Signs for Change: Analyzing Biases in Online Resources for Parents of Deaf and Hard of Hearing Children

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ABSTRACT

Parents of deaf children often report receiving information biased toward "fixing" deafness (e.g. through cochlear implantation), and are often advised to not use sign language, although studies have shown that sign language facilitates language development. An analysis of online resources showed that most resources were biased toward listening and spoken language approaches, and little to no information about sign language was found on most-frequently appearing sites. Evaluating the quality of online resources for parents of deaf children is vital for seeing what information is out there and informing future strategies for getting fact-based information on sign language into parents' hands.

KEYWORDS: deaf, language acquisition, deaf children, language deprivation, online resources, newborn hearing screening

1        Introduction

Finding out that a child is deaf can be an extremely stressful experience for hearing parents, especially if the parents have no knowledge of sign language or the support they can find within the Deaf community. Following the discovery that their child is deaf, parents need to decide which language approach they will choose for their child: a visual language approach like American Sign Language (ASL), an auditory/oral approach (e.g. using cochlear implantation and/or speech therapy to pursue the use of a spoken language

like English), or a combination of both approaches. Choosing between visual and auditory/oral language approaches is often presented to parents as a dichotomy, although they can in fact choose a combination of both approaches or change their choice of approach over time.

The choice to employ exclusively auditory-oral approaches forces deaf children to rely on their weakest, and sometimes inaccessible, sensory channel for the critical task of language acquisition. Additionally, while the auditory/oral approach works for some children, the success rates of hearing technology involved in such approaches (i.e. cochlear implants) is highly variable and contingent upon many factors, and there is currently no definitive way to predict cochlear implant success (Fink et al. 2007; Peterson, Pisoni, and Miyamoto 2010). If an auditory/oral language approach does not end up working for a child, and the child hasn't concurrently been given visual language, that child will end up missing critical years of language input and suffer the fallout of language deprivation. Failure to acknowledge sign language as instrumental to the cognitive development of deaf children is a leading factor in cases of language deprivation among deaf children in the US (Hall 2017). Despite that fact, solely auditory/oral language approaches are often advertised to parents. Lack of communication and proper training among professionals involved in early intervention steps for deaf children perpetuates the spread of false information regarding deafness, and those professionals often do not fully understand the harm that a solely auditory/oral approach (i.e. one that excludes sign language) can cause deaf children (Humphries et al. 2012). As hearing parents depend on outside resources like medical professionals and the

internet to learn about their child's deafness, the development of those children is put at risk when such resources do not discuss the importance of visual language for all deaf children. Not receiving information about the importance of sign language denies parents the opportunity to give their child visual language, and consequently denies that child of a secure environment for acquiring language.

Because parents have been shown to access the internet to learn about their child's deafness (to be discussed further in section 1.3), it is important to evaluate the information that parents would find about auditory/oral and visual languages approaches if they conducted a web search seeking information regarding their child's deafness. A preliminary search of online resources discovered a plethora of information discussing auditory/oral language approaches and very limited information regarding sign language approaches.

This project seeks to provide a clear picture of what a parent seeking information about their child's deafness might find on the Internet by simulating a web search and analyzing the information found on the webpages that appeared the most. This paper will first discuss the consequences of language deprivation and the benefits of sign language, in order to explain the motivations behind this project. The methodology will then be described, including details about the web search and the qualitative analysis of webpage content. Then, the data of the paper will be presented in relevant subgroupings, and the implications of that data will be elaborated on in the discussion section.

Note that *deaf* will be used throughout this paper to refer to children with a wide range of hearing loss, including those who are hard of hearing. Additionally, lowercase

*deaf* will be used instead of uppercase *Deaf*, as *Deaf* is used to identify those involved in the Deaf community and culture, and it cannot be assumed that every deaf child has access to that community or identifies with their deafness in that way. The deaf children discussed in this paper are also assumed to have access to sight; while language options like tactile sign language exist for deaf-blind individuals, the focus of this paper is on deaf children who can access visual language. The term *hearing* refers to non-deaf individuals that have full access to sound.

## 1.1    Linguistic Neglect and the Importance of Sign Language

Deaf children have historically been at risk for language deprivation. As over 90% of deaf children are born to hearing parents (Mitchell and Karchmer 2004), those children are often subjected to an environment with poor or inaccessible language input. If a child only receives spoken language input but has no access or limited access to hearing, they cannot receive the linguistic signal sent through oral channels. If the brain receives no linguistic input during early childhood (i.e. the period during which the brain is most elastic and able to acquire language), the ability to fully acquire a first language gradually diminishes. If the child's critical period of language acquisition passes before they receive accessible linguistic input, they will lose their ability to proficiently acquire language, setting them up for other cognitive linguistic issues such as struggling to comprehend and produce syntax (Friedmann and Rusou 2015).

Language deprivation affects deaf children in many aspects of life. If a deaf child does not have access to language for the first years of life and a listening/spoken language approach ends up failing, they would be at risk for cognitive deficits

(Humphries et al. 2012). While deaf children who do not have access to language experience linguistic isolation, they also face psychological, social, and emotional risks. The inability to make oneself understood has been linked to depression in deaf individuals (Fellinger et al. 2009), as has difficulty communicating with parents (Kushalnagar et al. 2017). Failure to give deaf children early and frequent access to sign language puts them at risk of irreversible cognitive harm, thus constituting child neglect (Humphries et al. 2016) and making the need for deaf children to be given fully accessible language (i.e. sign language) more pressing than ever. ASL proficiency has also been shown to positively influence psychological development (Schick et al. 2007); since deaf children are often noted as being at risk for psychological and emotional issues, especially if they are not given accessible language environments, empowering deaf children by giving them a language they can access would aid in those developmental areas.

Sign language should be included in the language options presented to all families with deaf children, regardless of whether or not they choose to pursue an auditory/oral language approach. The success of a hearing tool like the cochlear implant is contingent upon a variety of factors; the variables that affect language development most strongly are age of implantation and communication mode used during rehabilitation (Peterson, Pisoni, and Miyamoto 2010). While age of implantation also appears to be a significant factor (those implanted earlier having a better chance of success with their implant than those who were implanted later), high levels of variability remain among those who have been implanted for the same amount of time (Giraud and Lee 2007). Exposing a child to

sign language prevents them from missing out on critical developmental milestones while enhancing their cognitive development, which the cochlear implant cannot guarantee. This fact additionally supports the idea that choosing between visual and auditory/oral approaches does not have to be an either/or decision, since choosing a combination of both approaches has been proven to lead to the best overall language development in children.

Although sign language has been proven to support language development in terms of both speech and literacy, the majority of medical professionals do not promote the bilingual/bimodal approach to language learning for deaf children (Humphries et al. 2012). However, bilingual approaches to learning have proven to have the best cognitive and academic outcomes for deaf children. Fluency in a first language has been found to be a reliable predictor of skill in a second language (King 2013), so ensuring that deaf children have access to sign language as they learn spoken or written English would only benefit them.

Sign language has also proven to be instrumental to supporting children's academic abilities, such as reading comprehension and writing skills. Since social relationships, meaningful conversation, and cultural dialogue are instrumental to literacy (and since deaf children often do not have access to such entities), it is not surprising that many deaf children living in linguistic, social, and cultural isolation struggle to gain literacy skills (Kuntze 1998). Deaf students have historically experienced difficulty developing literacy skills past elementary grade levels (Yoshinaga-Itano and Downey 1996; Yoshinaga-Itano, Snyder, and Mayberry 1996; Musselman and Szanto 1998).

However, a foundation in sign language has been proven to give deaf children an advantage. Several studies have found that deaf children with strong sign foundations have stronger skills in reading comprehension than deaf children with little to no sign exposure (Strong and Prinz 1997; Prinz and Strong 1998; Hoffmeister 2000; Wilbur 2000; Cummins 2006; DeLana, Gentry, and Andrews 2007; Hermans et al. 2008; Freel et al. 2011; Mayberry, del Giudice and Lieberman 2011; Miller et al. 2012; Scott and Hoffmeister 2017). A foundation in sign language has also been shown to positively impact English writing skills (Dostal and Wolbers 2014).

Although one myth commonly heard about sign language is that it inhibits spoken language development, sign language has actually been shown to aid spoken language development. A study by Preisler, Tvingstedt, and Alström (2002) showed children with cochlear implants who had the best oral skills were also the best signers. Studies by Hassanzadeh (2012) and Davidson, Lillo-Martin, and Chen Pichler (2014) also provide evidence that children who have been exposed to sign language from birth may outperform children who have not been exposed on sign with regard to spoken language outcomes. When children are given an accessible language during the first crucial years for language learning, the operations they learn to understand and use are constrained by Universal Grammar (Lillo-Martin 1993), which gives children the foundation of a first language to build upon when acquiring a second language. Late exposure to an accessible first language can make a child incapable of acquiring other languages later in life (Mayberry 2007). Therefore, if parents want their deaf children to acquire English skills,

whether involving reading, writing, and/or speech, giving children access to sign language from birth would actually aid their English acquisition.

