

COMMUNICATION OPTIONS FOR CHILDREN WITH HEARING LOSS

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This article examines the communication options that are available for use within families of infants and young children who are hard-of-hearing or deaf. The need for language development, regardless of the specific communication mode, is stressed. The demands of the current environment of early identification and intervention often put families in a position of needing to decide among communication methods before they are fully knowledgeable and/or emotionally ready. Specific communication options are delineated and considered within a continuum of spoken and visual language. Available research related to early acquisition of language by infants and young children who are hard-of-hearing and deaf is reviewed; outcomes, when available, are presented for specific methods from reports of older children. Factors that influence families’ decisions regarding the selection of a communication option are highlighted in the context of the existing literature. An ongoing evaluative process that respects the choices of families is advocated; a context in which change(s) in communication mode through childhood is viewed as a positive circumstance. The ultimate goal in the selection of any communication approach is to ensure that infants and young children who are hard of hearing or deaf and their families are language proficient and fluent communicators.

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LANGUAGE DEVELOPMENT AND COMMUNICATION

Infants who hear normally and are developing typically generally acquire spoken language with great ease, primarily through the auditory channel. Young infants discern the differences among various acoustic phonetic units specific to their native language, as well as those of other languages to which they have had no exposure [e.g., Werker et al., 1981]. With increasing experience with their own language, however, infants’ phonetic perception is refined so that by six months of age, the native language environment has begun to alter the perception of speech sounds characterized by the development of language-specific phonetic prototypes [Kuhl et al., 1992]. Phonetic perception subserves phonemic awareness; that is, the organization of phonemes into categories that are fundamental to spoken language development [Kuhl et al., 1992].

Infants who are hard of hearing or deaf, have, like their hearing peers, the same capacity to learn language, as well as a desire to communicate. However, the infant who has a congenital or early onset hearing loss whose parents use a spoken

language (e.g., English, Spanish, etc.) will not experience the same acoustic language environment as infants with normal hearing. Indeed, this is the case for the vast majority (93%), where one or both parents of children with hearing loss themselves hear normally and communicate using a spoken language [Gallaudet Research Institute, 2002].

Although visual input influences speech perception, only a limited amount of information is available from the lips and face to distinguish among phonemes. Only about 40% of speech sounds are visually distinguishable [Woodward and Barber, 1960]. Therefore, developing spoken language through speechreading (lipreading) alone is challenging at best, and often unachievable. Children who are congenitally hard of hearing or deaf and are raised in families who are also deaf and use a visual (signed) language also develop visual language effortlessly.

Any degree of hearing loss restricts access to some or all of the acoustic features of speech. Thus, hearing loss may delay the acquisition of expressive and receptive spoken language, limit academic performance (in particular, the development of literacy skills), and later constrain an individual’s opportunities for vocational choice and advancement [see Carney and Moeller, 1998, for an overview]. According to the 2000–2001 Annual Survey of Deaf and Hard of Hearing Children and Youth [Gallaudet Research Institute, 2002], ~32% of children aged 0–21 years in the United States have profound hearing loss (>90 dB HL), while ~41% of children were categorized as having moderate (41–55 dB HL) to severe (71–90 dB HL) hearing loss. Remaining children (~27%) were categorized as having 40 dB average hearing level or better (mild loss of hearing).

Children who are considered hard of hearing (≤ 90 dB HL average hearing loss) usually benefit from conventional amplification systems (hearing aids, assistive listening devices, and FM technology). Through use of aided residual hearing and exposure to a language-rich environment, children who are hard of hearing may acquire spoken language in a manner similar to that of children who hear normally [Moeller, 2000]. Children

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who have profound hearing loss (average hearing ≥ 90 dB HL) are frequently referred to as deaf, although this does not necessarily indicate the total absence of hearing. These children experience multiple challenges in the acquisition of a spoken language. The auditory consequences of profound hearing loss (e.g., restricted dynamic range, compromised frequency resolution) limit these children's abilities to benefit fully from conventional forms of amplification. It is this group of children that currently are considered candidates for cochlear implantation. In addition to the degree of hearing loss, the acquisition of age-appropriate language is influenced by additional external and internal factors such as the age of the child at identification of the hearing loss, the availability of appropriate early intervention programs, the communication environment of the home, and the amount of parent involvement/participation in the child's intervention program [Yoshinaga-Itano et al., 1998; Moeller, 2000].

Universal newborn hearing screening (UNHS) is the direct testing of all neonates before hospital discharge or by one month of age [JCIH, 2000] and the practice has become a public health initiative in the majority of states in the U.S. The goal of UNHS programs is to identify children with congenital hearing loss (bilateral and unilateral ≥ 30 – 40 dB HL) in the newborn period for the purpose of enrollment in an early intervention (EI) program [NIDCD, 1993; AAP, 1999; JCIH 2000]. One goal of Early Hearing Detection and Intervention (EHDI) programs (screening by one month, confirmation by three months, intervention by six months) is to provide infants with permanent hearing loss amplification technology as early as possible (when parents choose) in order to maximize the development of auditory skills and facilitate spoken language development.

