Alumnus: Nicole Etter, PhD, CCC/SLP
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Current Position: Assistant Professor, The Pennsylvania State University, Department of Communication Sciences and Disorders

Dissertation Title: The Relationship of Somatosensory Perception and Fine-Force Control in the Adult Human Orofacial System

Background: Often the result of neurologic trauma or progressive disease, speech dysarthrias are a collection of disorders impacting the overall intelligibility of a person’s speech with changes noted in strength, range, steadiness, muscle tone and performance accuracy. Classically, dysarthrias have been defined as a “motor” problem with little attention paid to the importance of sensation in speech production or perception.

Purpose: The purpose of my dissertation study, and current line of research, is to define and describe the relationship between auditory and somatosensory perception and fine-force controlled behaviors in the orofacial region. I am primarily interested in how changes in auditory and somatosensation in healthy aging or disordered populations can impact speech behaviors.

Key Findings:
- Significant correlations between the 5 Hz test frequency for vibrotactile detection thresholds and 0.5N static and slow ramp-and-hold force measures (between sensation and movement)
- As ability to maintain mean force in hold phase 1 and 2 during the static and slow ramp-and-hold conditions decreases, there is an increase in the 5 Hz vibrotactile detection threshold
  - Decreased somatosensation = decreased force capabilities in healthy aging adults
- This relationship may be influenced by age, pure tone hearing thresholds, speech use, and smoking history
Big Picture:
Alterations in auditory and orofacial somatosensation may lead to changes in accurate orofacial production behaviors. Changes in this sensorimotor relationship could be impacted by age, sex, smoking history and other demographic variables - even in healthy aging adults. Further research should be completed in healthy populations to build a theoretical model before research is conducted with individuals with speech disorders.

Dissertation-Related Publications:


What Happened Next? Less than 3 weeks after graduating, I moved to Sydney, Australia to complete a post-doctoral fellowship funded by the Australian Department of Education with Dr. Kirrie Ballard at the University of Sydney. During this brief post-doc, we designed two series of studies. The first studies aimed to determine the reliability of using clinically available tools for assessing sensation in the lips and tongue of healthy young, older, and disordered populations. I moved back to the US in December and started my faculty position at the Pennsylvania State University in January. My first few months here have been consumed by setting up my lab, making connections with other researchers on campus and getting IRBs approved to start data collection. Lots of organizing and writing up those dissertation and post-doc publications! I will be heading back to Sydney this summer to continue the second series of studies assessing the use of technology as intervention tools for people with apraxia of speech.