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A CASE STUDY OF LITERACY DEVELOPMENT IN A CHILD WITH A COCHLEAR IMPLANT

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Abstract

I was born with a bilateral profound hearing loss, and I was implanted at age 2 with a cochlear implant. This paper investigates my language development as a hearing impaired child, focusing on literacy development. Sources of information about my language development came from interviews with my mother, early interventionist, and my audiologist. Reading techniques such as labeling and open-ended questions were among the most beneficial strategies used to teach me to read. The use of these techniques was supported by previous research of the benefits of educational reading strategies. While my case is a very successful example of early implantation and resulting near-normal language development, the techniques discussed in this paper are beneficial for any child with a hearing loss learning to read.

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A Case Study of Literacy Development in a Child with a Cochlear Implant

When a child is diagnosed with a hearing loss, life opportunities seem to disappear. Talking, reading, succeeding in school, going to college, having a career, and having a family seem to be unachievable when a child is diagnosed with a condition that changes the trajectory of the child's life. This life change comes from the disappearance of one important sense: to hear. Hearing loss has a universal effect on language development – the loss impacts all aspects of oral language such as speech, listening, reading, and writing. This lifelong impact makes hearing loss and subsequent interventions important issues to address.

About 2 to 3 out of every 1,000 children in the United States are born deaf or hard-of-hearing (National Institute on Deafness and Other Communication Disorders, 2010). The high number of young children with hearing loss makes early intervention for oral language, reading and writing development necessary and valuable for these children. Ninety percent of children who are born deaf are born to parents who can hear (National Institute on Deafness and Other Communication Disorders, 2010). Deaf children born to hearing parents dependent on the spoken modality have less access to oral language than deaf children born to deaf parents using visual sign language for communication, resulting in a serious communication mismatch. This mismatch "associates with higher levels of parenting stress…and reduced sensitivity in parent-child interactions, resulting in negative consequences for later linguistic and psychosocial development (Markman, Quittner, Eisenberg, Tobey, Thai, Niparko, & Wang, 2011, p. 389). The parental stress of raising a child with a potential disability or communication

disorder can be debilitating for a parent-child relationship, driving down the quality of interaction between child and parent or caregiver. Most children who are born profoundly deaf or become prelingually deaf (deafened before gaining language) fall significantly behind their normal-hearing peers in their development of oral language (Svirsky, Robbins, Kirk, Pisoni, & Miyamoto, 2000).

Overview

First, I will briefly describe typical language development to establish the baseline from which language development in the presence of hearing loss varies with an emphasis on literacy development. Then, I will discuss the atypical language development that is usual for children with a significant hearing loss. I also discuss cochlear implants as a potential solution to help develop literacy in deaf children. I will highlight some of the existing reading intervention strategies that are used today. Finally, to display the validity of the cochlear implant solution, I will use myself as a case study, investigating the techniques and strategies used to teach me how to read and write.

Typical Language Development

To start my analysis of how a deaf child learns to read, a basic introduction to typical language development is needed to establish the baseline of where language development diverges in the event of a hearing loss. Since much of a child's reading development builds upon already established oral language skills, knowledge of how and when normal language milestones are achieved is important.

Major milestones. Learning spoken language is a complex process that requires many intact components, including early auditory exposure, which is "necessary for neuronal commitment to support the auditory processing of complex signals" (Markman

et al., 2011, p. 395). Knowledge and skills based in the phonology of the sound system, semantics (meaning), the rules of grammar, and the pragmatics of interaction make up an oral language system, and "a child's eventual mastery of language entails a timely convergence of the systems of [these] skills" (Markman et al., 2011, p. 390).

The most dramatic change in infants' communicative behavior and language knowledge occurs in the first year of life, transforming from no understanding of language at birth to recognition of their own name at 6 months and a few more words at 8 to 10 months (Hoff, 2009). One significant language development component of the first year is vocal play. The infant produces a variety of different consonant-like ("goo goo") and vowel-like sounds ("ahh"), exploring how the voice and mouth form different sounds and developing a repertoire of sounds (Hoff, 2009). It is followed by the second mark of vocal development, canonical, or reduplicated, babbling. Unlike vocalizations made in vocal play, canonical babbling consists of true syllables of consonants paired with a vowel sound, such as "da da" (Hoff, 2009). Vocal play and canonical babbling make up infants' initial phonology development (Hoff, 2009). Recognition of the child's own name at 6 months kicks off lexical development. Intentionality begins to appear in infant's communicative behavior as well. Very young infants do not intentionally communicate at birth, but at around 10 months, become aware that their behaviors can be used to communicate with others around them and help satisfy their needs and wants (Hoff, 2009). Finally, children begin to produce recognizable speech at the end of the first year.

The second year is known for vocabulary growth, starting with the child's first word at around 10 to 15 months (Hoff, 2009). Phonology and articulation improvements

also contribute to the vocabulary development, even though not all words produced by the child sound adult-like (Hoff, 2009). Lexicon development continues throughout the second year, and the child has a 300-word vocabulary including first word combinations by the end of the year (Hoff, 2009).