EHDI programs (covering children 0–3 years), the availability of new amplification technologies, cochlear implantation at 12 months of age, and the passage of U.S. and state health and education laws all have fostered a milieu regarding infants with hearing loss that has not existed in the past. While the ability to detect and provide early intervention to infants with congenital/early onset hearing loss has significant benefits [Yoshinaga-Itano et al., 1998; Moeller, 2000], this dynamic context often exerts pressure on families to make choices regarding the management of their child's hearing loss and communication development well before many have the emotional capacity or the knowledge to do so

[Moeller and Condon, 1994]. Fortunately, there is a growing movement among early interventionists that these decisions should be incorporated into an ongoing, family-centered exploration of communication options [Luterman, 1994; Roush, 1994; Moeller and Condon, 1994]. This dynamic process is predicated on a family-centered approach to early intervention in which the needs of the family and child are explored as part of an ongoing process and parent-infant communication becomes the primary goal. Currently, less emphasis is placed on the specific method used to communicate (see below) and more on ensuring that language is abundant and exchanges are easy and frequent between the infant and family members. This family-centered approach also empowers parents to consider changes in how they communicate with their child whenever it is indicated throughout childhood [Moeller and Condon, 1994].

SPOKEN LANGUAGE AND

*“. . .the child and family
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VISUAL LANGUAGE

As referenced above, the language used by individuals who are hard of hearing or deaf can be broadly categorized as either spoken or visual. English is the predominant spoken language used in the U.S.; however, other spoken languages (e.g., Spanish, French) are also used within families as the primary or secondary language. American Sign Language (ASL) is the visual language used within the American Deaf community. [Note: the use of the word Deaf refers to a culture rather than to a degree of hearing loss; individuals in the U.S. who consider themselves Deaf use ASL [Carney and Moeller, 1998]]. ASL is not a signed representation of spoken English. Indeed, ASL is a complete language with a unique set of rules (visual phonology, syntax, semantic, and pragmatic), which differ from the forms used in spoken English. Deaf communities in other countries use other visual languages (e.g., British Sign Language, Australian Sign

Language). Speech is not a component of a visual language.

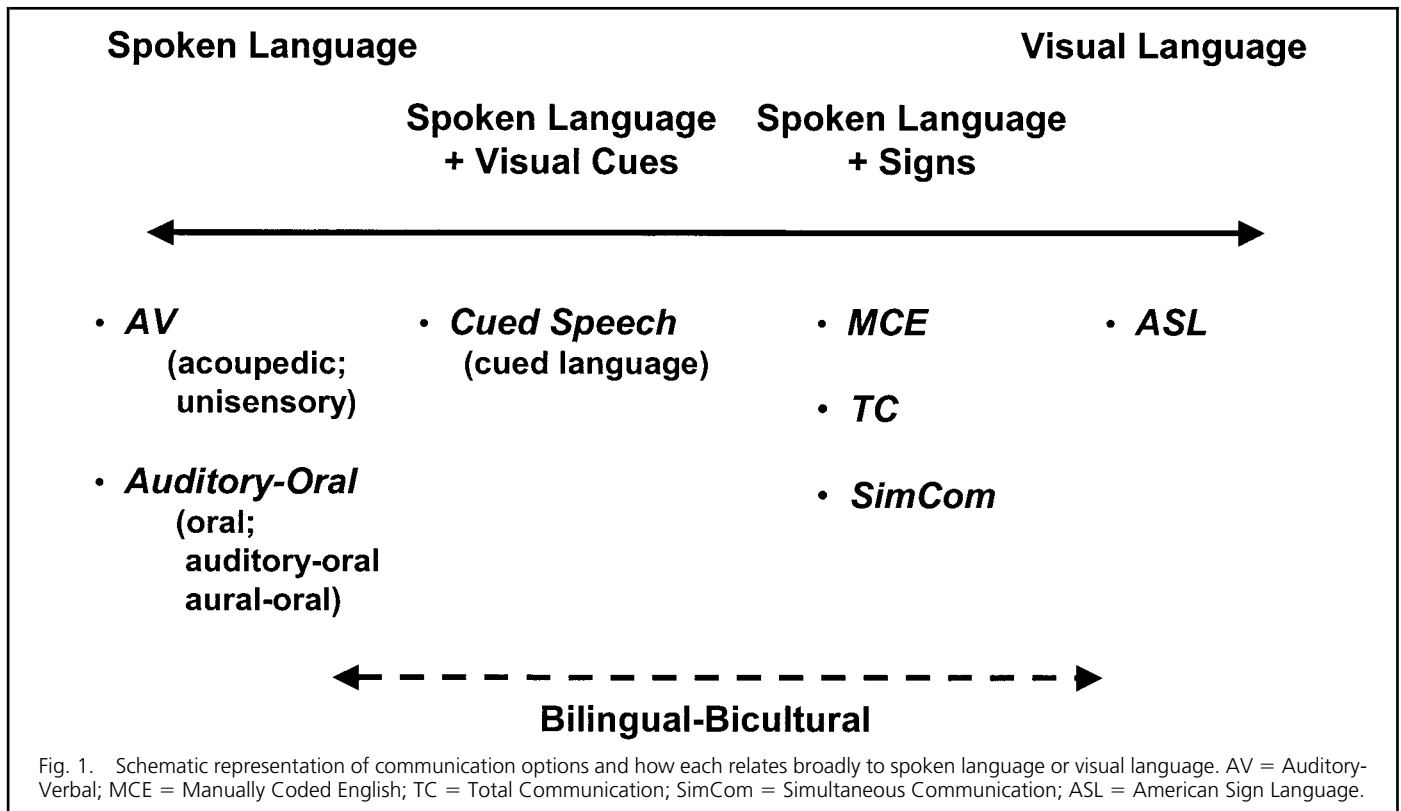
Most adults who are deaf, self-identify as a primary user of either visual or spoken language. Some Deaf adults consider themselves to be bilingual; that is, they use ASL when communicating within the Deaf community and a form of spoken English for interactions with individuals outside of the Deaf community. There are also adults who have profound hearing loss (are deaf in the audiologic sense) who communicate using only spoken language: these individuals do not consider themselves members of the Deaf community.

