2015 Student Research Day

Wednesday April 22
12:30-4:00 pm
Bioinformatics Auditorium (1131) and Lobby, UNC-CH

Division of Speech and Hearing Sciences,
Department of Allied Health Sciences, University of North Carolina at Chapel Hill
Seventh Annual
Division of Speech and Hearing Sciences
Student Research Day

Wednesday April 22, 2015
12:30 – 4:00pm
University of North Carolina – Chapel Hill
Bioinformatics auditorium and lobby

Welcoming Remarks
Dr. Jackson Roush 12:30 – 12:40

Oral Presentations

1. Tyson Harmon (2nd year Ph.D. Student) 12:40 – 1:00
Listener perceptions of simulated fluent speech in nonfluent aphasia

2. Nancy Quick (2nd year Ph.D. Student) 1:00 – 1:20
Joint Attention Among Children With and Without Hearing Loss

3. Nicole Corbin (2nd year Ph.D. Student) 1:20 – 1:40
Spatial Release from Masking: Effects of Simulated Unilateral Hearing Loss

4. Marziye Esghi (2nd year Ph.D. Student) 1:40 – 2:00
Nasal ram pressure evaluation of vocalizations in children with repaired cleft palate

5. Sallie Nowell (1st year Ph.D. Student) 2:00 – 2:20
Social-communication outcomes in preschoolers identified as at-risk for ASD at 12 months

Poster Session 2:30 – 4:00

1. Molly Drescher, Angela Bonino, Holly Teagle, Emily Buss, Ph.D., Laura Greaver, and Lori Leibold
Speech-on-Speech Recognition for Children with Cochlear Implants

2. Rediet Kifle, Whitney Johnson, and Lindsay Lai
Interventions for Children with Dual Diagnosis of Hearing Loss and Autism
3. Dani Warmund, Craig Buchman, and Jackson Roush  
*Management of Hearing Loss in Children with Down Syndrome*

4. Joel Fairchild and Valeriya Yavich  
*Cross-Language Transfer in Bilingual Patients with Aphasia*

5. Lucy Hardy and Heather Lam  
*Script Training Intervention: An Examination of Evidence in Context of the Life Participation Approach to Aphasia*

6. Rosally Aguilar and Claudia Lemus  
*The effectiveness of gastrostomy tube feeding in improving growth in children with cerebral palsy: A Systematic Review*

7. Rachel Anders and Cathy Zhao  
*A Systematic Review of the Use of Free Water Protocols in Dysphagia Patients*

8. Jeenna Browning, Emily Buss, Heather Porter, Angela Yarnell Bonino, and Lori J. Leibold  
*Evaluation of a two-interval, observer-based procedure for the behavioral assessment of hearing sensitivity in preschoolers*

9. Sarah Vanselous and Vincenzo Casbarro  
*A systematic review of feeding in the NICU: Oral sensorimotor intervention strategies and their effect on hospital discharge*

10. Hollis Elmore and John H. Grose  
*ABR Wave I Input/Output functions: Effect of Age*

11. Jordan Love and Sarah Vallarelli  
*Hearing Detection Implementation in the Preschool Population: A Systematic Review*

12. Tayler Simonds, Patrick Morrison, Erin Shumate, and Michael Smith  
*Challenges in Narrow-Level Phonetic Transcription of Apraxia of Speech*

13. Mallory Mullins, Jillian Kowalski, and Emily Potrzeba  
*Comparing Interventions for Childhood Apraxia of Speech*

14. Mandie Oslund, Anna Weinberg, and Mandy Simmons  
*The Effectiveness of Aphasia-Friendly Printed Education Materials: A Systematic Review*

15. Mark Moore, Margaret Dillon, and Meredith Anderson,  
*Speech Perception Outcomes of Sequential versus Simultaneous Cochlear Implantation*

16. Sarah Obarowski, Margaret Dillon, English King, Ellen Pearce and Marcia Adunka  
*Optimization of FSP and HDCIS: Influence on Speech Perception*
17. Kristin McGinley and Rebecca Stockin
   *A Systematic Review of the Effects of Cognitive Stimulation Therapy (CST) on Quality of Life in Individuals with Mild to Moderate Dementia*

18. Asia Clarke and Peter Schultz
   *Efficacy of Stuttering-Contingent Interventions on Fluency: A Systematic Review*

19. Conner Haring, Jason Guetgemann, Marcia Fort, and Jackson Roush,
   *Hearing Screenings for Non-Hospital Births in North Carolina: Current Status and Future Needs*
Tyson Harmon

Listener perceptions of simulated fluent speech in nonfluent aphasia

**Purpose:** The present study investigated listener perceptions of people with aphasia (PWA) and the effects of fluency on changing listener perceptions. The aims of the study were to (1) confirm previous research suggesting that listeners perceive PWA less favorably than their neurologically healthy peers and (2) determine the effects of simulated fluency on listener attitudes about PWA.

**Background:** PWA are concerned about how they are viewed by communication partners and have been reported to comment on withdrawing from or avoiding social situations for fear of being perceived negatively (Le Dorze et al., 2014). Previous research has suggested that negative perceptions of PWA are not restricted to their speech output but also include attitudes about characteristics and attributes of PWA and feelings of listeners during communicative interactions (e.g., Croteau & Le Dorze, 2011, Lasker & Beukelman, 1999). Communication partner training programs have incorporated listener attitudes to improve conversational interactions. While training conversation partners is an important way to improve listener perceptions, another way is to change the speech qualities that trigger the negative perceptions in the first place. The present study focused on the impact of fluency on moderating listener perceptions. Fluency has been electronically simulated in people who stutter to improve listener perceptions (Panico, Healey, Brouwer, & Susca, 2005; Susca & Healey, 2001). The hypothesis of the present study was that simulated fluency would similarly improve listener perceptions of aphasic speech, speakers with aphasia, and the feelings of listeners in response to the speech.

**Method:** Thirty-eight listeners heard nine narrative monologue language samples from three conditions. Eighteen listeners were graduate students in speech language pathology and the other eighteen were undergraduate students from various majors. Nine samples were obtained from the “AphasiaBank” database (http://talkbank.org/AphasiaBank/). Six samples were from people with nonfluent aphasia and three were from neurologically healthy controls. The six aphasic speech samples were subsequently edited to create a simulated fluent version by electronically deleting all disfluencies. After hearing each sample, listeners responded to a nine-item questionnaire that probed perceptions about speech output, speaker attributes, and listener feelings. The questionnaire responses were provided on a seven-point Likert scale. Listener responses were analyzed using a mixed effects model.

**Results:** Listeners perceived PWA significantly less favorably than their neurologically healthy peers. Simulated fluency yielded significantly more positive listener perceptions for all questionnaire items except speech intelligibility, which was unchanged by simulated fluency. Graduate student listeners perceived PWA significantly more positively than undergraduate students in the areas of speech intelligibility, speaker intelligence, and listener comfort.

**Discussion:** This study showed that listeners perceived the speech and characteristics of PWA more negatively than their neurologically healthy peers. Additionally, listeners reported more negative affective response to the speech of PWA. The education and clinical experience of graduate students likely caused them to perceive PWA as more intelligent, comfortable to listen to, and intelligible than undergraduate students. Simulated fluency improved listener attitudes of PWA significantly, indicating that speech fluency may be a socially valid treatment target in aphasia. Beyond direct training of communication partners, changing the verbal output of aphasic speech can also yield more positive listener perceptions of PWA. Specifically, we have shown that increased fluency improved listener perceptions. Simulated fluency might also be used for development of future treatment strategies for aphasia intervention.
Research Questions
The major research questions addressed by this study were: For parent-child dyads with preschoolers, (1) Are there differences in joint attention (JA) between parent-child dyads with and without hearing loss? (2) Is there a relationship between joint attention and global measures of language development? (3) Is there a relationship between parent attention-getting strategies and success in establishing JA, or child language outcomes?