1.2     Parent Utilization of Online Resources

In today's technologically-dependent world, it is almost second nature to search for the answers to all questions online, and parents of deaf children are no exception. Some studies have examined how parents use the Internet to find information related to their child's deafness (Zaidman-Zait and Jamieson 2004; Porter and Edirippulige 2007), though none have studied the relation between sources accessed and potential biases evident in their language use, such as whether or not they describe deafness in negative terms or regard hearing technology as a sure solution to deafness. Knowing that parents are turning to the internet to learn about language options for their deaf children makes it important to know the quality of the information that is out there. This study aimed to evaluate online resources intended for parents of deaf children in order to see what information they would come across in a web search. Because there has been conclusive research that supports sign language being an instrumental part of all deaf children's language learning and development, this study focused on examining the information presented by websites that are most likely to be found by parents searching for information about language options for their deaf children (i.e. the webpages that appeared most frequently in an extensive web search). It was predicted that the information on most websites would be biased toward listening and spoken language approaches and have little information regarding sign language. If websites did in fact contain more information on auditory/oral approaches and little to no information on

visual approaches like sign language, it would mean that parents who utilize the internet to learn about language options for their DHH children would not discover how integral sign language to ensuring that their children miss no developmental milestones.

2       Methodology

Because parents have been shown to use the internet to find out about their children's deafness, and because it is essential for parents to gain information about sign language, an examination of websites was conducted to assess the quality and amount of information in online resources regarding sign language. In order to choose which websites to analyze, an online web search was conducted using search strings that a parent searching for information on their child's deafness might use. The project had two phases: identification of the websites to include for analysis and the analysis of webpages from the selected websites.

2.1     Identification of Websites to Analyze

As stated previously, a web search was conducted to simulate searches that a parent might conduct themselves regarding their child's deafness. In order to simulate what a parent's search process would be like, 49 search strings were created, using keyword combinations that parents would be likely to use in their own Google searches. The key terms regarding deafness (*deaf*, *hearing loss*, *hearing impaired*) were combined with other highly relevant keywords in search strings, like "my ____child" (insert *deaf* or *hearing impaired*) or "my child with ___" (insert *hearing loss*). This approach resulted in 48 search strings. Adding the search string "my child can't hear now what" created a total

of 49 search strings. A sampling of the relevant keywords and phrases combined in the search strings can be seen in table 1 below, and the full list of search strings can be seen in table 2 in the appendix. Note that constructions such as "my ___ child" would have *deaf* or *hearing impaired* inserted into their blank spaces, and constructions such as "my child with ___" would have *hearing loss* inserted into their blank spaces.

| Keyword/phrase | Search strings |
|---|---|
| 1. deaf<br>2. hearing impaired<br>3. hearing loss | 1. my ____ child / [child with ___]<br>2. my child is____ what do I do [has ____ what do I do]<br>3. can my ____ child hear / [child with ____ hear]<br>4. can my ____ child talk / [child with ____ talk]<br>5. can I talk to my ____ child / [my child with ____]<br>6. should I sign to my ____ child / [child with ____]<br>7. raising a ____ child / [child with ____]<br>8. language options for my ____ child / [child with ____]<br>9. can I communicate with my ____ child [child with ___]<br>10. how can I communicate with my ____ child / [child with ____]<br>11. can my ____ child learn to communicate / [child with ____ learn to communicate]<br>12. should I teach my ____ child sign language / [child with ____ sign language]<br>13. resources for parents of a ____ child / [child with ____]<br>14. language options for a ____ child / [child with ____]<br>15. my child is ____ now what [has ____ now what]<br>16. tips for parents of a ____ child / [child with ____] |

Table 1: Sample search strings

After the search strings were created, each string was entered into a Google web search. Google was the search engine used to conduct the search because it is used globally for 73.73% of web searches, as opposed to other search engines like Bing (7.82%) and Yahoo (5.11%) (Net Market Share 2018). Key information for each website listed on the first page of Google search results for each search string was entered into an Excel spreadsheet: organization (or website name if the organization was unclear), article title, and article URL. Another factor tracked was whether or not the website was marked as an advertisement (meaning that the organization or website owner paid to be listed as an ad at the top of a list of search results). Because some sites appeared at the top of the

page as ads, those were most likely to be seen by parents. While a website being overtly covered marked as an ad may make parents question its material, they would presumably still access those sites if they were working from a background of no knowledge about language options for their deaf children. An example of how ads are marked within Google search results can be seen in figure 1 below (marked by the red arrow).
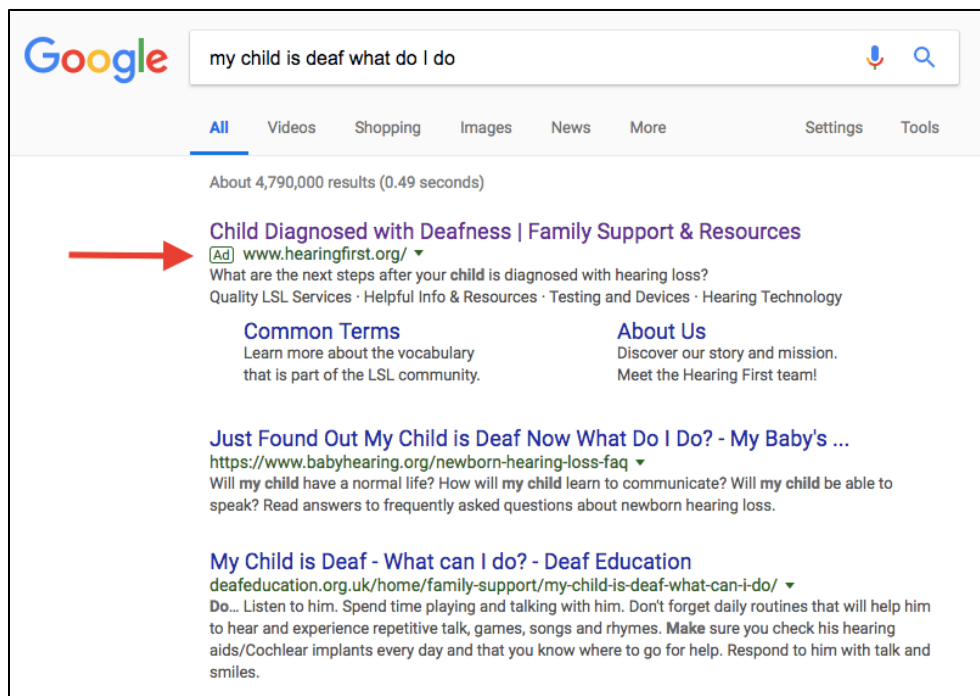


Figure 1: Example of website listed as an ad on Google

The number of websites that appeared on the first page of the Google search results varied, ranging from eight to sixteen results; search strings that generated higher numbers of results often had multiple sites marked as advertisements in their overall count. For future reference, the term *website* refers to the overall websites of specific organizations, companies, or other groups, and the term *webpages* refers to individual pages within websites.

In total, this web search of 49 search strings yielded 551 webpages. When organized according to their affiliated websites and the sponsoring organizations, the 551 webpages from the search results were found to represent 109 individual websites. The types of websites that appeared most frequently were those of companies (for example, companies that supply hearing technology), non-profit organizations, online media sources (e.g. blogs, online periodicals, YouTube videos), and academic journals. The websites were chosen for analysis based on the frequency with which they occurred in the web searches. The rationale behind that choice was that parents would be most likely to interact with sites that appeared most frequently in the web searches, so the websites that appeared most frequently were determined to be the most relevant for this study. The total number of times each site appeared in the web search was tallied, and all websites with at least ten appearances in the searches were included for further analysis.

