Loud & Clear!

A Cochlear Implant Rehabilitation Newsletter

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A Sign of the Times:

Cochlear Implants and Total Communication

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Over the past few years, much attention has focused upon whether sign language, being a visual communication method, is compatible with the cochlear implant, an auditory prosthesis. A substantial proportion of children with cochlear implants utilize sign language. Recent pediatric implantees are about equally divided between those who use Oral Communication (OC) and those who use Total Communication (TC). Although clinicians advising families on this issue may express strong opinions that contradict one another, these clinicians agree that well-developed strong language abilities are essential to the success of every implanted child. The purpose of this issue is not to debate the value of Total Communication as a methodology. Rather, we rely upon research and clinical findings to establish the degree to which TC children benefit from cochlear implants.

We also make recommendations to implant teams who evaluate TC children for implantation.

Why the Controversy?

Fundamentally different philosophies about communicating with deaf children existed long before the advent of cochlear implants. Clinicians were already divided on this issue when implants became widely available. Interestingly, cochlear implants have not caused dramatic changes in most clinicians' philosophies. The vast majority of clinicians believe that, with some modifications, their chosen methodology of teaching does benefit implanted children. In addition, impressive implanted children may

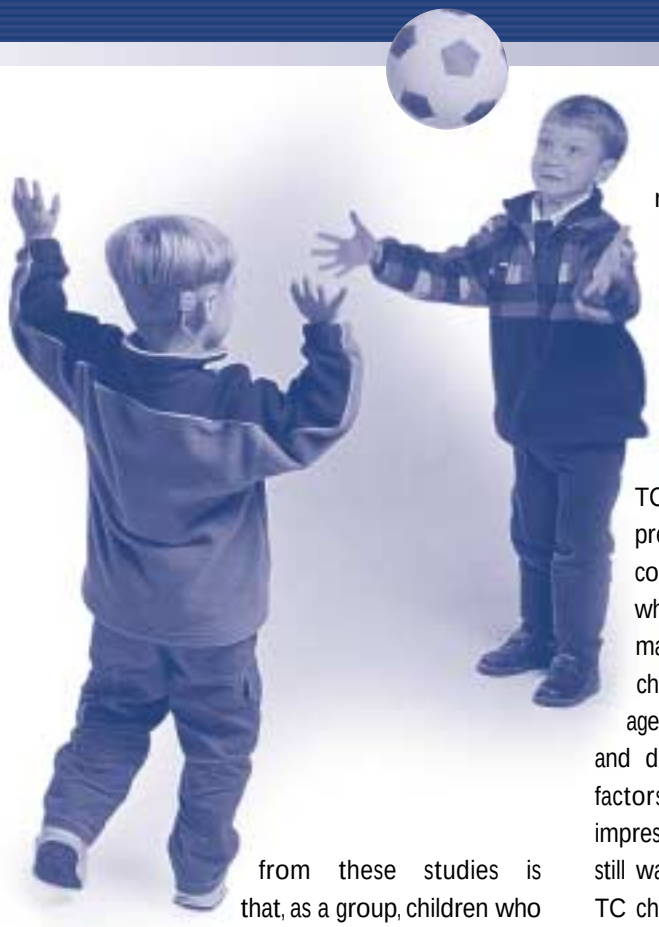
be found within every methodological camp. Depending on which impressive child one has been exposed to, one's opinion is swayed strongly in that methodological direction. As one writer said, "We don't live our lives statistically, we live them anecdotally." Meeting one "star" performer who uses a particular communication method may be more persuasive than reading several research articles on the topic.

WHAT DO THE RESEARCH FINDINGS SHOW?

A number of published investigations have examined the effect of communication mode on the language, speech perception, and speech intelligibility skills of children with cochlear implants. Studies of language outcomes reveal strikingly different trends than do studies of speech perception and speech intelligibility outcomes.

LANGUAGE STUDIES. Several different published studies of language skills in children with cochlear implants have found similar results. In these studies, children are tested in their preferred mode of communication; i.e., OC children are administered the language test using speech alone, whereas TC children are administered the test using combined speech and signs. Thus, it is underlying language proficiency that is assessed, not necessarily spoken language. Under these conditions, both OC and TC groups show similar and impressive language benefits from the cochlear implant (Robbins et al,1999; Geers, et al, 2000; Geers, et al, in press) On average, children wearing multi-channel implants make one year of language progress in one year's time (Svirsky, et al, 2000; Bollard, Chute, Popp, Parisier, 1999; Robbins, et al, 2000). This is a remarkable improvement over the historical finding that profoundly deaf children without cochlear implants make, on average, about six months of language growth in one year's time (Moeller, et al, 1986; Boothroyd, et al, 1991; Robbins, Svirsky, Kirk, 1996), or about half the language progress of their normal-hearing peers. Recall that even with a normal rate of language learning, many children with implants remain delayed in language after implantation, due to the fact that they started out so far behind their hearing peers.