The controversy that has surrounded the use of spoken or visual language by children who are hard of hearing or deaf has impacted education programs for children with hearing loss of all ages within the U.S. Both spoken and visual language approaches over the years have had strong proponents; this has led to the development of separate programs for the training of deaf educators and separate schools/classrooms wherein one philosophy or method of training/educating children who are hard-of-hearing or deaf has been practiced. There are also early intervention programs that specifically use only one communication mode.

COMMUNICATION OPTIONS

A communication option, mode, modality, or method is the *means* by which the child and family receive and express language. The choice of a communication modality that facilitates language development and allows the child who is hard of hearing or deaf to readily engage in communication interchanges with family and caregivers is a primary issue throughout childhood [Carney and Moeller, 1998]. As described in this chapter, continued controversy exists over which (if any) of the specific communication options described below is optimal. Frequently, professionals with whom parents are in contact in clinical and educational settings have strong opinions regarding the issue [Tye-Murray, 1998]. While there may be debate regarding specific communication methods, few question the concept that every child who is hard of hearing or deaf needs to develop language early in life and that the child and family need a method to communicate which facilitates natural, meaningful, and abundant interchanges.

Existing literature that supports the appropriateness of any one approach is limited. Available studies suffer from one or more confounds that prohibit the gen-



eralization of results. Studies of specific communication approaches have historically been limited to reports from one group rather than comparisons between groups using two different approaches, or single-subject research designs [Carney and Moeller, 1998]. Ethical issues preclude the development of randomized clinical trials examining the various approaches. Importantly, because of the recent advent of UNHS, there are very few studies that have examined the outcomes of groups of children over the long term who were identified by UNHS and who received intervention using a specific communication option. Such information could be beneficial to parents in helping them with decisions regarding at least the initial selection of a communication approach, one that meets the needs and goals of the family.

Existing communication options can be considered along a spoken/visual language continuum, schematically represented in Figure 1. Characteristics of the communication options available for hard of hearing and deaf children are outlined in Table 1 and are overviewed below.

Auditory-Verbal (AV)

The Auditory-Verbal (acoupedic; unisensory; auditory; auditory-only) approach has as primary goals (1) the development of spoken language acquired

exclusively through the use of aided residual hearing and (2) the complete integration of the child who is hard of hearing or deaf into the community of individuals who use spoken language (Auditory-Verbal International; www.auditory-verbal.org). Consistent (every waking hour) use of amplification or cochlear implant technology is considered requisite for achieving the goals set forth in the approach [Goldberg, 1997]. Audition is stressed so significantly that during language learning activities, the child is not permitted to view the lips or facial expressions of the speaker. AV-trained therapists work directly with families teaching the specifics of the approach. It is expected that the AV approach will be incorporated fully into the home environment and, ideally, in the early intervention setting. Because the goal is complete integration in the mainstream, the child and family are not exposed to Deaf culture or sign language.

Auditory-Oral

Similar to the AV approach just described, the goal of the auditory-oral (oral; aural-oral) communication option is the development of spoken language and inclusion in the mainstream in school and in society at large [Alexander Graham Bell Association: www.agbell.org]. Early identification of hearing loss and early fitting and consistent use of hearing

aids are also basic principles of this approach. Unlike the AV approach, children who develop spoken language using the auditory-oral approach use their aided residual hearing, as well as speechreading, facial expressions, and naturally occurring gestures. Consistent use of hearing aids/FM technology and provision of auditory training and speech therapy as well as specific practice in lipreading are critical features of the approach. Cochlear implant technology is strongly supported if the family of a deaf infant or child chooses that option.

