Sign Language Use

for Deaf, Hard of Hearing, and Hearing Babies:

The Evidence Supports It

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Linguistic proficiency has been called a central requirement for human life (Magnuson, 2000). Parents and professionals have rightly given great importance to the various discussions and studies concerning methods most likely to further children's language development. Educators and parents have long debated whether access to visual language (American Sign Language, for instance) enhances or hampers the efforts of deaf and hard of hearing children who are learning to develop spoken language and literacy skills. In more recent times, the discussion has broadened to include the relative merits of signed languages when used with children who have no auditory impairments. Does the use of signs encourage language development in young children? If so, are the advantages available only to specific populations?

The following is a review of current research addressing these questions. Conclusions drawn support the use of sign language with all children: hearing, hard of hearing, and deaf, and including those who benefit from technological hearing supports. The information provided is by no means exhaustive, but is intended to serve as a resource for parents and professionals working with *all* populations of children, as they seek to help individuals reach their full potential.

Importance of Early Language Learning Experiences

Why Early?

The most critical language learning occurs in a very short window of time, and research has shown repeatedly that lack of full exposure to language (spoken or otherwise) in this critical period can have devastating and permanent effects. Gleason (2000, p. 44) reports that babies begin to communicate intentionally before the end of their first year, usually at around nine or ten months, when they first realize that they can make a vocalization or gesture, and expect their caregiver(s) to respond. After that milestone, most children's language development proceeds at an amazing pace. "By the time they get to kindergarten, children have amassed a vocabulary of about 8,000 words and almost all of the basic grammatical forms of their language (p. 7)." Connor asserts that early vocabulary skills have a strongly documented relationship to later reading skills. She cites Anderson and Freebody, who documented this relationship in hearing children as far back as

1981, and Oakhill and Cain, who reported in 2000 that the same relationship applied to deaf children. They found that for deaf children the

ther children's vocabulary skills were in signed or in spoken language (Connor, 2002), so we know that early vocabulary skills are important, regardless of a child's hearing status or communication mode.

Vocabulary skills alone aren't enough. Gleason (2000) reported that by kindergarten children with normal language acquisition are able to handle "questions, negative statements, dependent clauses, compound sentences, and a great variety of other constructions." It is believed that everyone can learn to use nouns and verbs correctly throughout childhood, but "the critical period for learning grammar--the correct use of articles, conjunctions, and prepositions--seems to be much shorter," according to Neville, a cognitive neuroscientist at the Salk Institute in La Jolla, CA (quoted by Pennisi). In separate studies, this was shown to be true of immigrant children arriving in new-language environments after the crucial period had passed (Pennisi, 1992), as well as of children whose first exposure to sign language occurred too late for them to acquire the language fully (Glennen 2002). In every case, the age of first-

relationship between strong vocabulary skills and later reading skills held true whe

language acquisition was highly correlated to eventual proficiency in the language.

Effect on Other Areas of Development

Failure to provide complete and early access to language can have devastating and permanent effects on a child. Few things have as great an impact on a child--and in as many areas of development--as language skills. An article recently published by the American Speech-Language-Hearing Association gives detailed discussion of how language competency can powerfully affect children's development of fundamental social and cognitive skills (Schick, J. de Villiers, P. de Villiers, & Hoffmeister, 2002). This conclusion is corroborated by the findings of a recent study of children with specific speech and language difficulties; it was confirmed that children with these difficulties have problems with academics, and are more likely to have self esteem and behavior issues (Lindsay, Dockrell, Letchford, & Mackie, 2002).

The *British Medical Journal* reports that "failure to develop effective and sophisticated language at an early age has negative consequences for all aspects of psychological

development, and thus for children's mental health" (Hindley & Parks, 1999). One frequently used measure of a child's cognitive development is Theory of Mind. Theory of Mind is the concept that allows us to distinguish our own thoughts, beliefs, desires and emotions from those of others. As an example, one simple test that might be used to determine whether a child understands Theory of Mind involves having her view a series of pictures that tell a story. In the story, a boy puts a favorite toy under the bed before leaving the room. Later, an adult comes into the room and moves the toy (without the boy's knowledge) to a shelf in the closet and closes the closet door. After viewing the picture story, the child might be asked where the boy in the picture would look for his toy. A response indicating that the boy would look in the closet indicates a lack of Theory of Mind skills. If the child responds that the boy would look under the bed, in the last place he saw the toy, it indicates the ability to separate what she knows from what the character in the story knows, and we know that she has developed an understanding of Theory of Mind. Most children reach this milestone by around age four (Schick et al., 2002).

What does something so abstract as "Theory of Mind" really matter in the grand scheme of things? Schick et al. (2002) explains that without Theory of Mind, education is all but impossible. "Education requires children to talk about mutual understandings and misunderstandings, to reflect on their own beliefs as well as others', and to shift perspectives where evidence suggests that another point of view is valid. All of these require Theory of Mind skills." Even a simple fairy tale is pointlessly confusing without Theory of Mind skills. Why, for instance, would Snow White bite into a poisoned apple, and why would Little Red Riding Hood merrily skip into her grandmother's house when there was a wolf waiting for her? This clearly has serious implications for all children, as the same study noted that "children who had more advanced language skills were far more likely to pass the Theory of Mind tasks."

