

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME H. Timothy Bunnell, PhD		POSITION TITLE Director, Center for Pediatric Auditory and Speech Sciences, & Nemours Bioinformatics Core Lab	
eRA COMMONS USER NAME (credential, e.g., agency login) bunnell			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
University of Maryland, College Park, MD	B.S.	1975	Psychology
The Pennsylvania State University, University Park, PA	M.S.	1978	Psychology
The Pennsylvania State University, University Park, PA	Ph.D.	1983	Psychology

A. Personal Statement

I received my Ph.D. in Experimental Psychology from The Pennsylvania State University in 1983. After graduating, I worked as a Research Scientist in the Sensory Communication Research Laboratory (later Center for Auditory and Speech Sciences) at Gallaudet University from 1983 until 1989 conducting research on the application of digital speech processing techniques to hearing enhancement, primarily for acoustic hearing aid users. In 1989 I became the director of the Speech Processing Laboratory of the Applied Science and Engineering Laboratories at the Alfred I. duPont Hospital for Children where my research interests expanded to include text to speech synthesis and speech recognition along with acoustic phonetics and speech processing. Since 1989, I have held a number of positions at AIDHC and am now the director of the Nemours Center for Pediatric Auditory and Speech Sciences (CPASS) and head of the Speech Research Laboratory within the CPASS. From 2000, I also serve as director of the Nemours Biomedical Research Department's Bioinformatics Core facility. The Bioinformatics core maintains computing infrastructure for Nemours Biomedical Research, and provides expertise in biostatistics, data mining, numerical analysis and in the development of informatics tools. My current primary research interests continue to be related to biomedical and clinical applications of speech technology in both the diagnosis and remediation of hearing and speech disorders, particularly in pediatric patients. However, I also have a strong secondary interest in applying my background in Psychology and human factors to designing and implementing informatics tools that assist and promote good research practices. This has led my group to develop many web-based tools to support the researchers in the Center for Pediatric Research and in our department more generally.

B. Positions and Honors

Positions and Employment

- 1983 – 1989 Research Scientist, Sensory Communication Research Laboratory, Gallaudet University
- 1989 – 1991 Adjunct Assistant Professor, Dept. of Computer and Information Science, University of Delaware
- 1991 – 2013 Research Associate Professor, Dept. of Computer and Information Science; Joint Appointment in Dept. of Linguistics; University of Delaware
- 1989 – 1998 Director, Speech Research Program; Alfred. I. duPont Hospital for Children, Wilmington, Delaware
- 1998 – 2005 Research Scientist and Head, Speech Research Laboratory; Alfred. I. duPont Hospital for Children, Wilmington, Delaware
- 2000 – 2005 Research Scientist and Director, Bioinformatics Core Facility, Alfred I. duPont Hospital for Children, Wilmington Delaware.
- 2005 – 2010 Senior Research Scientist and Director, Center for Pediatric Auditory and Speech Sciences, Nemours Biomedical Research and Alfred I. duPont Hospital for Children, Wilmington Delaware.

- 2010 – present Principal Research Scientist and Director, Center for Pediatric Auditory and Speech Sciences, Nemours Biomedical Research and Alfred I. duPont Hospital for Children, Wilmington Delaware.
- 2013 – present Adjunct Professor, Department of Computer and Information Science

Other Experience and Professional Memberships

- 2000-2012 Editor (with Irene B. Vogel) *Language and Speech*
- 2000-2005 Vice President: Permanent Council for the International Conference on Spoken Language Processing
- 2000-2002 Editorial Consultant *Assistive Technology*
- 1996 General Chair: Fourth International Conference on Spoken Language Processing (ICSLP 96),
- 1995-2000 Member: Speech Communication Technical Committee, Acoustical Society of America.
- 2008-2012 ANSI S3 WG9.1 Working group on standards for measuring TTS intelligibility

Professional Affiliations & Activities

- Acoustical Society of America (Fellow)
- International Speech Communication Association
- IEEE
- ASHA

C. Selected Peer-reviewed Publications

Most relevant to the current application (software development & machine learning)