Background
Previous studies among children with hearing loss have noted differences in JA, but these studies included children with more profound degrees of hearing loss who were identified at older ages (Nowakowski, Tasker, & Schmidt, 2009; Tasker, Nowakowski, & Schmidt, 2010). No studies have examined JA among children who are hard of hearing with early identified hearing loss. Among children who are typically developing, JA is predictive of vocabulary development, but the magnitude of relationship diminishes or disappears over the second year of life (Morales et al., 2000). Alternative measurements may be more sensitive to the relationship between joint attention and language after 2 years. There are inconsistent findings as to which attention-getting strategies best support child language, and therefore more understanding is needed regarding the relationship between attention-getting strategies, success in establishing JA, and child outcomes (Gauthier, Genesee, Dubois, & Kasparian, 2013; Tomasello & Farrar, 1986).

Methods
A retrospective video analysis was completed of 24 randomly selected 34-36 month-old children (14 with hearing loss, 10 with normal hearing) that participated in the Outcomes of Children with Hearing Loss Study. Five-minute video samples of parent-child interactions were coded for JA behaviors using Tasker’s (2005) protocol with ELAN Linguistic Annotator. Child language was evaluated with the Vineland Adaptive Behavior Scales.

Results
There were no differences in JA behaviors between parent-child dyads with or without hearing loss. Among the entire sample, a moderately positive relationship was found between dyad success in establishing JA and later broad measures of child language. There was a moderately positive relationship between parent use of attention-directing strategies and parent success of establishing joint attention, but no relationship between parent style and child language outcomes.

Discussion
Given that previous studies found reduced quantity and quality of JA among children who are deaf, the lack of significant differences among parent-child dyads with children who are hard of hearing is encouraging. As most of these children were identified through UNHS, the findings may reflect cascading benefits of early identification and early intervention. As dyad success in establishing JA is moderately sensitive in predicting general measures of child language development, it suggests that JA would be an appropriate context for language intervention within the preschool years. The pervasive notion that attention-directing strategies are maladaptive is challenged by the positive relationship between parent attention-directing strategies and success in establishing JA. This relationship suggests that for some parents and children an attention-directing style can be an effective communication strategy.
Purpose
The overall objective of this research is to understand how unilateral hearing loss impacts children’s functional auditory skills. As an initial step towards this overall goal, the aim of the present study was to develop a feasible method to assess the effects of unilateral hearing loss on children’s masked speech perception and their ability to use spatial cues in the context of substantial informational and energetic masking.

Background
Children with unilateral hearing loss are at an increased risk for academic, cognitive, psychosocial, speech, and language problems relative to their peers with normal hearing (McKay, Gravel, & Tharpe 2008; Bess & Tharpe 1986). However, there is no consensus regarding the best approach for managing unilateral hearing loss in children (Fitzpatrick, Durieux-Smith, & Whittingham 2010). This gap in the knowledge base is partly due to the lack of evidence regarding which children with unilateral hearing loss have the greatest need for intervention, which intervention is most beneficial, and when intervention is necessary.

Most studies that have examined the extent to which unilateral hearing loss affects children’s auditory skills have used relatively steady-state maskers that may not fully capture children’s everyday listening difficulties. Studies using psychoacoustic methods and more complex auditory tasks that rely on a listener’s ability to use auditory input from both ears may more accurately capture underlying auditory skills of children with unilateral hearing loss.

Methods
Normal-hearing adults and children completed a sentence recognition task in a co-located or spatially separated masker in two hearing conditions: (1) normal binaural hearing, and (2) simulated unilateral hearing loss. The masker was either two-talker speech or speech-shaped noise. Target sentences were presented at 0 degrees azimuth. Spatial separation of target and masker stimuli was accomplished by presenting the masker at +90 or -90 degrees azimuth. A simulated unilateral hearing loss was achieved using a foam earplug as well as a supra-aural earmuff. The average attenuation provided by the unilateral hearing loss simulation was measured behaviorally. Laterality of simulated hearing loss and presentation order of listening conditions were randomized and counterbalanced across participants.

Results
All listeners performed more poorly in two-talker speech than in speech-shaped noise. The summation effect was small for both maskers. Listeners demonstrated a larger spatial release from masking in two-talker speech than in speech-shaped noise. The advantage of binaural input for the spatially separated target and masker was substantially larger for the two-talker than the speech-shaped noise masker, whether that masker was ipsilateral or contralateral to the plugged ear.

Discussion
The present results are in line with previous findings indicating that unilateral hearing loss affects listeners’ abilities to obtain a spatial release from masking. The differences in results obtained across listeners with simulated unilateral hearing loss in the presence of two-talker speech relative to speech-shaped noise suggest that the proposed methodology has the potential to provide novel insight into children’s everyday performance. This information will inform best practice for the audiologic management of children with unilateral hearing loss.
Nasal ram pressure evaluation of vocalizations in children with repaired cleft palate

Purpose
The objective of this descriptive study is to determine the status of velopharyngeal (VP) orifice in vocalizations of children at 12, 14 and 18 months of age using the nasal ram pressure technique (NRP).

Background
Velopharyngeal inadequacy (VPI) is referred to the coupling of oral and nasal cavities during speech due to the inability of the velum as well as posterior and lateral pharyngeal walls to separate the oral and nasal cavities. Instrumentation such as videofluroscopy, nasoendoscopy, and pressure-flow technique are usually applied clinically to evaluate the status of the VP mechanism. However, each of these procedures is potentially expensive and/or invasive. Furthermore, they demand children old enough to have a high degree of cooperation during the procedure. On the other hand, NRP monitoring is relatively easy and requires minimum cooperation of the child. NRP provides binary information relative to VP status as open versus closed. However, there is limited information on the clinical utility of NRP measures for young children less than 3 years of age.

Methods
Distress and non-distress vocalizations of two children with repaired CP and two typically developing (TD) children were obtained during NRP monitoring. Distress vocalizations included windups, cries, whimpers and screams, and non-distress vocalizations included stops, nasals and laughs. The subjects were all male and they were from American-English speaking families. None of the subjects had hearing loss and/or any known syndromes. The data collection for each subject was done longitudinally at 12, 14 and 18 months of age. The data were segmented into breath groups (i.e. the distance between two negative NRP peaks indicating the inspiration). Vocalizations were considered VP closed if the NRP corresponding to its audio signal was zero (a flat line). However, if the NRP indicated positive peaks partially or completely throughout the breath group, the segment was coded as VP open.

Results
Windups, whimpers and laughs were produced with 100% open velopharynx regardless of the group and across all three visits. Further, screams and cries were produced with 100% VP closure for all subjects at 12, 14 and 18 months of age. The only exception, however, was one of the TD participants who showed only 84% VP closure for cries at 12 months of age. As expected, all nasal consonants were produced with open VP orifice in all subjects. In one of the TD children, stop consonants were produced with the VP closure of 100% at 12 and 14 months of age and 88% at 18 months of age. The other child had the VP closure for 94% of stops at 12 months of age and 100% of stops at 14 and 18 months of age. One of the children with CP produced stops with 100% open VP orifice at 12 months of age. However, he achieved 100% VP closure for stop productions at 14 and 18 months of age. The other child with CP did not produce any stop during his first visit (i.e. at 12 months of age) but he had VP closure for 79% of stops at 14 months of age and 100% of stops at 18 months of age.

Discussion: Results are similar to Thom et al. (2006) who reported NRP data during vocalizations of non-cleft healthy infants. In the present study, the two subjects with CP showed adequate VP function at least at 14 and 16 months of age for stop productions. NRP assessments might necessitate early clinical interventions to achieve a better VP function for the speech of children with VP inadequacy.
Sallie Nowell

Social-communication outcomes in preschoolers identified as at-risk for ASD at 12 months

Purpose

Aim 1: Identify the proportion of children who screened as at-risk for autism spectrum disorder (ASD) on the First Year Inventory (FYI) at 12 months, who meet DSM-5 criteria for social (pragmatic) communication disorder (SPCD) versus ASD versus neither at 3-5 years. Aim 2: Determine if parent responsiveness at 24 months in children identified as at-risk for ASD on the FYI at 12 months is predictive of social-communication skills at 3-5 years. Aim 3: Examine if Adapted Responsive Teaching (ART) intervention group status predicts better social communication outcomes in this sample.