Theory of Mind is not the only problem area for children who do not have complete access to language at an early age. Addressing the challenges faced by children with specific speech and language difficulties, one group of researchers writes that, "in addition to their communication difficulties, they have educational problems, and are also more likely to have problems with behavior and self esteem" (Lindsay, Dockrell, Letchford & Mackie,

2002). Consistent inability to understand and to interact with caregivers and the environment may negatively affect the child's estimation of himself and make him feel helpless to request (and obtain) the information and things he desires. Magnuson (2000) corroborates this finding, and agrees that earlier language stimulation "enables the child to gain confidence by knowing what is going on." A study reported in Developmental Psychology found that "children who had a positive representation of self were rated as being more involved and as participating more in school activities, as well as being more self-directed and independent, than children who had a negative representation of self." This is more than a matter of simple feel-good. The same study reported that children who had a negative image of themselves at age five were less liked by their peers and less positively ranked by their teachers by age eight than were the students who'd had a positive self image at age five. "Low feelings of self-worth in early childhood constitute a risk factor for the ability to cope successfully with the demands and stresses of school, not only concurrently but also over time" (Verschueren, Buyck & Marcoen, 2001).

Unmet language needs have consequences extending far beyond the classroom, too. Inappropriate behavior is a one area in which low language ability is considered a risk factor. A report published on the homepage of the American Speech-Language-Hearing Association, abbreviated *ASHA*, (Prison Populations, 2002) comments that poor language skills, frustration, academic problems, and inadequate social skills may lead to school drop out, juvenile delinquency, and eventual adult criminal behavior. The report says that as far back as the 1920's, researchers have been aware of a relationship between poor communication abilities and high levels of delinquency, violence, and incarceration. Wickstrom-Kane and Goldstein (1999) explain it this way: "Children gain access to what they want and need using many behaviors, including those that would be considered inappropriate, annoying, or harmful. These problem behaviors act as unconventional communication strategies." The same article goes on to explain that there is a remedy. One needs to "focus on training a more conventional communication form that can serve the same function, and thus replace problem behavior."

Considering the risks associated with low-language ability for hearing children, it is little surprise that deaf and hard-of-hearing children are frequently at risk in the same areas.

They have been described as "more impulsive and as less compliant, less socially mature, and less skilled in social problem solving and social cognition than hearing children" (Brubaker & Szakowski, 2000). The American Speech-Language-Hearing Association article on *Prison Populations* (2002) cites startling figures: The reported incidence of hearing loss in jail populations is approximately thirty percent! Again, the difficulties are due to poor language skills.

In a comparison study of two hard of hearing boys we have an example of how full access to language can change a child's situation, all other circumstances being equal. In the study, one boy was given full access to language at age six months, while the other did not have full access to language until he was two and a half years old. The boys were similar in all aspects except the ages at which their hearing losses were confirmed. Both were from hearing families, both were enrolled in the same (signing) preschool. By age one, the first boy was communicating and by age three and a half he was considered to be on par with--or even ahead of--his normally hearing peers. The second boy, whose hearing loss was confirmed at a later date, and who did not have complete access to language until he was two and a half, had severe behavior issues. He pushed others, and cried when he couldn't make himself understood. By age four and a half, he had begun to develop more quickly, but he still had problems, and was not on par with others his age. Drawing from that study and others, Magnuson (2000) postulated that "the deaf children who are the most competent in their social, cognitive, and linguistic development are those who have participated in active linguistic interaction with their parents from an early age."

Deaf and hard of hearing children and incarcerated adults aren't the only individuals who show measurable differences in behavior when they find themselves unable to communicate. There has been a large body of research of late which connects the treacherous "terrible two's" stage of toddler development with frustration over being unable to communicate wants and needs. As Burton White, an educational psychologist and author of *The First Three Years of Life* has noted, the second year of life is a time when most children have very little spoken language, and this can cause their parents a lot of grief. Lack of communicative abilities can cause temper tantrums and fits as children struggle to make their needs known. The prevailing theory is that

having the ability to communicate with parents and other caregivers "reduces a major source of tantrums and stress for infants" (Brady, 2000). As long as a child is not able to communicate effectively--regardless of the child's hearing status--the child and his parents are sentenced to frustration and headaches that might otherwise be prevented.

Benefits of Successful Early Language Experiences

Not all of the news is negative; research supports some very encouraging conclusions. While it is true that lack of quality language exposure early in life and *late* learning of a first language can result in long-term language deficits, Mayberry (1993) notes that *early* acquisition of a first language can facilitate the acquisition of a second language. There is an abundance of evidence, too, suggesting immediate and complete language experiences lead to improved success in many areas. A survey was taken of successful college students at Gallaudet University, the internationally known and acclaimed university for deaf and hard of hearing students (Toscano, Mckee, & Lepoutre, 2002). Students were asked a wide variety of questions relating to possible factors in their academic success. Their backgrounds differed greatly. 90% of them came from hearing families. About 63% of the students were deaf from birth, and only about 47% of them considered English (as opposed to American Sign Language or other languages) to be their first language. The one thing these successful students had in common (besides hearing loss) was that they "communicated frequently and easily with their families." The results of the survey supported the principle that "the mode of communication is less important than the quality of communication" (Magnuson 2000).

