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: Mahr, Tristan Jay

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

POSITION TITLE: Assistant Scientist

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 Date MM/YYYY	FIELD OF STUDY
University of Wisconsin–Madison	B.S.	05/2009	Linguistics
University of Wisconsin–Madison	M.S.	12/2013	Speech Language Pathology
University of Wisconsin–Madison	Ph.D.	08/2018	Communication Sciences and Disorders

A. Personal Statement

I have the skills and expertise to consult with Dr. Long on the statistical analyses involved in her research proposal. I support Dr. Hustad's lab as a data scientist. I prefer this title because it speaks to three competencies that I will use to support this project: 1) domain knowledge about speech science and developmental phonetics, 2) statistical modeling of longitudinal and linguistic data, and 3) programming and reproducible research. In the past four years with Dr. Hustad, I have developed software and integrated tools from data science and corpus phonetics to process thousands of speech samples from hundreds of children. I then implemented the statistical analyses of these speech samples, leading to our prominent publications about the development of intelligibility in typically developing children and children with cerebral palsy, and the development of articulation rate in typically developing children. These analyses use sound, sophisticated techniques for modeling change over time, handling repeated measures within children. and estimated clinical variability in children. These techniques include generalized additive models, nonlinear and linear mixed effects models, and Bayesian regression models. I am a strong proponent of reproducible research with dynamic documents. For example, if I change one articulation rate measurement for one child in that project, then the data reduction, statistical analyses, manuscript prose and downstream research results are automatically regenerated. I am well-equipped to support Dr. Long successfully learn and conduct methods to be used in her proposal.

B. Positions, Scientific Appointments, and Honors

Positions and Scientific Appointments

2018 – Present Assistant Scientist, Wisconsin Intelligibility, Speech, and Communication Lab [R01-DC009411, R01-DC015653], UW–Madison
2015 – 2018 Research Assistant, Little Listeners Lab [R01DC012513, PI: Ellis-Weismer] UW–Madison
2013 – 2015 Research Assistant, Learning to Talk Lab [R01-DC002932, PI: Ellis-Weismer], UW–Madison
2013 – 2014 Speech-Language Diagnostician, Middleton Cross Plains School District, Middleton, WI

Honors

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.
2017 – 2018	Supported by NIH Training Grant to Susan Ellis-Weismer: T32-DC5359, *Interdisciplinary Research in Speech–Language Disorders.*
2016	Jean Berko Gleason Award for highest scored student submission at the 41st Boston University Conference on Language Development.
2013 – 2015	Supported by NIH Training Grant to Maryellen MacDonald: T32-HD049899, *Training in Language: Acquisition and Adult Performance.*
2012	Students Preparing for Academic-Research Careers (SPARC) Award. Given by the American Speech-Language-Hearing Association.

C. Contributions to Science

1. Speech intelligibility and speech rate in children with and without cerebral palsy

In Dr. Hustad's lab, I have carried out the analysis of speech intelligibility and speech rate data for children with cerebral palsy (longitudinally) and children who are typically developing (cross-sectionally). I bring innovative statistical methods to bear on these datasets including nonlinear mixed models and flexible spline models for growth trajectories. One recent work showed a Bayesian framework for clinical forecasting by simulating plausible development trajectories based off a single assessment. Child speech is highly variable but I embrace the richness of these data.

a. Mahr, T. J., Soriano, J. U., Rathouz, P. J., & Hustad, K. C. (2021). Speech development between 30 and 119 months in typical children II: Articulation rate growth curves. J*ournal of Speech, Language, and Hearing Research*, *64*(11), 4057-4070.
b. Hustad, K. C., Mahr, T. J., Natzke, P., & Rathouz, P. J. (2021). 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*, *64*(10), 3707-3719.
c. Mahr, T. J., Rathouz, P. J., & Hustad, K. C. (2020). Longitudinal Growth in Intelligibility of Connected Speech From 2 to 8 Years in Children With Cerebral Palsy: A Novel Bayesian Approach. *Journal of Speech, Language, and Hearing Research*, *63*(9), 2880-2893.
d. Hustad, K. C., Mahr, T. J., Broman, A. T., & Rathouz, P. J. (2020). 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. *Journal of Speech, Language, and Hearing Research*, *63*(1), 32-48.

2. Development of word recognition in toddlers and preschoolers

My graduate research focused on studying word recognition in young children. These are data-intensive and statistically rich projects. In these experiments, we present an array of images on a screen, play a prompt to view one of the images (e.g., *find the dog*), and use eyetracking to record the child's gaze over time. That time-series data of how a child's gaze changes *in response to speech* measures word recognition. If we manipulate what the child sees or hears, we can study when or whether listeners integrate information during word recognition. The main finding of my research is that children act a lot like adult listeners, using information when it becomes available but they are more slow and less reliable, and that there is developmental continuity in word recognition from toddlerhood to adulthood. (That is, adults do not have any special skills compared to children; they just more developed lexicons.) To investigate these data, which deal with time-series during a trial and longitudinally, I had to work with a number of statistical approaches including mixed models, generalized additive models, nonlinear growth curve models, and Bayesian versions of these models.

a. Mahr, T. J. (2018). *The development of word recognition in preschoolers.* (Doctoral dissertation). University of Wisconsin–Madison.
b. Mahr, T. J., & Edwards, J. R. (2018). Using language input and lexical processing to predict vocabulary size. *Developmental Science*. 10.1111/desc.12685.
c. Law, F., II, Mahr, T. J., Schneeberg, A., & Edwards, J. R. (2016). Vocabulary size and auditory word recognition in preschool children. *Applied Psycholinguistics*. 10.1017/S0142716416000126.

d. Mahr, T. J., McMillan, B. T. M., Saffran, J. R., Ellis Weismer, S., & Edwards, J. R. (2015). Anticipatory coarticulation facilitates word recognition in toddlers. *Cognition*, *142*, 345–350. 10.1016/j.cognition.2015.05.009.

3. Open-source statistical computing

My most impactful work, in terms of reach, is in open-source statistical computing. For instance, I am a coauthor of bayesplot R package, a library for visual diagnostics of Bayesian statistical models that receives 15,000 monthly downloads. I have written code tutorials on mixed-effects models and Bayesian regression models with thousands of reads as well. I have developed an interactive dashboard for computing intraclass correlations for estimating interrater reliability (ICCBot). I also have developed several “glue” packages. This is software that helps data flow through a scientific workflow. For example, I have written or contributed to R packages for cleaning data from Praat textgrids, E-Prime experiments, LENA time-series files, and iCoder and Tobii eyetracking files. These tools are open-source and used by a number of labs.

a. Mahr, T. J., Berisha, V., Kawabata, K., Liss, Julie, & Hustad, K. C. (2021). Performance of Forced-Alignment Algorithms on Children’s Speech. *Journal of Speech, Language, and Hearing Research.* 10.1044/2020_JSLHR-20-00268.
b. Geller, J., Winn, M. B., Mahr, T., & Mirman, D. (2020). gazeR: A Package for Processing Gaze Position and Pupil Size data. *Behavior Research Methods*. 10.3758/s13428-020-01374-8.