Background

Early social communication weaknesses are associated with poor social inclusion outcomes in adulthood. Therefore, early identification and treatment of social and pragmatic communication deficits is critical in order to optimize outcomes. Currently there is no “gold standard” assessment tool with which to diagnose SPCD. The proposed study will examine the feasibility of a SPCD diagnosis between the ages of 3 and 5 years. In addition, research in the area of child development has consistently linked mother’s responsiveness to their young children with later developmental outcomes. To my knowledge, this study will be the first to use parent responsiveness to predict later social communication outcomes in areas such as conversation, narrative retell, and appropriate adaptations to various social contexts.

Proposed Methods

Participants: Families who enrolled in the randomized controlled trial of the Early Development Project (EDP) will be asked to participate in this study. The EDP sample consists of 87 children who will be 3-5 years old this summer (2015). Procedures: Families will be scheduled for 3-4 hour in-person evaluations. The following measures are proposed: Parent Responsiveness: Maternal Behavior Rating Scale- Revised (MBRS); Structural Language - Preschool Language Scales- Fifth Edition (PLS-5); Social and Pragmatic Communication Skills- The Children’s Communication Checklist – Second Edition (CCC-2), the Pragmatic Rating Scale – School Age (PRS-SA), the Autism Diagnostic Observation Scales (ADOS-2), the Vineland Adaptive Behavior Scales – Second Edition (VABS-2), and the narrative retell task from the PLS-5.

Anticipated Results

Outcome 1: I predict that based on parent-report measures and behavioral measures covering all aspects of the SPCD diagnostic criteria as defined by the DSM-5, some children in this sample will meet criteria for SPCD between 3 and 5 years of age. Outcome 2: I hypothesize that parents with higher MBRS scores on the factors of Responsiveness and Affect at 24 months will have preschool children who score in the lower (sub-clinical) range on social-communication measures. Outcome 3: Considering that parent responsiveness was a target of the EDP intervention, I hypothesize that mother’s who learned responsive strategies during the intervention phase of EDP will have children with have reduced diagnostic severity in the dimension of social communication in preschool than children whose mother’s did not receive the ART intervention.

Discussion

The proposed study may have implications for assessment tool selection for preschool social and pragmatic language skills evaluations. Furthermore, this study may have implications for treatment of young children with social communication deficits in that hypothesized findings would support parent-mediated interventions emphasizing parent responsiveness.
Purpose
This study aimed to: (1) compare speech recognition in a two-talker masker between children with cochlear implants (CIs) and children with normal hearing and (2) determine if children with CIs benefit from a mismatch between the sex of the target and masker talkers.

Background
A two-talker masker is expected to produce substantial informational masking, presumably because listeners cannot segregate and/or selectively attend to target speech in a similar-sounding masker (e.g., Brungart et al., 2001). A larger performance gap has been observed between children with hearing loss who wear hearing aids and children with normal hearing for speech recognition in two-talker speech than in speech-shaped noise (Leibold et al., 2013). It was posited that children with hearing loss have reduced auditory experience, thus influencing the development of perceptual processing abilities such as sound segregation.

Speech-on-speech recognition is better for children with normal hearing when the sexes of target and masker talkers are mismatched than matched (e.g., Wightman & Kistler, 2005). Acoustic differences between male and female speech are thought to facilitate the separation of target from masker speech (e.g., Brungart, 2001). However, postlingually deafened adults with CIs show similar performance for mismatched and matched conditions (e.g., Stickney et al., 2004). If CIs limit access to acoustic cues that differentiate talker sex (e.g., Fuller et al., 2014), prelingually implanted children should also fail to benefit from the target/masker sex mismatch. Alternatively, children with CIs who have had little or no exposure to acoustic input may learn to benefit from subtle temporal envelope differences inherent in male versus female speech.

Methods
Subjects were eight children with CIs (4-13 years) and age-matched peers with normal hearing. Targets were 30 disyllabic words produced by a male or a female talker. The masker was 60-dB-SPL two-female-talker speech. Listeners were tested in two conditions: (1) matched target-masker sex in which both the target and masker speech were produced by females and (2) mismatched target-masker sex in which the target speech was produced by a male and the masker speech was produced by females. The task was a four-alternative forced-choice with a picture-pointing response. Listeners were tested in the sound field and were familiarized with the words prior to testing. Signal level was adapted to estimate 71% correct recognition.

Results
Children with CIs were more susceptible to speech-on-speech masking than their counterparts with normal hearing, and they were unable to take advantage of the acoustic differences between the male and female voices.

Discussion
Children with CIs did not benefit from a mismatch between the sex of the target and masker talkers. Future studies will examine the extent to which this finding applies to different combinations of male and female speech, with a specific emphasis on determining the fundamental frequency separation required for children with CIs to obtain a consistent speech recognition improvement. Preliminary data suggest a trend for an increase in the proportion of problems reported (as assessed by parental questionnaire) as the SNR required for speech-on-speech recognition increased.
Rediet Kifle, Whitney Johnson, and Lindsay Lai
*Interventions for Children with Dual Diagnosis of Hearing Loss and Autism*

**Research Questions**
What kind of evidence is available for an effective intervention for children with dual diagnoses of autism and hearing loss?

**Background**
According to the Annual Survey of Deaf and Hard of Hearing Children and Youth (2009-2010) conducted by the Gallaudet Research Institute, one in 59 children with hearing loss also receive services for autism, which is considerably higher than national estimates of 1 in 110 for hearing children. A child’s dual diagnosis of autism and hearing impairment is best addressed at the same time. However, families have reported a time lag of 18 months to 12 years between diagnoses, especially when a sensory loss is identified first. A child’s age when autism and/or a hearing impairment is diagnosed is critical. Although there are various forms of services for children with one of these diagnoses—from early intervention programs to the implementation of specialized equipment to accommodate children at home and the school setting—our research on this topic shows that there is very limited research on effective intervention approaches for children with this dual diagnosis. Our topic calls for a need for increased awareness and research in a population that has thus far received little services or attention.

**Methods**
Four research databases yielded forty articles relevant to a dual diagnosis of ASD and hearing loss. Two researchers reviewed the articles independently and assigned each article to the include or exclude group based on relevancy to the purpose. After each article was classified by two separate researchers and agreement was reached, six articles remained to be analyzed. The remaining six articles were read and appraised by two researchers independently using the Critical Review Form for Qualitative Studies. An overall rating of poor, adequate, or high was assigned to each article based on the form and agreement between the two researchers.

**Results**
Articles included in this review consisted of single-subject case studies, retrospective case studies, and one cohort quasi-experimental study. The two single-subject case studies showed positive effects post-interventions; in one, applied behavior analysis was shown to reduce the participant’s self-stimulating behavior; in the other, teaching Picture Exchange Communication System was reported to improve psychosocial development. In retrospective studies post-cochlear implantation, when compared to other groups of children with hearing loss and additional disabilities, children with ASD showed least improvement in auditory perception and little-to-no change for behaviors associated with ASD.

**Discussion**
Due to the challenge of identification and little research on children with dual diagnosis of ASD and hearing loss, there is as yet no clear method that has been shown to be an effective intervention for this population. Applied behavior analysis and PECS were separately found to make small positive changes in case study research articles. As Easterbrooks suggested, single-case research may be most effective in conducting research in the future.
Down syndrome is the most frequently occurring chromosomal abnormality, present in about 1 in 700 live births (Chin et al., 2014). The occurrence of hearing loss and related outer, middle, and inner ear anomalies in individuals with Down syndrome has been well documented (Diefendorf et al., 1995). Otologic findings in this population include small pinnae, stenotic ear canals, frequent cerumen impaction, otitis media with effusion, and in some cases sensorineural hearing loss (Chin et al., 2014).

