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Bridging Theories of Phonological Awareness for Deaf and Hard of Hearing Children: Perspectives from Verbotonal Specialists in the United States

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Bridging Theories of Phonological Awareness for Children who are Deaf and Hard of Hearing:
Observations and Perspectives from Verbotonal Specialists in Senegal and the United States

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Abstract

Approaching literacy instruction for children who are deaf and hard of hearing is one of the most significant challenges within global education because there are various evidence-based theories in the literature as to why children who are deaf and hard of hearing often manifest impaired reading abilities compared to children with normal hearing, and how they may acquire literacy skills differently. This study aims to identify agreements within the literature regarding the role of phonological awareness in literacy acquisition for children who are deaf and hard of hearing, and how tools such as the Verbotonal method of auditory therapy may be used to help children access phonological information. The theoretical framework of ethnomethodology guided the work in this study as participatory observations and ethnographic interviews were the tools used to verify conclusions drawn upon in the literature review. Through the analysis of the data for this study, it was concluded that phonological sensitivity is necessary for children who are deaf and hard of hearing to develop emergent literacy.

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Introduction

Great diversity exists within global education with regards to meeting the individual needs of children who are deaf and hard of hearing, as well as with regards to the theoretical perspectives used to understand how children who are deaf and hard of hearing learn language and literacy (Spencer & Marschark 2010). With recent advances in early identification and technology, each individual with hearing loss presents a unique combination of individual factors such as age of identification, severity and type of hearing loss, presence and type of amplification, and presence of additional learning challenges (Easterbrooks & Beal-Alvarez, 2013). All of these factors will interact within the family context and educational environment to influence the child's ability to access language and develop literacy (Nelson & Crumpton, 2015).

One of the most significant challenges for educators is how to approach literacy instruction for children who are deaf and hard of hearing since it is well documented that the majority of people with hearing loss demonstrate severely lower reading abilities than their hearing counterparts, with many graduating high school with the reading level compared to that of a hearing fourth grader (American Speech-Language-Hearing Association, n.d.; Easterbrooks & Beal-Alvarez, 2013; Miller et al., 2012; Traxler, 2000). It is reported that some individuals who are deaf and hard of hearing are able to master the ability to read (Easterbrooks & Beal-Alvarez, 2013). Therefore researchers are compelled to address the questions of why some individuals who are deaf and hard of hearing struggle with literacy skills and how they may develop these skills compared to the development of children with normal hearing. The primary theoretical debate about how individuals with hearing loss acquire literacy skills revolves around the necessity of developing phonological awareness, as highlighted in the most current two-part special edition of *American Annals of the Deaf*, 159 (4;5).

With so much complexity and recent concern around the issue of understanding literacy acquisition for individuals who are deaf and hard of hearing, it is essential to deepen our knowledge of current perspectives and available tools. The first purpose of this thesis study is to examine the current theories of literacy acquisition for children who are deaf and hard of hearing. A literature review was conducted regarding this issue to develop initial conclusions and research questions. The second purpose of this study is to examine how these literacy acquisition theories relate to the Verbotonal method of auditory therapy, and how the method can be used as a tool by educators to help establish phonological representations for their students. Observations were conducted at a Verbotonal primary school in Dakar, Senegal, and interviews were conducted with Verbotonal specialists in the United States in order to identify important themes and verify conclusions drawn upon in the literature review.

Four primary research questions were developed in order to guide the methodology and develop conclusions. The first research question was: What is the current evidence regarding the role of phonological awareness in literacy acquisition for children who are deaf and hard of hearing? The second research question was: What are the current theories from Verbotonal specialists in the United States regarding the role of phonological awareness in literacy acquisition for children who are deaf and hard of hearing? The third question was: How can the Verbotonal method be used as a tool to develop phonological representations for children who are deaf and hard of hearing? Finally, the last question was: How can the Verbotonal teachers in Senegal use this information to develop lesson plans to help their students with literacy acquisition?

Throughout this paper, the term “deaf and hard of hearing” refers to how an individual’s communication may be impacted by a hearing loss. In terms of the degree of hearing loss, “deaf”

can be described using audiometric findings, or how the hearing loss functionally impacts verbal communication (Schow & Nerbonne, 2012). “Audiometric deafness” refers to an individual who presents a severe hearing loss with a Pure Tone Average or Speech Recognition Threshold poorer than 80 to 90 dB HL (Schow & Nerbonne, 2012). A person who is hard of hearing may have a mild to moderate hearing loss and presents scores below the range of normal hearing (Schow & Nerbonne, 2012). “Functional deafness” or “functionally hard of hearing” are independent of the audiogram, and refers to the inability or limited ability to use hearing for verbal communication (Schow & Nerbonne, 2012). Deafness can also be described by the time of onset relative to the critical period of language development since the time a hearing loss is acquired will impact the extent to which a child will develop normal speech and language (Schow & Nerbonne, 2012). Prelingual deafness refers to a hearing loss present at birth or prior to the development of speech and language and perilingual deafness refers to a hearing loss that is acquired during the time period of first language acquisition (Schow & Nerbonne, 2012). A severe hearing loss that is acquired after age 5 when language is developed is referred to as postlingual deafness, and the term deafened refers to a severe hearing loss acquired after schooling is complete (Schow & Nerbonne, 2012). Finally, the term Deaf refers to individuals who identify with the Deaf community, and typically use a sign language such as American Sign Language (Schow & Nerbonne, 2012). Although there are many other ways to define a hearing loss, the degree and time of onset of a hearing loss are important factors to consider as they will significantly impact a child’s ability to perceive and develop a language (ASHA, n.d.)

A hearing disorder can also be described by a classification system within the World Health Organization called the International Classification of Functioning, Disability, and Health (WHO, 2001). This model aims to develop a common language throughout the world to be used

to describe the overall functioning of an individual with a disability (WHO, 2001). A person without normal hearing “functioning” is considered to have a hearing disorder within this model (Schow & Nerbonne, 2012). This involves three dimensions including the impairment of the body structure and function, the activity limitations, and participation restrictions (WHO, 2001). These factors interact with each other within the context of environmental and personal factors (WHO, 2001). This model considers that each individual with a hearing disorder will be uniquely impacted by the factors associated with the impairment, daily functioning, and context (Schow & Nerbonne, 2012).

Methodology

The theoretical framework of ethnomethodology was used to guide the research produced in this study. This social theory assumes that the dimensions of a social situation can be understood through the individual perspectives of people within that context (Westby, Burda, & Mehta, 2003). In order to establish research questions and complete the current study, the methodology included four parts. First of all, the initial inspiration for this study occurred during observations conducted at a school called the Centre Verbotal de Dakar in the capital city of Senegal, West Africa. Second, a literature review was conducted on theories of literacy acquisition for children who are deaf and hard of hearing, and the primary components and goals of the Verbotal method of auditory therapy. Another important source of information was a conference presentation given by Nelson and Crumpton (2015) at the annual Michigan Speech-Language-Hearing Association conference. The information gathered in this review was then used to construct interview questions. Third, ethnographic interviews were conducted with Verbotal specialists in Knoxville and Maryville, Tennessee, United States. Lastly, analysis of the information collected during the interviews was used to develop conclusions.