SPEECH PERCEPTION AND INTELLIGIBILITY STUDIES. A strikingly different trend from that found with language outcomes has emerged for speech perception and speech intelligibility outcomes. The repeated pattern of results



from these studies is that, as a group, children who use oral communication consistently achieve higher speech perception and speech intelligibility levels than do children who use total communication. This finding has been replicated by a number of researchers conducting independent studies and using different assessment measures (Osberger, et al, 2000; Osberger & Fisher, 2000; Geers et al., 2000; Dowell et al, 1996; Osberger et al., 1998; Young, et al, 2000; Geers et al, In press). Some have argued that this finding reflects the characteristics of children who are sent to TC programs, rather than the successfulness of the method. It is asserted that the TC group is often heavily-weighted with students who were deafened at a younger age, those who received their cochlear implants when older, students who failed to progress in Oral programs, and those with less pre-implant residual hearing. The latter might suggest poorer nerve survival, less speech development and less auditory experiences prior to implantation. In fact, each of these factors could potentially skew research results, and studies comparing OC and TC implanted children should ideally report the pre-implant status of the children in each group.

Several studies and clinical experience suggest that it is more than selection issues or population demographics that account for the superiority of listening and speaking skills in OC vs. TC children with implants. The issue of pre-implant characteristics was carefully controlled for by Osberger et al. (1994) who studied the speech intelligibility of matched pairs of OC and TC implanted children. The children were matched for age at onset of deafness, age at implantation and duration of implant use. With these factors held constant across groups, an impressive advantage in speech intelligibility still was demonstrated by the OC over the TC children. Although both groups showed substantial increases in speech intelligibility with the implant, the speech of the oral children was roughly twice as intelligible as that of the TC children. Likewise, Robbins, et al. (1998) found consistently higher scores for meaningful use of speech in OC vs. TC children with implants. This study shed a different light on the issue, because data were based upon parent responses to a structured interview schedule, the Meaningful Use of Speech Scale or MUSS (Robbins & Osberger, 1991). Although weaknesses in spoken communication were identified in both the OC and TC groups, examination of the parents' responses on several questions were very revealing. The authors found that parents of TC children with implants had much lower expectations about their child's use of speech with hearing persons than did OC parents. That was true even for TC children who had a considerable amount of intelligible speech. Parents of oral children seemed to have an internalized model of their child's best production of many words or phrases and required the child to use his or her "personal best," giving feedback or providing correction when that was not achieved. In addition, OC parents indicated their optimism that their child's speech would improve over time, and that their expectation would have to change based upon the child's evolving speech intelligibility.

In contrast, many parents of TC children responded with genuine surprise when asked if their child used speech alone in some situations. For example, when Question 7 was posed ("How does Johnny handle ordering in a restaurant or dealing with a clerk in a store?") the TC parents often stated that they never considered requiring their child to use speech in those situations. Rather, they immediately intervened and interpreted for their child.

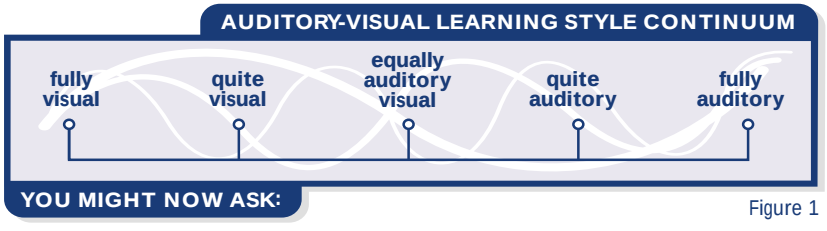


Figure 1

YOU MIGHT NOW ASK:

- **Where is the student now on the learning style continuum?**
- **What progress has the student made toward the auditory end of the continuum?**
- **In which situations does the student rely more on visual information?**
- **In which situations can the student follow auditory information with visual support (pictures, objects, or written text)?**
- **In which situations can the student rely on auditory information alone?**

Infant-Toddler Meaningful Auditory Integration Scale (IT-MAIS)

Interestingly, another parent report scale, the Infant-Toddler Meaningful Auditory Integration Scale (IT-MAIS, Zimmerman-Phillips, Osberger, Robbins, 1997) was used to collect parent data from young CLARION implant users at 3- and 6-month post-implant intervals. Zimmerman-Phillips et al (2001) found that for children implanted between 24 and 36 months, OC children showed faster progress on the scale than did TC children. However, for children implanted even earlier (between 12 and 24 mos.) there were no differences on IT-MAIS scores for Oral vs. TC children. As Dowell et al suggested (1995), very early age at implantation may reduce the impact of factors that traditionally have influenced performance levels in children.