Surely this is information that can be used to the advantage of *every* student: hearing, hard of hearing and deaf alike! Easy and early communication between a child and the people in his environment provides positive effects not only in language development, but also in cognitive, psychological and social development. The advantages of early language exposure are clear. The answer to the biggest difficulty faced by students with hearing loss, and a sure-fire way to boost progress for those with normal hearing, is an approach that will facilitate the highest quality of communication for each individual from the very earliest age possible.

Signing to Promote Early Language for All Children

Defining Sign Language

The phrase *sign language* is sometimes used with very different meanings. As such, it may be helpful to define what is meant by the phrase as it is used in this paper. Generally speaking, the terms *sign language* or *signed languages* have been used to mean *any* manual representation of language relying on the use of signed vocabulary to represent concepts. This includes American Sign Language--a full language that (like English, Spanish or any other language) has its own vocabulary, grammar, literature and even poetry--but it also includes signed representations of spoken language (such as Pigeon Signed English, Total Communication, Signing Exact English, and many others) which are rightfully *sign systems*, not true languages. I do *not* include in my definition any manual system (such as Manually Coded English) which relies only on attempts to make the phonics or the spelling of spoken language visually accessible, and which does not use any distinct vocabulary to express concepts.

As American Sign Language (ASL) *is* a complete language and the sign systems are *not*, I have no intention of comparing ASL to the others. Interested parties are encouraged to review the already extensive body of literature covering this subject. Realistically, the vast majority of parents (whether their children are deaf or hearing) are unlikely to be native users of ASL; as they learn to sign they are likely to adopt some mixture between their signed an their spoken language, even if only as an aid to them in the beginning stages of their learning. For this reason, I have here reviewed studies pertaining both to signed systems *and* to ASL. (In some cases, the authors of the studies have not indicated to what degree their subjects were using ASL structures and vocabulary, which would complicate any separation of the two bodies of research.) In this report, distinctions will be made between ASL and the various signed systems only when the distinction is clearly noted by the authors, and is important to the interpretation of the research. No distinctions will be made between the various sign systems.

Sign Language is the earliest possibility!

Given adequate exposure, children begin learning language long before they are physically capable of reproducing the sounds and patterns of speech (Gleason, 2000, p. 356). Fortunately, physical maturation of the organs of speech need not be a hindrance to children's expressive communication. Use of sign

language with children—hearing or otherwise—is known to promote early communication, since children can communicate with their hands sooner than they can master verbal skills. Marilyn Daniels, associate professor of speech communication at Pennsylvania State University, and author of a book promoting signing for hearing children's literacy,, says that "signs can encourage communication at least six months before most children start to form basic words…[which] not only increases the parents' bond and interaction with their babies, it helps reduce a major source of tantrums and stress for infants." Garcia, quoted in the same *Business Week* article, has been researching the subject since 1986, and says many children exposed to sign at the age of seven months "would be signing back in eight months," and that by nine months some babies can master as many as seventy-five individual signs (Brady 2000).

Starting with two languages

For years, there has been a belief held by professionals and by the general populace alike that has kept wary bilingual parents from teaching their prodigy two languages simultaneously. People have viewed "early simultaneous bilingual exposure suspiciously, fearing that exposing a young child to two languages too early may cause language delay and, worse, language confusion... [a fear that was] reflected both in educational settings and in comments made by many parents raising bilingual children." Parents have feared dual exposure held the possible danger of preventing full competency in either language, and often said they were waiting until one language was firmly established before introducing a second language (Petitto and Holowka, 2002).

"Language Confusion" is the label given to a theory that, in the beginning stages of language development, bilingual children do not understand that they are learning two distinct languages. The idea that children initially are "confused" about the matter was the result of observations and studies made of the language development of children who learned two languages simultaneously. The theory appears to have some holes, though. Although it has not been decisively proven wrong for children learning two spoken languages, it *has* been shown conclusively untrue of bilingual children who learn both a signed and a spoken language. For children learning two spoken languages, it is possible to mix vocabulary from each into the same utterance, or to pronounce something so unclearly that researchers cannot be certain which language the child is choosing,

if he is choosing one at all. (An example of this would be the English word *ball,* and the French equivalent *balle*—either of which might be pronounced "ba" by a young bilingual, leading observers to wonder if the child knows there is a difference between the two words.) For a child learning languages of two different modes, though—as a signed language and a spoken one—the problem is resolved by the inherent differences between the two languages. The lack of confusion experienced by these children is easily verifiable, because there can be no ambiguity between vocabulary words, and it is a matter of greatest ease to identify which mode a child uses each time he expresses himself (Petitto and Holowka, 2002).

The easier identification of signed versus spoken vocabulary made it possible for researchers to prove that children learning signed and spoken languages simultaneously reach all of the major language milestones (such as first-word, first fifty words, and first two-word phrase) on a similar timetable in each of their two languages, and on a timetable similar to that at which monolingual babies reach all the same milestones (Petitto and Holowka, 2002). Imagine: Children learn twice as much language as others in the same time frame, simply because they are exposed to two languages from the start, and neither language suffers!

Signing for Hearing Infants

Handy communication for better behavior.

As discussed earlier, quality and ease of communication can have tremendous effects on nearly every aspect of a child's life. The theoretical possibility of preventing behavior issues by giving children a method of communicating their wants and needs more readily at an early age has become a reality. There are now available countless books and videos specifically dedicated to teaching parents how to sign with their children. Parents and teachers alike are touting the benefits of signing with hearing infants, and all around the country classes that teach signing skills to parents and their hearing babies are increasingly popular.