Observations at the Centre Verbotonal de Dakar

The initial component of this study began during a three-week study abroad program in Dakar, Senegal called Cultural Connections in Senegal: Causes of Globalization and Consequences on Systems. One requirement of the program included spending 6 days working at a lab-site related to a specific field of study. I participated in a group of three speech-language pathology students and our professor who visited the Centre Verbotonal de Dakar. The teachers at this school requested that we develop two lesson plans to target reading comprehension for their students. In order to develop lesson plans that were in line with their current practices, we observed the classroom interactions to understand how the teachers were already addressing language and literacy. There were about five classrooms ranging from preschool to fourth grade that we observed for one hour at a time. We sat in the back of the classroom and took notes on the interaction between the teachers and students. We were specifically observing how the classroom was set up, how the teacher communicated with the students, how language was targeted within the lesson, and how the teacher incorporated printed letters and words into the lesson. We had the help of a translator who informed us of what was being spoken in French. We then used the results of our observations and evidence-based articles to construct our lesson plans to present to the teachers and faculty. During our presentations, additional observations were noted regarding the teachers' interpretations of our lesson plans.

Literature Review

The next step of the current study was to conduct a literature review and develop initial conclusions. Scholarly databases were used to locate the literature including those connected to Western Michigan University's research library and the American Speech-Language-Hearing Association. Such databases included PubMed, ERIC, ProQuest Research Library, and Google

Scholar. Within these databases, a wide net of key words were used: hearing loss, deaf and hard of hearing, reading, literacy acquisition, phonological awareness, phonemic awareness, alphabetic principle, comprehension, Verbotonal method, globalization, Senegal, United States. Literature was also located by examining recent editions of academic journals including *American Annals of the Deaf* and the *Journal of Deaf Studies and Deaf Education*. Articles were analyzed if they were peer reviewed and published within the last ten years (2005-2015). Once an article was analyzed for validity and relevance, it was sorted into a category of concern: interaction between language and literacy, the balanced literacy model and role of phonological awareness in literacy acquisition, theories related to literacy acquisition for children who are deaf and hard of hearing, and the Verbotonal method. Two recent books were also used to understand the current theoretical and practical perspectives of this issue: *Literacy Instruction for Students who are Deaf and Hard of Hearing* (Easterbrooks & Beal-Alvarez, 2013), and *Evidence-based Practice in Educating Deaf and Hard-of-Hearing Students* (Spencer & Marschark, 2010). This collection of literature was then used as data from which to draw conclusions and make connections about theories related to literacy acquisition for children who are deaf and hard of hearing and how the Verbotonal method can be used as a tool within these theoretical perspectives. The conclusions were used to construct interview questions and assess the implications of outcomes.

Ethnographic Interview

Ethnographic interviews were conducted in order to develop and verify conclusions related to the primary research questions in this study. Conducting an ethnographic interview can be viewed as a series of friendly conversations where the interviewer uses many levels of questions to understand the assumptions, motivations, and perspectives experienced by the

interviewee (Westby et al., 2003). The interviewer can begin by asking grand-tour questions that elicit information about broad experiences and information that is important to the interviewee. The interviewer can then use this information to develop mini-tour questions that provide an understanding of specific activities and events (Westby et al., 2003). If needed, these mini-tour questions are followed by structural questions to understand specific relationships between concepts. This form of interviewing provides qualitative data about interviewee perspectives within a given social situation.

Questions were asked concerning the participants' experiences with the Verbotonal method and the language and literacy development of children with whom they have worked. Interviewees were asked to elaborate on common themes such as how the Verbotonal method has developed in the United States and how it has been adapted to the curriculum. They were also asked to elaborate on their perception of how children who are deaf and hard of hearing develop literacy skills compared to children with normal hearing, specifically concerning the role of phonological awareness in the process. They were also asked to discuss the role of sign language for children who do not have auditory access to spoken language. The information gathered within the interviews was then analyzed to determine common themes and agreements. These agreements were then used to verify preliminary conclusions established in the literature review. Finally, the evidence was then used to develop a chart of activities that could be used to target phonological awareness for children who are deaf and hard of hearing using the Verbotonal method. All interviews were conducted in either Knoxville, Tennessee or Maryville, Tennessee at a specific location of convenience for the participant including the following locations: school classroom, restaurant, personal home, training center, and research facility.

Participants

Participants were selected using purposive sampling. This type of sampling involves the researcher selecting participants based on the particular type of background knowledge they possess. Their contact information was found online via websites related to the Verbotonal method of auditory therapy in the United States. Five Verbotonal experts were included in the current study and were given a title to protect their confidentiality. I interviewed a university professor (UP) who has been instrumental in the development of Verbotonal in the United States and has written extensive literature on the method. I interviewed a therapy expert and trainer (TT) who is the director of a Verbotonal training program and has had a career of working with children who are deaf and hard of hearing and children who have auditory processing disorders. I interviewed two teachers who have had years of experience using this method in the public school system. One is currently a preschool teacher (PT), and the other is an elementary school teacher (ET). Finally, I interviewed a research audiologist (RA) who conducts research on the Verbotonal method and concepts related to the language development of children who are deaf and hard of hearing, with additional expertise from her career as a deaf educator. Interviews were recorded and transcribed in order to accurately assess the content presented. In order to ensure the privacy of participants, recordings were deleted after they were transcribed.

Results

Observations at the Verbotonal Centre de Dakar

The teachers and faculty at the Centre Verbotonal de Dakar were hospitable and gracious toward our group of students and our professor. They allowed us to observe their classrooms and were willing to answer any questions that we had. The teachers were all experts in using the Verbotonal method of auditory therapy through their experience using the equipment and implementing the approach. They shared with us that the purpose of this school is to develop the

speech and hearing abilities of children who are deaf and hard of hearing so that they can learn the French language in order to be integrated into a normal primary classroom in the country. Since this is one of the only schools in the country to offer services to this population, many of the students come from remote locations and stay with host families in the city. Some of the children at the school have access to hearing aids from outside funding resources in France. However, many of the students do not have this access to amplification devices.

Common observations were noted regarding each classroom observed. Each teacher utilized the Verbotonal equipment by wearing a chest piece with a microphone that was attached to a center amplifying box. The children wore headphones and wrist vibrators that were also attached to this center amplifier so they could hear and feel the rhythm and parameters of speech. The headphones allowed the children to gain access to amplified sound through residual hearing. The wrist vibrators allowed them to augment the acoustic information through a tactile channel. The teachers also provided the children with a proprioceptive channel by using the traditional body movements of the Verbotonal method that are based on the parameters of speech such as tension and duration. Although the use of sign language was not encouraged, it was observed that the children communicated with each other through a signed system. It was observed that the teachers also utilized sign gestures as a source of communication with the students.

The youngest children were preschool and kindergarten aged, and were assigned to “rhythm classrooms.” The teacher and children sat in a big circle on the floor. The primary focus of the lesson was to have each child repeat individual phonemes. The teacher would say a sound using a body movement that was associated with the parameters of that sound, such as the manner of tongue articulation. One by one, the preschool aged children were asked to repeat the phoneme with the body movement. The body movements are an important part of the Verbotonal

method because they provide the child with a proprioceptive channel to access the acoustic information. The teacher did not provide letter representations of the phonemes during the lesson. The kindergarten aged children were asked to repeat full words instead of individual phonemes. The teacher provided picture cues to help the children comprehend the vocabulary, however the printed form of the word was not used in this lesson either. It was observed that the children with hearing aids were more intelligible than children without hearing aids at both the phoneme and word levels.