In between the second and third year, grammar development takes off with increasingly complex utterances, increasing length of word combinations, adding grammatical morphemes, and negatives and question forms (Hoff, 2009). Vocabulary development continues, growing into a 500-word lexicon, and the child's phonetic inventory, the child's repertoire of speech sounds, nears completion (Hoff, 2009). The child also develops stronger conversational initiative and responsiveness, contributing to pragmatic development (Hoff, 2009).

By the time the child reaches age 3, most grammar, lexicon, and phonology milestones have been reached. This stage reflects refinement and further development of existing skills (Hoff, 2009). The child can produce complete sentences with most grammatical elements in place. Phonological awareness continues to grow as well as vocabulary and sentence structure (Hoff, 2009). Finally, narrative skills, the ability to verbalize the occurrences of past events, begin to develop (Hoff, 2009). The time period between age 3 and 4 is important for literacy; emergent skills needed for literacy are developed and refined during this time.

Literacy. Even though literacy builds upon earlier-acquired oral language skills, it is not a natural next step in acquisition of language (Hoff, 2009). Reading is a skill set that many children have difficulty learning, especially hearing impaired children. Reading skills result from formal schooling, unlike speaking, which appears without

explicit instruction (Hoff, 2009). Some specific elements of oral language are required for foundations in literacy such as phonological awareness and vocabulary knowledge, but without the auditory input essential for gaining these oral skills that give rise to literacy, children with hearing loss have atypical language and literacy development (Hoff, 2009). A solid foundation in oral language and phonological awareness is essential for future reading development in hearing children (DesJardin, Ambrose, & Eisenberg, 2008).

Atypical Language Development in Children with Hearing Loss

A hearing loss in a child can escape detection for the first year if the hearing loss is not identified at birth by a mandated newborn hearing screening or the infant has no other discernable disorder or defect. However, a hearing loss goes undiagnosed mainly because infants and young toddlers do not yet produce speech (Markman et al., 2011). The first deviation from typical language development that can be clearly noted is the absence of canonical babbling. All infants babble in the first few months of life, but deaf infants rarely produce the reduplicated babbling that leads to the first spoken words (Hoff, 2009).

An undiagnosed hearing loss may have devastating consequences because the child may remain isolated from early auditory and linguistic experiences (Markman et al., 2011). The delay in exposure to appropriate language models is often reflected in poor language outcomes, including "delays in learning to understand the speech of others and to produce intelligible speech" (Markman et al., 2011, p. 389)

Many components go into the normal development of language; the absence of a sense or process could have a detrimental impact on language or reading development. In

the case of a hearing loss, those components required for proper literacy development based on previously acquired oral language skills are negatively affected.

Phonological awareness. Phonological awareness refers to the knowledge of sound structure and patterns of oral language. Children who demonstrate phonological awareness have the ability to understand and manipulate oral sounds (DesJardin et al., 2008). This ability extends to rhyming, alliteration, word awareness, syllable awareness, and phoneme awareness (DesJardin et al., 2008). Normal-hearing children show signs of phonological awareness around the age of 2 (Hoff, 2009). Phonological awareness is incredibly important in examining how a child learns how to read since a child's level of phonological awareness predict their success (DesJardin et al., 2008). Letter knowledge, knowing the names of letters of the alphabet and the sound associated with each letter, also contributes to reading success (Hoff, 2009). Children with hearing loss have been shown to be at risk for poor phonological awareness skills, which is important for word decoding and reading success (DesJardin et al., 2008), discussed below.

Vocabulary knowledge. Vocabulary knowledge plays a central role in learning to read (DesJardin et al., 2008). It is also a strong correlate of reading achievement for several reasons (Hoff, 2009). First, the relationship between the size of child's lexicon and the child's phonological awareness is strong – vocabulary development indirectly influences reading development by encouraging phonological development (Hoff, 2009). In other words, the more vocabulary words a child can produce, the more sounds that are present in the child's phonetic inventory, which helps significantly with word decoding in reading. This relation also works the other way: the more children read, the bigger their working vocabulary will get (Hoff, 2009). Vocabulary knowledge also supports reading

comprehension for later school years, since common skills support lexicon building and reading comprehension (Hoff, 2009).

Reading and educational implications. In children with hearing loss, significant delays can be expected in all language domains, such as semantics, pragmatics, phonology, and morpho-syntax (Svirsky et al., 2000). These delays do not bode well for normal literacy development.

