BIOGRAPHICAL SKETCH

NAME: **Katherine C. Hustad, Ph.D.**

eRA COMMONS USERNAME: kchustad

POSITION TITLE: Professor

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
University of Wisconsin – Eau Claire, WI	B.A.	05/1990	Communication Disorders
University of Wisconsin – Madison, WI	M.S.	05/1992	Speech-Language Pathology
University of Nebraska, Lincoln, NE	Ph.D.	12/1999	Speech-Language Pathology

A. Personal Statement

My role in the project is study is to mentor to Dr. Long as the Primary Mentor of her proposal and support her training in clinical and translational research to develop skills as an independent investigator. I have been a Professor of Communication Sciences and Disorders at the University of Wisconsin – Madison and an Investigator at the Waisman Center for 20 years. I also have experience as a clinical speech-language pathologist, serving children and adults with neurogenic communication disorders. My ongoing research program includes a large longitudinal project focused on speech and language development in children with cerebral palsy. We have followed the same cohort of children for 16 years. My ongoing research seeks to characterize changes in speech production features, speech intelligibility, language/cognition, and functional communication and identify early predictors of later outcomes that can be used to guide intervention decision-making. A primary goal is to generate theoretically driven, data-based longitudinal models of speech and language development that can be used to create and test clinical treatments, with the long-term goal of enhancing developmental trajectories and communication outcomes for children with cerebral palsy and other neurodevelopmental disabilities.

Dr. Long's research dovetails nicely with my own work in that her proposed studies address the predictive nature of early vocal and speech development in children with CP. However, the proposed research is fundamentally different in that it aims to examine pre-cursors to the production of spoken words, specifically very early vocal development as a means of identifying delays in speech motor development even before first words are expected. Dr. Long will use data from my lab, which was collected to study speech intelligibility. However, she will analyze these data in novel ways that have not been previously examined, in an effort to identify speech deficits at earlier ages than have ever been studied in CP. Dr. Long will conduct the proposed studies in my lab. She has full access to all of the resources of the Waisman Center and of my laboratory for this project.

I want to highlight the following ongoing and recently completed projects (past three years):

NIH, NIDCD R01DC019645 **Hustad** & Berisha (**MPI**) 05/01/2022 – 04/30/2027
Title: Quantifying articulatory performance in children with dysarthria: Developing an automated metric for clinical use
Goal: To refine and test an automated tool for measuring speech sound development in children that will allow us to determine which speech sounds make the largest contribution to speech intelligibility for children at different ages
Role: PI

NIH, NIDCD R01DC009411 **Hustad KC (PI)** 06/01/2008 – 05/31/2023
Title: Communication Development in Children with Cerebral Palsy
Goal: To validate a longitudinal speech and language classification model for children with cerebral palsy by measuring how quickly and in what ways speech and language change as children grow and develop.
Role: PI

NIH, NIDCD R01DC015653 **Hustad KC (PI)** in no cost extension 07/08/2016 – 06/30/2023
Title: Differential Diagnosis of Functional Speech Deficits in Children with Cerebral Palsy
Goal: To develop empirically based, developmentally sensitive standards that allow us to differentiate between children with typical and atypical speech motor abilities between the ages of 3-7 years.
Role: PI

Citations:

1. Allison KM, & **Hustad KC**. Acoustic Predictors of Pediatric Dysarthria in Cerebral Palsy. *J Speech Lang Hear Res.* 2018 Mar 15;*61*(3), 462–478. PMID: 29466556; PMCID: PMC5963041
2. **Hustad KC**, Sakash A, Natzke P, Broman AT, & Rathouz PJ. Longitudinal Growth in Single Word Intelligibility Among Children With Cerebral Palsy From 24 to 96 Months of Age: Predicting Later Outcomes From Early Speech Production. *J Speech Lang Hear Res.* 2019 Jun 19;62(6):1599-1613. PMID: 31112444; PMCID: PMC6808366
3. Mahr TJ, Rathouz PJ, & **Hustad KC**. Longitudinal Growth in Intelligibility of Connected Speech From 2 to 8 Years in Children With Cerebral Palsy: A Novel Bayesian Approach. *J Speech Lang Hear Res.* 2020 Sep 15;63(9):2880-2893. PMID: 32783783; PMCID: PMC7890228
4. **Hustad KC,** Mahr T, Natzke P, & Rathouz PJ. Development of Speech Intelligibility Between 30 and 47 Months in Typically Developing Children: A Cross-Sectional Study of Growth. *J Speech Lang Hear Res*. 2020 Sep 15;63(9):2880-2893. PMID: 32783783; PMCID: PMC7839034