Cued Speech

Cued Speech [Cornett, 1967; www.cuedspeech.org] comprises eight different handshapes and four different hand locations around the speaker's face as seen in Figure 2. Each of the eight handshapes represents a group (3–4) of consonants. Consonants within a handshape group are distinguished through lipreading. Vowels are cued by moving the hand to one of four locations around the lower face and neck (at the lips, side of the lips, chin, and throat) with lip shape distinguishing the vowels (2–3) within a vowel group. The receiver of the cued speech observes the speaker's hand pattern, hand location, and lip position in order to distinguish among individual speech sounds; none are visually ambiguous.

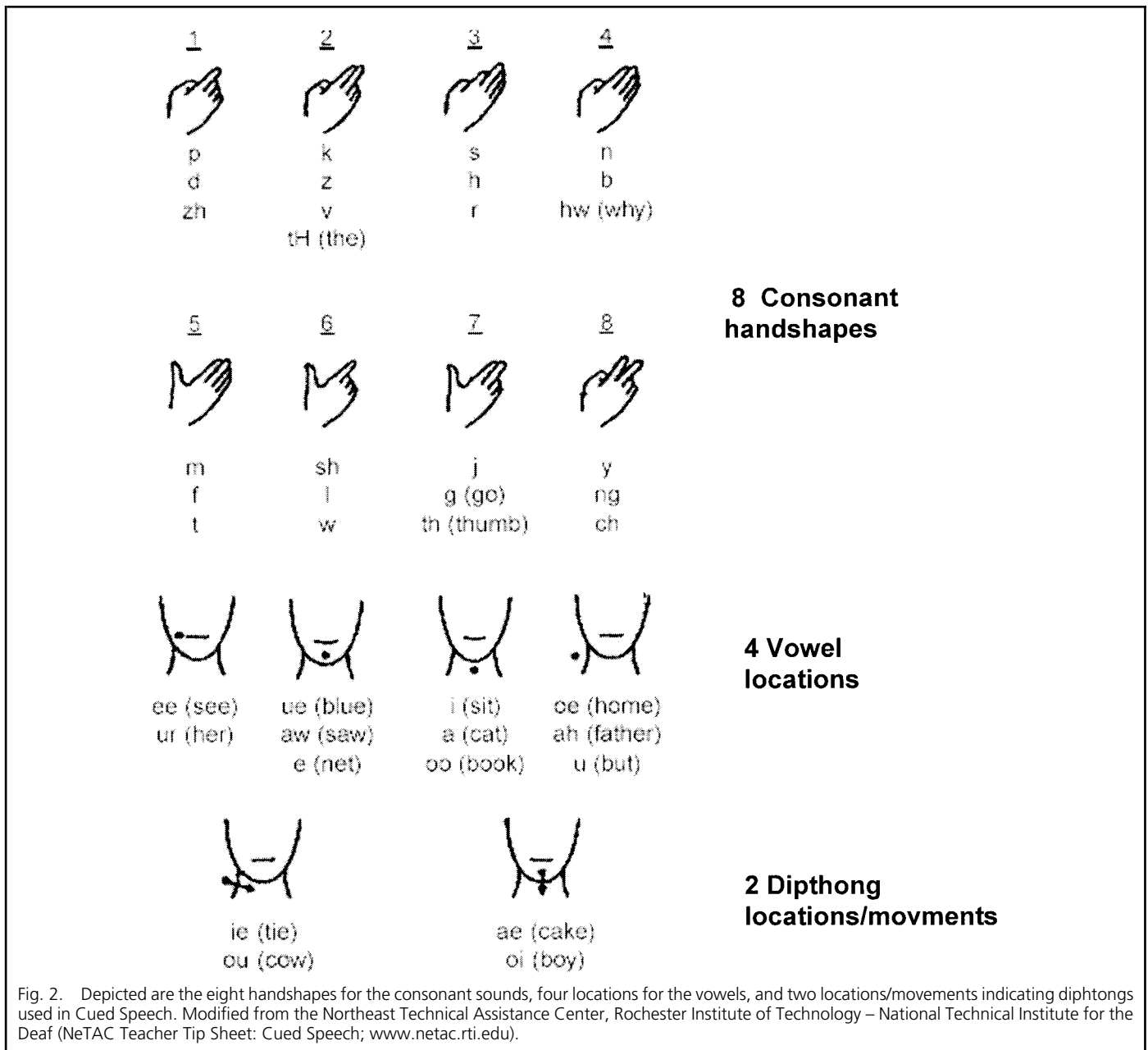
Table 1. Communication Options Available for Use by Children With Hearing Loss