One reason why children with a hearing loss have reading problems is that the language system these children have is too inadequate to build literacy skills upon. The reduced knowledge of vocabulary and grammatical rules interferes with learning how to read (Tye-Murray, 2009). The second reason why deaf children struggle to learn to read is the absence of an auditory basis for mapping sound to the printed letters, which is the process of "sounding out words." Phonological awareness also plays a role in this process also know as word decoding, since it "sets the stage for children to discover the relationship between sounds and letters that will, in turn, facilitate the recognition of new words in print" (DesJardin et al., 2008, p. 23). Word decoding is the process of associating the orthographic form of a word to its sound properties, and thus its meaning. (Tye-Murray, 2009). Word decoding is very difficult for children with a profound hearing loss because the connection between the written form of a word and its auditory form cannot be made due to the lack of the auditory signal.

Due to the lack of auditory speech input, other considerations have to be made concerning reading and academic instruction, including grammar. Learning rules of grammar may be difficult because "detecting and subsequent learning of the rules of grammar relies on attention to the more subtle "little words" and (morphosyntactic)

endings of words and phrases. Thus, reduced access to acoustic-phonetic cues may inhibit the natural attentional enhancement of grammatical cues." (Markman et al., 2011, p. 398). Special techniques, such as a multisensory approach, might be used to integrate auditory and visual cues for early development and to ensure access of all necessary information to develop appropriate reading and academic skills.

Cochlear Implants

Until the 1980's, there was no treatment for profoundly deaf people to restore the sense of hearing that would allow them to understand spoken speech. However, a new device called a cochlear implant (CI) provided the technology to allow deaf people to have the sensation of sound. A CI is not like a hearing aid, which only amplifies surrounding sound. A CI is a small electronic device that provides the deaf user a sense of sound. It consists of an internal portion, inserted via surgery, and an external portion, which is worn on the outside on the ear. Starting with the external portion, a microphone picks up sound from the environment, which is converted into electronic signals by the speech processor. The signal is transferred electromagnetically to the internal device via a transmitter, held to the scalp by a magnet. Moving to the internal device, the signal is received then transmitted to the electrode array inserted in the cochlea of the inner ear. The electrodes stimulate the nerve endings, replacing the hair cells' function, and send the signals to the brain via the auditory nerve. The brain interprets these signals as sound (National Institute on Deafness and Other Communication Disorders, 2011). Essentially, a CI bypasses the damaged or missing hair cells in the cochlea and stimulates the auditory nerve directly (Tye-Murray, 2009).

The CI is an amazing invention, changing the course of deafness history. Svirsky et al. described the CI as "the first major success, both scientific and commercial, of a neural sensory prosthesis that replaced a human sense with an electronic device" (Svirsky et al., 2000, p. 153). The advent of cochlear implant technology changed the standard treatment for individuals with hearing loss, especially children. The FDA approved the use of CIs with children with hearing loss in 1990 (Tye-Murray, 2009) and now both children and adults with severe to profound hearing loss now have a successful and beneficial treatment option. With sufficient auditory input to develop comparable oral language, children with profound hearing loss now have the opportunity to develop oral skills as well as reading and writing.

Outcomes of early implantation. Overall, early cochlear implantation of deafened children had great benefits, ranging from increased receptive and expressive vocabulary, improved grammar and reading skills, and general oral language success.

CIs promote the development of speech perception and speech production in prelingually deafened children by providing the necessary auditory stimulation needed to develop oral language (Svirsky et al., 2000). Even though implanted children still lagged behind normal-hearing children, they developed language faster than what would have been predicted for unimplanted deaf children (Svirsky et al., 2000). It was found that the average rate of language development in the deaf children after cochlear implantation was similar to their normal-hearing peers (Svirsky et al., 2000).

The usefulness of CIs also comes from how consistent the benefits are for each person utilizing the technology. Markman et al. stated, "the CI produces consistent effect in improving the trajectory of spoken language learning and that age of implantation is a

significant predictor of the level of spoken language skills acquired" (Markman et al., 2011, p. 395). More sources support the fact that earlier cochlear implantation is very beneficial in different areas. For example, Svirsky et al. (2000) emphasized that cochlear implant users already experience a speech and language delay when compared to their normal-hearing peers. However, when they receive their implant, this delay is kept from increasing further. Svirsky et al. (2000) went on to say that earlier cochlear implantation in deaf children would result in smaller delays in language development. Another benefit that results from early implantation is substantially improved grammar skills. Grammar was positively impacted for early implanted CI users (prior to 18 months) "because the early activation of auditory cortex was able to rescue the development of multisensory integration circuits that ultimately amplified the salience of grammatical cues" (Markman et al., 2011, p. 398).

Finally, cochlear implantation and the subsequent auditory input also have a positive effect on reading development. Deaf children with CIs have the potential to achieve better reading skills than children using hearing aids. Some implanted children even reach reading competencies that match those of their hearing peers (DesJardin et al., 2008). DesJardin et al. (2008) also encouraged early implantation, stating, "children fitted earlier had better performance outcomes on phonological awareness, vocabulary, and reading compared to their hearing peers" (p. 25). CIs can mitigate the deleterious effect of hearing loss on reading achievement but not completely eliminate it (Tye-Murray, 2009). CI users will still need reading and educational support for later school years.