"Signing Together" is one such class. Taught by Celeste McAlvaine Davis, a speech-language pathologist, the class enrolls children as young as six months old. Davis, who taught her own (hearing) children to sign, says the classes have proven useful for foreign-adopted babies, too, as they adapt to their new language environments. Is signing with hearing babies a passing fad? It seems unlikely. Some of the research dates back more than a decade, and

Davis' class enrollment numbers doubled between 1999 and 2000 (Brady, 2000). Clearly, parents are more than a little impressed with the results thus far.

Signing for smarts and scholastic achievement.

Behavioral differences aren't the only issue being examined in connection with hearing children who learn to sign as part of their early language development. Evidence from a variety of studies shows that children who learn to sign as infants often score higher on standardized tests, measure higher on tests of I.Q., and outperform their peers in a variety of social and academic arenas (Waldman, 2001). Critics have argued that parents of hearing children who teach their babies to sign are spending a greater amount and quality of time with the infants, and that the sign alone may not account for the children's I.Q. scores. The added attention given to the children, and the intent of the parents to develop early language skills certainly cannot be discounted as factors, but hearing babies of deaf parents also have been shown to have better than average abilities (Waldman, 2001). These are children who learn to sign as a natural consequence of their daily exposure--not because of greater efforts made by the parents-- and this is despite getting little or no *spoken* language at home in that same crucial time period!

Daniels told Waldman (2001) that she recalls her graduate students in the communications field repeatedly approaching her for answers to what seemed an unexplainable phenomenon. Many of the students worked as sign interpreters in the public schools, and frequently attended conferences with deaf parents and their hearing children. How was it possible, they wanted to know, that these hearing children who were growing up in silent homes—and learning English after learning to sign—seemed always to show "an above-average ability to speak and read?" Why was it that they excelled in reading and in spoken English? Their questions led Daniels to ten years of research, and the results were astounding. Daniels did seven studies of pre-school and kindergarten students, and compared those whose teachers used sign languages simultaneously with spoken English to those whose teachers did not. "In each study, children in the sign-language classes scored higher on standardized tests than the students whose learning was not augmented with sign language.

Believing that instruction in sign language might be advantageous to other

populations, she tested her theory in Prince George's county, MD. There, a large percentage of the population is African American, and educators were concerned by studies showing that black children consistently score 15 points lower on standardized tests than do their white peers. Daniels compared four middle school classes, all made up of children from disadvantaged neighborhoods. Two of the classes were given sign language instruction, and two were not. Not only were the test scores of the signing children significantly higher than the scores of the other classes, but the African-American signing children had significantly decreased the gap with their non-minority peers (Waldman, 2001).

A third advantage is to be had by these children, if their sign instruction is in American Sign Language (ASL), an officially recognized language used by most of the deaf population in the U.S. In addition to the positive effects that signing has on the academic, developmental and behavioral aspects of a child's life, mastery of American Sign Language provides the advantages usually associated with knowledge of more traditional "foreign" languages. Although signing peoples of other regions and countries have languages of their own and ASL is not universal--so it is more domestic than foreign, geographically speaking--it is rapidly gaining approval as a foreign language for study in public high schools, and institutes of higher learning in many states have begun to accept ASL course-work for the fulfillment of foreign language requirements at entrance and graduation. Better still, although ASL is not universally used by deaf people across the globe, it *is* frequently the language of choice for deaf individuals in international forums, and so has international as well as domestic uses (Wilcox, 1991). This does not even take into account the obvious advantages that come of being readily able to communicate with members of a rich culture distinct from one's own, and possibly living no farther away than the house next door.

Taking advantage.

It's true: A hearing child born to hearing parents does not *need* to learn sign language. If the parents wait, children will very likely develop spoken language with no particular effort on the parents' part, and the lines of communication will eventually be opened. Parents are a strange breed though--"Good enough" is very often not what we want for our children. As long as research continues to point clearly to the advantages of involving our children in the earliest language interactions

possible, parents of hearing children are unlikely to ignore the benefits of teaching sign.

Signing for Deaf Infants

Avoiding the risks of language delays.

The most pressing issue facing children with hearing loss is the process of developing their language skills at a rate comparable to that of their normally hearing peers. The common estimate is that ninety percent of children with a significant hearing loss are born to families in which all other individuals use a spoken language. This leaves these children unable to access the full, natural language stimulation that is so critical to the development of language (Gleason, 2000, p. 349).

The human brain is wired for language. It doesn't matter whether the language is spoken, signed, or otherwise--All humans crave language. Even lacking exposure to any language from its parents, a deaf baby will attempt to communicate. Researchers have found that "deaf children spontaneously developed gestures that were not based on gestures used by the parents. The babies actually invented a way to attempt to communicate" (Gleason, 2000, p. 48). Yet, all that promise and potential has a limit. Early sign language exposure is vital for deaf children, if they are to be given the opportunity to fully develop language--and if we are to prevent them from facing all the negative effects of inadequate language skills on other aspects of their development.