Option/Features	Familial Role	Amplification
<p><i>Auditory-Verbal</i></p> <ul style="list-style-type: none"> ● Maximizes use of residual hearing to develop spoken language <ul style="list-style-type: none"> ● Auditory channel is primary input mode: exclusively during language learning experiences/therapeutic intervention. ● Restricts use of visual cues, speech reading and signs ● Provides only auditory training 	<ul style="list-style-type: none"> ● Serve as spoken language models ● Provide abundant opportunities for spoken language learning through Auditory-Verbal techniques in the home environment ● Seek professional support from those knowledgeable in AV approach ● Ensure appropriate audiologic management ● Monitor rigorously the performance of amplification/cochlear implant technology ● Desire mainstream educational setting & inclusion in hearing community as primary goal 	<ul style="list-style-type: none"> ● Provide early amplification ● Provide maximum audibility across the speech-frequency range ● Promote consistent use of hearing aids, FM systems and/or Cochlear Implant
<p><i>Auditory-Oral</i></p> <ul style="list-style-type: none"> ● Maximizes use of residual hearing and speech reading to develop spoken language <ul style="list-style-type: none"> ● Use of both auditory and speech reading encouraged during language learning and therapeutic experiences ● Provides both auditory and speech reading training 	<ul style="list-style-type: none"> ● Serve as spoken language models ● Provide abundant opportunities for spoken language learning using auditory and speech reading input in the home environment ● Arrange for appropriate Auditory-Oral programs/professionals ● Ensure appropriate audiologic management ● Monitor rigorously the performance of amplification/cochlear implant technology ● Desire mainstream educational setting & inclusion in hearing community as primary goal 	<ul style="list-style-type: none"> ● Provide early amplification ● Provide maximum audibility across the speech-frequency range ● Promote consistent use of hearing aids, FM systems and/or Cochlear Implant
<p><i>Cued Speech</i></p> <ul style="list-style-type: none"> ● Makes spoken language visible through use of specific handshapes, positions and lipreading (i.e., cues) 	<ul style="list-style-type: none"> ● Learn and become fluent in Cued Speech ● Provide abundant opportunities for spoken language learning cueing all communication interactions with the child in the home environment ● Support use of Cued Speech by early intervention personnel, teachers and all others communicating regularly with child ● Arrange for appropriate educational settings or Cued Speech transliterator ● Determine desire for child to use amplification or cochlear implant technology 	<ul style="list-style-type: none"> ● Amplification not necessary for spoken language acquisition ● Provide maximum audibility across the speech-frequency range when family desires child to use amplification or cochlear implant
<p><i>Manually Coded English (MCE)</i></p> <ul style="list-style-type: none"> ● Uses sign system and fingerspelling to represent spoken English ● Often used in conjunction with Total Communication and Simultaneous Communication 	<ul style="list-style-type: none"> ● Learn and become fluent in manual sign system (MCE) ● Arrange for appropriate educational settings/professionals who are fluent users of MCE system used by the child or interpreter 	<ul style="list-style-type: none"> ● Amplification not necessary ● Provide maximum audibility across the speech-frequency range when family desires child to use amplification or cochlear implant
<p><i>Total Communication</i></p> <ul style="list-style-type: none"> ● Uses multiple methods simultaneously (manual, oral, auditory) ● Uses MCE system 	<ul style="list-style-type: none"> ● Learn and become fluent in manual sign system (MCE) ● Encourage speech reading and use of audition in combination with sign (MCE) ● Arrange for appropriate educational setting/TC professionals who are fluent in TC and support use of sign, speech reading and audition ● Ensure appropriate audiologic management 	<ul style="list-style-type: none"> ● Provide amplification early amplification ● Provide maximum audibility across the speech-frequency range ● Promote consistent use of hearing aids, FM systems and/or Cochlear Implant
<p><i>Simultaneous Communication</i></p> <ul style="list-style-type: none"> ● Use sign system and finger spelling and speech ● Does not require use of audition 	<ul style="list-style-type: none"> ● Learn and become fluent in manual sign system (MCE) ● Encourage speech and sign (MCE) ● Arrange for appropriate educational setting; may be the same as TC (as above) ● Ensure appropriate audiologic management when required 	<ul style="list-style-type: none"> ● Amplification not generally used for communication as part of approach
<p><i>American Sign Language (ASL)</i></p> <ul style="list-style-type: none"> ● Native language of the American Deaf community ● Complete visual language distinctly different from English ● Incorporates signs, body language, facial expression, movement 	<ul style="list-style-type: none"> ● Learn and become fluent in ASL ● Ensure regular interaction with members of Deaf culture/community ● Provide opportunities for child interaction with peer group that uses ASL ● Arrange for appropriate ASL educational setting/ASL interpreter 	<ul style="list-style-type: none"> ● Amplification not used for visual language learning ● Amplification/CI may be used for alerting, warning, awareness of environmental sounds
<p><i>Bilingual-Bicultural (Bi-Bi)</i></p> <ul style="list-style-type: none"> ● Philosophy of language learning: first ASL, second spoken language (e.g., English) ● Combines ASL and form of spoken language (MCE, Cued Speech) ● Opportunities for experiences in Deaf and hearing communities 	<ul style="list-style-type: none"> ● Learn and become fluent in ASL ● Ensure regular interaction with members of Deaf and hearing culture/community ● Arrange for appropriate educational setting in program supporting Bi-Bi philosophy 	<ul style="list-style-type: none"> ● Amplification not required for visual language learning ● Amplification/CI may be used for alerting, warning, awareness of environmental sounds and for support of spoken language development