Existing Interventions for Reading Development

Whole language approach. The "whole language teaching approach" became popular with teachers and language interventionists in the early 1990's. The approach taught children to read by recognizing words as whole pieces of language. In general, teachers using the whole language approach believe that children learn how to read by writing, and learn how to write by reading. (Bomengen, 2010)

Joint storybook reading. Joint storybook reading is an activity typically done at home with the parent interacting with the child, reading a book together. Parent-child joint book reading is an essential activity for later phonological awareness and reading achievement. During the interaction, parents or caregivers can provide the necessary linguistic input to assist receptive and expressive language growth for the child (DesJardin et al., 2008). This language growth in turn helps reading development indirectly through vocabulary growth.

Joint storybook reading provides the parent and child opportunities to spend time together. The quality of the interactions also has an impact on reading development. Higher quality parent-child storybook interactions further prepare typically developing hearing children for school-aged reading tasks such as word decoding and reading comprehension skills (DesJardin et al., 2008)

Higher level facilitative techniques. Higher level facilitative techniques are strategies used by the parent during joint storybook reading to encourage the child's language and reading development. There are several specific strategies commonly used. Recast is the technique of the parent restating the child's utterance in a question format, prompting the child to use expressive language to answer (DesJardin et al., 2008). Expansion is when the parent repeats the child's utterance in the same word order with or

without adding any new information or words. If new words are added, it is usually to model the sentence in correct grammatical structure (DesJardin et al., 2008). The parent might utilize open-ended questions to ask the child a question that will elicit an answer that is more than one word in length (DesJardin et al., 2008). This question can be to make a prediction of upcoming events in the story or to wonder what are the book characters' motivations. Lastly, parallel talk is when the parent narrates what the child is looking at in the book. (DesJardin et al., 2008)

Each higher level facilitative technique enhanced different aspects of oral language. For instance, the recast technique emerged as a strong predictor variable for receptive language. On the other hand, open-ended question was a significant predictor variable for expressive language (DesJardin et al., 2008). Reading intervention can help develop receptive and expressive language and vocabulary. At the same time, vocabulary development exercises can enhance reading achievement. DesJardin et al. (2008) emphasized the importance of higher level facilitative techniques, saying, "[these] techniques encourage participation and conversation during storybook reading, eliciting more complex vocabulary and syntactic skills in young children" (p. 26). Parents' use of higher level facilitative techniques was positively related to improved language skills in young deaf children with CIs. For example, use of open-ended questions was positively associated with increased phonological awareness skills (DesJardin et al., 2008).

Lower level facilitative techniques. Lower level facilitative techniques are different strategies used during joint storybook reading. Imitation is when the parent simply repeats what the child said (DesJardin et al., 2008). Label is the parent providing a label for a picture in the book (DesJardin et al., 2008). A closed-ended question is a

parent-asked question that elicits a one-word response (DesJardin et al., 2008), such as a "yes/no" question. Linguistic mapping is when the parent interprets the child's intended message by using the context as clues. For example, if the child pushes away the book, the mother would say, "All done." The parent might give the child a directive, such as telling the child to turn the page (DesJardin et al., 2008). Finally, the parent might make a comment to keep the conversation going or to give the child positive reinforcement (DesJardin et al., 2008).

The lower level facilitative techniques are very useful when the child's skill level is suited to those strategies. However, the use of lower level techniques may be detrimental to the child's reading development if they are not matched to the child's abilities. DesJardin et al. (2008) stated, "lower level techniques such as linguistic mapping, label, and directive hinder language development for young deaf children with cochlear implants who demonstrate more complex language structures" (p. 26), such as good phonological awareness. As demonstrated by DesJardin et al.'s (2008) work, deaf children's language skills and parents' facilitative language techniques utilized during joint storybook reading are significantly related.

Parent/Caregiver Role in Reading Intervention. Parents play a huge role in their own children's language and reading development. Some parents might view their role as a teacher, actively fostering their children's literacy skills. Unfortunately, not every parent thinks that it is his or her role to be involved. Other parents may feel that it is the responsibility of professional educators to lead their children's reading development (DesJardin et al., 2011).

A lot of what a child learns in the classroom during his or her school years can be linked to what their home environment is like before entering school. Parents who take an active role in their child's literacy provide their children with rich language experiences such as reading books (active joint storybook reading) and playing language-based games and activities. These activities have a direct impact on children's literacy skills including rhyming, letter knowledge, letter-word recognition (important for word decoding), phonological awareness, and overall reading abilities. (DesJardin et al., 2011).

Taking an active parental role during these rich language activities, especially joint storybook reading, will have a strong positive impact on a child's language development. For example, a parent will be able to teach new words in a meaningful context. In other words, a parent is more likely to successfully teach a word such as "bear" by linking the word to a favorite stuffed bear at home than a teacher successfully teaching bear by linking the word to an unfamiliar picture or object. When new words are used in meaningful contexts, a child with a CI is more likely to "store those words in the mental lexicon in order to retrieve it at a later time" (DesJardin et al., 2008, p. 38). Also, a parent engaging his or her child in active questioning and linking prior life experiences to the book events during joint book reading are optimal techniques for later reading success (DesJardin et al., 2011).