Of the 109 individual websites that appeared in the searches, 17 of the websites appeared more than ten times. The webpage with the most hits was chosen for 16 out of 17 websites. In the case of the website *Supporting Success for Children with Hearing Loss*, the webpage that appeared second-most frequently was analyzed over the most popular webpage because it discussed the different communication options for parents to choose from for their deaf children. As this project has a special interest in analyzing how language approaches for deaf children are described in online resources, this page seemed more pertinent to analyze than the page that appeared most frequently ("Unilateral Hearing Loss"). An additional page from the *Hearing First* website was added for analysis, as well. While the page "Hearing Testing and Devices" only appeared once in

the in the initial search results, it was discovered during the analysis phase that the URL for the most-frequently appearing webpage on the *Hearing First* website, "Learning and Growing LSL," began linking to the "Hearing Testing and Devices" page. Because the webpage linked to that URL was labeled as an ad on Google, it seemed as though the landing page at that URL was changed from "Learning and Growing LSL" to "Hearing Testing and Devices." Since the "Hearing Testing and Devices" page would newly be the one that parents would interact with most frequently, it was also analyzed, resulting in a total of 18 webpages analyzed from 17 different websites. The resources, total webpage counts, and webpages analyzed can be seen in table 3 below.

| Website | Total number of site hits | Webpage analyzed | Total number of hits on webpage chosen for analysis |
|---|---|---|---|
| Supporting Success for Children with Hearing Loss | 37 | Ways to Communicate with a Child with Hearing Loss | 6 |
| Baby Hearing | 34 | Raising a Child who is Deaf or Hard of Hearing | 26 |
| My Child Without Limits | 25 | How Can a Child With Hearing Loss Learn to Communicate? | 18 |
| Phonak | 25 | My child has a hearing loss: A guide for parents | 14 |
| National Deaf Children's Society | 22 | 11 tips for communicating with a deaf child | 7 |
| hear-it | 19 | 10 signs that your child may have a hearing loss | 9 |
| Hearing First | 18 | Learning and Growing LSL | 17 |
| Hearing First | 18 | Hearing Testing and Devices | 1 |
| Healthy Hearing | 18 | Hearing loss in children | 14 |
| American Speech-Language-Hearing Association (ASHA) | 18 | Unilateral Hearing Loss in Children | 8 |
| Hearing Like Me | 15 | Learning Sign Language with a Baby or Toddler | 3 |
| Speech and Language Kids | 14 | Hearing Loss | 14 |
| The Guardian | 13 | A sign for change: learning how to talk to a deaf child | 12 |
| Aussie Deaf Kids | 13 | Communicating with Your Baby | 4 |

| Audiology Online | 12 | What Parents Should Know About Hearing Loss: Pointers for Parents | 11 |
|---|---|---|---|
| Cochlear.com | 11 | Signs of hearing loss | 6 |
| Hearing Loss Association of America | 11 | For Parents of Children with Hearing Loss | 11 |
| MyDeafChild.org | 10 | Homepage | 8 |

Table 3: Websites with 10+ hits and webpages selected for analysis

2.2     Methodology for Webpage Content Analysis

Each of the 18 webpages chosen for analysis underwent a line-by-line qualitative analysis with the purpose of identifying biased information and language. For the purposes of this project, *bias* was defined as anything that covertly or overtly advocated against one language approach over another. As this project in particular was interested in investigating biases against visual language, since visual language has been proven to be instrumental to the development of deaf children but is often not addressed as such, special attention was given to websites that provided limited, inaccurate, or negative information about sign language. The text from each webpage was copied and pasted, line by line, into an Excel spreadsheet. After all the text was transferred into Excel, a qualitative analysis was conducted. Each line was read individually, and any lines determined to give biased information or use biasing language were commented upon. A sample of webpage content accompanied by qualitative analytic comments can be seen in table 4 below.

| Website | Extracted Phrase(s) | Analysis Notes |
|---|---|---|
| My Child Without Limits | American Sign Language (ASL) is a language used by **some** individuals with **severe hearing impairment** and their **families**. | This statement is highly misleading for several reasons. It implies need for severe hearing impairment for ASL use, neglects mention of users outside of direct family, and the quantifier "some" makes ASL seem like it's used particularly rarely; even among the small group they've singled out, it seems like not all |

| | | people use it. |
|---|---|---|
| Hearing First | The goal of the LSL approach is for your child with hearing loss to develop listening and spoken language skills **just like their hearing friends**. | Reads like propaganda; promotes uniformity and idea of hearing loss being alienating, unless a listening/spoken language approach is pursued. |
| Baby Hearing | Communication is **constantly an effort**. If your child is signing, you must always make sure that you have your child's visual attention, and they get your attention. You are always looking up from what you are doing, always dropping things to get your hands free! For us, every day is a **constant challenge**." | The tone here makes a visual language environment feel like a burden. While the family has chosen to sign with their child, the text here makes their situation seem stressful and negative. This information could potentially bias parents against using sign language with their deaf child, since it's only presented in a negative light. |

Table 4: Sample qualitative analysis

After every line of text was evaluated, linguistic and content-related patterns of bias that appeared throughout the sources were identified. Each webpage was analyzed in terms of the content they provided, and any potentially relevant affiliations they had with companies or organizations was noted. The significant patterns that emerged across the websites analyzed will be discussed in section 3 below.

3       Results and Discussion

In total, 1,367 lines of text were copied from the 18 webpages chosen for analysis. Several recurring themes were identified for bias throughout the data set. The themes that seemed most recurrent across all sources in relation to biases and misinformation were *speech* or *communication* being portrayed as synonymous with *language*, deafness being described in negative terms, references to technology being a solution for deafness, communication options presented as accommodating the family or hearing world over the child (e.g. saying spoken language should be pursued because it is the easy option for the child's family, not the easy option for the child), and biased or misleading portrayal of

ASL and/or the concept of deafness. An overview of the frequency with which each bias appeared can be seen in figure 2 below.
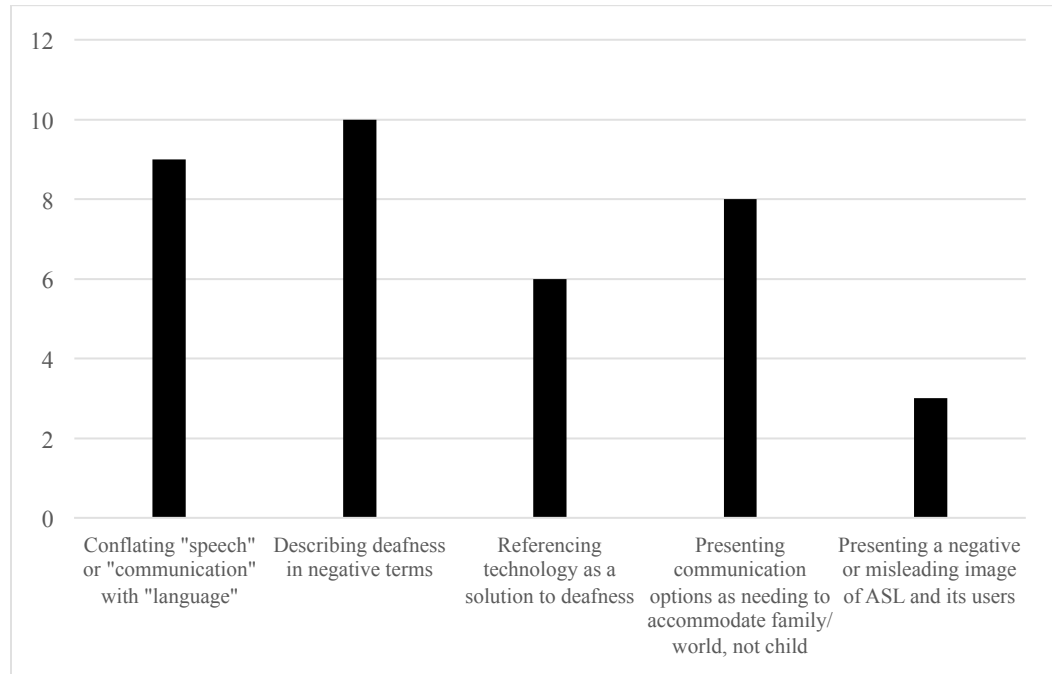


Figure 2: Main biases identified in webpage analysis

Before launching into a discussion on each of the themes (in sections 3.2-3.6), a general discussion of terms used to describe deafness itself will be covered in section 3.1.