B. Positions, Scientific Appointments, and Honors

Positions and Scientific Appointments

2020 – 2023	Editor in Chief, *American Journal of Speech Language Pathology*
2021	Ad hoc reviewer, Social & Developmental Aspects of Children's and Youth's Health committee, Canadian Health Institutes
2019	Editor, *American Journal of Speech Language Pathology*
2016 – 2019	Chair, Department of Communication Sciences and Disorders, University of Wisconsin – Madison, Madison WI
2013 – present	**Professor, Department of Communication Sciences and Disorders,** University of Wisconsin - Madison, Madison WI
2012 – 2016	Standing panel member, Communication Disorders Review Committee, NIDCD, NIH.
2012 – 2016	Associate Chair, Department of Communication Sciences and Disorders, University of Wisconsin - Madison, Madison WI
2012 – 2014	Member, Research and Scientific Affairs Committee, American Speech, Language, and Hearing Association
2011 – 2018	Co-Director, Clinical Translational Core, Waisman Center, University of Wisconsin – Madison, Madison WI
2010 – 2015	Director of Research and Education, Communication Aids and Systems Program, Waisman Center, University of Wisconsin - Madison, Madison WI
2010 – 2011	Ad Hoc Reviewer, Communication Disorders Review Committee, NIDCD, NIH.
2009 – 2013	Associate Professor, Department of Communication Sciences and Disorders, University of Wisconsin - Madison, Madison WI
2009 – 2013	Associate Editor, *Journal of Speech, Language, and Hearing Research*
2008 – present	Fellow, American Academy for Cerebral Palsy and Developmental Medicine
2007 – 2015	Associate Editor*, Augmentative and Alternative Communication*
2005 – present	Ad Hoc Reviewer, National Institutes of Health (6/2005, ZDC1 SRB-Y), (6/2010, CDRC), (10/2010, CDRC), (2/2011, CDRC), (6/2011, SEP ZDC1 SRB-L), (11/2011, SEP ZDC1 SRB-Y), (1/2012, SEP ZDC1 SRB-Y), (6/2012, CDRC) (7/2016, JUL SEP), (06,2021 CDRC)
2003 – present	Investigator, Waisman Center, University of Wisconsin – Madison, Madison, WI
2003 – 2009	Assistant Professor, Department of Communication Sciences and Disorders, University of Wisconsin – Madison, Madison WI
2000 – 2003	Assistant Professor, Department of Communication Sciences and Disorders, The Pennsylvania State University, University Park, PA.

1996 – 1999 Clinical Instructor, Barkley Memorial Speech, Language, and Hearing, Clinic, University of Nebraska, Lincoln, NE.
1994 – 1996 Speech-Language Pathologist, Communication Aids and Systems Clinic, University of Wisconsin Hospitals and Clinics, Madison, WI.
1993 – 1994 Speech-Language Pathologist, Children's Seashore House, Philadelphia, PA.
1992 – present Certificate of Clinical Competence, American Speech-Language-Hearing Association
1992 – 1993 Speech-Language Pathologist, Community Services for Autistic Adults and Children, Rockville, MD.
1990 – present Member, International Society for Augmentative and Alternative Communication
1990 – present Member, United States Society for Augmentative and Alternative Communication
1990 – present Member, American Speech-Language-Hearing Association (ASHA)

Honors

2019 Editor's Award for Article of Highest Merit, Journal of Speech, Language, and Hearing Research (Speech section). Awarded to Kristen Allison and **Katherine Hustad** for "Acoustic Predictors of Pediatric Dysarthria in Cerebral Palsy," published March 2018
2019 Meritorious poster, American Speech, Language, and Hearing Association Annual Convention. Awarded to **Katherine Hustad**, Tristan Mahr, & Phoebe Natzke for "Speech Intelligibility Acquisition in 3-year old Typically Developing Children". November, 2019.
2018 Distinguished Honors Faculty Award, University of Wisconsin – Madison, Madison, WI.
2015 Fellow, American Speech, Language, and Hearing Association.
2014 Meritorious poster, American Speech, Language, and Hearing Association Annual Convention. Awarded to Meghan Darling-White, Ashley Oakes, and **Katherine Hustad** for "Characteristics of speech rate in children with cerebral palsy: A longitudinal study." November, 2014.
2008 National Student Speech, Language, and Hearing Association (UW-Madison chapter), Professor of the Year, Madison, WI.
2003 International Society for Augmentative and Alternative Communication Editor's Award for the most significant research article in *Augmentative and Alternative Communication*, "Improving Intelligibility of Speakers with Profound Dysarthria and Cerebral Palsy."