Finally, the quality of parent-child interactions that might occur during joint storybook reading or other reading interventions also contributes a critical foundation for the child's overall development (Markman et al., 2011). Unfortunately, the quality of parent-child interactions may be negatively affected because of the parents' negative feelings or overcompensation for the child's "disability." Markman et al. (2011) made an

observation concerning potential negative behavior from hearing mothers of deaf children:

> Mothers of deaf children tend to be more controlling in their verbal and nonverbal interactions, spend less time in coordinated joint attention with the child, and have greater difficulty responding to the child's emotional and behavioral cues…the consequences [of these controlling interactions] may include less secure attachment, difficulties sustaining attention and exerting behavioral control, and slower development of communicative competence. (p. 396)

The quality of the parent-child interaction also carries an affective component. Emotional aspects such as joy from playing, warmth and nurturance from loving care, and panic from separation distress help shape language development (Markman et al., 2011). This also contributes to reading development. Positive emotional experiences can encourage a child's desire to explore and engage with the world, which is accompanied by exposure to a diversity of sounds, leading to positive language development (Markman et al., 2011). The parent of the deaf child probably plays the biggest role of educator in the child's language development.

Direction of Paper

In this paper, I will examine my own literacy and academic development as a deaf child with a cochlear implant. I will examine the specific techniques that were used to help me gain the communication skills that led to my literacy development. This information comes from a variety of sources such as educators involved in my early language development and my own experiences. I wish to find out if my experiences and the techniques put into practice by my educators could be helpful to another child with

cochlear implants. Could there be any lessons to be learned from my experiences? Are there any lessons that could be applied broadly? Finally, are there any new topics of study or techniques that could be inspired by my case study?

Method

To investigate my own literacy development while growing up with a CI, I utilized three different sources of data: interviews with family members and professionals, clinical and educational documentation and artifacts, and my own personal experience.

Sources of Data

Interviews. The group of teachers and professionals who were directly involved in my early years of language development with a Cochlear Implant were the best sources of first-hand observations and data that I had the opportunity to investigate. I conducted interviews with key educators in my early years to learn their strategies of teaching me how to listen and speak, and eventually how to read and write.

Participants. Starting with my first teacher, I interviewed my early interventionist. She was involved in my therapy very early on, starting when I was diagnosed with a profound bilateral hearing loss at 18 months. She handed me off to the teachers in the preschool program for children with disabilities I attended when I was 3 and a half years old, but much of what she taught me and my family laid the groundwork for learning communication skills, reading, and writing in future years.

She received her undergraduate degree in Elementary/Special Education and her master's degree is in Deaf Education from University of Pittsburgh. She taught a Special Education class at Pitt for one semester and then at a school for the deaf for six years

after that. She took time off from teaching full time to have her children, opting to teach an evening sign language class at the Community College of Allegheny County as well as tutoring and interpreting for students occasionally. She returned to work 22 years ago, getting involved in Early Intervention, and continues her work in Early Intervention full time today.

I also interviewed my current audiologist from Children's Hospital of Pittsburgh (CHP). She is the coordinator of the CI program at CHP and has practiced for over 20 years.

Finally, the best source of information about my experience as a young child with a CI is my mother. She was my teacher at home everyday and implemented all the different strategies learned in therapy at home.

Semi-structured interview format. To obtain the most useful data from my interviewees, I utilized a semi-structured interview format. After researching different interview styles, the semi-structured format was ideal for my interviews because open-ended questions and subject prompts allow for more freedom for my interviewees to speak about their experiences in their own words (Cohen & Crabtree, 2006). I also prepared a list of topics of interest, tailored to each individual depending on their area of expertise (Cohen & Crabtree, 2006). When we strayed from my list of prepared questions, I used this list of topics to redirect the conversation and for further questioning.

Ethnographic interviews use two types of questions: descriptive and structural questions, both of which I utilized in my interviews. Descriptive questions are broad and general questions and are meant to allow people to describe their experiences in

their own words (Westby, Burda, & Mehta, 2003). For example, I asked each professional her opinion about the parent/caregiver role in a child's reading instruction. Structural questions, on the other hand, are used to further explore details of the experiences described in the responses to the descriptive questions (Westby et al., 2003). For example, I asked for specific examples of what techniques each professional used during my therapy sessions. I asked my participants broad questions about how their fields related to reading development for deaf children, then I narrowed my focus on the answers the interviewees provided to gather more specific information about my own case.