Articles from *New Scientist* (in 1995 and again in 2000) offer devastating figures to support this conclusion. In the 1995 published study of deaf adults who had used ASL for twenty years or more, individuals were asked to judge the grammatical correctness of complex sentences in ASL. The group of adults who had been exposed to the language since infancy scored very well with little effort. Those who learned the language at around six years (usually as they began primary school) were intelligible but not fluent. Predictably, those who learned ASL between the ages of nine and thirteen were even worse. They showed little signs of comprehension (Mestel 1995). The study published in 2000 had similar results. Children of signing parents scored very well, children who learned in primary school were not as proficient, and late learners "performed barely better than chance" (Motluk 2000).

As we know that language learning is most effective in the early years of life, none of these results seem particularly surprising--until we learn about the last group studied in the 1995 study. The last group of adults had grown up as

hearing children, and lost their hearing later in life. How did they do on the test of complex grammar in ASL? They, like those who had been exposed from birth, signed fluently and easily. The author explains how it is that these children, who learned the language later than infancy, scored so well on the test. By learning their first language during the critical childhood period, "they had acquired the neurological foundation that would allow them to learn other languages later in life" (Mestel). What an advantage for young deaf children who will later need to learn English, if they are allowed to first develop those neurological foundations through access to the language that comes most naturally to them!

Fears and facts.

There is significant controversy on the matter of whether deaf children (especially those with minimal losses, and those using assistive technologies) learn best through oral-only education, through visual-only education, or through some combination of the two. A history of better test scores by deaf children of deaf parents--as compared with those of deaf children with hearing parents (Hoffmeister & Wilbur, 1979)--might seem to indicate an additional disadvantage for children with hearing losses born to hearing parents, but this isn't necessarily true. The *Journal of Child Psychology and Psychiatry* states that "many of the quantitative and qualitative psychological differences observed during the school years between deaf children with deaf parents and deaf children with hearing parents can be linked to the effectiveness of early communication (Vaccari, & Marschark, 1997). Magnuson (2000) agrees with the conclusion, stating "the deaf children who are the most competent in their social, cognitive, and linguistic development are those who have participated in active linguistic interaction with their parents from an early age."

Although visual language is obviously the sensible answer to any question of how to improve communication between hearing parents and their deaf children, there has been a long-running debate, which has led to confusion for both parents and professionals. Many have held the fear that introducing young deaf children to sign language might impair their ability or motivation to later acquire spoken language--a fear that research has proven unfounded. There seemed at first to be evidence that, in measures of spoken language, children in oral-only programs out-performed children in programs emphasizing signed communication. It's important to consider the nature of those

statistics. As Yoshinaga-Itano (1998) wrote in analysis of her own study showing that oral-only children produced the most intelligible speech, it is "a descriptive statistical analysis, not a causal one." Such numbers cannot alone answer questions about what causes the correlation. Were children of greater speech ability more likely to be enrolled in oral-only programs? Similarly, if children had greater residual hearing or had been deafened *after* some period of critical language exposure, would they not have somewhat better than average success with oral-only instruction? In other words, there is no way to know the actual cause of the better speech production in one group of children over the other, if the speech abilities of the children were not also analyzed *before* they began their respective programs. Such studies have become more available in recent years, as the greater number of early-identified cases of deafness increases researchers' abilities to study children's development from its earliest stages.

Does sign language in fact hinder deaf children from learning to read and to write spoken languages? According to findings presented in the *Journal of Child Psychology and Psychiatry*, there is no evidence to support that position, except in those cases where parents use sign language only inconsistently with their children. In these cases, write Vaccari and Marschark (1997) parents are unlikely to see many benefits to the children in either signed or spoken language development, even if the signs are sufficient to allow some level of interpersonal communication. Of the notion that signing might prevent later learning of spoken languages they write the following:

> There has been no empirical research demonstrating that learning sign language as a first language impedes the learning of spoken language. In fact, deaf children who learn sign language as a first language generally have been shown to have better reading and writing skills than deaf children exposed only to spoken language.

It has also been postulated that it may be harder for deaf children to read if they have learned sign language first, because signed languages have different syntax and semantics, so students "must translate the grammatical system of written English in order to obtain meaning from the text." However, according to information presented at the American Speech-Language-Hearing Association Convention in 2002 (Connor), "using sign language did not interfere with reading comprehension skills" for

these students. Not only did sign language not interfere with students' abilities to read and write, but Yoshinaga-Itano notes that "expressive language ability, when both spoken and signed output were considered... was a significant predictor of speech outcome" (1998).

As Mestel 1995 writes, "Profoundly deaf children must be exposed to sign language as early as possible or they may miss a critical learning period for language acquisition and never become fluent at signing." With hearing screening at birth now mandatory in many states that should be easy; but that isn't the end of the barriers. Assuming parents are convinced of the value of sign language for their deaf children, there remains one possible hindrance to the deaf child's language learning, and this was mentioned previously in the *Journal of Child Psychology and Psychiatry*. Vaccari (1997) notes that sometimes hearing parents "do not feel comfortable with sign language, especially in public, and tend to sign only when they communicate directly with the child." He goes on to say that this presents a difficulty for deaf children because it disallows them access to environmental and incidental learning. If parents sign only when directly addressing their child, it "leaves the child ignorant of what is being said and constitutes an obstacle to the deaf child's learning." In effect, lack of parental confidence could lead to semi-lingualism--the development of only a partial language--which isn't much better than the situation of other deaf children who, without exposure to signs, are left to semi-lingual development of English, or of no language at all.