If access to sound is compromised by hearing loss, children are at risk for delayed or disordered speech and language development. When hearing loss is combined with intellectual disabilities as is typical for most children with Down syndrome, the implications for speech and language development are even greater (Laws and Hall, 2014).

Because many children with Down syndrome experience chronic hearing loss secondary to craniofacial anomalies and middle ear disease, amplification is a logical consideration even though the hearing loss is likely to be conductive in nature. However, a number of issues complicate the selection, fitting, and successful use of amplification by children with Down syndrome. Complications include small ear canals, fluctuating hearing levels, and in some cases lack of acceptance by the child.

Based on an in-depth review of patients followed in the Department of Audiology at UNC Hospitals, this presentation will examine key considerations related to candidacy for hearing aid use and factors that predict successful fitting and acceptance of amplification by children with Down syndrome.
Purpose
Half of the world’s population is bilingual according to some estimates. This number is growing each day and therefore it is more likely that a speech-language pathologist will need to provide services to a client who is bi/multi-lingual. In bilingual patients with aphasia, how does intervention in L1 compared with intervention in L2 affect generalization to the untreated language? This systematic review is designed to provide clinicians with guidance for best practices when treating bilingual patients with aphasia.

Background
Clinicians are trusted with the task of reducing the impact of the communication disorder and increase the patients’ functional communication to the highest possible level. When providing services to bilingual patients with aphasia, the clinician must make clinical decisions based on several factors.
- Should treatment be provided in native language (L1) or acquired language (L2)?
- Should treatment be provided in both L1 and L2?
- If treatment is provided in L1 and L2, should intervention be simultaneous or consecutive?
- Did the patient present with unbalanced language proficiency pre-aphasia?
- How much improvement can be expected from cross-language transfer?
These are challenging questions. Monolingual clinicians may feel unprepared and apprehensive when treating bilingual patients with aphasia. Bilingual clinicians may experience difficulty deciding which language to treat. There is a lack of research regarding cross-language generalization in bilingual patients with aphasia and how this may benefit the client.

Methods
A literature search was conducted January through March, 2015 using PubMed, CINAHL, Google Scholar and Academic Search Premier with the following search terms: aphasia, bilingual, multilingual, polygot, treatment, intervention, generalization, L1, L2, and cross-language generalization. Five total articles were included after the appraisal process. Those articles and their findings are presented here.

Results
Findings showed varying amounts of cross-language transfer between L1 and L2.

Discussion
There are several limitations on these results including the limited number of studies examining bilingual aphasia patients and cross-language transfer. Many of the studies presented have small sample sizes. Perhaps more importantly, additional research is needed to examine the intricate relationship between pre-aphasia L1/L2 proficiency and cross-language transfer. Additional research will contribute to guidelines, policies and best practices to ensure greater outcomes for patients. Moreover, clinicians can draw from this knowledge the confidence to provide services in native as well as acquired language when possible.
Purpose
The purpose of this review is to 1) investigate the efficacy of script training as an aphasia intervention, and 2) conduct a preliminary analysis of the various categories of outcome measures used in light of the aims of the Life Participation Approach to Aphasia.

Background
In the year 2000, the influential “Life Participation Approach to Aphasia” (LPAA) introduced a shift in approach to assessment and treatment for PWA. This movement prioritizes “re-engagement in life” by focusing on “broader life-related processes and outcomes” with the explicit goals of enhancing life participation and developing measures of success that document how those affected by aphasia meet their life participation goals (LPAA Project Group, 2000). The emerging script training intervention, developed by Holland and colleagues in an effort to help people with aphasia to produce personally relevant language in a natural, automatic way, is centered within this newer approach (Holland & Ramage, 2004). The current review aims to evaluate the strength of the evidence for script training and how the current research surrounding it adheres to the values of the LPAA, specifically looking at how researchers have measured its success (outcome measures) and what the intervention has been shown to accomplish (outcomes).

Methods
A review of the literature was conducted in February 2015, searching five major databases (PubMed, PsychINFO, CINAHL, ComDisDome, and EMBASE) using the key words/phrases “aphasia,” and “script training.” Only peer-reviewed studies that included adults with aphasia and used a script training intervention approach as their independent variable were considered. Each study was independently appraised for quality and strength by both investigators (Hardy and Lam), using formal checklists, with inter-rater reliability coming out at 90.4%. All differences in appraisals were resolved through discussion and further analysis of the studies. Finally, the strength of the evidence base, all reported results and outcome measures used to obtain them, was examined.

Results
The literature review resulted in 9 studies (6 case series, 2 single-case experimental design studies, and 1 randomized controlled trial crossover study). Reported outcomes included script acquisition probes, language evaluation, generalization measures, and measures of impact on communication and participation in daily life. Analysis of the body of results shows that script training is a well-received and effective intervention in helping PWA to improve dialogue skills, daily communicative exchanges, and overall quality of life.

Discussion
A preliminary examination of the outcomes shows that more sensitive measures may be needed to capture script training’s full effects. Increases in life participation were presented in interviews and questionnaires across several studies, but were not reflected in the scales and surveys currently used in the field to measure life participation. With the advent of the LPAA, outcomes of interest have shifted, and a reexamination of the measures used to evaluate the effects of intervention on life participation for PWA is needed.
The purpose of this systematic review is to determine the effectiveness of gastrostomy tube feeding in improving the height and weight of children with cerebral palsy.

Background:
Many children with cerebral palsy experience eating and drinking difficulties that can range from minor difficulties, such as trouble with coordination resulting in increased meal times, to significant difficulties that can lead to poor health and life-threatening conditions (Hinchcliffe, 2003). These more severe difficulties may result in swallowing problems and/or disorders that may lead to numerous issues during oral feeding including malnutrition, dehydration, increased risk for aspiration, and chronic pulmonary issues. Consequently, alternative feeding methods such as gastrostomy tube may be a viable option for a child with cerebral palsy who has feeding and/or swallowing problems, has received nasal tube feeding for a longer time than recommended, takes too long to be fed orally, shows poor weight gain on a normal oral feeding diet, and is at risk for aspiration (CPIRF). So far, there is very limited research that specifically investigates the efficacy of gastrostomy feeding in increasing growth among children with cerebral palsy (Arvedson 2013).

Methods
This review was limited to studies that included children with cerebral palsy fed by gastrostomy only. The following databases were used to search for relevant articles: PubMed, EMBASE, Web of Science, and CommDisDome. The literature search resulted in 195 potentially relevant articles using the search terms “gastrostomy,” “cerebral palsy,” “growth,” “children” and/or “child.” These articles were published between 1980 and 2015. The title and abstract of the 195 articles were read by two reviewers for relevance. Of these, 26 articles were obtained and furthered reviewed. Only 4 articles met the full inclusion criteria and were appraised for quality.

Results
Overall, we found four studies demonstrating that gastrostomy resulted in small to significant increases in weight and height measurements of children with cerebral palsy. These findings provide some support that gastrostomy is effective in improving growth outcomes in children with cerebral palsy. However, there is not enough high quality evidence.

Discussion
As of now there is insufficient high quality evidence specifically investigating the effectiveness of gastrostomy in improving growth outcomes in children with cerebral palsy. Given the need for more high quality evidence, it is unwarranted to conclude that gastrostomy tube feeding is an ideal alternative feeding method for this population.
Rachel Anders and Cathy Zhao
*A Systematic Review of the Use of Free Water Protocols in Dysphagia Patients*

**Purpose or Research Questions**
The purpose of this presentation was to review the existing literature regarding free water protocols in order to determine their safety. Our clinical question is as follows: In adult dysphagia patients on a modified diet, does allowing intake of free water result in a higher incidence of aspiration pneumonia than in patients without access to free water?