C. Contributions to Science

C1. **Tested efficacy of interventions for improving speech intelligibility in individuals with dysarthria**. My earliest research focused on testing the efficacy and effectiveness of augmentative and alternative communication (**AAC**) interventions for enhancing speech intelligibility in individuals with dysarthria and CP. Early R03 funding supported this work which focused specifically on examining the effects of speech supplementation strategies (e.g., topic cues, alphabet cues, and combined topic and alphabet cues) on intelligibility. These studies impacted the field in that they demonstrated very clearly that intelligibility gains of up to 40% could be achieved with AAC interventions that supplement speech. Studies also showed that specific changes to speech production features occurred with the implementation of alphabet supplementation (e.g., increased interword pauses, expanded vowel space areas) and that these changes accounted for the observed intelligibility enhancements. More recently, we have begun examining the effects of speech supplementation strategies on children's speech. Representative publications from this research are as follows:

a. **Hustad KC.** Unfamiliar listeners' evaluation of speech supplementation strategies for improving the effectiveness of severely dysarthric speech. Augmentative and Alternative Communication. 2001;17(4):213-220.
b. **Hustad KC.** Jones T, & Dailey S. Implementing speech supplementation strategies: Effects on intelligibility and speech rate of individuals with chronic severe dysarthria. J Speech Lang Hear Res. 2003 Apr;46(2):462-74. PMID: 14700386
c. **Hustad KC** & Lee J. Changes in speech production associated with alphabet supplementation. J Speech Lang Hear Res. 2008 Dec;51(6):1438-50. DOI: 10.1044/1092-4388(2008/07-0185). PMID: 18664687.
d. Sakash A, Mahr TJ, Natzke P, & **Hustad KC.** Effects of Rate Manipulation on Intelligibility in Children with Cerebral Palsy. Am J Speech Lang Pathol. 2020 Feb 7;29(1):127-141.

PMID: 31869242; PMCID: PMC7231911

C2. **Developed classification paradigm for communication abilities in children with cerebral palsy.** Through my early work on adults with CP, I became interested in the course of development leading to adult outcomes. This interest led to a shift in my research program, initially fostered by a K23 award, to a focus on speech and language development in children with CP. Because children with CP are extremely heterogeneous and very little work addressed communication development in this population, my group began a longitudinal study that focused on developing a classification paradigm specific to communication abilities. Our communication classification model was developed using empirical data from children (at four years of age) with CP. Our current R01, in its third funding cycle, focuses on examining/expanding that model in a longitudinal developmental context, examining children through the age of 15. To date, our work has validated the profile group model, demonstrated that younger children (at two years of age) require special consideration and a different type of classification paradigm owing to developmental constraints and that our classification model is superior to two other communication classification paradigms that were recently developed with regard to comprehensiveness of constructs captured and reliability. Representative publications from this research are as follows:

a. **Hustad KC,** Gorton K, & Lee J. Classification of speech and language profiles in 4-year-old children with cerebral palsy: a prospective preliminary study. J Speech Lang Hear Res. 2010 Dec;53(6):1496-513. PMID: 20643795; PMCID: PMC2962882
b. **Hustad KC,** Allison K, McFadd E, & Riehle K. Speech and language development in 2-year-old children with cerebral palsy. Dev Neurorehabil. 2014 Jun;17(3):167-75. PMID: 23627373; PMCID: PMC3732544
c. **Hustad KC,** Oakes A, McFadd E, & Allison KM. Alignment of classification paradigms for communication abilities in children with cerebral palsy. Dev Med Child Neurol. 2016 Jun;58(6):597-604. PMID: 26521844; PMCID: PMC4853292
d. Allison KM. & **Hustad KC.** Data-Driven Classification of Dysarthria Profiles in Children With Cerebral Palsy. J Speech Lang Hear Res. 2018 Dec 10;61(12):2837-2853. PMID: 30481827; PMCID: PMC6440310

C3. **Developed longitudinal models for predicting speech and language outcomes in cerebral palsy.** My work on classifying speech and language profiles in children with CP also examines change over time. Specifically, we are investigating growth curves for key speech and language variables to characterize rates and limits of change. We are also investigating how profile group membership changes over time. This work has a strong statistical modeling component and includes identification of early predictors of later outcomes. Results suggest that basic classification profiles shift in early speech and language development—from a 3-group classification model to a 4-group model—but that early classification is highly predictive of a later classification group membership. In addition, the age at which children begin speaking is highly predictive of intelligibility, and a maximum length of utterance at four years. Specifically, children who are speaking by two years have the best outcomes later in life. In addition, the age at which children cross a 50% intelligibility threshold is negatively correlated with intelligibility at eight years such that children who cross the 50% threshold at younger ages have higher intelligibility later in life. Finally, our work to date has shown that growth in language comprehension development follows two discrete patterns, each of which comprises a latent class. Children who are unable to speak comprise their own class and show significant developmental delays in language comprehension growth. Children with CP who can speak (whether dysarthric or not) comprise a separate group and show a rate of change over time that does not differ from typical developmental expectations. Representative publications are as follows:

a. **Hustad KC,** Allison KM, Sakash A, McFadd E, Broman AT, & Rathouz PJ. Longitudinal development of communication in children with cerebral palsy between 24 and 53 months: Predicting speech outcomes. Dev Neurorehabil. 2017 Aug;20(6):323-330. PMID: 27792399; PMCID: PMC5409890
b. **Hustad KC,** Sakash A, Broman AT, & Rathouz PJ. Longitudinal growth of receptive language in children with cerebral palsy between 18 months and 54 months of age. Dev Med Child Neurol. 2018 Nov;60(11):1156-1164. PMID: 29786137; PMCID: PMC6175617

c. **Hustad KC,** Mahr TJ, Broman AT, & Rathouz PJ. Longitudinal Growth in Single-Word Intelligibility Among Children with Cerebral Palsy From 24 to 96 Months of Age: Effects of Speech-Language Profile Group Membership on Outcomes. J Speech Lang Hear Res. 2020 Jan 7;63(1):32-48. PMID: 31910070; PMCID: PMC7213485

d. Mahr TJ, **Hustad KC.** Lexical Predictors of Intelligibility in Young Children's Speech. J Speech Lang Hear Res. 2023 Jan 10;:1-13. doi: 10.1044/2022_JSLHR-22-00294. [Epub ahead of print] PubMed PMID: 36626389.

C4. **Quantified speech intelligibility development in children with and without dysarthria.** An ongoing focus on speech intelligibility, variables that contribute to it, and its development has paralleled my speech and language classification work. Our studies examining speech development in young children with CP have demonstrated that children with different speech profiles have different growth trajectories, that articulatory abilities seem to make the most impactful contribution to speech intelligibility, and that intelligibility scores differentiate between children with dysarthria and typically developing children very accurately at age 5 . Representative publications from this research are as follows:

a. Lee J, **Hustad KC,** & Weismer G. Predicting speech intelligibility with a multiple speech subsystems approach in children with cerebral palsy. *J Speech Lang Hear Res.* 2014 Oct;57(5):1666-78. PMID: 24824584; PMCID: PMC4192090

b. **Hustad KC,** Sakash A, Broman AT, & Rathouz PJ. Differentiating Typical from Atypical Speech Production in 5-Year-Old Children With Cerebral Palsy: A Comparative Analysis. *Am J Speech Lang Pathol.* 2019 Jul 15;28(2S):807-817. PMID: 31306596; PMCID: PMC6802859

c. **Hustad, KC,** Mahr, TJ., Natzke, P, & Rathouz, PJ. Speech development between 30 and 119 months in typical children i: Intelligibility growth curves for single-word and multiword productions. *Journal of Speech, Language, and Hearing Research, 2021; 64*(10): 3707-3719. PMCID: PMC9132140

d. **Hustad KC,** Mahr TJ, Soriano JU, Rathouz PJ. Developmental Cut-Points for Atypical Speech Intelligibility in Children With Cerebral Palsy. J Speech Lang Hear Res. 2023 Mar 9:1-11. doi: 10.1044/2022_JSLHR-22-00310. Epub ahead of print. PMID: 36892950.

C5. **Examined clinical services and interventions for children with neurodevelopmental disabilities.** As part of the study of communication development in children with CP, we have also examined the specific services children receive through educational and medical interventions. This work has shown that a clear bias regarding the types of interventions children receive is based on whether they can produce speech or not, without considering the quality and intelligibility of speech. Specifically, children who could benefit from the use of assistive technologies (e.g., AAC) and who can produce any speech appear to be systematically overlooked for interventions focusing on AAC. Ongoing work seeks to track the point at which children are introduced to AAC and advance professional education regarding the complementary roles of speech and AAC for fostering functional communication abilities. Representative publications from this research are as follows:

a. **Hustad KC** & Miles LK. Alignment between Augmentative and Alternative Communication Needs and School-Based Speech-Language Services Provided to Young Children with Cerebral Palsy. *Early Child Serv (San Diego).* 2010 Sep 10;4(3):129-140. PMID: 22194705; PMCID: PMC3243446

b. Smith AL & **Hustad KC.** AAC and Early Intervention for Children with Cerebral Palsy: Parent Perceptions and Child Risk Factors. *Augment Altern Commun.* 2015;31(4):336-50. PMID: 26401966; PMCID: PMC4628599

c. Koopmans C, Sakash A, Soriano J, Long HL, **Hustad KC**. Functional Communication Abilities in Youth With Cerebral Palsy: Association With Impairment Profiles and School-Based Therapy Goals. Lang Speech Hear Serv Sch. 2022 Jan 5;53(1):88-103. doi: 10.1044/2021_LSHSS-21-00064. Epub 2021 Nov 12. PMID: 34767477; PMCID: PMC9153917.

Complete list of published work in MyBibliography: https://www.ncbi.nlm.nih.gov/sites/myncbi/katherine.hustad.1/bibliography/41150556/public/?sort=date&direction=descending