The best hope for deaf children to fully develop their language skills lies with their parents. It may be useful for parents to review their attitudes towards signing. If a parent acts in public as though the child's first language is a source of embarrassment, how will the child's perception of himself be affected during those important developmental years? And how will the child become proficient enough in his first language to allow him to grasp a second? Magnuson (2000) encourages parents to sign as much as possible, regardless of their skill levels. "For a deaf child with hearing parents," she writes, "it is vital that parents start signing... though the signing may first be simple and incomplete. This provides the opportunity for the child to start developing language."

Yoshinaga-Itano (1998) notes that several researchers have reported that children with hearing loss "speak more clearly if they have better mastery of the rules of syntax and strong skills in vocabulary and semantics."

Fortunately, time and research have brought positive changes. Parents do not have to choose between a sign-only method (which might preclude a child from later success in academics if literacy is not a prerogative) and an oral-only method (which might also preclude the possibility of later success if it does not allow the child to develop a full language.) Recognizing the advantages afforded by early language development for deaf children who will have to learn a spoken language to which they cannot gain full access through sound, many parents and schools of the deaf have chosen to teach both signed and spoken languages in the same program.

Signing for Hard of Hearing Children

Children who are hard of hearing live with a kind of double jeopardy. Despite all the research as to what most benefits deaf children in education, and even the vast quantities of research concerning the hearing majority, those who lie between the two extremes are relatively unserviced by either side. Although the lack of literature and research might indicate otherwise, the hard of hearing population is far from small. Not only do the ranks of children with mild or minimal hearing losses "greatly exceed those of children with severe or profound hearing loss," statistics show that the smaller the loss measured, the greater the number of people who are affected. Unfortunately, "hard of hearing children continue to be forgotten and overlooked in comparison to their peers with severe and profound hearing losses" (Meadows-Orlans, Mertens & Sass-Lehrer, 2003).

One of the contributing factors in the neglected needs of these children has long been the simple matter of identification. Meadows-Orlans et al. (2003) note that parents of hard of hearing children have reported that their children's losses were discovered at an average of 28.7 months old, while the loss of profoundly deaf children was found (on average) by age 14.5 months. For those children whose loss is especially minimal, or whose loss is progressive (and doesn't appear significant during initial screenings), their remaining hearing and their own adaptive abilities often become their worst enemy, say some researchers. They cite the facts that hard of hearing children have "typically communicated very well in one-on-one and face-to-face interactions, and their good lip-reading skills tended to mask the extent of their hearing loss, lulling parents and teachers into believing that they understood more than they did." This isn't a problem that can be solved by asking the children whether they're hearing or not, either. "The person with the hearing loss is

the worst judge of what he or she heard," according to Vesey and Wilson (2003), both hard of hearing. They write, "Our biggest problem is not what we don't hear, but what we think we heard. For people who were born with a hearing loss, what they hear feels normal." Fortunately, many states now require hearing screenings for infants, and this will go a long way toward preventing unidentified hearing losses from going by unnoticed at the time of birth.

Even assuming every hearing loss is identified at birth (or at the onset of the loss, if it occurs later), hard of hearing children face other difficulties if their needs are not met adequately. Meadows-Orlans, Ph.D., a former senior research scientist at Gallaudet Research Institute, wrote with others that professionals and parents "too often assume erroneously that once hard of hearing children are fitted with hearing aids, they will function like children without a hearing loss" (Meadows-Orlans et al., 2003). Although technological helps have come a long way and have done much to help individuals to hear better, they haven't solved the host of other problems associated with hearing loss. Studies focusing on social or behavioral issues for hard of hearing children have reported severe problems. In a study of behavioral problems, she writes, hard of hearing children had significantly worse scores on the behavior rating scale--even when compared to children with severe losses! In consideration of the information earlier presented concerning behavior problems of deaf children, this is undoubtedly an alarming figure--and one that is worthy of further study.

Having established already that a lack of adequate language skills can be a cause of disruptive behaviors, one might still question whether it is fair to assume the same causes for hard of hearing children as we have found for those who are profoundly deaf. The language-learning difficulties of deaf children are well documented; how do hard of hearing children compare on similar measures? To begin with, it is useful to define what we consider to be a hearing loss. Generally speaking, audiologists consider any loss of less than 25 dB to be within normal limits (Bess & Humes, 1995). Yet, even students whose hearing is considered normal may suffer the consequences of having a hearing loss. Grushkin (2003) reports that "even for students with mild hearing losses of 15 to 25 dB, the average delay in vocabulary and other language skills has been found to be over one year." Beyond that, he writes hard of hearing students have "been found to perform two to

three years behind hearing students on standardized academic achievement tests, and are commonly held back from grade promotion by an average of one and a half grades." So yes, it is safe to say that even very minor hearing losses can have a strongly negative impact on language development, behavior and academic performance.

Adding to the difficulty, it has been found that parents of hard of hearing children are very frequently not given the information that would most help then to meet their children's needs. A study cited by Meadows-Orlans et al. (2003) found these parents were less likely than parents of profoundly deaf children to receive information about legal rights, behavioral development, school choices, deafness or sign language instruction, or even to be given opportunities for participation in parent groups! Where does this leave us? This leaves us with dedicated and hopeful--but sometimes uninformed--parents, who are struggling to do their best for children who are only partially able to access spoken language, and who have the full capability of learning visual language, but often are denied the opportunity.