I prepared my questions ahead of time, drawing inspiration and questions from my literature analyses as well as my personal interactions with each person. For example, I phrased the questions I asked my mother in terms of home literacy activities like joint storybook reading and learning vocabulary. She has the most experience with my home living and everyday learning activities. On the other hand, I asked my audiologist and early interventionist about the strategies they used to train me to hear, comprehend, and ultimately develop reading skills and written language. They have more experience in the theories behind my structured therapy activities.

Conducting the interviews. Due to time and location constraints, I conducted my interviews via email. I initiated contact with the contact information I had on hand from previous conversations and appointments. I started my email with a brief description of my research project, asking if each person would like to contribute to my thesis paper. I described my process of outlining all the factors and techniques that contributed to my academic and reading success. I also included my initial questions at

the end of the email message, suggesting that the reader put it into a Word document for easy manipulation and saving. I concluded by asking if each person knew any colleagues that could help me out with their expertise as well as letting them know I would contact them at a later date with any follow up questions I might have.

Documentation. The written clinical records of my education and therapy are my second source of data. My mother and I have saved many records from my early school years such as IEP's and audiology reports. These documents also outline my therapy goals for each school year, showing my reading and academic progress.

Introspection. Finally, I used my own personal experience and memories from growing up with a CI to supplement my data collection and interview results.

Results and Discussion

Case History

I was born in April of 1990 in Pittsburgh, Pennsylvania. Because mandatory newborn hearing screenings were not in place in Pennsylvania when I was born, I was not identified with a hearing loss at birth. I achieved all of my normal developmental milestones within my first year, including gross and fine motor skills, cognitive, social, emotional, and adaptive skills. The only exceptions were hearing and communication skills. There was no known family history of hearing loss. Also, a CT scan of my auditory structures was read as normal.

However, I did not start producing words at around one year old. My mother was using my older sister as a reference, since she had started producing her first words at around that time. My parents' suspicions were raised, and I was taken to the family pediatrician. After an extensive investigation including an OAE (Ototacoustic Emissions)

test and an ABR (Automated Brainstem Response) test, I was diagnosed with a bilateral profound hearing loss at 18 months old. I wore hearing aids for 6 months, but I gained no benefit from the amplified audition. I also wore a "tact-aid," a bracelet with an attached metal plate that picked up vibrations from speech and ambient noise to assist with my environmental sound awareness. I utilized these two devices until I was old enough to meet the FDA's minimum age requirement of 2 years old before I could have cochlear implantation surgery. I had a CI surgery on my left ear on September 10th, 1992, and I was activated one month later.

Early intervention. As soon as I was diagnosed with a bilateral profound hearing loss, I started an early intervention program. My early interventionist created my pre- and post-implantation therapy strategy before I moved to a preschool program specifically designed for children with disabilities when I was 42 months old (3.5 years old). At the very beginning of my early intervention therapy, a method of communication and education needed to be selected. My mother said that the importance of me learning to read and speak drove the choice of communication methods.

Total communication. The method chosen for my education was Total Communication, which is the method of using any means of communication to get the message across. This might include oral language, manual language, lip reading, writing, or pictures (Berke, 2011). My early interventionist suggested sign language to my family because I was receiving no auditory stimulation at all. I needed to have communication with my family in the hiatus before I could receive my CI. My mother chose to utilize Signed Exact English (SEE), a sign system based on English (Stephenson & Zawolkow, 2005). In other words, SEE is a visual representation of spoken English. My mother and

my early interventionist wanted to teach me English word order and grammar that would coincide with reading instead of opting for American Sign Language (ASL), which has a looser sentence and grammatical structure. SEE includes articles, prepositions, and pronouns that are often left out of ASL, which makes it easy to match signing SEE with reading aloud. It was very important to my early interventionist that we always spoke when we signed. She and my mother never signed without any speech accompanying it, so that I could match what I heard acoustically to the signs I saw to learn speech recognition and improve my vocabulary and speech perception.

From November 1992 to the end of 1993 was my "infant" year of listening. I had a very expressive face and I was gesturing and babbling all the time, but I did not produce real words until I was age 3. Interestingly, my younger brother and I started talking around the same time – he was born in March of 1993, only a few months after my activation. We followed similar oral language development tracks.

Interview Results

Each person I interviewed is a professional and an expert in her own respective field, including my mother. In order to synthesize the materials, I emphasized the answers to each question I asked of each person. In some instances, one particular individual might have an overriding expert opinion or experience that I will indicate clearly to represent the direction of reading development I experienced growing up. For example, my mother's experiences and responses dictated how I learned to read at home and what reading activities I participated in outside of therapy.

My own personal experience also plays a big role in how I learned to read, even though the development occurred at a young age. I will also indicate these throughout the responses to the interview questions.

Importance of reading. Reading is emphasized heavily in early intervention and preschool education for children with hearing loss. My mother understood the importance of reading in her children's education and development. She read books to my older sister and me all the time, even before I was diagnosed with a hearing loss. Reading is important in my family, and even before my early interventionist advised to incorporate reading into our everyday activities, my parents and my sister had made reading a part of their normal routine. After I was diagnosed with a hearing loss and we chose the SSE method of communication, my mother read the book aloud and signed at the same time. I read many colorful picture books as well as Gallaudet University published children's books with ASL signs printed below the text.