**Background**
In the management of patients with dysphagia, prevention of aspiration is a primary concern. A thickened liquid diet is the traditional treatment. However, there is little evidence supporting the efficacy of a thickened liquid diet in preventing aspiration, and there are many negative outcomes associated with a thickened liquid diet including dehydration, poor quality of life, compliance issues, and increased risk of pneumonia when aspiration does take place. If there is bacteria in saliva and/or secretions or if the patient has poor oral health, aspirating material into the lungs creates a major risk for aspiration pneumonia. Free water protocols allow patients with dysphagia to drink water in between meals, provided that they adhere to oral hygiene practices. Despite the potential benefits of allowing access to free water, the lack of conclusive research on the topic continues to generate much controversy.

**Methods/Proposed Methods**

**Search Strategy**
PubMed, SCOPUS, and CINAHL databases were searched using the following terms: (dysphag* OR swallow* OR deglutition) AND (free water protocol OR Frazier water protocol OR GF Strong water protocol OR “oral intake of water”)
414 records were identified via database search, reference sections, and other sources. After duplicates were deleted, 278 records were screened. 260 records were excluded based on title and abstract. 18 records were fully assessed for eligibility. 7 records met inclusion criteria.

**Analytical Strategy**
Included sources were appraised for quality by both authors. Each author independently extracted the results from each study.

**Results**
5/7 of studies report no adverse events.

**Discussion**
Research findings are inconclusive due to small sample sizes and short study durations. The examined studies report conflicting findings. While multiple studies provide evidence that free water protocols increase fluid intake, 2/7 studies also show an increase in lung complications. It seems that access to free water should be case-dependent, as the correlation between access to water and aspiration pneumonia may be higher in certain populations. Karagiannis et al. (2001) recommend avoiding free water protocols in populations with neurodegenerative diseases and/or poor mobility. To minimize adverse effects, free water protocols should be implemented with: populations with reduced medical acuity, safe-swallowing strategy recommendations, and plans of care in place for both water access and oral hygiene routines. In addition, free water protocols should involve an interdisciplinary approach (SLPs, MDs, nurses, NAs, etc), with clearly outlined roles for each professional.
Jenna Browning, Emily Buss, Heather Porter, Angela Yarnell Bonino, and Lori J. Leibold

Evaluation of a two-interval, observer-based procedure for the behavioral assessment of hearing sensitivity in preschoolers

Purpose
The purpose of this study was to determine if a two-interval, forced-choice procedure using a conditioned play response is feasible and reliable for use with preschoolers.

Background
Conditioned Play Audiometry (CPA) is currently used in the audiology clinic to test children between about 2 and 5 years of age. In CPA, the child is taught to perform a motor response (i.e. dropping a block in a bucket) that is time-locked to the presentation of an auditory stimulus. Once the child is conditioned, a threshold can be determined by varying signal intensity. Assessment of hearing in toddlers and preschoolers can be difficult due to attention and comprehension demands, and requirements to respond appropriately when a signal is heard (Browning, 2000). Other factors such as language development, speech intelligibility, and increased mobility can further increase difficulty of testing preschoolers (Holt & Lalonde, 2012). CPA is utilized to test toddlers and young children because: (1) it allows for a greater number of trials prior to habituation than VRA (Thompson et al., 1989), (2) thresholds are not impacted by stimulus type if the child is under stimulus control (Thompson & Thompson, 1972), and (3) multiple thresholds can be obtained in most children 3 years or older (Nielsen & Olsen, 1997). However, a high degree of inter-subject variability is seen in 2 year-olds, specifically in their ability to condition and the number of responses prior to habituation (Thompson et al., 1989). CPA can also be influenced by response bias of the listener and/or the examiner. This limits comparisons in adaptive threshold estimates between children and adults because it can result in differences in d’ at threshold between the two age groups. A two-interval forced-choice (2IFC) psychophysical procedure has been developed and validated to test infants using an observer-based procedure in our laboratory (Browning et al., 2014). This procedure controls for both examiner and listener response bias and allows for comparisons in adaptive threshold estimates between infants and adults.

Methods
A 2IFC implementation of the observer-based psychoacoustic procedure described by Olsho et al. (1987), and previously used for testing infants (Browning et al., 2014), was modified and used for testing preschoolers. Tone detection in quiet and speech detection in noise were assessed using the modified procedure. During the 2IFC psychophysical test procedure, the signal is presented during one of two temporal windows. The examiner is blind to which interval contains the signal and must make their decision based solely on the subject’s behavior. The examiner receives feedback on a computer monitor about which temporal window contained the stimulus after every trial. An adaptive, 2-down, 1-up procedure was used to estimate hearing sensitivity (Levitt, 1971) using a CPA task.

Results
Stable adaptive tracks were obtained for 6 preschoolers with similar threshold estimates of tone detection in quiet across two testing sessions. It was feasible to obtain estimates of speech detection in noise for 8 preschoolers using the 2IFC procedure.

Discussion
The modified 2IFC procedure is feasible for use with preschoolers for assessing tone detection in quiet and speech detection in noise. This procedure has the potential to be used in the audiology clinic since reliable thresholds can be obtained.
Vincenzo Casbarro, and Sarah Vanselous
A systematic review of feeding in the NICU: Oral sensorimotor intervention strategies and their effect on hospital discharge

Research Question
For premature infants in the NICU, what are the effects of different oral sensorimotor intervention strategies on length of stay, as compared to control conditions?

Background
In the premature infant population, successful feeding ability is a critical component of qualification for discharge from the NICU (Daly, 2000), though infants are typically unable to coordinate the suck-swallow-breathe pattern until 33-34 weeks postconceptual age (PCA; Bache, et al., 2014). However, because suck begins to develop between 15-18 weeks PCA (Poole, et al., 2008), non-nutritive suck (NNS) and other oral sensorimotor stimulation techniques have the potential to be accessible for many premature infants and may help advance coordination skills to allow for successful feeding. Given that one study estimated that an average day in the NICU costs $1090.00 (Law-Morstatt, et al., 2003), and shorter LOS contributes to family bonding (Zecca, et al., 2010), it’s advantageous for both the hospital and the infant’s family to decrease the amount of time prior to discharge. Therefore, the effects of oral sensorimotor intervention strategies on length of stay hold increasing clinical importance.

Methods
A literature search spanning 3 databases (i.e., Pubmed, CINAHL, and Web of Science) was executed to identify high quality empirical studies (post 1980) that evaluated oral sensorimotor interventions and included length of hospital stay (LOS) as an outcome measure. The two researchers independently identified, appraised, and extracted data from identified studies after initially establishing inter-rater reliability (e.g., 668 titles double-reviewed). Ten high-quality studies (i.e., randomized control trials and quasi-experiments) that examined oral sensorimotor intervention were selected and aggregated to reflect the current state of the science.

Results
Of the ten studies that met inclusion criteria, interventions included paced feeding, cue-based feeding, spoon feeding, cup feeding, Premature Infant Oral Motor Intervention, oral stimulation protocols, NNS alone, and oral stimulation combined with NNS. Oral stimulation with nonnutritive sucking, spoon feeding, cue-based feeding, and NNS all resulted in significantly earlier discharge compared to the control groups in their respective studies (Pimenta, et al., 2008; Rocha, et al., 2007; Kumar, et al., 2010; Puckett, et al., 2008; Bahgat and Elsayad, 1999). Studies that used oral stimulation alone as intervention provided incomplete results. Kamhawy (et al., 2014) also did not analyze the significance of differences in LOS, despite a lower average in the intervention group. Overall, half of the studies reviewed revealed significant results in the effects of oral sensorimotor interventions on LOS, while the other half yielded insignificant results or failed to calculate significance levels.