The next level of classrooms were called “transition classrooms,” and consisted of children with ages from first to third grade. These rooms were set up with individual desks for each child and a chalkboard at the front of the room that was referenced throughout the lessons. Each classroom had a specific subject of study including English and math. For the English classrooms, children were asked to repeat full sentences. The Verbotonal hand movements were still used as a prompt to help the child use correct articulation and rhythm. The words and sentences were written on the board as a way to instruct literacy acquisition. The children in the oldest transition classroom also had individual chalk boards that they could use to practice writing the words as well.

The oldest children at the school were in the “primary classroom.” The lessons that we observed involved the children silently reading a passage that was written on the board, and answering questions to assess their comprehension. For example, the passage they were working on was about the World Cup that was happening at that time. The teacher first went over individual vocabulary words that were used within the passage as a way to help with comprehension. He then instructed them to read the passage silently, which was followed by him asking questions to the class. These questions involved concepts related to who, what, where,

when, and why, and were answered by the students coming up to the board to point out the answer in the passage, or by writing the answer on their individual chalkboard. It was observed that the students had difficulty differentiating between these concepts. This form of reading comprehension instruction is known as the basic reading approach, and is supported by evidence-based literature (Al-Hilawani, 2003).

My peers and I were asked to create a lesson plan for the primary classroom that would help the students with reading comprehension. We created a lesson plan based on our classroom observations and an evidence-based article regarding reading comprehension for students who are deaf and hard of hearing. Our plan utilized a concept map of “who, what, where, when, and why” questions that could be asked prior to silent reading to help prepare them for the content. We presented this lesson plan to the teachers and faculty at the school. It was observed that they found the lesson plan useful, and would continue to incorporate its principles.

My peers and I also created a lesson plan for the children in the youngest transition classroom. These children were around the age of first graders. Based on our previous understanding of the importance of milestones related to phonological awareness skills for children with normal hearing, we decided to devise a lesson plan that would target the alphabetic principle. The alphabetic principle is the knowledge that written graphemes, or letters, correspond to the phonemes, or sounds, of spoken words (Easterbrooks & Beal-Alvarez, 2013). Our lesson plan involved giving each child a piece of paper with the beginning letter and picture of the target word on which they were working. For example, they were working on the word “pomme” (apple), so we had a P at the top of the page and an apple cutout that they could glue to the paper. However, while we were presenting the lesson plan, the teachers expressed that the lesson may not have been appropriate for this group based on the children’s knowledge of letters.

We did not want the lesson plan to be inappropriate for the children, so we altered the activity to focus on the picture cue and spoken form of the word without using the letter. The teachers expressed interest in knowing more about ways to introduce letters to young learners. The observations conducted at this school guided the development of research questions in the present study in order to provide teachers of the Verbotonal method with lesson plans from the evidence-based literature in order to target phonological awareness.

Literature Review

Language and Literacy

It is important to examine the continuum of learning environments that exist for children who are deaf and hard of hearing in order to provide a contextual framework for the assumptions identified within this study. Each environment facilitates language acquisition through a communication mode that places varying amounts of emphasis on auditory input and visual input (Spencer & Marschark, 2010). Approaches referred to as “oral” or “auditory-oral” focus on the production and understanding of spoken language through the auditory system, in addition to some visual information provided by context and lip/speechreading (Spencer & Marschark, 2010). In contrast, “manual” or sign-based educational settings focus on the production and processing of visual symbols, which include natural sign languages and created sign systems (Spencer & Marschark, 2010). Within the continuum lie various levels of oral and manual support, with language environments such as Simultaneous Communication, or Sign Supported Speech (Spencer & Marschark, 2010).

This study focuses primarily on the Verbotonal method, which reflects the assumptions of an auditory-oral perspective. The main goal of these approaches is for children who are deaf and hard of hearing to develop spoken language skills (Spencer & Marschark, 2010). Proponents

believe these individuals gain the most benefit from being able to communicate effectively in the language of the surrounding culture (Spencer & Marschark, 2010). With recent strides such as Universal Newborn Hearing Screenings, and an increased access to technology such as cochlear implants, acquisition of spoken language is much more feasible for children who are deaf and hard of hearing than ever before (Lederberg, Miller, Easterbrooks & Connor, 2014). It is important to keep in mind, however, that these advances and resources are not always available to individuals in developing countries, and individuals without access to sound must be given alternative forms of language to support communication and a foundation for further learning (Spencer & Marschark, 2010; Lederberg et al., 2014). Reviewing the current research may provide guidance and ideas for culturally responsive practices, as well as provide a basis for program development in these countries (Spencer & Marschark, 2010).

Regardless of the language and mode of communication, children who are deaf and hard of hearing need to be exposed to complex language (Humphries et al., 2012; Nelson & Crumpton, 2015). Children that do not have access to spoken or signed language during early childhood years will miss the period of greatest brain plasticity, and may not ever be able to develop fluent language (Humphries et al., 2012). This is harmful to the academic success of a child, since the foundation of a first language is the biggest cognitive correlate to literacy development (Humphries et al., 2012). Language encompasses many skills that are fundamental to early and long term literacy success—vocabulary, syntax, discourse, and phonology (Mayer & Trezek, 2015). These skills create interactive levels of language that are embedded within the modalities of thinking, writing, reading, speaking, and listening (Nelson & Crumpton, 2015). An individual receives language input through the modalities of listening, reading, or sign language. He or she creates meaning through the levels of decoding at the sound and word level, and

comprehension at the sentence and discourse level. An individual will then express language output through speaking, writing, or signing, and will use the same levels of language to create meaning. If one modality is impaired, such as the ability to listen due to various causes of hearing impairment, it will negatively impact each other modality (Nelson & Crumpton, 2015). Fortunately, however, the opposite of that is also true; that is, strengthening any particular modality will positively impact the others (Nelson & Crumpton, 2015). The importance of this theory is emphasized within the newly developed language assessment tool called TILLS, the Test of Integrated Language & Literacy Skills (Nelson, Plante, Helm-Estabrooks, & Hotz, 2015).

Balanced Literacy Model and Phonological Awareness Definition

As stated, one of the biggest challenges within the current literature regarding deaf education is establishing a common understanding of how children who are deaf and hard of hearing learn to read (Andrews & Wang, 2015). In trying to find an explanation for why deaf readers often manifest impaired reading abilities, researchers usually frame their position within an assumption of whether or not these individuals follow the same developmental trajectory of literacy acquisition as hearing individuals, specifically stressing the importance or insignificance of phonological awareness skills (Andrews & Wang, 2015; Mayer & Trezek, 2014). Therefore, it is important to outline the current understanding of the balanced literacy model used within current curricula, and identify a common definition of phonological awareness skills.