3.1    Terminology Used to Describe Deafness

One focus of this project was which term was used most to describe deafness: *deaf*, *hearing loss*, or *hearing impaired*. Accounting for the terms used in the 18 sites that had ten or more hits, *hearing loss* appeared 278 times, *deaf* appeared 81 times, and *hearing impaired* and *hearing impairment* appeared 14 times all together. While the terms *hearing impaired* and *hearing impairment* appeared most infrequently, it is significant to note that *hearing loss* was used almost 200 more times than the term *deaf* to describe deaf

children's hearing status. A distribution of this data proportionally can be seen in figure 3 below.
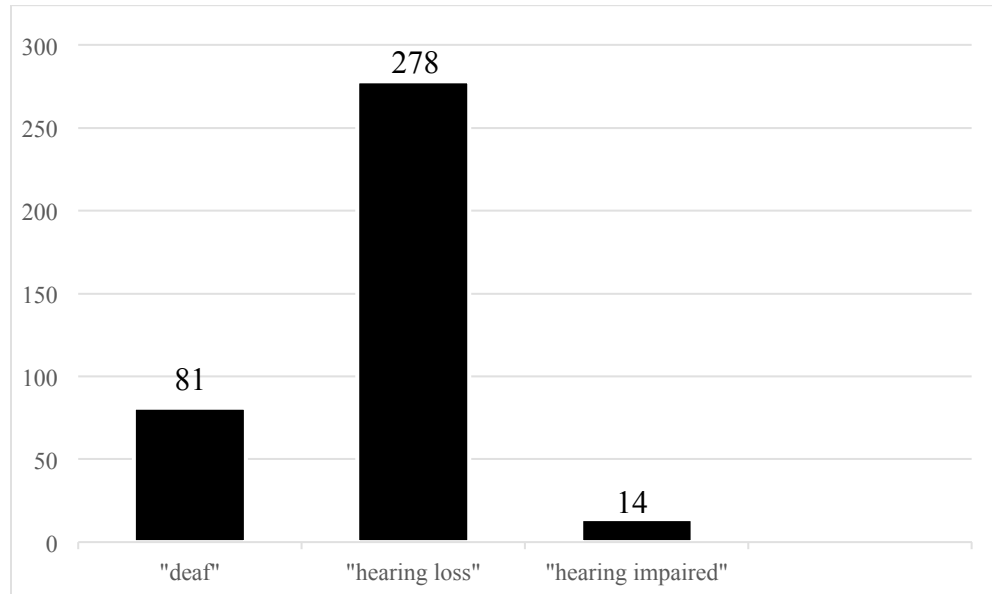


Figure 3: Terms used to describe deafness

There was not an apparent difference in the context in which either term was used (i.e. the terms did not seem to appear in specific contexts over others). However, the primary term used to discuss deafness being one that connotes a loss shows that the general focus across these websites was on sound being missing from a deaf child's life. Characterizing a child's deafness as a loss could make parents inclined to fill that perceived loss in with listening and spoken language approaches, while visual language approaches, which are unaffected by a child's ability to hear, could be overlooked.

3.2    Conflating *Speech* or *Communication* with *Language*

Nine of the websites analyzed seemed to conflate *speech* or *communication* and *language*. *Speech* and *communication* were most often presented alongside *language* in a way that made them seem inherently related. Exemplar data in (1) note instances of

*speech* and *language* being presented alongside each other, and exemplar data in (2) note instances of language being referenced with solely spoken language in mind.

(1) a. Many children with hearing loss develop good speech and language when given the appropriate support and training. The sooner your child is exposed to speech and language, the better. [Source: *Phonak*]

    b. Your child's unilateral hearing loss will not keep him or her from learning to talk. However, some children with UHL [Unilateral Hearing Loss] have been found to have delays in their speech and language development. [Source: *American Speech-Language-Hearing Association*]

    c. At least 2 in every 1000 children will experience hearing loss severe enough to prohibit their ability to develop speech and language unless specific therapeutic intervention is provided. [Source: *Audiology Online*]

    d. The earlier a hearing loss is detected in infants the better the outcome for language and speech development. [Source: *Hearing Loss Association of America*]

    e. Children with hearing loss should definitely be enrolled in speech therapy at a young age to ensure that they develop speech and language skills as normally as possible. [Source: *Speech and Language Kids*]

(2) a. Getting enriched auditory information through the hearing technology to your baby's brain is critical to your baby's learning. [Source: *Hearing First*]

    b. A critical window for learning LSL [Listening and Spoken Language]. [Source: *Hearing First*]

c. Most babies with hearing loss can have the same chance to develop their brain for learning language and reading as their hearing friends. [Source: *Hearing First*]

d. Most of the language that children learn is from overhearing other people talking. [Source: *Supporting Success for Children with Hearing Loss*]

The words *speech* and *language* appeared together 25 times in the data set. Presenting *speech* and *language* together so frequently has the potential to make parents constantly associate the two. Parents could end up thinking of speech and language as synonymous when they are presented in this way, causing *spoken language* and *language* to become synonymous ideas. The examples in (2) also perpetuate the idea that language input needs to be spoken. (2a), (2b), and (2d) make direct references to hearing and listening being the key to language learning, and (2c) indirectly promotes hearing and listening as the key to language learning. In (2c), *Hearing First* saying that babies with hearing loss have the "same chance to develop their brain for learning language and reading as their hearing friends," implying that hearing is necessary for developing their brain for language learning. Additionally, the brain does not need to "develop" for general language learning. The brain of a deaf child would be ready to acquire visual language to which they have full access, but *Hearing First* presents the brain as needing to develop toward an auditory/oral language approach.

While the brain does not prefer spoken language over sign language, speech and language are often presented alongside each other in a way that implies that one cannot exist without the other, and hearing is often attributed as the key to language learning. It is biased and potentially dangerous for many sites to present the importance of acquiring

language solely in the context of a speech-learning environment because it could make parents feel that they must pursue a listening and spoken language approach if they want their child to acquire language.

3.3     Describing Deafness in Negative Terms

Ten of the websites analyzed tended to describe deafness in negative terms. Negative terms used to describe deafness most typically included othering language, such as references to normal hearing versus hearing loss, or calling deafness a problem; medicalized language, such as references to deafness as something that needs to be treated; or pitying words that imply that deafness is something to be upset about, such as saying there is hope for deaf children. Exemplar data in (3) provide references to normal hearing and hearing loss as a problem, exemplar data in (4) provide references to deafness being described in medicalized terms, and exemplar data in (5) provide examples of deafness being discussed in pitying language.

(3)  a.  Unilateral hearing loss (UHL) means that hearing is normal in one ear but there is hearing loss in the other ear. [Source: *American Speech-Language Hearing Association*]

b.  Two normal hearing ears help us to filter out noise to better hear speech. [Source: *American Speech-Language-Hearing Association*]

c.  The term hearing loss describes a problem with a child's hearing. [Source: *Speech and Language Kids*]

d.  Research has shown that on average, children with mild hearing loss perform poorer than their normally-hearing peers and may need to repeat a grade. [Source:

*Hearing Loss Association of America*]

  e.  I also make allowances for the communication issue, but I seldom think of her as
      being any different from the other children. [Source: *Baby Hearing*]

  f.  People with normal hearing can catch talking at home in the same room and
      sometimes from another room in the house if it is quiet. [Source: *Supporting
      Success for Children with Hearing Loss*]

The use of the word "normal" to describe hearing in non-deaf individuals was one
of the most prevalent aspects of negative language used to discuss deafness. Describing
"normal" hearing of non-deaf individuals in this way immediately depicts deafness as
being abnormal. Sentences like (3f) that emphasize a benefit of "normal hearing" show
how such language can be used to set up comparisons between deaf and non-deaf
individuals that reinforce the idea of deafness as bad and inconvenient.

(4)  a.  Infant hearing loss can cause your baby to fall behind on milestones if left
         undiagnosed and untreated. [Source: *Hearing First*]

     b.  This kind of loss cannot be medically "cured" at this time. [Source:
            *Audiology Online*]

     c.  Hearing loss may be the most common physical disability. [Source: *Phonak*]

     d.  An untreated hearing problem can have a devastating effect on a child's ability to
         learn spoken language. [Source: *Cochlear.com*]

Medicalized language emphasizes deafness as a "loss," often one that needs to be
fixed. Saying that deafness "cannot be medically 'cured' at this time," as *Audiology
Online* does in (4b), depicts deafness as a disease that needs to be fixed. Focusing on

deafness as a medical condition can make parents focus on it as a disease or disability, rather than as a hearing status. It is noteworthy that such language was used across websites, not just on websites like *Cochlear.com* and *Phonak* whose goal is to correct hearing loss with hearing technology. All websites that discussed language in this way were notably biased toward an auditory/oral language approach.

(5) a. There is every reason to be optimistic about what can be done to help

your child reach his/her highest potential. [Source: *Phonak*]

b. There has never been more hope for children with hearing loss, even those with

profound loss. [Source: *Healthy Hearing*]

Depicting deafness as something to be pitied was another way in which it was described in pitying terms. In (5a), *Phonak* tells parents that they should be "optimistic" about their child's future implies that they should have negative feelings about deafness, immediately depicting it in a negative way. In (5b), *Healthy Hearing* tells parents that "there has never been more hope" for deaf children, implying that a deaf child's situation is initially hopeless.