I was also watching TV with my older sister with the closed captioning, even when I couldn't read. The exposure to closed captioning allowed me to begin matching the visual words to the sounds of those words. Also I did not watch puppet shows, such as Barney, Sesame Street, Muppets, or Mr. Rogers – there were no expressions on the puppets' faces. My sister and I watched Disney movies and cartoons, where the characters had facial expressions that could convey emotions and visual information to viewers.

Beginning of reading instruction. In the beginning, it is important for a good relationship to be established between parents and child so that the quality of interaction is beneficial to the child's development. Engaging in eye contact, turn taking, and listening is a positive way to develop a good quality relationship between parent and

child. Establishing a good connection is the best way to start communication development.

It is important for the parents to pass on the importance of reading to their child. If the parents do not value reading, then it will be difficult for the child to see the benefit of reading for himself or herself. All members of the early intervention team, including the audiologist, emphasize the importance of including reading and literacy development into the family culture.

Listening. One of the key elements in early reading development is "tuning in to listening," as my early interventionist put it. She emphasized the deaf child's "listening plane," the child's natural setting in which the child's optimal attention and listening takes place. For example, it was easy for me to listen to my siblings because they were on the same level as me, talking into my implanted ear as we were playing and interacting. Adults need to sit at ear level or bend down to talk with children with hearing loss to ensure that no auditory information is missed.

Also, my mother taught me to listen for environmental sounds around my house such as the water turning on or the garage door opening. My early interventionist said that it is important to attach meaning to sounds. This sound-meaning connection directly contributes to how some children learn to read by word decoding. Children with hearing loss miss incidental learning, which is learning gained from observing and interacting with the environment, including surrounding people and activities (Family Connect, 2011). The parents and the therapist need to "fill in the blanks" for the child, teaching them explicitly what the sounds they are hearing are.

Parent/caregiver's role in reading instruction. In early intervention, the role of

the therapist is to model activities for the family. Parents/caregivers are active participants in the session. My early interventionist emphasized the teamwork aspect of teaching the child. She said, “Parents share their ideas about what is working at home and what isn’t. Therapists model ideas such as reading techniques and turn taking in communication by playing games and activities.” Early interventionists use the child’s home to their advantage, using familiar toys and games and utilizing family members during each session. My early interventionist also stressed that each therapy session is not about what can be done by the therapist in the allotted time. It is the therapist’s job to empower the parents/caregivers and to “give them the confidence and guidance to help their children reach their goals” outside of the designated therapy sessions. The parents are the lifetime teachers of their children.

Therapy sessions. My early interventionist came to my house for scheduled therapy sessions, and my mother was always involved in the learning activities. The therapist is there to model the activity or interaction that is appropriate to teach certain skills to the child. It is important for the therapist to give the parent the opportunity to take a turn during the session to practice the skill. The parent should not feel like the professional is always in charge of teaching their child. The parents are the lifelong teachers, and they need to be taught the tools to practice with their child.

Whatever books or reading activities my early interventionist did with me at home, my mother re-read the same books, using the techniques my early interventionist taught her. My mother was always in the room whenever my early interventionist visited for a session. She understood that the early interventionist was present only for the short term, and that she was the most important and constant teacher in my life.

Because I did not receive a lot of information through listening early on in my life, I was, and still am, more of a visual learner. One technique my early interventionist emphasized early on was to establish eye contact with me before communicating with me, since I did not respond readily to auditory cues. My early interventionist and my mother made sure to pair basic signs with pictures and objects. Activities that included the labeling technique were important for building my vocabulary. My early interventionist's favorite activity was making homemade books. We used pictures cut from magazines and old family photos to create storybooks with many labels, pairing each written word with a basic sign to give me many visual opportunities to learn the new words. My first homemade book was a family name book, which included photographs of my extended family members with their written names and drawn sign names below the pictures.

Outside of therapy sessions, my mother often included my older sister in our reading activities. My sister would hold the book while my mother signed the book to me, reading aloud together. When I was old enough to read myself, I had learned rudimentary signs and I was able to read aloud and sign simultaneously.

Techniques. Certain techniques that my early interventionist and my audiologist taught to my family members and me focused on different areas of spoken language and reading that contributed to my overall language development.

Learning to listen. Learning to listen to sounds and distinguish between the varieties of sounds is a good tool for developing listening skills essential for reading and auditory comprehension. One particular strategy my early interventionist suggested was to learn nursery rhymes, which helps with developing memory skills, intonation, and

pitch, all of which are important for conversational speech and reading. My audiologist, even though she was not highly involved in my reading development, suggested speech tracking, a technique where the child listens to the book read aloud and follows along visually. Children who already know how to read usually utilize this technique, but it helps develop speech recognition as quickly as possible.