Since the middle of the 20th century, there has been debate about the most effective methods for reading instruction including bottom-up and top-down perspectives (Easterbrooks & Beal-Alvarez, 2013). Bottom-up approaches focus on the foundational aspects of reading like decoding, phonics, and word analysis, where as top-down approaches focus on how meaning is constructed by activating and applying prior knowledge (Easterbrooks & Beal-Alvarez, 2013). In

1999, a group of experts called the National Reading Panel (NRP) established that both perspectives offered an important piece to the literacy process and should be explicitly addressed through five key factors: phonemic awareness, alphabets (letter knowledge, phonological awareness, and phonics), vocabulary, text comprehension, and fluency (National Institute of Child Health and Human Development, 2000). Although the literature has been inconclusive regarding how these factors relate to children who are deaf and hard of hearing, common agreements amongst researchers have been identified in the most recent issue of *American Annals of the Deaf* (Andrews & Wang, 2015).

In order to understand the significance of the theories and assumptions explored throughout this paper, it is important to define common concepts related to the process of decoding. Broadly and linguistically speaking, the study of phonology refers to the smallest contrastive units of language which can be identified as sounds in spoken languages or fingerspelling in natural sign languages (Andrews & Wang, 2015). Phonological awareness is most often defined as an umbrella concept that involves a variety of sound-related decoding skills that are based on the relationship between graphemes and phonemes (Easterbrooks & Beal-Alvarez, 2013). This term encompasses both phonemic awareness and the alphabetic principle, and involves the understanding that words are made up of sounds that can be manipulated, and that sounds and print are connected (Andrews & Wang, 2015). Phonemic awareness refers to the conceptual and explicit understanding of distinctive features of individual phonemes, and is developed through listening alone (Easterbrooks & Beal-Alvarez, 2013). Phonemic awareness skills include skills such as initial letter identification and alliteration (identifying words that begin with the certain sounds, e.g., “What is the first sound you hear in b-oat, boat?”), elision (dropping a sound to create new meaning), segmenting (how many phonemes are in a word),

blending (putting parts of a word together), and rhymes (Easterbrooks & Beal-Alvarez, 2013).

The most salient distinction between these two concepts is that phonological awareness refers to specific abilities related to the alphabetic principle, where as phonemic awareness refers to a conceptual understanding of distinctive features (Mayer & Trezek, 2014).

Qualitatively Similar Hypothesis

The most common paradigm in the research literature is called the “qualitative similarity hypothesis,” since it assumes that literacy acquisition for children who are deaf and hard of hearing is qualitatively similar but quantitatively delayed in comparison to hearing children (Andrews & Wang, 2015; Mayer & Trezek, 2014; Wang, Trezek, Luckner, & Paul, 2008). This hypothesis assumes phonological skills are necessary to foster reading comprehension for both hearing and deaf individuals (Mayer & Trezek, 2014; Miller, 2010; Miller et al., 2012; Wang et al., 2008). Proponents of this theory argue phonological decoding skills are necessary in order to develop an understanding of the phoneme-grapheme link which will then facilitate adequate reading skills in both deaf and hearing individuals (Wang et al., 2008). They also argue that phonological units are not modality specific and can be derived through visual, kinesthetic, or tactile channels with coding systems such as Visual Phonics and Cued Speech (Wang et al., 2008). This theory is most in line with auditory-oral language learning approaches because it is assumed that by developing spoken language skills, these individuals will gain access to adequate phonological information and will be able to acquire emergent literacy skills similar to their hearing peers. (Spencer & Marschark, 2010).

The most current evaluation of this hypothesis is highlighted in the most recent special two-part issue of the academic journal *American Annals of the Deaf* 159 (4;5). The purpose of these special issues was to gather various researchers in order to assess the validity of the

qualitatively similar hypothesis. It was determined that the common agreement among researchers is that phonology is important to the reading process in order to develop segmentation skills that allow the brain to store words (Andrews & Wang, 2015). It was also determined that the qualitative similarity hypothesis is tenable only if it is independent of a child's language modality, meaning that phonological skills can be derived regardless of whether the child uses spoken or signed language (Andrews & Wang, 2015).

Research supporting this theory consists of evidence documenting the positive association between phonological awareness and reading development with visual and tactile channels such as Cued Speech and Visual Phonics. Cued Speech involves the speaker complimenting the lip gestures of speech with manual cues (Colin, Leybaert, Ecalte, & Magnan, 2013; Colin et al., 2007; Wang et al., 2008). A single cue consists of two parameters: how the hand is shaped, and where the hand is placed around the mouth (Colin et al., 2013; Colin et al., 2007). While speech reading can only give information about place of articulation, "the integration of the visual information leads to a single, unambiguous, phonological percept that children cannot deduce from either source alone" (Colin et al., 2013, p. 1782). Longitudinal studies show that children with early exposure to Cued Speech produce better phonological awareness skills than those who were exposed later on, suggesting the importance of early exposure to Cued Speech in helping children produce phonological awareness skills (Colin et al., 2007; Colin et al., 2013).

Another example of how this theory is supported within current research is a recent study conducted by Herman, Roy, and Kyle (2014) that examined how the reading difficulties demonstrated by children who are deaf compared to the nature of difficulties demonstrated by children with normal hearing ability and dyslexia. They found that children who were deaf who

used spoken language demonstrated similar weaknesses compared to hearing children with dyslexia, and concluded that phonological skills play a central role in reading for both groups (Herman et al. 2014). They proposed an interactive model of phonological awareness, vocabulary, and single word reading, suggesting that the limited exposure to language experienced by most individuals who are deaf affects each area of the model. They urge the implementation of individualized interventions known to be affective with hearing dyslexic children, and state that deaf children develop their phonological skills by combining information attained through listening with hearing aids or cochlear implants with information obtained from observable lip-patterns (Herman et al., 2014).

Another recent study that supports this hypothesis was presented by Nelson (2015) regarding the results of administering the newly developed TILLS assessment test with two deaf children in order to find areas of most difficulty. Results highlight that deaf children demonstrate phonological representations through multiple modalities and cues. Participants included an 8 year old boy that was identified with hearing loss as a newborn, and a 13 year old boy that was identified with hearing loss at 2 years of age. They found that these two children manifested the most difficulty in the areas of vocabulary, phonemic awareness and non-word repetition. The task of non-word repetition was administered through an audio recording with no visual cues, which suggests that they were missing an important component of their phonological representation. Nelson (2015) stated that it is important to explicitly teach phonemic awareness and phonics together in order to provide these children with concrete visual cues to help them differentiate between sounds. It was also stated that by not teaching phonics and providing these children early opportunities to play with sounds and pull them apart, professionals serving

children who are deaf and hard of hearing are in fact doing a huge disservice (Nelson & Crumpton, 2015).

Another more recent method that is based on the qualitative similarity hypothesis is called *Foundations for Literacy*, which consists of an early literacy intervention program specifically designed for deaf and hard of hearing students with functional hearing (Lederberg et al., 2014). It was designed with the assumption that both hearing and deaf and hard of hearing children will have better reading outcomes with a foundation in two types of skills: code-based skills (phonological awareness and alphabetic knowledge) and meaning based skills (vocabulary) (Lederberg et al., 2014). Each unit within the strategy explicitly teaches letter(s)-sound correspondences and vocabulary in a language-rich narrative context. Each story focuses on teaching a specific phoneme. The story teaches multiple ways to spell the phoneme, with meaningful semantic associations provided through multisensory representations (Lederberg et al., 2014). The results and discussion of this strategy suggest that explicitly teaching deaf and hard of hearing children these skills help them learn how to read (Lederberg et al., 2014).