The language used to discuss deafness can have a significant effect on how parents think about their child's deafness. Online resources that call deafness a "problem," say that deafness cannot be "cured," or say that parents should not "lose hope" for their children condition parents to think about deafness as something negative. While the use of the term "normal" to describe the hearing of non-deaf individuals may seem harmless, it immediately creates the association with deafness being an abnormality. If a parent were to encounter resources with information like this during

their initial searches about deafness, it would condition them to think that their child's

deafness as something to correct, not embrace. Introducing visual language and the Deaf

community to a deaf child's life has the power to put them in an environment where the

focus is not on an inability to hear or fixing hearing, but on learning language visually in

a supportive environment. The webpages from which these lines were pulled largely

focus on a child's inability to hear as the issue stopping them from learning language,

revealing that the language they have in mind is spoken, not signed. If sign language was

regarded as a fully accessible language option for deaf children, conversation around

childhood deafness would potentially not be so negative.

3.4     Referencing Technology as a Solution for Deafness

Six of the websites analyzed referenced technology being a solution to deafness. Hearing

technology was described with extremely positive adjectives like "amazing" or

"excellent," and they were often presented as a default option for deaf children. Exemplar

data in (6) provide an example of websites praising the advanced and amazing nature of

hearing technology, and (7) includes examples of hyperbolic promises in relation to

technology and what it can do for deaf children, or how technology should be integrated

into their lives.

(6)  a. There are many amazing forms of amplification for children (and adults)

         with hearing loss. The technology is getting better every day. [Source: *Speech*

         *and Language Kids*]

     b. Fortunately, your child is living in an age when technology and support offer

         many excellent options. [Source: *Phonak*]

c. Hearing instruments have progressed a great deal in recent years and offer a whole range of technologies designed to meet each child's specific hearing needs. [Source: Phonak]

d. Hearing aids are just one kind of device that can help children with hearing loss hear clearly again. There are many advanced models, including high-powered aids for children with profound hearing loss, that offer high-quality hearing assistance. [Source: *Healthy Hearing*]

Focusing on how "amazing" and "excellent" hearing technology is serves to convince parents that pursuing hearing technology is the best option for their children. Statements like (6b) and (6c) from *Phonak* make technology seem like a surefire solution for a child's deafness, as they push the range and variety of hearing technology available and build upon the image of technology as the best approach to a child's deafness. While hearing technology can benefit some deaf children, presenting it in a solely positive way that does not address the potential fallout and failure of that technology is misleading.

(7) a. Today, there is virtually no hearing loss which cannot benefit from the use of appropriate technology. [Source: *Phonak*]

b. For most babies diagnosed with hearing loss, a hearing device can offer the brain access to all the sounds of speech. [Source: *Hearing First*]

c. Hearing aids and similar technologies are the basis of the program for a child with a hearing loss. [Source: *Audiology Online*]

d. Cochlear implants work for infants and children who cannot benefit from hearing aids. [Source: *Healthy Hearing*]

Several websites exaggerated the level to which hearing technology can definitively give deaf children access to hearing. In (7a), *Phonak*'s claim that "there is virtually no hearing loss which cannot benefit from the use of appropriate technology" makes it seem like all deaf children can benefit from and should therefore be given hearing technology. However, as previously discussed, the success of hearing technology is variable and dependent on a variety of factors, so making a claim like this is misleading for parents. Additionally, as seen in (7c), a line from the *Audiology Online* webpage reads "Hearing aids and similar technologies are the basis of the program for a child with a hearing loss." A statement like that could make parents think hearing technology must be pursued for every child identified as deaf, if it is the "basis" of the approach to language for all deaf children. While many families pursue the use of hearing technology, hearing technology does not necessarily need to be part of a family's approach to language.

As can be seen in the data set, presenting hearing technology as a default part of a child's language approach is biased in assuming that listening/spoken language is the best choice for a family. While some children can benefit from hearing technology, others struggle with it, so setting technology up with such esteem and assurance could lead parents to choose a solely auditory/oral route, when the success of such technology is in fact variable.

This data set brings up the potential ulterior motives behind the material posted on websites connected with for-profit companies. For example, Phonak is a company that makes and sells hearing aids. While that fact accurately, and perhaps obviously, predicts

that the information on their webpages would be largely biased toward listening and spoken language methods, it highlights the fact that parents encountering such websites may only be exposed to an auditory/oral approach, simply because that approach ties in to the company's commercial success.

Other websites seem to carry professional motives with them, as well. Much of the content on websites like *Audiology Online* and *Healthy Hearing* is created by and caters to audiologists, and the content on *Speech and Language Kids* is created by and caters to speech pathologists. While those professionals work with families who have chosen either or both auditory/oral and visual language approaches for their children, because their specialties are based in speech, it is not surprising that the information provided on those websites caters mainly to listening and spoken language methods.

While the *Hearing First* website does not seem backed by commercial motives, it puts forth information based on personal biases (a bias that becomes evident simply from viewing the website name). The website is a product of the Oberkotter Foundation, a group that donates grants to organizations that work with deaf children, but only organizations that pursue listening and spoken language methods. Lines like (6g) from the *Hearing First* webpage place the emphasis on sound and speech being the gateway to language, ignoring visual language as integral to deaf children's development. As mentioned in section 2.1, an additional page was analyzed from the *Hearing First* website, and there was not even one mention of sign language between the two webpages. The *Hearing First* pages were listed as ads on Google the majority of the times that they appeared, so they appeared at the top of the page, making it more likely

for parents to interact with them during a web search. While the Oberkotter Foundation is not a company, its bias toward listening and spoken language as the only approach for deaf children perpetuates the commercial success of hearing technology companies by convincing parents that listening and spoken language is the only approach to use with deaf children.

3.5     Presenting Communication Options as Needing to Accommodate Family or General Hearing World over the Child

Eight of the websites analyzed seem to perpetuate the belief that communication approaches should be ones that accommodate the family over the child. Information that fell into this category often set up the concept of a child's communication approach needing to match that of the hearing world. Exemplar data in (8) provides instances of family comfortability being prioritized over that of the child, and (9) provides instances of children being charged with the responsibility of auditory/oral communication and the negative effects of that burden.

(8)  a.  The communication choice needs to be one that the family can

comfortably do all the time. [Source: *Supporting Success for Children with Hearing Loss*]

b.  If a child is growing up in an environment where everyone around them is speaking sign language (fluently), that child will be exposed to language through the use of sign language and doesn't necessarily need speech or hearing to function and thrive within their community. However, if your child does not have people who are fluent in sign language around them

constantly, this may not be the right choice for you. [Source: *Speech and Language Kids*]

    c.  However, when children with hearing loss are identified at an early age, fit with appropriate and beneficial amplification which they use consistently, and are trained to use their residual hearing to the maximal level for understanding speech, they can acquire age appropriate speech and language skills (listening, speaking, and comprehension) which enable them to function effectively in the hearing world. [Source: *Audiology Online*]

    d.  While their LSL journey may be a bit different, most children can learn communication skills in the same language spoken in your family home. [Source: *Hearing First*]

While it is true that a child needs to be in a rich language environment in order to acquire language, families seem to be encouraged away from sign language and toward listening/spoken language approaches because they, the parents and other family members, can comfortably communicate in that kind of approach. However, even if a home has a rich environment for acquiring spoken language, that language will be lost on a child who cannot receive auditory input, putting them at risk for language deprivation. Trying to get deaf children to "function effectively in the hearing world," as put by *Audiology Online* in (8c), seems to be favored over putting them in a visual language.

While learning a sign language is clearly require effort, as would acquiring any language, parents can do it, especially if they find support from signers in the Deaf community to help them along the way. The website *Baby Hearing* depicts a parent's

experience with sign language as a negative one, featuring a quote in which the parent says "Communication is constantly an effort. If your child is signing, you must always make sure that you have your child's visual attention, and that they get your attention. You are always looking up from what you are doing, always dropping things to get your hands free! For us, every day is a constant challenge." While communication in a second language can be frustrating for parents, the benefits for the child are not addressed in this statement. On the other hand, an article featured in *The Guardian* quotes a mother who learned BSL (British Sign Language) to communicate with her daughter, saying "It's a strain to use your second language all the time," but she notes that she and her husband have seen their signing skill levels jump after "turning our voice off." While *The Guardian* article speaks to the difficulty of using sign language with a deaf child, it highlights the family's experience as an ultimately positive one. The goal is not to lie to parents and say that learning sign language is easy; saying that learning sign language can be challenging but plays an integral part in ensuring that their child reaches their developmental milestones would be a good approach to take.