Signing for Children with Cochlear Implants

Significant numbers of pre-lingually deaf children are receiving cochlear implants. While parents and professionals have reported positive experiences with implants (Connor, 2002), it is important to remember that "even recent positive clinical experience with cochlear implants... does not suggest that [the impact of] deafness can be fully overcome by assistive devices" (Gleason, 2000). At Cochlear.com, the internet site of the company producing the Nucleus® cochlear implant, the information given clearly states that the device is "a tool, nothing more," and parents are cautioned that children "will not miraculously be able to discriminate sound following implantation" (Cochlear, 2003). As such, children with cochlear implants continue to have special language-learning needs and it is worthwhile to consider the available research that addresses the matter of how best to meet those needs.

Connor (2002) found that children with larger pre-implant vocabularies performed better in measures of language ability than did peers who had smaller pre-implant vocabularies. That finding has important implications: Parents considering cochlear implants for their children must do whatever is necessary to increase their children's vocabulary

skills *before* the surgery! Children can receive cochlear implants at ages as young as twelve months (refer to Cochlear, 2003), but that leaves very little time if parents are to teach language skills to their children before that time. Thus--even for children whose parents are considering cochlear implant surgery--sign language continues to be the most supportable early communication option for deaf children.

What communication mode is best *after* a cochlear implant surgery? An interesting parallel can be drawn between newly implanted deaf children and hearing children who are adopted internationally to families who do not speak the children's native languages. An article in the *American Journal of Speech-Language Pathology*, details the difficulties faced by such internationally adopted children. There is a period of time in which these children show signs of language delay in *both* languages, because they begin to lose their native language, while simultaneously acquiring the newly adopted language (Glennen, 2002). For children traveling across the globe far from their native lands, this period of arrested language development is unfortunate but generally not preventable. For children receiving cochlear implants, there is another option. By continuing to enforce development in a child's first (signed) language after the surgery, parents can ensure that their children will not need to go through regressive periods in which they are suddenly unable to express themselves or to understand others.

Parents who begin with sign language and who encourage its continued use after cochlear implant surgery may be helping their children with second (spoken) language development more than they realize. In a study of thirty-nine adult volunteers who had learned English as a second language between the ages of five and eight (Motluk, 2000), results were very encouraging. There were three groups of adults. The first group was hearing and spoke Urdu as their first language. The second group was all deaf, and had used sign from early childhood. The third group were also deaf, but had learned sign sometime after age five, and had had no fluent language prior to that time. Measurements of English language skills with the third group were decidedly grim, and individuals' scores were comparable to the scores obtained by people after they've suffered strokes. The scores for the second group, however, were excitingly positive. The deaf individuals who had used sign from early childhood had scores comparable to the first group, who were all hearing. The *Journal of*

Speech and hearing Research published similar findings, stating that the timing of *first* language development positively affects individuals' abilities to learn a second language. The article says the first language provides dual benefits by (a) allowing individuals to recognize and figure out new material based on previous language experience, and by (b) reducing the increased load on individuals' working memory by allowing them to translate unfamiliar second-language material into a more familiar first language (Mayberry, 1993). Then, too, it would hardly make sense to deny these children all the advantages afforded to their normally-hearing peers who, having the benefit of sign language as one of their languages, show above average performance in their later pursuits.

What tremendous advantages these children have! They are deaf, but--with access the very best and earliest language input possible--we can help each to reach his full potential in a way never before possible.

When Technology Fails--Language to the Rescue!

Hearing aids and other technological helps are of great benefit to children with hearing loss—when they are utilized, and when they are functioning properly. Sadly, no technology is without its failings, and those failings are complicated further still by human error and misinformation. An awareness of what technology can--and cannot--do for our children is important if we are to be prepared to provide the best language-learning environments possible for children auditory losses.

Hearing aids

The primary purpose of a hearing aid is to make otherwise inaudible speech accessible to hard of hearing persons (Bess & Humes, 1995, p. 242). For many people, especially those with moderate sensory-neural loss, hearing aids provide the amplification needed to meet their communication goals, particularly in quiet environments where background noise is not a factor (p. 245). When any unwanted noise is present, though, we must remember that aids do not improve the speech-to-noise ratio; they amplify *all* sounds, including those that interfere with the speech signal (p. 251). Kim Meyer (2003), an educational audiologist, reminds us that in addition to amplifying unwanted background noise, hearing aids fall short because they can only pick up and amplify sounds that are less than ten feet away. Such a deficiency might easily be problematic in school, especially in consideration of the fact that children, unlike adults, are still learning

language and may not have the skills necessary to guess what is missed in an interaction.

For young deaf and hard of hearing children, consistent amplification is crucial, say Bess and Humes (1995, p. 261), but they cite numerous school surveys that have revealed "about one-half of children's hearing aids do not perform satisfactorily." Most (2002) agrees this has been a long-standing issue for children using hearing aids, and cites hearing aid malfunctioning rates ranging from twenty five to sixty nine percent when checks were made periodically throughout the school day. In his study of high school students (whom we might suppose were old enough to recognize and report problems with their aids), Most reported "adolescents were not even aware of the criteria for a well-functioning hearing aid," and they tended to report that their devices were functioning even when they were not. The primary causes of malfunctioning hearing aids, as reported by Most, were deteriorated batteries and damaged tubing. The second leading cause reported was problems with the earmold, such as poor cleanliness or improper insertion. Other common causes he noted were incorrectly set operating switches and volume controls. Obviously, regular and diligent maintenance is a crucial factor in the effectiveness of hearing aid use. In addition to the advantages sign language affords to all students by virtue of providing earlier access to expressive language, it might well provide a crucial support for hard of hearing students who must frequently suffer through inconsistent amplification and poor quality of spoken language input.