1. DiCanio, C.T., Nam, H., Whalen, D.H., Bunnell, H.T., Amith, J.D., Garcia, R.C. (2013). Using automatic alignment to analyze endangered language data: Testing the viability of untrained alignment. *J. Acoust. Soc. Am.* 134(3), 2235-2246.
2. Bunnell, H.T., Lilley, J.S., Soli, S.D., Pal, I. Utterance Verification for automating the Hearing In Noise Test (HINT). *Proceedings of Interspeech 2011*, Florence, Italy, August 28-31, 2011.
3. DiCanio, C.T., Nam, H., Whalen, D.H., Bunnell, H.T., Amith, J.D., Garcia, R.C. (2012). Assessing Agreement level between forced alignment models with data from endangered language documentation corpora. *Proceedings of InterSpeech 2012*, 130-133.
4. Steidl, S., Polzehl T., Bunnell H. T., Dou Y., Muthukumar P. K., Perry D., et al. (2012). Emotion Identification for Evaluation of Synthesized Emotional Speech. *Proceedings Speech Prosody 2012*, May 22-25, 2012, Shanghai, China.
5. Black, A. W., Bunnell H. T., Dou Y., Kumar P., Metze F., Perry D., et al. (2012). Articulatory Features for Expressive Speech Synthesis. *Proc. ICASSP 2012*.

Additional recent publications of importance to the field (in chronological order)

1. Yeni-Komshian, G. and Bunnell, H.T. (1998) Perceptual evaluation of spectral and temporal modifications of deaf speech. *J. Acoust. Soc. Am.*, 104, 2, 637-647.
2. Bunnell, H.T., Pennington, C., Yarrington, D., and Gray, J. (2005). Automatic personal synthetic voice construction. *Proceedings of the Eurospeech 2005*, Lisbon, Portugal. September 4-8. 89-92.
3. Bunnell, H.T., Lilley, J. (2007). Analysis Methods for Assessing TTS Intelligibility. *Proceedings of the 6th ISCA Workshop on Speech Synthesis*. Bonn, Germany, August 22-24. 374-379.
4. Vallino LD, Lass NJ, Bunnell HT, Pannbacker M. (2008). Academic and Clinical Training in Cleft Palate. *Cleft Palate Craniofac. J.*, 45(4), 371-380.
5. Skorpinski, E.W., Vannelli, P.M., Yousef, E., Bunnell, H.T., McGeady, S.J. (2008). Radiologic outcomes in children with chronic rhinosinusitis and ostiomeatal complex obstruction after medical management. *Ann Allergy Asthma Immunol.* 100(6), 529-532.
6. Spinu, L., Vogel, I., & Bunnell, H.T. (2008) Palatalization in Romanian - Acoustic Properties and Representation. Presented at 38th Linguistic Symposium on Romance Languages (LSRL) University of Illinois at Urbana-Champaign, April 4-6, 2008.

7. DiDario, A.G, Whelan, M.A, Hwan, W.H, Yousef, E., Cox, T.J., Oldham, H.M, Padman, R., Bunnell, H.T., Shaffer, T.H., McGeady, S. (2009) Efficacy of Chest Physiotherapy in Pediatric Patients with Acute Asthma Exacerbations. *Pediatric Asthma, Allergy & Immunology*.
8. Vogel, I., Hestvik, A., Bunnell, H.T., and Spinu, L. (2009) Perception of English Compound vs. Phrasal Stress: Natural vs. Synthetic Speech. *Proceedings Interspeech 2009*. 1699-1702.
9. Jreige, C., Patel, R., & Bunnell, H.T. (2009). VocaliD: Personalizing Text-to-Speech Synthesis for Children with Severe Speech Impairment. *Proceedings of ASSETS 2009*.
10. Bunnell, H.T. (2010) Crafting Small Databases for Unit Selection TTS: Effects on Intelligibility. *Proceedings of the 7th ISCA Speech Synthesis Workshop*.
11. Spinu, L., Vogel, I. and Bunnell, HT (2012). Palatalization in Romanian—Acoustic properties and perception. *Journal of Phonetics*, doi:10.1016/j.wocn.2011.08.001

6.

Software and Web Development (selected):

Bunnell, H.T. (2011). *EDW/WEDW* – Software for display, analysis, and editing of digitized speech files (Version 3.0). [Software]. Available on request.

Bunnell, H.T., Hoskins, S., Yarrington, D., Gray, J., Pennington, C., Moyers, B., Lilley, J. (2011). *ModelTalker* – A text to speech synthesis system for voice banking and communication devices. [Software]. Available from <http://www.modeltalker.com>.

Bunnell, H.T., Gray, J., Pennington, C., Moyers, B. (2011). *MTVR* – The ModelTalker Voice Recorder System. [Software] Available from <http://www.modeltalker.com>.

Bunnell, H.T., Pennington, C., Eberhardt, S., Yarrington, D., (2000). *STAR* – Software for Speech Training, Assessment, and Remediation. [software] Available on request.

Bunnell, H.T., and McCahan, S. (2003). *TimeKeeper* – a web-based effort reporting system compliant with federal standards for non-profit organizations using federal grant funds. [software & website].