Qualitatively Different Hypothesis

Another paradigm within the research assumes that deaf individuals are qualitatively different than hearing individuals, and use different processes to develop reading ability (Wang et al., 2009). This theory assumes that these individuals can bypass phonology and become proficient readers (Mayer & Trezek, 2015). Proponents of this theory suggest that deaf and hard of hearing individuals struggle with extracting meaning from text because they often lack adequate structural (syntactic) knowledge that allows them to integrate words into a broader supra-lexical (sentence) level (Miller et al., 2012). While it is important to process words at the lexical level, it is assumed that a proper understanding of text can only take place when the

reader is able to determine the final meaning based upon this structural knowledge (Miller, 2010). This hypothesis is supported by studies that suggest children who are prelingually deaf tend to ignore structural information (particularly word order), and rely on a top-down manner of comprehension by mapping the content words and applying them to prior knowledge (Miller et al., 2012).

Researchers that support this theory have not found a significant relationship between phonological awareness and reading comprehension, suggesting these skills may not be a “necessary” condition for reading acquisition in DHH students (Allen et al., 2009; McQuarrie & Parrila, 2009; Miller, 2010; Miller et al., 2012). A study conducted by McQuarrie and Parrila (2009) examined the performance of deaf individuals on experimental tasks designed to assess the syllable, rhyme, and phonemic levels of phonological awareness. They found similar insensitivity to phonological structure regardless of reading ability (McQuarrie & Parilla, 2009). They state that that their findings are “inconsistent with traditional equivalence proposals in the deafness literature that awareness of phonological structure is a developing skill that improves with age and/or reading ability” (McQuarrie & Parilla, 2009, p. 12-13).

Another study that failed to find this causal relationship was conducted by Miller and others (2012) as part of an international effort to move toward a reading theory for the prelingually deaf. They collected data from 213 sixth through tenth graders with prelingual deafness from four orthographic backgrounds (Hebrew, Arabic, English, and German). To test the validity of the hypothesis that phonology is central to the reading process, Miller and others used a word processing experiment involving a real word and pseudohomophone condition. They assessed the reading ability of each participant and formed three groups of readers each with different levels of comprehension. They found that “the qualitative (error rate) and

quantitative (reaction time) phonological processing effects exhibited by the three profiles were not found to be different” (Miller et al., 2012, p. 454). This corroborates other evidence that some deaf individuals can process written words with high efficiency even though they do not have efficient phonological processing skills, suggesting these skills may not be a necessary condition for reading acquisition (Allen et al., 2009; Miller, 2010; Miller et al. 2012).

Within the same study, Miller and others (2012) also investigated the qualitatively different hypothesis by examining deaf readers’ abilities in other areas of reading ability. They administered a sentence comprehension test to assess if the participants’ reading comprehension was determined by their ability to apply structural knowledge (Miller et al., 2012). Half of the sentences were semantically plausible (SP) and half were semantically implausible (SI) to see if deaf readers were able to comprehend sentences that required syntactic knowledge to extract meaning. In looking at how skilled readers and less skilled readers were able to comprehend both sentence types, they found that the comprehension gap between both groups was about three times larger for SI sentences than for SP ones. In sum, they suggested that the findings support the assertion that the poor comprehension skills demonstrated by prelingually deaf readers were primarily related to variance in their ability to apply prior structural knowledge, and that children who are deaf and hard of hearing do not necessarily need phonological awareness skills (Miller et al., 2012).

Agreements

Although there has been inconclusive research within the last decade regarding the necessity for children who are deaf and hard of hearing to develop phonological awareness skills in learning to read, the recent two-part issue of *American Annals of the Deaf* identified common agreements between proponents of both hypotheses. All contributors supported the view that

early, consistent, and high-quality language input in either spoken language or signed language is needed for the child to build a foundation for reading development (Andrews & Wang, 2015). It was also agreed that phonological sensitivity is necessary but not sufficient in learning to read, and the qualitatively similar hypothesis is tenable if it is independent of the language, meaning that it can be based on a spoken language or a signed language (Andrews & Wang, 2015).

Therefore it can be agreed that children who are deaf and hard of hearing must pass the same developmental milestones as hearing children, such as emergent literacy (Andrews & Wang, 2015). Two contributors stated that “since phonological skills are implicit in language acquisition in the first place, the argument of whether or not deaf individuals need phonological understanding has persisted for far too long,” and that future research should focus on how the process of learning to read may be manifested differently in deaf readers (Mayer & Trezek, 2014).

The Verbotonal Method

Finally, I reviewed the current literature on the Verbotonal method of auditory therapy. A brief description of the method is provided within the section, and is elaborated within the interview results of the study. This method has been used on a global scale since the 1950s when it was first introduced by the Croatian linguist and speech scientist, Petar Guberina (Asp, 2012; Santore, 2013). The method was formed under the belief that acoustic information about sound quality could be augmented by the use of visual, kinesthetic, and proprioceptive clues (Santore, 2013). The purpose was to help deaf and hard of hearing individuals develop natural speech patterns through providing access to the prosodic parameters of speech including rhythm and intonation. It utilizes multiple sensory modalities to help the child access these suprasegmental parameters of speech, such as auditory, visual, tactile, vestibular, and kinesthetic modalities

(Asp, 2012). These modalities are accessed through the use of body movements that help the child perceive how a sound feels within his or her body. Through multisensory input and neuroplasticity (especially during the critical period of language development), the method is “designed to provide the important link between the child’s auditory cortex (auditory) and associated sensory areas (vestibular and speech); or in simple terms, the link between the child’s brain, body, and tongue” (Asp, 2012, p. 1).

The primary component of this method is a stimulus-response approach which is used to help the child approximate toward correct productions of sounds and rhythms (The Hearing and Speech Foundation, 2012). The clinician first presents a stimulus to the child using natural rhythm and intonation. The clinician then listens to the child produce the sound or rhythm, and analyzes the response in terms of the parameters of speech (frequency, intensity, time, tension, pause, intonation, and rhythm). The clinician then alters the stimulus in order to provide the child with optimal perception of the sound based on the parameters. “The ultimate goal of the stimulus-response therapy technique is to make the optimum listening condition similar to the optimum for a normal hearing person” (HSF, 2012).

There are many other components to this method that provide an integrative approach to language development. It emphasizes that therapy be conducted in an active situational environment that the child is interested in. The teacher or clinician uses objects to draw the child into an active environment, and then works with the child at his or her level of language through role-playing and imitation (HSF, 2012). It also emphasizes the importance of integrating the muscular forces of the body into the development of natural speech patterns. “The clinician uses macro movements to indirectly train the micro movements of the articulators” (HSF, 2012).

Lastly, it emphasizes the use of music and natural nursery rhymes to help develop rhythm and intonation. The use of these method help integrate the modalities of perception and production.