Cochlear Implants

A cochlear implant is an alternative to conventional amplification that some parents choose for their children with profound hearing loss. Although there are potential advantages to the use of such a device, there remain some technical issues that warrant consideration. For example, each cochlear implant must be individually programmed for its user. According to information published by the Laurent Clerc national Deaf Education Center at Gallaudet University (Nussbaum, 2003), the program is determined by setting each electrode in the device to be loud enough for sound awareness, but quiet enough to prevent discomfort. The process can take about two hours on the first appointment, and requires follow-up appointments for fine-tuning and continued adjustments as the brain begins to adapt to sound. Nussbaum writes that, because children often will not sit through an entire mapping session, and because maps for very

young children must be designed with only age-appropriate responses (a change in movement or facial expression, for example), there is a lot of guessing involved. Nussbaum writes, "The map may be set by generalizing responses obtained in a few electrodes to the full array of electrodes. The audiologist may also have a child try a map with similar characteristics to those used successfully by other children." Thus, original programming for the implant may not be accurate for some time after the child begins to use the device and, while it is certain the child can hear *some*thing, there is no guarantee as to what he is hearing, or how well. Imagine trying to learn a spoken language through such unreliable means! Many children have had great success with their implants, but parents must be aware that success is relative to one's expectations, and that complete success with young children can not be expected immediately. It would be unfair and without benefit to deny some form of full language access during the child's adjustment period.

There are many instances in which parents of cochlear implant users will find a visual means of communication very convenient. A search of the Cochlear website (Cochlear, 2003) reveals many instances when the implant will not be immediately useful: The external portion of cochlear implants cannot be worn, for instance, when a child is bathing or swimming. Even mild moisture, as from sweating, can affect implants. The makers also warn that parents should use their judgement when determining whether to allow the external portion (necessary for the child's perception of sound) to be worn during sports events and other activities in which impact to the speech processor might be a problem, and consider mandating the use of protective head gear. Wearers of cochlear implants must be wary of typical playground and amusement center equipment, too. Plastic slides, ball pits and moon walks can create an excess of electrostatic discharge, which can scramble the speech processor's programming and necessitate another round of audiologist appointments before the implant's functioning can be restored. Some device makers are beginning to provide safeguards against the problem of electrostatic discharge, but the necessity of removing a child's source of sound input during certain activities mandates the retention of another form of communication, if only for safety purposes.

There are maintenance issues to consider with implants, too. Taking the information still from Cochlear.com, we learn there are small parts that will necessarily have to

be replaced, such as cords, coils and microphones, and it is possible the speech processor and headsets will require maintenance as well. The actual risk of device failure for the implanted portion is small, according to Nussbaum (2003), but there is the slim possibility that a child will need additional surgery to replace the device, or to reposition it if it has moved from its intended placement. If this happens, or if a smaller part needs to be replaced and is not immediately at hand, children using *only* spoken language will be left without any means of communicating (or learning to do so) until the problem is resolved. Children who have developed good expressive skills with sign language before their operations, and who have been encouraged to retain the use of sign language will not, of course, suffer the same consequences while awaiting the restoration of the technological support.

Sign Language Use--An Advantageous Approach to Language Development for All Children

For infants with normal hearing, sign language can prevent tantrums caused by poor verbal communication skills, and give a head start in language learning, positively affecting children's cognitive, academic and social development, and even leading to higher measures of intelligence in later life. For deaf children, sign language is the critical first step to communication and eventual development of literacy and spoken language skills. It provides a means of preventing children from falling prey to the well-documented risk of language delay, as well as other negative outcomes often associated with inadequate language learning opportunities, while opening the door to a world of supportive communication with deaf peers. For children who depend on various technologies to improve their auditory acuity, sign language is the natural way of supporting language development through visual stimuli. It does not depend on batteries or other maintenance issues, and is always accessible to the children, even when the technologies aren't. Sign language provides all parents--whether their children have optimal hearing or not--a way of furthering their children's progress and helping them to meet their highest potential.

There are many credible sources of information about the advantages of using American Sign Language and various sign language systems to boost language development, literacy, and even to improve the quality of deaf children's speech production. Interested parties are encouraged to use the sources cited in this document as a beginning

reference tool, and to contact schools for the deaf, infant-toddler programs, and the American Society for Deaf Children for further information.

The controversies over available technologies and over the cultural and political implications of choosing a communication mode or educational philosophy need not be a barrier to parents as they choose what is best for their children. While the information presented here strongly supports the use of sign language with all children, the primary purpose of this paper is to provide information that will allow parents to make informed decisions based on their own values and needs. The philosophical, political and educational stand that will best serve our children is one that supports well-informed parents and teachers, and takes into account the individual goals and circumstances of each family as it strives to meet the early language needs of its children.

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