(9) a. Start to think about "hearing conservation." This refers to protecting the hearing that you have. …As your child grows, teach him or her about hearing conservation. It should become a habit. [Source: *American Speech-Language-Hearing Association*]

   b. Instruct your child to let the speaker know when he/she is aware something that was said was missed, and to ask for it to be repeated if he/she did not understand. [Source: *Phonak*]

c. Children can be taught how to help themselves. [Source: *American Speech-Language-Hearing Association*]

d. Help your child with hearing loss know that they may feel more fatigue after classes since they must work so much harder to keep up with the information presented. [Source: *Phonak*]

A solely auditory/oral language approach puts the burden of communication on children, putting the critical task of language acquisition on their shoulders. Making children responsible for dictating the quality of their conversations as described in (9b) and tasking them with "helping themselves" as mentioned in (9c), indicates that children using an auditory/oral language approach have to become the main advocates for their linguistic development. While an auditory/oral approach charges young children with that hefty responsibility, a visual language approach would provide children with easy access to language that they would not have to strain to decipher.

Parents are often willing to work around their children's needs once those needs are made known to them. If sign language was presented to them as an instrumental need, they could be more likely to pursue it for the good of their child. However, if parents do not get information about how essential sign language is to their deaf children's development, they would have no way of making that informed decision.

3.6    Presenting a Negative or Misleading Image of Sign Language and its Users

Three websites were found to present a biased image of sign language. These sites mainly highlighted sign language as a language approach only used among profoundly deaf people, most likely those in the Deaf community. Exemplar data in (10) provide

examples of negative or misleading information about sign language, and exemplar data

in (11) provide examples of misleading information surrounding deafness as an identity.

(10)  a.  American Sign Language (ASL) is a language used by some individuals

with severe hearing impairment and their families…It's a language

with grammar rules that are different from English. ASL has no written

form. [Source: *My Child Without Limits*]

b.  Communication is constantly an effort. If your child is signing, you must always

make sure that you have your child's visual attention, and that they get your

attention. You are always looking up from what you are doing, always dropping

things to get your hands free! For us, every day is a constant challenge."

[Source: *Baby Hearing*]

c.  Sign Language Only Approach: In this approach, the children and caretakers all

use sign language exclusively. Most commonly, families who choose this

method may have deaf parents or caregivers or the child may be attending a

school for the deaf. Outside of the Deaf Community this approach is not very

common. [Source: *Speech and Language Kids*]

Presenting sign language as something used solely by the Deaf community, or as

something that only children with severe hearing loss can benefit from is misleading. As

*My Child Without Limits* describes it in (10a), ASL "is a language used by some

individuals with severe hearing impairment and their families," one that "has no written

form," and has "grammar rules that are different from English." While ASL is mentioned

on their website, the way it is described portrays it as an unfavorable language option.

Focusing on the ways in which it is different from English could make families lean toward listening/spoken language options that are familiar to them. Also, by using the qualifier "some" and the phrase "severe hearing impairment," the site pigeonholes ASL users into being those who are profoundly deaf, although sign language has been proven to benefit all children, regardless of their hearing status.

It is additionally misleading for *Speech and Language Kids* to note a sign language approach being uncommon outside the Deaf community, as is done in (10c). While those in the Deaf community would naturally be inclined to use sign language with deaf children, stating this could make parents who know nothing about sign language or the Deaf community shy away from a visual language approach, since it is presented as being used by a community in which they are not already included. Additionally, parents in the Deaf community with deaf children sometimes pursue an auditory/oral approach for their children along with a visual language approach, so the question of which groups using visual and auditory/oral language approaches is not as straightforward as it is presented to be.

(11) a. A child who is deaf has no hearing at all. [Source: *Speech and Language Kids*]

b. However, you also have the choice not to amplify your child. Parents who choose this option are often found in deaf communities. [Source: *Speech and Language Kids*]

c. The number of hearing impaired children far exceeds the number who are deaf. [Source: *Phonak*]

Some websites avoided using the term "deaf" to describe children at any and all levels of hearing loss. Statements like (11a), "a child who is deaf has no hearing at all," and (11c), "the number of hearing impaired children far exceeds the number who are deaf," highlight the tendency to distinguish "deaf" as a term that only applies to those with profound hearing loss. Online resources seem reluctant about using the term "deaf" and generally prefer the term "hearing loss" for describing deaf children's hearing status. That trend indicates a desire to distinguish among levels of deafness, perpetuates fear of the word "deaf" and its implications, and it ignores the fact that deafness can be an integral part of the identity of anyone at any level of deafness (i.e. people at different levels of deafness can all identify as "deaf" in their own way, but viewing deafness as a sole product of level of hearing loss disregards that fact).

## 3.7     Representations of Sign Language

Overall, there was a general lack of sufficient, fact-based information about sign language on the webpages analyzed for this project. Some webpages regarded sign language negatively, while others provided little to no information about it. A few of the websites involved in the study portrayed visual language in a positive light, as well. An overview of the information on sign language presented on the analyzed webpages can be seen in figure 4 below.
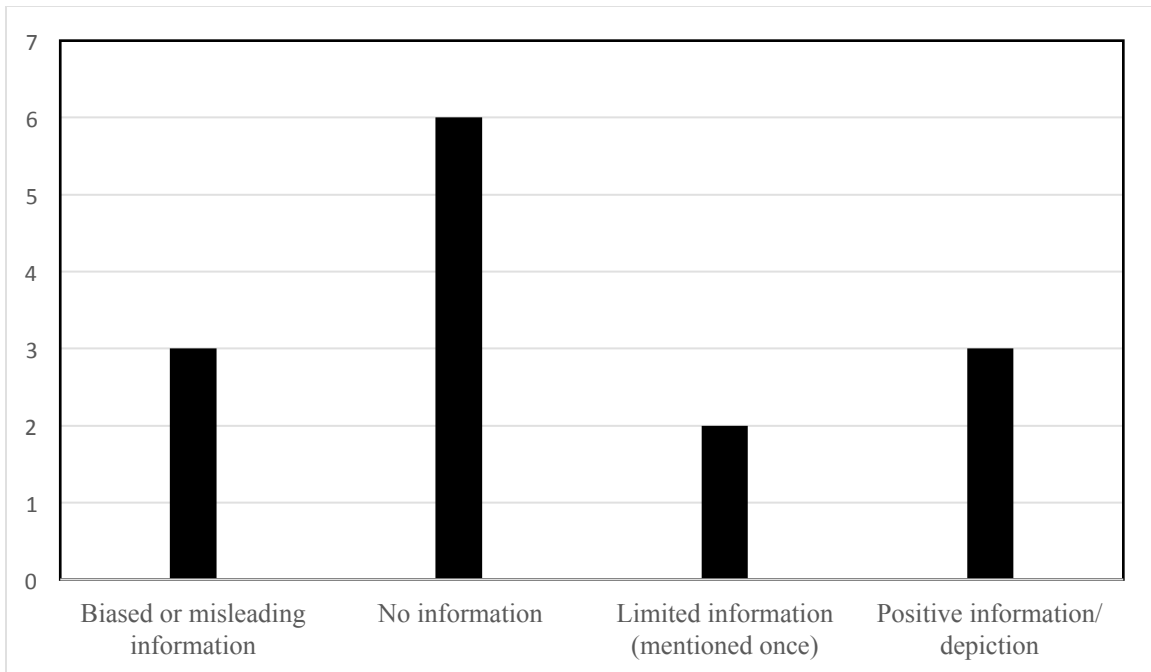
**Figure 4**: Representation of sign language in analyzed online resources

   While biased and limited information about sign language (as well as some positive information) appeared on several webpages, the majority had zero information on sign language at all. The implications of these varied representations of sign language will be discussed in sections 3.7.1 and 3.7.2 below.

3.7.1 Negative and Nonexistent Representations of Sign Language

While only three of the 18 webpages analyzed contained biased or misleading information about sign language itself, as seen in (10) above, other websites had limited to no coverage of sign language, which has consequences of its own. Six websites did not mention sign language at all (*Hearing First*, *Healthy Hearing*, *Cochlear.com*, *Hearing Loss Association of America*, *American Speech-Language-Hearing Association*, *hear-it.com*), and two sites only mentioned it once overall (*Phonak*, *Audiology Online*). The one line that appeared on *Phonak*'s webpage that discussed sign language was line 136

out of 155 total lines, reading "There are many ways that communication can happen: orally, with gestures or with sign language." *Audiology Online*'s mention of sign language was line 103 out of 143 total lines, reading "Language, whether spoken or signed, enables the child to communicate with others, to express and understand needs, desires, feelings, and ideas." While both sentences seem to neutrally discuss spoken and signed languages as being equal, the fact that each webpage only mentions sign language once in a non-detailed way shows that those websites do not believe sign language and spoken language are equally important.

The lack of sufficient information about sign language in online resources is just as concerning as biased or false information about sign language. If parents receive no information on sign language from online resources, and they additionally don't get information on it from health professionals they encounter, they may not ever learn about it. Additionally, if they come across information on sign language that portrays it negatively, they may not realize that sign language is instrumental to their child's development, and consequently could choose not to pursue learning it.