<https://www.nemoursresearch.org/tk>.

Bunnell, H.T., and Yarrington, D. (2000) *Language and Speech* – Main web portal for authors to submit manuscripts for *Language and Speech*. [software & website] <http://www.asel.udel.edu/lgsp>.

D. Research Support

Ongoing Research Support

U54-GM104941 9/25/13 to 5/31/18 NIH, Binder-MacLeod (PI). Center for Translational Research. Large infrastructure grant to support development of translational research capacity across three institutions in Delaware (University of Delaware, Christiana Healthcare, and Nemours Alfred I duPont Hospital for Children) and the Medical University of South Carolina.

Role: Co-director of Communications responsible for development of web-based cross-institutional support applications.

P20-RR020173 - Shaffer (PI), 9/23/04 to 9/22/15, NIH/NCCR: Center for Pediatric Research

The goals of this proposal are to develop a Pediatric Research Center at the Alfred I duPont Hospital for Children. The current grant is a 5-year renewal/extension of the original 5-year project. Funding supports mentoring activities and bioinformatics core facility activities, notably biostatistics, database design, and development of web-based applications.

Role: Core Director & Mentor

R01 HL114899-01 Blake (PI) 8/15/12 to 6/30/16, NIH: *Use of Mobile Devices and the Internet to Streamline an Asthma Clinical Trial*.

Develop mobile electronic means of communication and information transfer to streamline the conduct of clinical research using an ongoing clinical trial, "*Long-acting beta agonist step down study*" for a side-by-side comparison of traditional and streamlined approaches.

Role: Supervise development team to design and implement mobile device and web applications.

Recently Completed Research Support

H133E080006 - Bakke (PI), 9/1/08 to 8/31/13, US Department of Education/NIDRR: Rehabilitation Engineering Research Center on Hearing Enhancement

The major goal of this project is to develop a comprehensive center addressing needs of individuals with hearing impairment, their families, service providers, hearing aid and cochlear implant manufacturers, and researchers. SRL support on this grant will lead to development of text to speech synthesis and utterance verification software for aural rehabilitation as well as software for aural habilitation of pediatric CI recipients.

Role: Project PI for 3 projects

IIS-1116799 - Patel (PI), 10/1/11 to 9/30/13, NSF/CSIE: HCC: Small: Modeling Acoustic and Articulatory Features for Hybrid Synthesis

In this project, we will use conjoint acoustic and articulatory features to model fluent speech for a parametric text to speech synthesis system. Models trained on normally articulating children and adults will be mapped to vocal tract characteristics of dysfluent talkers, allowing us to synthesize fluent speech that sounds like it was produced by the dysfluent talker's vocal tract.

Role: Senior Technical Consultant & Subaward PI

IIS 0712821 - Patel (PI), 7/1/07 to 6/30/11, NSF/CSIE: Adapting a text to speech synthesizer to convey user identity

Novel techniques are proposed to alter Concatenative TTS voices so they sound like other individuals. This would extend the capability of Concatenative TTS systems to individuals who are not able to record enough of their own speech to create a concatenative voice from scratch.

Role: Consultant

Unnumbered - London (PI), 3/1/10 to 2/28/11, Delaware Health Science Alliance: Linking Genotype to Phenotype: A pilot project to create a research data warehouse of biospecimen and omic information. Implementation of software and hardware to show feasibility of inter-institutional database structures, identify barriers to data sharing, and test approaches to data deidentification.

R42 DC006193-03 - Bunnell (PI), 6/1/06 to 5/31/10, NIH/NIDCD: Personalized Synthetic Speech using ModelTalker: Development and Evaluation

Technology transfer grant to make further improvements to the ModelTalker synthesizer and InvTool voice recording program. This phase of the project will focus on improvements to the voice capture and generation stages including changes to the speech coding schemes presently used by ModelTalker. It will also involve development of a Windows CE compatible version of the synthesizer which can run on new AAC devices based on that operating system.

Role: PI

R43 DC008212 - Pal (PI), 9/1/08 to 6/30/09, NIH/NIDCD: Use of speech recognition technology for functional hearing assessment

Apply Automatic speech recognition to administration and scoring of HINT test.

Role: Co-Investigator

R21 DC007466-01- Bunnell (PI), 4/1/05 to 3/31/08, NIH/NIDCD: Phenotypes and familiarity in speech disorders

A database of speech production, perception, and acoustic measures will be collected from 250 children along with family history data. HMM based acoustic analysis techniques will be used to characterize children in terms of acoustic phenotypes. These data will be compared to family history data.

Role: PI