Children who have learned spoken language through Cued Speech frequently improve in speechreading skills,

facilitating their understanding of the speech of individuals who do not cue. As in the auditory-based spoken language

communication, children who have learned spoken English through Cued Speech may use hearing aids or a co-



chlear implant, and may also benefit from auditory training and speech therapy if a goal of the family is for the child to maximize residual hearing and develop intelligible speech. Hearing, however, is not required to be a proficient receiver of Cued Speech. As such, Cued Speech could serve as the means through which users of ASL learn English. Families can learn the method in about 18 hours, although cueing at a normal speaking rate is achieved over time with regular use [Caldwell, 1997]. If the child's early intervention provider does not learn Cued Speech, cued speech transliterators can be incorporated into these settings.

Manually Coded English (MCE)

Manually Coded English (MCE) is a visual representation of the spoken En-

glish language [Gustason, 1997]. Signs and fingerspelling are used to represent spoken English. Syntax follows the rules of spoken English; lexical items without specific signs are fingerspelled. Grammatical morphemes are conveyed by gestures or fingerspelling. Amplification is not necessary for an individual who uses a form of MCE. MCE is often used as the visual (signed) component of Total Communication and Simultaneous Communication approaches (see below). There are several forms of MCE: Seeing Essential English (SEE I), Signing Exact English (SEE II), and Linguistics of Visual English (LOVE). The Rochester Method (consisting exclusively of fingerspelled English) has also been classified as a form of MCE [Tye-Murray, 1998].

Total Communication (TC)

Total Communication (TC) is a philosophy that promotes the simultaneous use of multiple modalities (e.g., signs, gestures, speechreading, hearing) for the understanding of communication [Hawkins and Brawner, 1997]. TC is the most widely used communication method in educational settings for the deaf [GRI, 2002]. In the ideal TC environment, families (and EI personnel) would use signed English (MCE) accompanied by clear and visible speech at a normally loud conversational voice level. The infant or young children would use aided residual hearing and the visual cues available from signs and lipreading for receptive communication. The child is encouraged to use both signs and speech

to communicate expressively. Families adopting a TC philosophy would need to learn MCE. An intensive TC early intervention experience has been associated with social skill development and communication competence in deaf preschool children [Greenberg et al., 1984]. Simultaneous Communication (SimCom) is often considered to be the same as TC. It is actually different and broadly defined as the simultaneous use of signs and speech [Caccamise et al., 1997]. Use of amplification, considered a component in TC, is not necessarily used in the SimCom approach.

American Sign Language (ASL)

As described previously, American Sign Language (ASL) is a naturally evolved visual language used by the Deaf community in the U.S. Many members of the Deaf community, however, consider themselves to be bilingual: use both ASL and some form of spoken language (MCE) when communicating with the Deaf and hearing communities, respectively [Baker and Baker, 1997].

The bilingual-bicultural (Bi-Bi) philosophy (National Association of the Deaf: www.nad.org) advocates that children who are deaf be able to communicate in two languages (visual and a form of spoken) allowing them to experience two cultures (Deaf and hearing communities). The Bi-Bi philosophy holds that children who are deaf are inherently members of the Deaf community. The Bi-Bi approach supports early language learning through ASL with a form of spoken English taught as a second language later in elementary school [Baker and Baker, 1997].

For hearing families adopting this approach, familiarity with Deaf culture is achieved through regular interaction with the Deaf community. Deaf advocates may spend time in the home working with the infant or young child, teaching the family ASL, and providing the family with information about the Deaf community. Parents who use spoken language must become proficient users of ASL, acquiring the second language in a timely manner so that ASL is routinely used by all members of the family for all communication in the home. Since ASL has no auditory form, early exposure to the acoustics of spoken language are minimal and/or delayed until later in childhood. Whether these reduced early auditory experiences result in difficulty with the later use of residual hearing (through amplification, cochlear implant technology, or other sensory aid) to learn spoken language has yet to be studied

directly in children raised through the Bi-Bi philosophy. Incorporation of the Bi-Bi philosophy in EI programs is relatively new and currently there are few EI programs that use the approach [Baker and Baker, 1997].

FACTORS THAT IMPACT THE SELECTION OF A COMMUNICATION APPROACH

As families choose a communication approach for use by the family with infants who are deaf or hard of hearing there are multiple factors that impact their decision. Table 2 presents some of the variables that can influence the family's selection of a communication approach. Several of these factors are explored further below, and available relevant research is cited.