3.7.2   Positive Representations of Sign Language

Additionally, while the majority of webpages analyzed in this project were either neutral or against visual language approaches, three of the 18 webpages discussed sign language in a positive light. However, one of those webpages was a news article from *The Guardian* and a parent-written blog post from *Hearing Like Me*. While both of those webpages featured stories that described the benefits and importance of sign language, they were personal accounts of families' stories. While it is powerful for parents to read

about families who have chosen to use sign language with their deaf children, those websites are not designed as parent resources either neutral or against visual language approaches, some websites.

It is also worth noting that *Hearing Like Me* is a website by Phonak, so though Phonak is largely biased toward listening and spoken language methods overall, it allowed this blog post praising sign language on the *Hearing Like Me* site. Some of the other websites that were generally biased toward an auditory/oral approach occasionally gave some quality lines of information. For example, the webpage analyzed for the *Phonak* website had the line "Correcting the lack of clarity that may be associated with a sensorineural hearing loss is not completely possible by amplifying sounds." While *Phonak* was one of the websites that praised how technology was improving every day, that example line shows that *Phonak* was truthful about expectations for technology in this specific case of hearing loss. While that statement conflicts with their lofty claim of there being "virtually no hearing loss which cannot benefit from the use of appropriate technology" elsewhere on the same webpage, it is notable that those contradictions exist.

The other webpage of the set of 18 that actively supported sign language as an integral part of deaf children's language learning and development was *MyDeafChild.org*. The website provides resources for parents to learn sign language, and it details the benefits and importance of visual language. The site is framed sign language as something that benefits language development of all children, saying "American Sign Language is an important developmental tool that will help your child acquire a foundation for thinking and language (signed or spoken)." Making the point that sign

languages like ASL can enhance development of all languages, be they signed or spoken, is a key point to communicate to parents who may be debating whether or not they should sign with their children.

As the webpage from *MyDeafChild.org* was the only website that focused on sign language as being integral to deaf children's development, one page from the *National Association of the Deaf* and two webpages from the *American Society for Deaf Children* were additionally analyzed. Although these organizations appeared minimally in the web searches (the *National Association of the Deaf* website appearing seven times, the *American Society for Deaf Children* website appearing six times), webpages from those sites were evaluated to see how organizations that hold visual language at the core of their beliefs present information about it. Exemplar data in (12) show examples of sign language being discussed as beneficial to all children, a theme that was prevalent across both websites.

(12) a. All children can benefit from the use of sign language, with no risk to other language skills. This includes: Hearing children, Deaf children, Hard of hearing children, [and] any child benefiting from technological auditory assistance [Source: *American Society for Deaf Children*]

b. The earlier a child learns his first language, the greater his success will be in acquiring language skills and meeting other important developmental goals. Sign language provides the earliest possible mode through which children can learn expressive language skills. [Source: *American Society for Deaf Children*]

c. Even the "terrible twos" stage of child development is thought to be caused by children's frustration at being unable to communicate with their caregivers. [Source: *American Society for Deaf Children*]

d. Do not be afraid to start learning. Good communication, starting as early as possible, will enhance your relationship with your child throughout your lives. [Source: *National Association of the Deaf*]

The webpages analyzed from *American Society for Deaf Children* and *National Association of the Deaf* provide ideal springboards for parents to learn about sign language. Both websites emphasize how sign language can benefit children in a general way that all parents could find relatable. For example, mentioning the "terrible twos" stage in (12c), which is thought to be brought on by communication frustration in all children, is effective in that it applies to all children, not just deaf children. If a parent is wrapped up in not knowing about their child's deafness, describing the benefits of sign language in terms applicable to all children could help them understand things more easily. In that respect, *American Society for Deaf Children* presents sign language as something that all children, hearing and deaf, can benefit from in (12a) and (12b), changing the narrative of sign language being used only by "some individuals with severe hearing impairment and their families," as *My Child Without Limits* puts it, to something which children would benefit from learning at any level of hearing or deafness.

While not included in (12) above, *National Association of the Deaf* notably mentions how technology can be used to help families learn sign language, stating "Technology can help many families learn to sign. The Internet offers many signing web

sites, and many families benefit from using books and videos." While technology

mentioned on the majority of webpages that appeared in this search referred to hearing

technology like cochlear implants or hearing aids, *National Association of the Deaf*

highlights that hearing technology is not the only kind of technology that can be used to

provide families support throughout their deaf child's language journey.

4       Next Steps and Suggestions for Future Research

The issue of bias is much more multifaceted than it appears on the surface. The

qualitative analysis of these web resources revealed that bias appears both in what

information is (or is not) presented and how that information is presented. This project

revealed how the language and content used in online resources can bias parents toward

some communication methods over others (mainly auditory/oral language approaches

over visual language approaches).

      One concerning finding of this project was that the few online resources with fact-

based information on visual language and stakeholder input from the Deaf community

(e.g. American Society for Deaf Children, National Association of the Deaf) appeared so

infrequently. Only six webpages from the American Society for Deaf Children appeared

in the web searches, and only seven webpages from the National Association of the Deaf

appeared in the web searches. Websites that promote the importance of early sign

language exposure would be ideal for parents to interact with, but this project revealed

that there is a limited chance that parents would find such websites as opposed to those

biased toward auditory/oral methods. The next logical step would be investigating how

websites appear more frequently than others in a web search and sharing that information

with organizations like American Society for Deaf Children to help them strategize about how they can reach more parents of deaf children with their online resources.

In the future, it would be helpful to look into how much parents rely on online resources for information, including the degree to which they make decisions based on information they find online about deafness. While parents have been found to utilize online resources in their search for information about their child's deafness, it is important to know how the information they find online affects the actual decisions that they make to better understand the significance of the biases found online. Additionally, it would be helpful to have more research into the factors that affect how frequently websites appear in web searches. While the use of paid ads on Google seemed to make some website appear consistently at the top, research into what other factors dictate the order in which sites appear in a web search could help figure out ways to bring resources like *American Society for Deaf Children* up in the search ranks, as opposed to websites that have little to no information about visual language.

## 5 Conclusion

It is undeniable that language acquisition is instrumental to the development of all children. If a child misses their critical period of language acquisition, it would have devastating consequences for their cognitive, psychological, emotional, and social development. Despite the fact that sign language is the only language to which deaf children have full access and its use has been proven to enhance English language skills in children, sign language is often left out of the communication options presented to parents of deaf children.

This project shows that if parents were to conduct an online search for information about how to communicate with their deaf children, they would find little to no information about sign language. While some sites provided information on sign language that was positive or neutral, twelve of the most-frequently appearing webpages presented sign language as a less favorable option in comparison to listening and spoken language or did not mention sign language at all. Sign language needs to be recognized as an integral part of the development of all deaf children. Regardless of whether a child is simultaneously pursing an auditory/oral approach, giving that child access to visual language would ensure that they do not miss their critical period of language development.

All online resources regarding language options for deaf children have an obligation to include information about sign language. Not doing so is irresponsible and puts deaf children at several levels of developmental risk. If parents use the Internet to learn about their children's deafness, the websites providing resources and information on childhood deafness need to recognize that not educating others (and themselves) about the importance of visual language for deaf children only serves to hurt the population they claim to serve.

6        References

Cummins, Jim. (2006). The Relationship Between American Sign Language Proficiency And English Academic Development: A review of the research. Paper presented at the Conference Challenges, Opportunities, and Choices in Educating Minority Group Students, Norway, October.

Davidson, Kathryn, Diane Lillo-Martin, and Deborah Chen Pichler. (2014). Spoken English language development among native signing children with cochlear implants. *Journal of Deaf Studies and Deaf Education, 19*(2), 238-250.

DeLana, Melissa, Mary Anne Gentry, and Jean Andrews. (2007). The efficacy of

ASL/English bilingual education: Considering public schools. *American Annals of the Deaf*, *152*(1), 73-87.

Dostal, Hannah M., and Kimberly A. Wolbers. (2014). Developing language and writing skills of deaf and hard of hearing students: A simultaneous approach. *Literacy Research and Instruction*, *53*(3), 245-268.

Fellinger, Johannes, Daniel Holzinger, Heribert Sattel, Manfred Laucht, and David Goldberg. (2009). Correlates of mental health disorders among children with hearing impairments. *Developmental Medicine and Child Neurology, 51*(8), 635-41.

Fink, Nancy E., Nae-Yuh Wang, Jiovani Visaya, John K. Niparko, Alexandra Quittner, Laurie S. Eisenberg, and Emily A. Tobey. (2007). Childhood development after cochlear implantation (CDaCI) study: Design and baseline characteristics. *Cochlear Implants International*, *8*(2), 92-116.

