

LENA™ Pilot Study on Bilingual Language Expansion Funded by The Children's Hearing Institute

The Language Environment Analysis (LENA) system is the world's first automatic language collection and analysis tool. Established by the Lena Research Foundation in 2007-2008, researchers have been using the technology to investigate many aspects of children's natural home language environments. A revolutionary tool, LENA provides real data on a child's language environment, including estimations of Adult Words, Conversational Turns, Child Vocalizations, and TV and Electronic Sounds in a child's natural language environment, and a breakdown of the composition of the Audio Environment. The breakthrough technology has the potential to help parents, clinicians, and researchers close the gap in language development between advantage and disadvantaged children and improve the language development of children with hearing loss and language disorders such as autism.

The Pilot Study consists of the LENA Digital Language Processor (DLP), an unobtrusive recording device that weighs 2 ounces. This device is worn by the child with hearing loss in their own environment and is able to: record up to 16 hours of continuous speech data/audio; collect and manage multiple recordings from a variety of clients or groups; view reports in 5-minute, hourly, daily, or monthly time frames; mark, organize and find specific audio segments easily and efficiently; add research or clinician notes and comments; and conduct an advanced analysis using the data mining tool – ADEX. The speech therapist will then take the DLP and connect it to the LENA software to process the audio recording to provide reports and data for analysis. Ultimately, this data will be used to enhance the language input directed to our pediatric population with hearing loss.

Conducting the research is Elizabeth Ying, Director of Hearing Habilitation at the New York Eye & Ear Infirmary. It has been well-documented that children with hearing loss are not able to fully access the enriched language models provided within their everyday home environments, often referred to as "incidental learning". Furthermore, children with hearing loss raised in bilingual home environments are at an even higher risk for language delays. Like their peers from monolingual home environments, infants and toddlers growing up in bilingual home environments experience similar difficulty accessing the language occurring around them. In addition,

their speech and language development is hindered by the miss-match between what they hear at home vs. in therapy or in school. It is also assumed that there is a tendency for non-native English speaking families to talk less or to use less sophisticated language forms in their verbal interactions with their hearing-impaired children. The focus of the LENA investigation here at NYEE's Ear Institute will be to facilitate more enriched language-learning models within bilingual home environments through the direct instruction of age-appropriate language expansion strategies. Pre and post LENA analysis will be used to validate the effectiveness of this therapy intervention.

Background Information:

It is well documented in the literature that monolingual Spanish speaking families were similar to English-speaking families with respect to: 1. parents talk more to daughters vs. son; 2. parents talk more to first-born; and 3. parents tend to use "closed ended" constructs and more verbal directives with children who have hearing loss compared to those with normal hearing. Approximately 15% of students in US schools come from primarily Spanish-speaking homes (NCES, 2010). However in most US schools, instruction is conducted only in English and Spanish-speaking students face the dual challenge of acquiring the expected academic skills (such as literacy and math) and learning English as a second language. This challenge is particularly difficult for the student with a severe to profound hearing loss that is fitted with a cochlear implant.

Methodology:

The purpose of this study is to obtain information regarding the parental input directed to both a child with a cochlear implant and a younger normal hearing sibling. It is predicted that there will be a difference in the maternal input directed to these siblings, e.g. with less sophisticated and more constructs requiring a yes/no response directed to the child with a hearing loss. LENA monitoring and transcription of a 24 hour period within the child's home will be obtained prior to the direct instruction/intervention to the Spanish-speaking parent regarding specific expansion techniques. A second 24 hour monitoring session will be transcribed following the instructional/ intervention programming.

Expected Results:

It is expected that more open-ended maternal input will be documented. In addition, changes in child's English and Spanish verbal proficiency; specifically, increase in lexical diversity and linguistic complexity (w/increased parental expansion strategies). An increase in word count,

turn-taking, and complex linguistic forms is anticipated. The findings of this pilot will guide the formulation of more extensive IRB investigation of the benefit to different bilingual home environments (including Russian, Mandarin, Cantonese, Arabic, Italian and Wolof, e.g. representative of the caseload followed by the NYEE-Ear Institute's hearing habilitation program).