My research involves applied, clinical investigations that involve models of intervention, target selection, and assessment of speech sound disorders in children who are highly unintelligible. My research typically includes intervention studies using single-subject designs in order to carefully examine individual client's response to treatment in a detailed manner. These lines of inquiry form the majority of my research with my development of the **multiple oppositions** approach (Williams, 2000a; 2000b; 2003a; 2003c; 2004; 2005a; 2005c; 2006; 2010). I have conducted funded studies through the National Institute of Deafness and Other Communication Disorders (NIDCD) to experimentally examine the effectiveness of this approach. Since 2006, my work has involved **translational research** in making the newer models of phonological intervention, including multiple oppositions, accessible to practicing clinicians. This translational research was funded by Small Business Innovative Research (SBIR) Phase I and Phase II grants by the NIDCD and the National Institute of Child Health and Human Development (NICHD). In collaboration with EBS Healthcare, *Sound Contrasts in Phonology (SCIP)* is an intervention app I developed that translates the research from the newer, evidence--based models of speech intervention (including multiple oppositions) into a digital tool that provides a time-saving resource for speech language pathologists to use in designing individualized treatment materials for the children in their clinical practice.
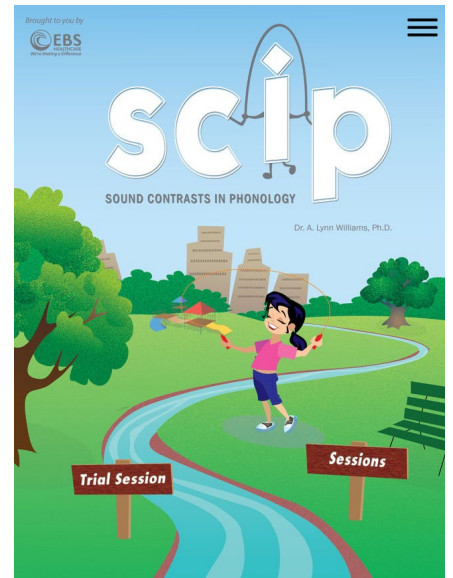
My current focus on intervention models has been with a research team who I've worked with over the past decade (Professor Sharynne McLeod: Charles Sturt University, Bathurst, Australia; Professor Elise Baker: University of Sydney, Australia; and Dr. Rebecca McCauley: Ohio State University) to develop a **Phonological Intervention Taxonomy** (Baker, Williams, McLeod, & McCauley, 2018). The taxonomy was created after (1) conducting a qualitative investigation into the range and type of elements that comprise phonological interventions, and (2) coding the intervention elements within each intervention as required, optional, or absent. The taxonomy allows comparison among interventions with regard to density of intervention elements, flexibility, and uniqueness. The Phonological Intervention Taxonomy has clinical, pedagogical, and research implications with regard to clinicians' ability to implement an intervention with fidelity, how interventions are taught to student clinicians, and identifying the active intervention elements that contribute to phonological outcomes.

Parallel to my research in intervention is the development of a model of assessment of speech disorders in children called *Systemic Analysis of Child Speech* (*SPACS*; Williams, 2001; 2002a; 2002b; 2003c; 2005a; 2006). As we get better methods for describing disordered sound systems, we have the capability of designing more effective treatment plans for each child. Using linguistic methodology, *SPACS* provides an in-depth description of a child's sound system as a unique, independent, and self-contained language. Once the child's system is described as a unique and separate language, it is then mapped onto the adult sound system via phoneme

collapses. These phoneme collapses represent how the two systems align since the ultimate goal is for the child to be intelligible in the ambient language.

A logical extension of this line of clinical investigation is examination of an approach that I have developed for selecting treatment targets from the phoneme collapses called the ***distance metric*** (Williams, 2003b; 2003c; 2005a; 2005b; 2006). Analogous to a puzzle, the distance metric is based on two parameters for selecting target sounds for treatment which will result in targets that are maximally distinct from each other and from the child's error substitute. Therefore, the treatment targets are more salient and considered to be more learnable, similar to the corner puzzle pieces, as the child works to restructure his/her sound system to be more like the adult sound system and hence increase his/her speech intelligibility.

The integration of a systemic perspective to intervention, assessment, and target selection provides a unified approach to the clinical management of speech disorders in children. From a systemic view, the **multiple oppositions approach**, *SPACS,* and the **distance metric** have the potential to result in the greatest amount of change in the least amount of time with the least amount of effort.

My latest endeavor involves another assessment tool, but with younger children. In collaboration with Dr. Carol Stoel-Gammon, linguist at University of Washington, Seattle, we have developed a developmentally appropriate and comprehensive test of early phonological skills in young children (18-36 months of age). **PEEPS: Profiles of Early Expressive Phonological Skills** incorporates a broad-based analysis that is designed to be used by researchers and clinicians in diverse clinical settings. PEEPS will be published by Brookes Publishing in 2020.

Finally, my research interests have broadened to examine the impact of communication disabilities on health. I'm currently working with Loretta Nunez, ASHA Director for Academic Affairs & Research Education, to conduct a narrative analysis of **communication disabilities and health disparities.** There is a significant literature on the impact of communication disabilities on health outcomes with regard to co-occurring chronic health conditions, increased number of office visits, hospitalizations and emergency department visits, increased medical errors, and lower patient satisfaction coupled with higher provider frustration. These are critical findings given that 10% of the US adult population has a communication disability.