Discussion
When examining LOS as an outcome, an oral stimulation protocol combined with NNS is the most frequently studied intervention strategy in the literature, as represented by three reputable health and speech-language pathology related databases. Oral stimulation in combination with NNS produced significantly shorter LOS in each experiment (Kamhawy, et al., 2014; Pimenta, et al., 2008; Rocha, et al., 2007).
Purpose
This research project tested the hypothesis that older listeners with normal audiometric hearing have a “hidden hearing loss” due to a depleted cranial nerve VIII fiber population.

Background
Recent animal work has shown that normal behavioral thresholds are not good indicators of hearing ability. Linn et al. (2011) showed in guinea pigs that despite recovery of normal thresholds after noise exposure (temporary threshold shifts) the ABR Wave I growth function remained abnormal due to depleted neural connections. Sergeyenko et. al (2013) showed a similar effect in mice where the independent variable was age rather than noise exposure. Again, ABR Wave I growth functions declined more rapidly with age than did otoacoustic emissions even when thresholds remained normal. This was associated with up to a 40% loss of spiral ganglion cells. The age-related loss of spiral ganglion cells has also been measured in human temporal bones (Makary, 2011). The results of this cadaver study showed an average loss of 1,000 cells per decade, and this loss occurred more rapidly than associated clinical records of audiometric thresholds. Based on the prior animal work, and the knowledge of human age-related loss of spiral ganglion cells, it can be hypothesized that older listeners with normal audiometric hearing will have an abnormal ABR Wave I growth function due to a depleted cranial nerve VIII fiber population.

Methods
Subjects: Two groups of 10 subjects with normal audiograms were tested. The groups were Younger (18-25 years) and Older (50-65 years).

ABR test: Responses were recorded using a click stimulus at 70 and 80 dB nHL level. Each run consisted of 2080 sweeps at a rate of 7.70 clicks/s, and three runs were collected for each level and averaged. The recordings were collected from a 1-channel recording system using two sticky tab electrodes placed at the Fpz and Fz positions and an ear canal electrode. Wave I amplitudes were measured at each stimulus level.

Results
The average amplitude of Wave I in the younger listeners was 0.32μV at 70 dB nHL and 0.53μV at 80 dB nHL; in the older listeners it was 0.18μV at 70 dB nHL 0.28μV at 80 dB nHL. The slopes of the ABR input/output functions differed between younger listeners and older listeners [F(1,19) p=.030], with the older listeners exhibiting a shallower slope. These results confirm the hypothesis of an age-related decline in the slope of the ABR Wave I growth function.

Discussion
The results of the experiment suggest that older listeners have a depleted population of cranial nerve VIII fibers. This could underlie hearing difficulties even in the presence of normal audiometric thresholds. In particular, these difficulties are likely to be most evident in noisy backgrounds.
Purpose
We sought to evaluate the strengths and limits of evidence on the effectiveness of implementing hearing screenings in the preschool setting and its effect on the timing of services provided to children with congenital and late-onset hearing loss who previously passed the newborn hearing screening. The target population includes all children up to 5 years old without previously known conditions associated with speech and language delay, such as hearing and neurologic impairments.

Background
The first 36 months of life are a critical period for learning language. Undetected hearing loss can lead to delays in speech and language development which can negatively affect academic performance and social-emotional growth. Although newborn hearing screenings are now required nationwide, children who have passed newborn hearing screening may still be at risk for hearing loss (progressive or acquired) due to genetic causes, trauma or infections. Furthermore, there are few opportunities for screening after newborns are discharged from the hospital. Widespread preschool hearing screening programs may lead to earlier interventions that can improve communication abilities, lower educational costs and increase lifetime productivity.

Methods
Studies were identified from Pub Med, Academic Search Premier, Academic OneFile, ComDisDome and CINAHL databases (1998 to February 2015), systematic reviews, reference lists, and experts. The evidence review included only English-language, peer-reviewed studies that reported original data on pediatric hearing loss in preschool populations. Outcome measures were considered if they were obtained at any time or age after screening and/or intervention as long as the initial assessment occurred while the child was ≤5 years old. Outcomes included speech and language intervention and other functional and health outcomes related to earlier detection of hearing loss such as social behavior. A total of 14 full-text articles met our eligibility criteria and were reviewed. Data were extracted from each included study, summarized descriptively, and rated for quality by using criteria specific to different study designs.

Results
There are early detection benefits to implementing hearing screenings in the preschool setting that can lead to earlier intervention therapy for preschool children with hearing loss. The data for this systematic review is still being analyzed and will be completed in time for the Spring Research Day poster presentation.
Purpose
The purpose of this undergraduate independent study was to develop narrow phonetic transcription skills beyond what is achieved in classroom instruction and to learn to apply those skills to challenging communication disorders. The students listened to a series of narrative speech recordings from a survivor of a traumatic brain injury who was diagnosed with apraxia of speech.

Background
The four student research assistants participating took Dr. Haley’s Introduction to Phonetics class in the Fall of 2014. Narrow-level phonetic transcription often varies among transcribers due to differences in sound perception and linguistic background, as well as the expectations they have for a word’s production. As Barry Heselwood states in his book on clinical phonetic transcription, “there is no perfect final transcription”.

Methods
The four student research assistants listened to a set of seventeen narrative videos recorded over a period of about nineteen months. The goal was to analyze the phonetic properties of the speech and identify features typical of the disorder apraxia of speech. To begin, the students totaled the number of words produced with speech errors. These errors were further categorized as distortions, phonemic errors, and repetitions/revisions. This categorization was completed after defining criteria for the phonemic IPA symbols and 28 diacritic phonetic symbols that were to be used in narrow transcription. Transcription was first completed by hand and then converted to Klattese transcription symbols on an Excel spreadsheet. Various strategies were used for listening to and analyzing the distorted words in order to maximize inter-transcriber reliability. The strategies included using acoustic software, slowing down recordings, using video to see lip movement, and listening to wav files of repeated distorted words.

Results
The four students demonstrated strong reliability in their individual transcriptions. The speaker demonstrated a significant decrease in the total number of words with errors as the weeks following her injury progressed.

Discussion
During their analysis, the students believed that much of the discrepancy was due to the process of describing speech and speech errors, both of which exist on a continuum, with a system of discrete phonemic and diacritic symbols for sounds and distortion. This, coupled with the transcribers’ perceptual differences, posed the most difficult challenge for achieving high inter-transcriber reliability. By coming up with a few standardized guidelines for more ambiguous sounds, the students’ final transcriptions had a high inter-transcriber reliability for their counts of each error type.
Purpose: The purpose of this study was to investigate the existing literature on the outcomes of varying treatment methods for childhood apraxia of speech (CAS); more specifically to compare whether auditory-visual focused treatment or motor-tactile focused treatments resulted in greater gains in expressive language.

Background: Childhood apraxia of speech (CAS) is a motor speech disorder that is becoming increasingly difficult to diagnose appropriately among speech-language pathologists due to the varying opinions of the distinctive features that characterize the disorder. The wide range of characteristics seen by professionals is creating an increasing number of diagnoses. There are currently a variety of intervention approaches for treating CAS, including motor-tactile focused treatments such as the Touch-Cue Method, Prompts for Restructuring Oral Muscular Phonetic Targets (PROMPT), and Rapid Syllables Transitions Treatment and auditory-visual focused treatments such as alternative and augmentative communication (AAC) devices.

Methods: A review of the current literature pertaining to intervention outcomes for CAS was conducted in Spring 2015, on three online databases (PubMed, PsycInfo, Google Scholar) using the search terms “treatment of childhood apraxia” “childhood apraxia of speech intervention” “AAC apraxia” “PROMPT apraxia” “motor tactile intervention childhood apraxia”. Articles were included for appraisal and analysis if they were published between the years of 1995-2015, investigated either an auditory-visual or motor-tactile focused intervention, and examined expressive language as an outcome measure. All levels of evidence, editorial through systematic review, were considered for inclusion.