Freel, Brittany L., M. Diane Clark, Melissa L. Anderson, Gizelle L. Gilbert, Millicent M. Musyoka, and Peter C. Hauser. (2011). Deaf Individuals' Bilingual Abilities: American Sign Language Proficiency, Reading Skills, and Family Characteristics. *Psychology*, *2*, 18-23.

Friedmann, Naama, and Dana Rusou. (2015). Critical period for first language: The crucial role of language input during the first year of life. *Current Opinion in Neurobiology, 35*, 27-34.

Giraud, Anne-Lise, and Hyo-Jeong Lee, H. J. (2007). Predicting cochlear implant outcome from brain organization in the deaf. *Restorative Neurology and Neuroscience*, *25*(3-4), 381-390.

Hall, Wyatte C. (2017). What you don't know can hurt you: The risk of language deprivation By impairing sign language development in deaf children. *Maternal and Child Health Journal*, *21*(5), 961-965.

Hassanzadeh, S. (2012). Outcomes of cochlear implantation in deaf children of deaf parents: comparative study. *The Journal of Laryngology & Otology*, *126*(10), 989-994.

Hermans, Daan, Harry Knoors, Ellen Ormel, and Ludo Verhoeven. (2008). The relationship between the reading and signing skills of deaf children in bilingual education programs. *Journal of Deaf Studies and Deaf Education*, *13*(4), 518-530.

Humphries, Tom, Poorna Kushalnagar, Gaurav Mathur, Donna Jo Napoli, Carol Padden, Christian Rathmann, and Scott R. Smith. (2012). Language acquisition for deaf children: Reducing the harms of zero tolerance to the use of alternative approaches. *Harm Reduction Journal*, *9*(16), 1-9.

Humphries, Tom, Poorna Kushalnagar, Gaurav Mathur, Donna Jo Napoli, Carol Padden, Christian Rathmann, and Scott R. Smith. (2016). Avoiding Linguistic Neglect of Deaf Children. *Social Service Review*, *90*(4), 589-619.

King, J. Freeman. (2013). The Advantages of a Visual Pathway to Learning: Suggestions for Hearing Parents of Children Who Are Deaf. *The Exceptional Parent*, *43*(2).

Kuntze, Marlon. (1998). Literacy and deaf children: The language question. *Topics in Language Disorders*, *18*(4), 1-15.

Kushalnagar, Poorna, Sheila Bruce, Tina Sutton, and Irene W. Leigh. (2017).

Retrospective Basic Parent Child Communication Difficulties and Risk of Depression in Deaf Adults. *Journal of Developmental and Physical Disabilities, 29*(1), 25-34.

Lillo-Martin, Diane. (1993). Deaf readers and universal grammar. In *Psychological perspectives on deafness*, ed. by Mark Marschark & M. Diane Clark, 311-337. Edison, NJ: Lawrence Erlbaum.

Mayberry, Rachel I. (2007). When timing is everything: Age of first-language acquisition effects on second-language learning. *Applied Psycholinguistics*, *28*(3), 537-549.

Mayberry, Rachel I., Alex A. del Giudice, and Amy M. Lieberman. (2011). Reading achievement in relation to phonological coding and awareness in deaf readers: A meta-analysis. *Journal of Deaf Studies and Deaf Education*, *16*(2), 164-188.

Miller, Paul, Tevhide Kargin, Birkan Guldenoglu, Christian Rathmann, Okan Kubus, and Peter C. Hauser. (2012). Factors distinguishing skilled and less skilled deaf readers: Evidence from four orthographies. *Journal of Deaf Studies and Deaf Education*, *17*, 439-462.

Mitchell, Ross E., and Michael A. Karchmer. (2004). Chasing the Mythical Ten Percent: Parental Hearing Status of Deaf and Hard of Hearing Students in the United States. *Sign Language Studies, 4*(2), 138-163. Retrieved from: http://gupress.gallaudet.edu/SLS.html

Musselman, Carol, and Gabriella Szanto. (1998). The written language of deaf adolescents: Patterns of performance. *Journal of Deaf Studies and Deaf Education*, *3*(3), 245-257.

Peterson, Nathaniel R., David B. Pisoni, and Richard T. Miyamoto. (2010). Cochlear implants and spoken language processing abilities: review and assessment of the literature. *Restorative Neurology and Neuroscience*, *28*(2), 237-250.

Porter, Ann, and Sisira Edirippulige. (2007). Parents of deaf children seeking hearing loss related information on the internet: The Australian experience. *Journal of Deaf Studies and Deaf Education*, *12*(4), 518-529.

Preisler, G., A.-L. Tvingstedt, and M. Ahlström. (2002). A psychosocial follow-up study of deaf preschool children using cochlear implants. *Child: Care, Health and Development*, *28*(5), 403-418.

Prinz, Philip M., and Michael Strong. (1998). ASL proficiency and English literacy within a bilingual deaf education model of instruction. *Topics in Language Disorders, 4*, 47-60.

Schick, Brenda, Peter de Villiers, Jill de Villiers, and Robert Hoffmeister. (2007). Language and theory of mind: A study of deaf children. *Child Development*, *78*(2), 376-396.

Scott, Jessica A., and Robert J. Hoffmeister. (2017). American Sign Language and Academic English: Factors Influencing the Reading of Bilingual Secondary School Deaf and Hard of Hearing Students. *Journal of Deaf Studies and Deaf Education*, *22*(1), 59-71.

Search Engine Market Share. (2018). *NetApplications*. Accessed April 25, 2018.

Strong, Michael, and Philip M. Prinz. (1997). A study of the relationship between

American Sign Language and English literacy. *Journal of Deaf Studies and Deaf Education*, *2*(1), 37-46.

Wilbur, Ronnie B. (2000). The use of ASL to support the development of English and literacy. *Journal of Deaf Studies and Deaf Education*, *5*(1), 81-104.

Yoshinaga-Itano, Christine L. Snyder, and Doris M. Downey. (1996). The Effect of Hearing Loss on the Development of Metacognitive Strategies in Written Language. *Volta Review*, *98*(1), 97-143.

Yoshinaga-Itano, Christine L. Snyder, and Rachel Mayberry. (1996). Examining written language assessment and intervention links to literacy: Can lexical/semantic skills differentiate deaf or hard-of-hearing readers and nonreaders. *Volta Review*, *98*(1), 39-61.

Zaidman-Zait, Anat, and Janet R. Jamieson. (2004). Searching for cochlear implant Information on the internet maze: Implications for parents and professionals. *Journal of Deaf Studies and Deaf Education*, *9*(4), 413-426.

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7       Notes

8       Appendix

| Groupings | Search Strings |
|---|---|
| Group 1 | my deaf child |
|  | my child with hearing loss |
|  | my hearing impaired child |
| Group 2 | my child is deaf what do I do |
|  | my child has hearing loss what do I do |
|  | my child is hearing impaired what do I do |
|  | my child can't hear what do I do |
| Group 3 | can my deaf child hear |
|  | can my child with hearing loss hear |
|  | can my hearing impaired child hear |
| Group 4 | can my deaf child talk |
|  | can my child with hearing loss talk |
|  | can my hearing impaired child talk |
| Group 5 | can I talk to my deaf child |
|  | can I talk to my child with hearing loss |
|  | can I talk to my hearing impaired child |
| Group 6 | should I sign to my deaf child |
|  | should I sign to my child with hearing loss |
|  | should I sign to my hearing impaired child |
| Group 7 | raising a deaf child |
|  | raising a child with hearing loss |
|  | raising a hearing impaired child |
|  | language options for my deaf child |

| | |
|---|---|
| Group 8 | language options for my child with hearing loss |
| | language options for my hearing impaired child |
| Group 9 | can I communicate with my deaf child |
| | can I communicate with my child with hearing loss |
| | can I communicate with my hearing impaired child |
| Group 10 | how can I communicate with my deaf child |
| | how can I communicate with my child with hearing loss |
| | how can I communicate with my hearing impaired child |
| Group 11 | can my deaf child learn to communicate |
| | can my child with hearing loss learn to communicate |
| | can my hearing impaired child learn to communicate |
| Group 12 | should I teach my deaf child sign language |
| | should I teach my child with hearing loss sign language |
| | should I teach my hearing impaired child sign language |
| Group 13 | resources for parents of a deaf child |
| | resources for parents of a child with hearing loss |
| | resources for parents of a hearing impaired child |
| Group 14 | language options for a deaf child |
| | language options for a child with hearing loss |
| | language options for a hearing impaired child |
| Group 15 | my child is deaf now what |
| | my child has a hearing loss now what |
| | my child is hearing impaired now what |
| Group 16 | tips for parents of a deaf child |
| | tips for parents of a child with hearing loss |
| | tips for parents of a hearing impaired child |

Table 2: List of all search strings