This method has recently been used to create an early literacy program called Sounds in Motion (Santore, 2013). This program utilizes the body movements within the Verbotonal method to target the foundational aspects of literacy discussed in this study, including phonemic awareness, articulation stimulation, and auditory perception. It pairs kinesthetic gross motor movements with phonemes to teach the association between sounds and symbols. The program is intended for 15 weekly sessions, each lasting 30-40 minutes. It should be implemented by both the teacher and speech language pathologist (Santore, 2013). This program provides a framework for how phonological awareness skills can be targeted within a standardized curriculum.

Preliminary Conclusions

Through my preliminary literature review I was able to develop conclusions regarding my first research question: What are the current evidence-based theories regarding the role of phonological awareness in literacy acquisition for deaf and hard of hearing children? First of all, it can be concluded that researchers supporting each theory propose the most important component of literacy acquisition is the strong foundation of language. Children without adequate access to sound must be given alternative forms of communication such as sign language, especially during their critical years of brain development. Language and literacy are inextricably linked through an interactive relationship of modalities such understanding (listening and reading), and producing (speaking and spelling) language within various levels of decoding and comprehension.

Secondly, it can be concluded that there are primarily two perspectives within the literature regarding the role of phonological awareness skills in learning to read. Proponents of

the qualitatively similar hypothesis believe that children who are deaf and hard of hearing must possess phonological awareness skills much like their hearing counterparts. It is assumed that these children can use alternative routes to access phonological information such as through visual, tactile, and kinesthetic sensory pathways. If educators subscribe to this hypothesis, it is necessary that they explicitly address all of the recommendations set forth by the National Reading Panel, including phonemic awareness and alphabetic knowledge (2000).

On the other hand, proponents of the qualitatively different hypothesis believe that deaf and hard of hearing individuals do not need to gain phonological representations in the same way as hearing children. Research that supports this theory fails to find a significant causal relationship between phonological awareness skills and adequate reading abilities for children who are deaf and hard of hearing. If educators subscribe to this hypothesis, it is necessary to conduct alternative research to understand the unique processes that these children utilize in learning to read.

Overall, researchers agree that phonological sensitivity is a significant component in literacy acquisition for children who are deaf and hard of hearing, and therefore these children must pass the same developmental milestones as hearing children. Researchers also agree that alternative visual, tactile, and kinesthetic channels can be used to help these children develop this sensitivity. This information provides a framework for the data gathered from the interviews with Verbotonal specialists. It will be concluded which hypothesis is most in line with the perspectives of Verbotonal specialists. These perspectives will provide insight into how educators using this method around the world can target emergent literacy skills of the individuals they treat.

Interviews

Themes and Quotes:

The results from the interviews yielded an understanding of how the Verbotonal method has been adapted within the United States, and how it can be used as a tool to help deaf and hard of hearing children develop language and literacy skills. Prior to the interviews I identified common themes based on the literature review, and developed broad questions to understand the social context within the United States. Below I list the themes presented within the interviews and quotes provided by the participants. I also created a table of the quotes related to phonological awareness theory and practice for children who are deaf and hard of hearing (see Appendix A).

1. The development of the Verbotonal Method in the United States:

During the interview I asked about the progression of the Verbotonal method since it was first introduced by Guberina in the 1950s. The method has been used in over 50 countries throughout the world because of the many connections that Guberina had as a world renowned linguist and politician (TT, personal communication, March 11, 2015). The method was introduced and developed in the United States through various research grants at the Ohio State University and the University of Tennessee. Participants agreed that the biggest challenge to spreading the use of the method was the lack of research. During the 1950's clinical methods developed differently in the United States than in Europe, and there was not much communication between the two. Whereas Americans valued standardization and using research to develop methods, Guberina was a French man and was more philosophical in his ideas (UP, personal communication, March 10, 2015; TT, personal communication, March 11, 2015). He was "ahead of his time" in that his ideas are reflective of the current integrative understanding of using multiple modalities to access phonological representations (TT, personal communication,

March 11, 2015). In addition, many of the Verbotonal experts in the United States were the ones actually conducting the therapy and were not able to standardize and “cookbook” the method (TT, personal communication, March 11, 2015).

2. How the Verbotonal method has been adapted to the curriculum:

The Verbotonal method was first used in the United States through its traditional development as a full-classroom setting. Currently however, the school district referenced in this study uses the nation-wide curricular standards of High Scope for preschool and the Common Core for elementary. This means that Verbotonal no longer has the capacity to be implemented as the original “whole-package” approach (TT, personal communication, March 11, 2015). However, the teachers in this study agree that they have had success with “utilizing the tools and techniques of the Verbotonal method while implementing the Highscope curriculum” (PT, personal communication, March 11, 2015). Both the High Scope curriculum and the Verbotonal method are based on a situational style of teaching, so it is easy to meet the child where he or she is at and use body movements or various rhythm patterns to help the child access the components of language in a natural way (PT, personal communication, March 11, 2015; ET, personal communication, March 10, 2015). Since the students are expected to be integrated into a normal classroom and follow the same curricular standards regardless of hearing loss, it is important that they are able to develop their language skills as much as possible before being returning to their neighborhood schools (ET, personal communication, March 10, 2015).

3. How does sign language relate to the Verbotonal method?

The next theme that was discussed in each interview was how sign language may help supplement language and literacy for deaf and hard of hearing children using oral methods such as the Verbotonal method. The traditional form of the Verbotonal method does not encourage

signing because the goal is auditory and speech development (RA, personal communication, March 12, 2015). However, each participant in this study acknowledged the value of visual input to aid language and literacy acquisition. Since deaf children have a limited auditory input, signing can help them gain access to language and learn about the communication exchange (RA, personal communication, March 12, 2015). For children in developing countries that do not have access to sound, signing is probably the best option for their language development (RA, personal communication, March 12, 2015).

4. How can the Verbotonal method be used to help develop phonological awareness skills?

In relation to the purpose of the present study, the theme of phonological awareness was brought up with each participant. Results showed that the understanding of phonological awareness skills encompasses a vast range of abilities that are necessary for the language and literacy development of children who are deaf and hard of hearing. It is also agreed that these skills develop similarly to hearing children. Since phonological awareness includes both phonemic awareness and the alphabetic principle, results are organized according to each level. A table, provided in Appendix A, is related to common agreements and practical implications.

First of all, phonemic awareness begins with the ability to perceive rhythm and speech patterns (RA, personal communication, March 12, 2015). For normally hearing children, this begins in the womb and they are born with the priming necessary for babbling and speech development. (TT, personal communication, March 11, 2015). “Phonotactic probability is another name for phonological awareness for babies,” and involves the ability to recognize patterns for where words begin and end (RA, personal communication, March 12, 2015). This ability is developed through infant directed speech, or acoustic highlighting, which gives

children a model of exaggerated rhythm and intonation. Children with hearing loss do not have access to the same cues as hearing children, so methods like Verbotonal are extremely important for acoustic highlighting (RA, personal communication, March 12, 2015). In fact, this participant (RA) recently completed a doctoral dissertation that found hearing impaired babies had higher accuracy and reaction time for infant directed speech for a longer period of time (RA, personal communication, March 12, 2015). This finding suggests babies with hearing loss benefit from exaggerated rhythm and intonation in the same way that hearing children do, except they need longer exposure due to their delayed “hearing age,” or the age at which they receive amplification devices (RA, personal communication, March 12, 2015). Verbotonal clinicians expose the child to exaggerated babbling rhythms with various intonations to help the child perceive the use of rhythm (TT, personal communication, March 11, 2015). Even during the preschool years it is important to explicitly target rhythm for these children so they can develop their auditory memory; after all—“speech is rhythm” (PT, personal communication, March 11, 2015).