Learning child's name. It is an important first step in literacy development for the child to learn his or her name. Repetition is very useful in this case. Playing with magnetic letters on the fridge to match to the child's name on a piece of paper allows the child to learn the individual letters. Also, repeated writing activities with the child's name is beneficial, such as drawing activities or making bookmarks, placemats, or objects that the child uses regularly with the child's name on it.

Learning signs. Signs that are important to the family are integrated in the teaching activities of each therapy session. Pictures of new signs are posted where everyone can see them, for example, on the refrigerator. Also, the early interventionist should set time aside during each session to teach new signs to the parents and other family members and practice with them. My mother and my early interventionist sometimes made up new signs for concepts that were important to our daily lives. For example, I loved ketchup on my chicken nuggets growing up, and my mother wanted a sign for ketchup so I could ask for it during meal times. A sign for ketchup didn't exist at the time, so my mother and my early interventionist made one up and taught it to me.

Book activities. Making homemade books about the child's specific experiences is a popular technique of my early interventionist. For example, I made a book about a trip to the zoo, cutting out pictures of animals and photographs of myself enjoying the

experience. This activity makes the book meaningful and directly relevant to the child, sparking the child's interest to revisit the experience and the book time and time again.

When reading a book with the child, a parent should pay attention to what their child gets excited about in the book. Let the child take the lead in reading the story, and ask open-ended questions, such as "What happened?" or "What will the character do now?" Ask for the child's predictions for what will happen next. When asking these kinds of questions, it is incredibly important that parents wait for the child's answer when they ask a question. Often times, parents will ask another question if their child doesn't answer right away. The child needs time to formulate their answer in their heads and respond. Patience is key in positive interactions during joint storybook reading, and parents need to learn to give their child room to grow and not come to the rescue all the time. Parents and professionals always need to challenge the children appropriately so that they always have the possibility to get something right without assistance.

Importance of Reading Development Techniques

The techniques highlighted in joint storybook reading are used commonly in the early intervention and speech pathology fields. I was very successful in my own literacy development, thanks to my early interventionist, my audiologist, my hearing support teachers in the mainstream setting, and finally my mother. My case history and outcomes are consistent with the noted positive effects of joint storybook reading, and many of the techniques I learned about in my research are consistent with the techniques my early interventionist utilized and taught to my mother to help develop my communication and reading skills. In particular, labeling was a strategy very important to my early interventionist, used to expand my working vocabulary. Open-ended questions and

predictions during joint storybook reading also were strategies emphasized to improve reading skills in addition to the improved quality of parent-child interactions.

My individual experience is unique to the CI field in that I was so successful at developing speech and reading at a fairly normal rate once I was implanted at age 2. My level of success resulted from my supportive environment and dedicated teachers, as well as my natural cognitive intelligence. The only deficit I had was a hearing loss. Once this deficit was corrected, I was able to develop as close to normally as possible in terms of speech, reading, and academic achievement. The techniques and strategies used to teach me to talk and read are very applicable to other children growing up with a CI. Because I was one of the first children to be implanted at such a young age, I am part of the population that is now reaching adulthood with the same devices we were implanted with as young children.

The other benefit of my case is the young age that I was implanted. I was implanted very early in life, and this contributed to my success in language development. To get the best benefit from a CI, the youngest the child can be implanted is ideal. There is a corresponding impact on development depending on how soon or how late a child is implanted. The CI "produces consistent effect in improving the trajectory of spoken language learning and that age of implantation is a significant predictor of the level of spoken language skills acquired" (Markman et al., 2011, p. 395).

Further research. There are many unanswered questions about typical language development of children with cochlear implants. These questions will not be answered until a large enough sample of profoundly deaf children implanted at a young age is

studied and tested. Also, reading interventions are changing everyday as new educational techniques are invented and put into practice.

Bilateral Cochlear Implantation. The benefits of binaural hearing are now being studied extensively by those in the CI field. The human brain is wired for having two ears and two streams of auditory information. Bilateral CI hearing "confers significant advantages in emergent speech recognition and in language learning" (Markman et al., 2011, p. 392). I only had one CI in my left ear growing up. I still had great success at learning how to talk and how to read and write, but would there be different outcomes if a child is implanted with two CIs?

Conclusion

I started this project with the goal to find out if my specific experiences and the techniques put into practice by my mother and my early interventionist could be beneficial to another child with cochlear implants. Parents are usually devastated when their child is diagnosed with a hearing loss. Everything that they dreamed of for their child seems to disappear when they are told that their child will most likely not be able to speak due to their hearing loss. Thanks to the improving technology of cochlear implants and new educational techniques focused on children with hearing loss, the chances of a deaf child to develop normal communication and reading skills are greatly increased. Most children with CIs are very successful in academics and extracurricular activities, and many go on to college, careers, and to have families of their own – everything that their parents dreamed of for them. The fact that they have a hearing loss should not stop them.

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