Results: A total of eight articles met the inclusion criteria; two systematic reviews, three single-subject designs, two case studies, and one editorial. Each article was appraised for quality using standardized checklists by two graduate students. Raters agreed that each study was of moderate to high quality. All studies noted gains in expressive language following the implementation of their intervention. Motor-tactile interventions reported increased intelligibility, increased percent accuracy of target productions at the sound and word level, and improved prosody; auditory-visual interventions reported increased mean length of utterance, increased repairs of conversation breakdowns, increased communication initiations and increased number of turns in conversations. There was not enough high-quality research evidence to suggest whether one of the intervention modalities showed greater expressive language gains than the other; both interventions appeared to have their own particular benefits.

Discussion: It is evident that there is a lack of literature examining the outcomes of varying treatment methods for CAS. In order to support evidence-based practice for speech-language pathologists working with children with CAS, longitudinal experimental studies should be conducted. There appear to be benefits from both intervention modalities, however it is not clear what aspects of each particular treatment is resulting in greater expressive language gains.
Mandie Oslund, Anna Weinberg, and Mandy Simmons

The Effectiveness of Aphasia-Friendly Printed Education Materials: A Systematic Review

Purpose
The aim of the current systematic review was to investigate whether printed education materials that utilize strategic formatting (“aphasia-friendly”) characteristics are better comprehended and preferred by people with aphasia (PWA) when compared to non-adapted materials.

Background
National guidelines state that printed education materials (PEMs) should be written at a sixth grade comprehension level, however the majority of healthcare information is written at a tenth grade level or higher (Safeer & Keenan, 2008). Due to their acquired language deficits, PWA are especially vulnerable to being under-informed. Previous research indicates that specific formatting characteristics make PEMs more accessible to PWA. Written materials that meet these criteria are termed “aphasia-friendly” (Howe, Worrall, & Hickson, 2004).

Methods
A systematic review of literature published between January 1990 and February 2015 was conducted using four electronic databases: ArticlesPlus, EMBASE, PubMed and Scopus. Reference lists of eligible papers were reviewed and subjected to inclusion and exclusion criteria. Relevance and methodological quality of eligible articles was appraised and findings were synthesized. Of the 860 papers identified through the search process, 6 were selected based on inclusion criteria.

Results
General trends indicated that aphasia-friendly content and design characteristics improved the comprehension of PEMs for PWA. Preference for the inclusion of graphics in these materials was mostly uniform in the sampled population of PWA. However, preference ratings indicated for materials incorporating general aphasia-friendly characteristics (e.g., large font, use of white space, simple and short sentences) were inconsistent.

Discussion
The majority of PEMs surveyed did not meet recommended guidelines for best practice in terms of readability. There is emerging evidence that aphasia-friendly formatting and design characteristics should be incorporated into the guidelines for the creation of PEMs for PWA. Moreover, the findings indicate that written materials must incorporate multiple design considerations in order to truly be aphasia-friendly. Although PWA report mixed preferences regarding these materials, it is critical that aphasia-friendly materials be provided as an alternative source of information. Further research is needed to specify how these characteristics may be best utilized and combined to meet the needs of individuals across the spectrum of aphasia.
Mark Moore, Margaret Dillon, and Meredith Anderson,
*Speech Perception Outcomes of Sequential versus Simultaneous Cochlear Implantation*

**Purpose**
The purpose of this study was to determine whether inter-cochlear implantation intervals influences speech perception performance for the second ear.

**Background**
Bilateral cochlear implantation has been shown to offer patients improved localization, speech perception in noise, and squelch benefits (Reeder et al, 2014; Dunn et al, 2012; Litovsky et al. 2009). Differences in postoperative outcomes in bilaterally implanted children have been attributed to variations in inter-cochlear implantation intervals. Inter-cochlear implantation interval is defined as the duration of time between the initial and second cochlear implantation procedures. Shorter inter-cochlear implantation intervals may be associated with better performance, which has been documented in children (Smulders et al, 2011). The relationship inter-cochlear implantation interval on postoperative outcomes has not been addressed for the adult population. It is hypothesized that shorter inter-cochlear implantation intervals may yield better speech perception outcomes for the second ear for postlingually deafened adults. Simultaneously implanted cochlear implant recipients may outperform sequentially implanted adults on speech perception tasks.

**Methods**
A retrospective chart review was conducted on speech perception data collected from sequentially implanted and simultaneously bilaterally implanted adult cochlear implant recipients. Subjects underwent cochlear implantation between December 1998 and February 2014. Subjects were also dependent on the following: English as a primary language, age at implantation greater than 18 years, post-lingually deafened, no history of revision surgery, and poorer ear implanted first. Speech perception outcomes were assessed with monosyllabic CNC words. Intervals included preoperative and 12-months for each ear. Changes in performance of the second side, or better hearing ear, were assessed in respect to the inter-cochlear implantation interval, as well as, age at implantation.

**Results**
An "ear difference" score was obtained at the 12-month follow-up interval by subtracting the CNC word score of the second ear from the CNC word score of the initial ear. There was no significant correlation (r=0.286, p=0.10) for the interval between CI surgeries and the difference obtained between the two ears. This finding was maintained if the simultaneous subjects were removed (r=0.203, p=0.34). Results suggest there is no correlation between electric current levels and postoperative hearing preservation or aided speech perception within the first few months of listening experience.

**Discussion**
When adult unilateral cochlear implant recipients are considering implantation of the contralateral ear, they should be counseled on realistic expectations regarding the potential performance of the contralateral ear. For the cohort reviewed here, inter-cochlear implantation interval was not found to be related to speech perception performance outcomes with the second side. A limitation to the current analysis is the change in hearing in the contralateral ear and duration of hearing aid use prior to cochlear implantation was not controlled, which could affect the speech perception performance of the second side. Other variables, including speech coding strategies, and internal and external technology should be evaluated.
Sarah Obarowski, Margaret Dillon, English King, Ellen Pearce and Marcia Adunka
Optimization of FSP and HDCIS: Influence on Speech Perception

Purpose
The purpose of this study was to evaluate speech perception performance of cochlear implant recipients listening exclusively to either the HDCIS or FSP coding strategy within the first six-months post-initial activation.

Background
Cochlear implant signal coding strategies have traditionally provided the envelope of a signal to the listener, such as in the High-Definition Continuous Interval Sampling (HDCIS) strategy. The aim of Fine Structure Processing (FSP) is to provide the user with both fine structure and envelope information. Theoretically, providing both of these cues should result in improved speech perception, especially in the presence of challenging background noise (Moore, 2008). However, prior studies comparing FSP to HDCIS performance, using an intersubject design with experienced listeners, have reported mixed results. Arnoldner and colleagues (2007) found that speech perception scores improved in noise using FSP; however, Magnusson (2011) and Riss et al. (2008) found no statistical difference in speech perception scores or subject preference between the two coding strategies long-term. Currently, it is unclear whether listening exclusively to one coding strategy starting at initial activation will provide improved speech perception outcomes.

Methods
Adult subjects implanted with a MED-EL standard, medium, or Flex28 internal array, were randomly assigned to either the HDCIS or FSP signal coding strategy cohorts. The mapping procedure included loudness balancing, as well as evaluation of stimulation rate, maplaw, sensitivity, and threshold and comfort levels. The audiologist completing speech perception testing was blinded to the specific signal coding strategy. Speech perception testing was completed at the one, three and six-month post-initial activation intervals. Recorded materials were presented in sound field at 60 dB SPL. The test battery included: CNC words in quiet, HINT sentences in quiet and noise (SNR+10), AzBio sentences in quiet and noise (SNR+10, +5) and BKB-SIN.

Results
Final analyses revealed a significant difference of interval on all tasks, but no significant interaction between interval and signal coding strategy.