Within the development of early phonemic awareness, children also begin discriminating between sounds and their characteristics (RA, personal communication, March 12, 2015). Perception and production are very integrated, so it is important to help the child perceive the sound through as many routes as possible (RA, personal communication, March 12, 2015). The Verbotonal method helps make children more aware of these differences, how they occur in different environments, and the correct pronunciation (ET, personal communication, March 10, 2015). The body movements provide the child with a prompt for how the sound should feel within the body so they are able to perceive it and produce it (ET, personal communication, March 10, 2015). Preschool teachers can use activities in the classroom to target discrimination

tasks such as one sound vs. many sounds, quiet vs. loud, short duration vs. long duration, and finally the difference between specific phonemes (PT, personal communication, March 11, 2015; ET, personal communication, March 10, 2015). For example, one participant uses rubber circles on the floor during an activity. She might put one circle on the floor on one side of the room, and many circles on the floor on the other side of the room and have the children identify one sound vs. many sounds by running to which one she produces. She would say “ba, ba, ba” and then would run to the many circles, and “ba” and they would run to the one circle. “You have to hear it in order to say it” (PT, personal communication, March 12, 2015).

Another important step in early phonemic awareness is blending sounds together, and pulling them apart to facilitate the understanding that sounds make up words (PT, personal communication, March 12, 2015). “You play with the sounds, you put the sound slowly into a word, and then you immediately bring the word in and make it make sense. It’s so natural” (TT, personal communication, March 12, 2015). This begins with the babbling rhythms utilized by the Verbotonal method that do not necessarily represent meaning, but help the child perceive and produce consonants within different environments; “Hearing a ‘bu’ is really different than hearing a ‘bi’” (TT, personal communication, March 12, 2015). The clinician presents a rhythm with various consonant-vowel blends, body movements and natural intonation, and the child repeats the sequence using the same characteristics. This helps them understand that sounds can be blended together in different ways and helps build auditory perception (RA, personal communication, March 12, 2015).

Phonological awareness also encompasses the alphabetic principle and skills related to phonics. Overall, it is agreed that once children with hearing loss have a strong foundation of language and auditory perception, they develop phonics and emergent literacy in the same way

that hearing children would (TT, personal communication, March 11, 2015; ET, personal communication, March 10, 2015; RA, personal communication, March 12, 2015). You can begin to target emergent literacy when they are young through reading books and making print information available. Then once the child is at a language age of about 2 or 3, you can begin to pair letters with sounds just like you would for hearing children (TT, personal communication, March 11, 2015; PT, personal communication, March 11, 2015; ET, personal communication, March 10, 2015; RA, personal communication, March 12, 2015). It is necessary to explicitly teach them “this letter makes this sound when it’s in this position” (RA, personal communication, March 12, 2015). For children that struggle with the auditory component of language, teachers often look forward to introducing the written system because it helps provide another pathway to access the language (RA, personal communication, March 12, 2015). Verbotonal helps children develop letter identification because the body movements help the child remember the sound so they can pair it with a letter (ET, personal communication, March 10, 2015).

Letter identification is highlighted within the High Scope curriculum through activities such as “Letter Links,” where each child’s name is posted on the wall with a picture that begins with the same letter as their name, such as a picture of a ladder for the name Langdon (PT, personal communication, March 11, 2015). Letters are also identified throughout the day with phrases such as “Wacky Wednesday,” or “Thumbs-up Thursday.” The goal is that children will start the thought process of how letters have sounds, and sounds go together to make up words (PT, personal communication, March 11, 2015). Some other examples of activities could be putting a letter on the ground and coming up with words that begin with that letter, and saying phrases such as “b, b, b, cow- well that didn’t work! B, b, b, bubble- hey that worked!” (PT,

personal communication, March 11, 2015). These kinds of activities help the children notice letters everywhere they go. This participant shared that while her students were playing on the playground outside they noticed that the license plates on cars had letters and they were having fun identifying them (PT, personal communication, March 11, 2015).

Once children have a handle on letter identification, they can move progress to other skills within the alphabetic principle of phonological awareness such as spelling words and rhyming (PT, personal communication, March 11, 2015). For example, this teacher plans simple activities with picture cards, a magnet board and magnetic letters so they can find the letters that make up a word such as “d-o-g” (PT, personal communication, March 11, 2015). “It starts the thought process of how letters have sounds and that sounds go together to make words” (PT, personal communication, March 11, 2015). They also work on identifying and producing words that rhyme, which is more of a listening activity. An example of how to target rhyming is having objects sitting out for the child to find which ones rhyme (PT, personal communication, March 11, 2015).

Discussion

The data presented from the observations and interviews can be used to answer remaining research questions regarding how Verbotonal specialists perceive the role of phonological awareness in literacy acquisition, and how this method can be used as a tool to help develop phonological representations for children who are deaf and hard of hearing. In this section I will relate the quotes in the interviews to the paradigms within various bodies of research.

It can be concluded that the assumptions within the Verbotonal method are most in line with the qualitatively similar hypothesis. It was perceived by all participants that children who are deaf and hard of hearing learn phonics and emergent literacy in the same way as hearing

children. It was also perceived that these skills must begin with a strong foundation of language perception and production. The participants in this study target the various levels of phonological awareness through the Verbotonal method. As stated within the literature review, educators that subscribe to this hypothesis must explicitly teach each skill set forth by the National Reading Panel—phonemic awareness, alphabetics (letter knowledge, phonological awareness, and phonics), vocabulary, text comprehension, and fluency (National Institute of Child Health and Human Development, 2000). Since the Verbotonal method is most in line with this hypothesis, it can be concluded that Verbotonal specialists around the world should incorporate phonological awareness skills into their daily lessons.

In answering my second research question, the Verbotonal method can be used in many ways to target the various levels of phonological awareness. First of all, it is concluded that these skills begin before birth through perceiving rhythm and discriminating between sounds. Normally hearing babies babble and play with phonemes so they can begin to understand the patterns and characteristics of sounds. Children with hearing loss must also develop these skills once they gain access to sound. The Verbotonal method uses natural rhythm patterns to introduce individual phonemes in various articulatory contexts so that the child can identify patterns within the speech system. Gross body movements are also incorporated to provide a kinesthetic pathway to phonological representations.

The participants also recognized the importance of the alphabetic principle, and how the Verbotonal method can be used to help develop phonics skills such as letter identification and decoding words. Letters can be introduced and paired with individual phonemes and corresponding body movements. The body movement provides a prompt for how the sound feels within the body, which will then lend itself to helping the child remember the visual orthographic

representation of letters. Within a classroom setting, the teacher can use activities such as “Letter Links” to provide the child with a cue for the beginning letter of his or her name. The teacher can then progress to other phonological awareness skills such as rhyming and spelling through activities that manipulate the letters within words.

