interaural time and level difference thresholds for acoustically presented signals in post-lingually deafened adults fitted with bilateral cochlear implants using CIS+ processing. *Ear Hear, 29,* 33-44.
25. Sladen, D.P. and **Ricketts, T.A**. (2015). Frequency importance functions in quiet and noise for adults with cochlear implants. *Am J Audiol, 24,* 477-86.

**Complete List of Published Work in MyBibliography:**

<http://www.ncbi.nlm.nih.gov/sites/myncbi/1BwZUEGdS72QA/bibliograpahy/48077434/public/?sort=date&direction=ascending>

**D. Additional Information: Research Support and/or Scholastic Performance**

**Ongoing Research Support**

NIH/NIDCD (1R01DC016643-01) Ricketts (Co-I) 06/01/2018-05/31/2023

Psychophysical Reweighting of Auditory Spatial Cues

PI: Stecker

The main goals of this project are to psychophysically measure how human listeners adjust the way they used auditory spatial cues as a function of stimulus context, hearing impairment, and device use.

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| Industry Funding: Sonova The impact of hearing aid processing on persons with hearing loss | Ricketts (Co-I) | 3/1/18-2/28/23 |
| The major goals of this research are to develop measures that have optimal sensitivity to some of the psychosocial consequences of hearing loss including listening effort and emotion, to determine what individual variables mitigate listening effort, and to identify processing which either degrades or enhances listening effort based on individual patient predictor variables.

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| NIH-NIDCD (R01DC015997-01A1) Cost-effective hearing aid delivery models: Outcomes, value, and candidacy PI: Yu-Hsiang Wu | Ricketts (Co-I) | 5/1/18-4/30/23 |

The major goal of this research is to examine patient outcomes across different levels of hearing aid technologies and hearing aid services. The outcomes of this study are expected to inform patient care regarding optimizing hearing aid selection and delivery of services in a cost-effective manner.

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| RR&D Merit Review Award (1 I01 RX002777-01A1)Efficacy of a coupler-based fitting approach for experienced users receiving replacement hearing aids PI: Sherri Smith | Ricketts (Co-I) | 10/1/18-9/31/22 |

The major goal of this research is to evaluate a process aimed at improving the cost effectiveness of replacing hearing aids for patients within the VA.

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| National Institute on Aging R44AG058268 Ricketts(Co-I) 04/01/19-03/31/21(Phase 2)A Low-Cost and Convenient Solution for Hearing Aid Shell ManufacturingPI: Steven YiRole: Co-InvestigatorThe major goal of this research is to develop and improve an app-based 3D scanning technology to improve convenience and reduce cost of manufacture of custom coupling solutions.

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| NIH-NIDCD (R01DC015997-01A1) Supplement to “Cost-effective hearing aid delivery models: Outcomes, value, and candidacy” PI: Yu-Hsiang Wu | Ricketts (Co-I) | 08/01/19-07/30/20 |

The major goal of this research is to examine patient outcomes across different levels of hearing aid hearing aid services in patients with Alzheimer’s disease and related dementias. The outcomes of this study are expected to inform patient care regarding optimizing hearing aid delivery of services in a cost-effective manner. |

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| Patient-Centered Outcomes Research Institute (PCORI) Addressing the clinical dilemma and patient preference for unilateral versus bilateral hearing aids PI: Sherri Smith | Ricketts (Co-I) | 11/01/20-10/31/23  |

The major goal of this research is to evaluate the preference for one versus two hearing aids in patients with mild-moderate hearing loss within the constraints of real-world clinic service delivery.