Age of Identification and Intervention

The advent of newborn hearing screening has lowered appreciably the

“the active involvement of the family. . . appears to be a primary mediator of outcome regardless of the communication option used”

age of detection and subsequent intervention to between three and five months of age [e.g., Harrison et al., 2003], significantly earlier than the previous ages of identification of hearing loss in children late in the language-learning period (2.5 years and greater for mild and moderate hearing loss [Harrison and Roush, 1996]). Language-based family-centered early intervention provided before the first six [Yoshinaga-Itano et al., 1998] to 11 [Moeller, 2000] months of life results in better language scores at older ages than intervention later in childhood. The advantage of early identification and early intervention appears to be maintained at all ages across early childhood using a cross-sectional research design [Yoshinaga-Itano et al., 1998].

In a longitudinal study, Moeller [2000] found that the language ages of children who received early intervention were within the average range when compared to hearing-age matched peers.

Five-year-olds who received later intervention (>2 years of age) had significantly lower (1 to 1.5 standard deviation) vocabulary and verbal reasoning scores than the matched hearing-age sample. It is important to note that in both the Moeller [2000] and Yoshinaga-Itano et al. [1998] studies, the benefits of early intervention on later language development were found for children who communicated using either an auditory-oral or a TC approach, with little influence of degree of hearing loss.

Family Involvement

The active involvement of the family in various aspects of the EI process appears to be a primary mediator of outcome regardless of the communication option used. Recall that Moeller [2000] found two factors accounted for a significant amount of the variance in children's language scores: family involvement and age of enrollment. The factor accounting for the greatest variance was family involvement. This was measured using a rating scale that examined family participation in the intervention program, and characteristics such as family adjustment and effectiveness of communication with the child [Moeller, 2000]. Numerous earlier studies [Greenberg, 1983; Greenberg et al., 1984; Watkins, 1987] have also supported the benefits of active participation of families in the early intervention process. [See Kurtzer White, this volume, for an in-depth review of how families cope with demands of children with hearing loss]

Use of Hearing Aids/Cochlear Implant

Several of the communication options available for use with children are highly dependent on the child having access to the acoustic features of speech through the use of either hearing aids or a cochlear implant that will facilitate the development of spoken language. The majority of children with hearing loss of mild to severe degree benefit from conventional amplification devices for the reception of spoken language and environmental sounds. Even families who choose visual language may desire their child to use a hearing aid for the purpose of environmental sound awareness, alertness, and safety.

Ramkalawan and Davis [1992] found that age of the child at hearing aid fitting was negatively correlated with children's number of words produced per minute, proportion of questions asked, and vocabulary, controlling for age at the time of the initial testing. Notably, all children received amplification after the

Table 2. Factors Impacting the Selection of a Communication Option for Children Who Are Hard of Hearing or Deaf

Factor	Consideration
Language used in the home	<ul style="list-style-type: none"> ● Spoken (English, Spanish, etc.) ● Bilingual (use of 2 spoken languages) ● Visual (ASL) ● Combination of visual and spoken (bilingual)
Family Involvement	<ul style="list-style-type: none"> ● Abundant opportunities for language learning and communication in the home ● Level of participation in intervention ● Home situation/family membership and other demographic factors ● Consistency in learning & using MCE, ASL, cued speech ● Socio-economic circumstances ● Work schedules
Age of Identification & Intervention	<ul style="list-style-type: none"> ● Before 6 to 11 months of age ● After 6 to 11 months of age
Literacy	<ul style="list-style-type: none"> ● Speech perception ● Development of phonological awareness
Community resources	<ul style="list-style-type: none"> ● Availability of certified AV therapists; auditory-oral therapists, sign language interpreters, ASL community, transliterators etc. ● Availability of EI programs that use above approaches
Hearing status	<ul style="list-style-type: none"> ● Degree of hearing loss ● Stability of hearing loss ● Repeated episodes of OME
Hearing Aids & Cochlear Implants	<ul style="list-style-type: none"> ● Consistent use of Hearing Aids/FM system ● Cochlear implant candidacy ● Financial constraints related to acquiring assistive device technology ● Expectations regarding benefits of device
Speech Intelligibility	<ul style="list-style-type: none"> ● Access to acoustic speech features through hearing aids/cochlear implant ● Speech therapy
Presence of additional disabilities	<ul style="list-style-type: none"> ● Visual ● Motor ● Cognitive ● Attention/Behavior
Availability of later educational options	<ul style="list-style-type: none"> ● Mainstream with support services ● Self contained classroom ● Special school ● Residential facility

age of 12 months. To date, there are little empirical data specifically on the effects of very early fitting of amplification (before six months), or the outcomes achieved through fitting the hearing aids using one of the prescriptive methods [e.g., Desired Sensation Level [DSL], Seewald et al., 1997; National Acoustics Laboratory [NAL], Byrne and Dillon, 1986] currently available, on later auditory, speech perception, and speech production abilities.