The final research question in the present study related to how teachers who are using the Verbotonal method of auditory therapy in Senegal can address phonological awareness skills for their students. The observations within the current study prove that the teachers in Senegal already address many of the components of phonemic awareness such as rhythm and sound discrimination. The teachers demonstrated expertise in using the stimulus response approach of the Verbotonal method that helps the children develop their speech patterns at the phoneme and word levels. The teachers at this school also demonstrate concepts related to print awareness by providing access to the printed vocabulary words of instruction.

Based on the additional phonological awareness skills identified through the literature review and interviews with Verbotonal experts in the United States, it can be concluded that the teachers in Senegal can help their students with phonological awareness by introducing additional skills and activities. The two primary skills that were not observed being targeted were sound discrimination tasks within phonemic awareness, and letter identification within the alphabetic principle. Teachers can develop lesson plans related to these two skills. For example, the teachers may introduce activities to target sound discriminations tasks such as “one vs. many” or “quiet vs. loud.” The teacher could use rubber circles on the floor to have the children run to the corresponding side (one circle on one side and multiple circles on the other side). This activity could be adapted such as having the children point to one side of the room, or having

different objects to represent the discriminating task. The teacher could also adapt this activity to have the children discriminate between individual phonemes.

The teachers in Senegal may also be able to facilitate the alphabetic principle by incorporating letter identification into daily lessons. To begin, teachers can incorporate individual letters during lessons that consist of having the children repeat phonemes. This practice will give students with hearing loss another route to remember phonemes as well as begin to provide a foundation for literacy acquisition. Teachers can introduce a letter by writing it down on a piece of paper or the chalk board while the children take turns repeating the corresponding phoneme. They can also focus on the beginning letter of the words they are working on. Letters can also be incorporated incidentally through the instruction of common concepts such as day of the week and individual names. For example, an interview participant shared that her students use “Letter Links,” where each child’s name is written on a piece of paper that hangs on the wall. Each paper has the child’s name written on the top with a picture under the name that begins with the same letter, such as the name Langdon with a picture of a ladder.

Conclusion

This study has examined the role of phonological awareness in literacy acquisition for children who are deaf and hard of hearing. Although the literature has demonstrated multiple theories regarding the causal relationship between phonological awareness and reading ability, the overall agreement among proponents of each theory is that phonological sensitivity is central to learning to read (Andrews & Wang, 2015; Mayer & Trezek, 2014). Proponents of both hypotheses would agree that reading fundamentally rests on a language foundation (Andrews & Wang, 2015). Since phonological skills are implicit in language acquisition in the first place, the

argument of whether or not deaf individuals need phonological understanding has persisted for far too long (Mayer & Trezek, 2014). These authors advocate that future research should no longer focus on how deaf readers are different, but rather on how “the process of learning to read is manifested differently in deaf readers” (Mayer & Trezek, 2014). Future research must focus on the relationship between code and language related abilities, and explore the reciprocity between reading and writing abilities.

This study also examined how the Verbotonal method of auditory therapy can be used as a tool to develop phonological representations for children who are deaf and hard of hearing, and how teachers that are already using this method can expand the phonological skills of their students. Future research should consist of observations and interviews relating to how teachers are already addressing emergent literacy for their students in order to verify the conclusions drawn upon in this study. Future research should also explore how teachers of the Verbotonal method can help develop other levels of reading as well such as vocabulary, fluency, and reading comprehension.

The overall agreement identified within the literature review is that children who are deaf and hard of hearing develop literacy acquisition through the same processes as hearing children. This means that teachers of children who are deaf and hard of hearing must explicitly address all the requirements put forth by the National Reading Panel, including skills related to phonemic awareness and the alphabetic principle. It was also agreed that children who are deaf and hard of hearing must first be exposed to a complex language during the critical years of life to develop a foundation of rhythm and auditory memory. Children that do not receive early access to identification and intervention services should be encouraged to use sign language as a way to support language development. Results from the current study also reveal that children who are

deaf and hard of hearing can benefit from multiple modalities to develop mental representations of the link between phonemes and letters, and should be given as many sensory channels as possible with tools such as the Verbotonal method. All of these agreements are also supported within the perceptions provided by interview participants who use the Verbotonal method. Teachers in Senegal that already use the Verbotonal method can begin to address phonological awareness skills with activities identified through the interview portion of this study.

With so much diversity in meeting individual needs of children who are deaf and hard of hearing, it is essential for educators, speech-language pathologists, and other professionals to understand the evidence base related to current theoretical perspectives and practical implications. The outcome of the study provides a foundation of information on the topic of literacy acquisition for children who are deaf and hard of hearing, and how the Verbotonal method can be used as a tool to help develop evidence-based lesson plans to target phonological awareness skills. Implications for future research will inform teachers and other professionals about the best practices to facilitate language and reading development at every level.

Appendix A: Table of Interview Results

Phonological Awareness Development for Children who are Deaf or Hard of Hearing			
Level of Phonological Awareness: Skill	How children who are deaf learn skill compared to children with normal hearing:	How Verbotonal can help target skill:	Examples of activities:
Phonemic Awareness: Foundation of Rhythm	Delayed due to “hearing age” Need longer exposure to infant directed speech	Exaggerated rhythm and intonation give children foundation of language	Teachers can demonstrate babbling rhythms with exaggerated varying intonation
Phonemic Awareness: Sound Discrimination and Production	Perception and production are integrated DHH child needs additional routes to access characteristics of speech parameters	Verbotonal body movements provide child with tactile and proprioceptive cues for how sound should feel	Teachers can use discrimination activities to target: One vs. many sounds Quiet vs. loud sound Short vs. long duration Difference between phonemes
Phonemic Awareness: Blending and Pulling Apart Sounds	Need understanding that sounds make up words, in addition to how sounds are different Need explicit instruction and practice using a phoneme in different environments	Repeating babbling rhythms help child perceive and produce phonemes in different articulatory environments	Teachers can incidentally have the child repeat rhythms with various consonant-vowel blends such as “bi bu ba,” using natural rhythm and intonation
Phonics and Alphabetic Principle: Print Awareness	Develop emergent literacy in the same way as hearing children Print provides additional route to the language	Body movements can be paired with printed letters and words	Making print information available Reading books

<p>Phonics and Alphabetic Principle: Letter Identification</p>	<p>Develop letter knowledge in the same way as hearing children using multiple sensory modalities</p> <p>Need explicit instruction that letters have sounds</p> <p>Need explicit instruction of the sounds that letters make</p>	<p>A letter can be paired with the body movement and phoneme</p>	<p>Teacher can use “Letter Links” to help child know letters of name</p> <p>Teacher can incidentally introduce letters with common concepts such as days of the week</p> <p>Teachers can introduce a letter and have children come up with words with beginning letter</p>
<p>Phonics and Alphabetic Principle: Spelling Words and Rhyming</p>	<p>Need explicit instruction that sounds and letters go together to make up words, and practice spelling words</p>	<p>The natural rhythm patterns can be incorporated in spelling</p>	<p>Teachers can have the children play with letters to make up words, such as providing picture cards and cut out letters to make up word</p>

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