Discussion
All subjects experienced an improvement in speech perception compared to their preoperative performance with appropriately fit hearing aids. There was no statistical difference on speech perception outcomes between cohorts, though there appeared to be a trend for better performance with the FSP coding strategy on measures conducted in speech babble.
Kristin McGinley and Rebecca Stockin
*A Systematic Review of the Effects of Cognitive Stimulation Therapy (CST) on Quality of Life in Individuals with Mild to Moderate Dementia*

**Purpose**
The purpose of this study was to review the literature and complete a systematic review to answer the following question: For older adults (65+) diagnosed with mild to moderate dementia, does Cognitive Stimulation Therapy (CST) or Maintenance Cognitive Stimulation Therapy (MCST) increase quality of life?

**Background**
Cognitive Stimulation Therapy (CST) is a short-term treatment program common in the United Kingdom for individuals with mild to moderate dementia to improve cognitive functioning. CST involves fourteen or more sessions of themed activities, which typically run twice weekly for seven weeks. The sessions aim to actively stimulate and engage people with dementia, while providing an optimal learning environment and the social benefits of a group. CST treatment can be administered by anyone working with people with dementia, including speech language pathologists, in a variety of settings. Maintenance Cognitive Stimulation Therapy (MCST) takes place after CST and aims to be a more long-term approach to improving cognition. Quality of life has been identified as an important measure of outcome in people with dementia (Kane et al., 2001), and prior research has shown that quality of life changes are correlated with improvement in cognition (Woods et al., 2006). With a progressive disease like dementia, quality of life becomes an important factor to consider when choosing treatment objectives.

**Methods**
A thorough search of the literature from the years 2000 to the present (Academic Search Premiere, CINAHL, ComDisDome, Embase, ERIC, Google Scholar, PsychInfo, PubMed, Scopus, and speechBITE) was conducted using the key words “Cognitive Stimulation Therapy,” “CST,” and “Dementia.” References of relevant articles and clinical trial protocols were also reviewed. The researchers excluded grey literature from the systematic review.

**Results**
There is mixed evidence for the efficacy of CST and MCST in improving quality of life in individuals with moderate-to-severe dementia. Of the six studies that passed criteria, only one study found a significant improvement in self-rated quality of life scores; however, several studies did demonstrate significant improvements in proxy-rated quality of life measures. Additional analysis revealed a significant correlation between changes in quality of life and improvements in cognition, indicating that the program has benefits beyond social stimulation. Of the domains of quality of life assessed, significant improvement was shown in areas of memory, energy, relationships, and managing chores. A trend for a significantly greater improvement in quality of life for females over males was also observed.

**Discussion**
Results indicate that CST and MCST, and therapies that target cognition in general, have the potential to improve quality of life in patients with moderate-to-severe dementia. However, studies targeting subjective quality of life measures should be interpreted with caution given the progressive nature of dementia as well as the average quality of evidence that relies heavily on a limited pool of data and proxy-rated measures of quality of life.
Research Question
For children and adults who stutter, are fluency interventions that provide feedback contingent on stuttering events more efficacious at reducing stuttering-like disfluencies than:
   a) No treatment
   OR
   b) Alternative treatments?

Background
There are many potential treatment methods for stuttering and little agreement over which methods are the most efficacious. Blomgren (2013) divides treatments into four categories based on the age of the client. Treatment options for children have traditionally utilized either multifactorial therapy or an operant conditioning paradigm (Blomgren, 2013). Treatment of adult stuttering has typically centered on fluency shaping techniques and anxiolytic stuttering management strategies (Blomgren, 2013). The most well-known operant conditioning treatment is the Lidcombe Program, which teaches parents to provide verbal feedback to their children based on their speech. However, little research has been done on other treatment approaches that use stuttering-contingent feedback, and there has been no systematic attempt to assess the efficacy of operant therapy techniques for adults. Our research question sought to study the efficacy of all operant conditioning therapies across the lifespan. Our systematic review excluded research on the effects of the SpeechEasy and similar devices, due both to the system’s infeasibility for many stutterers and the lack of clinical data supporting it.

Methods
A systematic electronic search of literature was conducted in the ComDisDome, PubMed, and PsycARTICLES databases. Inclusion criteria: (1) Dated 1984 – present; (2) Participants with oral fluency disorder; (3) Test variable incorporated a stuttering-contingent feedback treatment; (4) Outcomes measured in stuttering frequency. Exclusion criteria: (1) Participants with additional communication and/or cognitive disorders; (2) Literature reviews. Included articles were read and appraised for quality based on two approved appraisal checklists. Appraisal quality for each article was discussed and agreed upon by both authors. Given heterogeneity of outcome measures, results were not pooled quantitatively.

Results
All of the eight studies reviewed showed a significant effect of stuttering-contingent interventions on reducing % of syllables stuttered. However, in cases where stuttering-contingent interventions were compared with other treatments there were no statistically significant differences between treatment efficacy. These studies were assigned various quality ratings based on the number of appraisal criteria they met. One study was assigned a high quality rating, five were assigned moderate quality ratings, and two were assigned adequate quality ratings.

Discussion
Stuttering-contingent interventions appear to be a successful way to reduce stuttering-like disfluencies. However, at this time it is difficult to say whether they are more efficacious than other treatments. Additionally, the small number of studies included in this systematic review, along with the small sample sizes in each study, make it difficult to generalize these findings.
Conner Haring, Jason Guetgemann, Marcia Fort, and Jackson Roush
Hearing Screenings for Non-Hospital Births in North Carolina: Current Status and Future Needs

Purpose
The purpose of this study is to investigate the state of hearing screenings for infants who are not born in a traditional hospital setting. This study aims to answer the following questions:
1. What is the history of out-of-hospital birthing in the United States?
2. Where are non-traditional births taking place in the state of North Carolina?
3. How many infants are born out of the hospital in North Carolina?
4. How many infants born out of the hospital in North Carolina have their hearing screened?
5. What is the screening protocol for out of hospital births in North Carolina?
6. How can hearing healthcare providers encourage and support midwives in the screening process?

Background: In North Carolina and across the nation, most babies are born in hospitals where newborn hearing screening is provided as a standard of care prior to discharge. However, a growing number of families are choosing non-hospital settings that include birthing centers and home births. Review of current policies and procedures in North Carolina regarding non-hospital births revealed a lack of uniformity in screening protocols and in communication with families. The first phase of this project is aimed at determining where non-hospital births are occurring in North Carolina and the protocols, procedures, and personnel employed. The second phase will involve working with the North Carolina Early Hearing Detection and Intervention (NC-EHDI) program to establish statewide policies and procedures that ensure all newborn infants, regardless of where they are born, have access to timely and appropriate newborn hearing screening and follow-up.

Methods: A review of NC-EHDI and Vital Records data on all recorded births and screenings in North Carolina in 2014 was used to determine the “Where?” and “How many?” questions regarding out of hospital births. A direct interview of midwives in a Freestanding Birth Center was used to determine screening protocols for birthing centers. In the future, midwives who attend home births will be interviewed in order to determine their screening protocols and attitudes towards Newborn Hearing Screening.

Results: The data collected indicated that the largest number of infants who were born out of the hospital and were not screened were intended home births. Infants who were born in Freestanding Birth Centers were screened at a much higher rate. The authors anticipate that upon interviewing midwives who attend home births the factors that influence the large number of missed screenings will become apparent. It is likely that North Carolina home birth midwives are unaware of the importance of hearing screenings, unable to afford the equipment necessary to screen babies, or unwilling to subject newborns to this type of intervention.

Discussion: It is important that all infants born in the state of North Carolina have the same access to hearing screenings. Early detection of hearing loss can allow children to develop language in an appropriate time course instead of in a remedial fashion. Although the number of infants born in non-traditional settings is small, they represent a large proportion of the infants who are not screened in North Carolina despite the state’s high percentage of total infants screened.