Evidence suggests that earlier cochlear implantation (two to three years of

age) results in greater overall vocabulary growth than children implanted later (four to five years of age) and a reduction in the gap between the chronological age and the language age of deaf children and their hearing peers [e.g., Brackett and Zara, 1998; Nikolopoulos et al., 1999]. Data are only now emerging regarding the capacity of deaf infants who have been implanted at 12 months of age (and in some circumstances younger) to acquire spoken language via a cochlear implant.

Speech Intelligibility

Access to the acoustic features of speech through conventional hearing aids or a cochlear implant appears critical if a goal of the family is for their child to develop intelligible speech. Children with lesser degrees of hearing loss tend to have more intelligible speech than those with greater impairments; those with profound hearing loss have great difficulty developing intelligible speech using conventional forms of amplification [Boothroyd, 2000]. Early speech recep-

Table 3. Needs of Families Surrounding the Selection of a Communication Option for Their Child Who Is Hard of Hearing or Deaf

- Recognition of the individuality of each child and each family
- Unbiased, objective information from knowledgeable individual regarding all communication options
- Compassionate and unhurried discussions
- Unbiased, objective response to questions about communication options, hearing aids and cochlear implants
- Direction to multiple resources on language development, in general and each communication approach, specifically
- Arranged contacts with families who are successful users of each communication option
- Arranged visits with early intervention/educational programs that use various communication approaches
- Empowerment and encouragement of parent choices
- Liaison between parent and early intervention program
- Guidance in the communication option selected by the family
- Objective, regular assessment of child's progress using the chosen approach
- Non-judgmental, objective discussion of child's progress using the chosen approach
- Avoidance of extreme views, technical language, and implied criticism related to the family's selected communication approach
- Opportunity to meet deaf adults
- Experiences in the Deaf community
- Collaborative, non-directive parent-professional relationships

tion skills appear to facilitate good speech production and speech intelligibility.

Evidence suggests that children who were trained to communicate using an auditory or auditory-oral approach versus a sign language method (even one that incorporates the use of residual hearing) have better speech intelligibility at later ages [e.g., Geers et al., 1984; Markides, 1988; Geers and Moog, 1992]. Compared to deaf children who use conventional hearing aids, there is evidence that children who use cochlear implants have better speech intelligibility and larger phonetic inventories (similar to that of children with normal hearing), with age of implantation apparently related to speech outcomes [e.g., Brackett and Zara, 1998; see Chute, this volume, for a complete review]. For this group of young children with profound hearing loss, the cochlear implant provided sufficient acoustic speech features and self-monitoring capabilities for optimal speech production to occur, information that could not be provided by conventional amplification devices.

Presence of Additional Disabilities

The numbers of children who are hard of hearing or deaf who have one or more additional disabilities (cognitive, visual, motor, attentional, behavioral) is large, estimated to be as high as 40% [GRI, 2002]. A family of a child with one or more developmental disabilities in addition to hearing loss has greater challenges in the selection of a communication approach. The ongoing family-cen-

tered diagnostic process (described below) appears critical for this population, particularly in infancy and early childhood when the child's strengths and limitations for communication have not been delineated fully. Children who are hard of hearing or deaf and who are visually limited or blind (~3% of the population with hearing loss; GRI, 2002) represent a unique population with regard to available communication options that include those described previously, as well as a somatosensory form of communication (Tadoma method).

FAMILY-CENTERED DIAGNOSTIC APPROACH TO SELECTION OF A COMMUNICATION OPTION

Moeller and Condon [1994] described the Diagnostic Early Intervention Program (DEIP) in which multiple factors are considered to help determine communication mode. No one option is best for every child and selection of one communication option does not preclude a change or modification of that approach at one or more points in childhood. The needs of the child and family may change or the results of an ongoing diagnostic assessment in multiple areas of development may indicate that a change in communication approach could facilitate language development [Moeller and Condon, 1994]. This includes systematic and regular assessment of the: 1) progress/lack of progress in the communication abilities of the child; 2) desires of the family for easier and more abundant

communication among members; 3) a change (progression) in hearing sensitivity; 4) choice of the family of an alternate technology; and/or, 5) identification of special sensory or cognitive needs [Moeller and Condon, 1994]. Informed choice by families is at the core of the family centered approach. Table 3 presents considerations compiled from various reports and surveys [Roush, 1994; Moeller and Condon, 1994; Luterman and Kurtzer White, 1999; Roush, 2000; Harrison and Roush, 2002] that indicate needs expressed by parents when faced with the selection of a communication option for their child.

CONCLUSIONS

Available evidence suggests that no one single communication option is optimal for infants and young children with hearing loss. Multiple factors impact on the family's decision, particularly in the early months following confirmation of hearing loss. Rather than a specific method, early identification of congenital hearing loss followed by language-based early intervention results in expressive and receptive communication abilities that are superior to those of children later identified. Family participation potentially has more impact on language development than age of identification, intervention, and degree of hearing loss. Thus, an ongoing process that empowers parents, considers family dynamics, and continually evaluates the changing needs of the child appears to be the best means of ensuring the development of optimal

communication in children with hearing loss. ■

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