Osberger et al (1994) outlined other factors that may place TC children at a disadvantage in spoken language development, relative to their OC peers. These include: the amount of hours dedicated to spoken language within the school day; the limited amount of instruction that TC teachers receive in their training programs on how to develop spoken language (Hochberg & Schmidt, 1983); and the speech models of classroom peers within the TC program. Osberger et al. concluded that, "Even if the amount of speech training, teacher preparation and parental expectations for the use of speech can be improved in total communication, the development of intelligible speech may still occur more often in children who use only speech to communicate than in children who use signs plus speech for communication. If signs are the more salient aspect of communication, auditory and speech information will often receive secondary attention. It may be that many children who use total communication do not reach their potential in speech development" because of the nature of their method of communication. Note that a wide range of individual performance is found in both the OC and TC groups. Some TC children do achieve high levels of performance with their implants.

TO SUMMARIZE: Do TC children, as a group, improve in their language, listening and speaking skills after implantation? The answer is a resounding yes. But do they improve to the same levels as their OC peers? The answer is a disappointing no.

CLINICAL EXPERIENCE On the Value of Signs

Many respected clinicians support the use of signs as a component of communication with implanted children. Koch (2000) suggests that signs may be critical to the development of a symbolic code that allows children to create linguistic neural networks to organize, store and retrieve concepts.

She notes that with very deaf children prior to implantation, she may use signs to establish such a network of concepts. Once hearing is established through a cochlear implant, rehabilitation and listening experience allows these concepts to be transferred gradually to an auditorially-based system, i.e., spoken language. Clinicians hypothesize that this implementation of signing disambiguates language and prevents a wide cognitive-linguistic gap from forming.

THE CHANGING FACE of Total Communication

The TC approach, developed in the early 1970's, was originally intended to promote the use of any method of communication that was needed to develop language competence in a child.

Implied in this definition of TC is the notion that a person communicating with a child would use whatever method was needed and would not use what was not needed. Over time, however, the definition of TC has become synonymous with "simultaneous communication" (i.e., the combined use of speech and sign in all situations.) The insistence on simultaneous communication at all times was meant to ensure that the child had full access to ongoing language models, a critically important component of incidental learning capabilities. Cochlear implants have altered the notion of full language access and the need for every TC child to have sign and speech in all situations. Many TC children who successfully use their cochlear implants can communicate orally at home or in social settings, but cannot do so at school because of the heavy informational and linguistic load inherent in academic content material. For such children, signing is a necessary aid to full communication access, but not in every situation or with all people.

Support for this hypothesis may be found in a study by Archbold et al (2000) who evaluated speech perception and intelligibility. The results showed that children who started in a TC program then switched to OC at some point after implantation performed as well after 3 years of device use as did children who had used OC all along.

Moeller (personal communique´, 2001) noted that the population of implanted children is so highly heterogeneous that a variety of communication methods are needed to address the diverse needs of these children. She reported that the child implanted after 5 years of age is often particularly dependent on sign language. Although many of these children derive significant benefit from their devices, Moeller notes that they may rely on sign for reception of classroom discourse, clarification when spoken language breaks down, and communication with deaf peers or deaf adults. Parents of later implantees have commented on the utility of sign for a)supporting the child's transition toward oral communication b) clarifying complex ideas or new content within the regular classroom and c) tracking rapid conversational exchanges among several speakers. One adolescent implant user who received her implant at age 4 told me, "I communicate orally with my friends at school and even at home. But in my Middle School classes, I would miss so much information if I did not have a sign interpreter. She not only interprets all the teacher's lectures, but also the comments, questions and discussion of students in the classroom that I have a lot of trouble following."

RECOMMENDATIONS TO IMPLANT TEAMS

Regarding TC Children

When a TC child presents as a candidate for cochlear implantation, Robbins (2000) recommends the following:

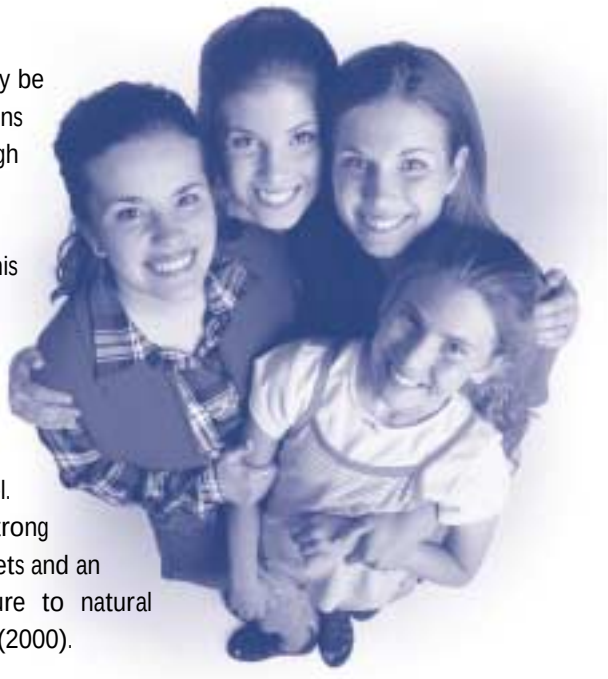
1. Begin a frank discussion of methodology issues between parents, implant center and school before surgery. The implant team must determine if there is enough flexibility in the home and school environment to accommodate and reinforce the child's new sensory avenue for learning, i.e. audition. Although the cochlear implant represents an incredible technology, successful use of the device requires a considerable effort of time, expense and energy. That effort is justified only if the child has a reasonable chance to utilize the auditory information provided by this technology.

2. Adopt the philosophy that the child will move along a continuum to become as auditory as is possible for him or her (Fig. 1). Many TC children are exclusively visual learners at the time of implantation. How far each child moves depends on many factors. However, clinical experience suggests that *a visual learner enrolled in a TC program that does not reinforce real-world consequences for listening and speaking will remain a visual learner despite the cochlear implant.*

3. Resolve that adults will provide to the TC child whatever modality is needed to communicate successfully, but only what is needed. As situations arise in which the child is successful orally, as he begins to understand some phrases by listening alone and acquires an intelligible spoken vocabulary, his auditory and oral skills must be respected and valued and signs will not be used in those situations. Over time, the goal is to establish more and more of those situations. *To make use of the auditory information conveyed by a cochlear implant, the child, whether TC or not, must have considerable auditory practice, experience and reinforcement for listening. Because of the heavy emphasis placed on visual learning within a TC program, the TC child typically receives less of this type of practice, experience and reinforcement than does an OC child.* Preliminary data from Geers (in press) reveal that higher levels of achievement with the implant are associated with children whose TC programs have a stronger "speech emphasis" than children whose TC programs are categorized as "sign emphasis".

4. Teach families to present conversational information first without signing. They may be genuinely surprised at how much their child understands. If this is unsuccessful, signs may be added. Once information is clarified, repeat the information through listening alone. This creates an "auditory sandwich" (Koch, 1999).

5. Be certain that the child's educational program, including his IEP, reflects his new-found auditory potential and that staff expectations are increased. Remember that, *in order to be effective, expectations must be put into practice.* A child's educational goals and objectives should look very different after he receives his implant than it did before his implant. I advise parents that no teacher would continue with second grade Math lessons if a child came back from summer break and had dramatically improved to the fifth grade Math level. Similarly, after implantation, the TC child's IEP should be re-written to reflect strong auditory goals, greater demands for oral-only interactions, higher-level speech targets and an emphasis on opportunities for incidental learning of language from exposure to natural conversation in the environment (See Loud and Clear, Vol. 1, Issue 1, or Robbins (2000).



QUESTIONS to Assess Communication Methodology

These questions apply across communication approaches and assess whether an implanted child's communication methodology is appropriate.

1. *Is the chosen methodology working in concert with the cochlear implant to enhance communication development?*
2. *Is this child a functional communicator? Do his linguistic skills have high value on the "communication currency" market? Do they buy him successful interactions with other?*
3. *Does this child have a wide range of people with whom she/he can communicate? Does his linguistic system* ***broaden*** *rather than narrow his communication potential with other human beings?*
4. *Is the child's communication supportive of literacy development and academic success?*
5. *Using this communication system, is this child making steady and measurable progress in language, listening and speech over time?*

Summary

Keep in mind that, whether parents select an Oral or Total Communication path with their implanted child, they are motivated by the same goal: establishing excellent communicative competence. To that end, clinicians may pose a series of questions, (See Above) to dialogue with parents about the effectiveness of the child's current communication methodology. Regarding the last question, any program should establish milestones for auditory, speech and language behaviors that are expected to emerge in children at specific post implant intervals. Noticeable changes in communication should be seen after three months of implant use. Although children vary in the patterns of their language growth, both OC and TC programs should have preestablished "red flags" for children who are not progressing appropriately. The clinician should keep a watchful eye on how well the chosen methodology works for a given child. If progress is not occurring, teachers and parents should meet and discuss strategies. As several studies have shown that the average implanted child learns approximately one year of language in one years' time, adults should "red flag" a child whose language progress is significantly slower than this.

The factors that influence a decision to use sign language with an implanted child are complex, and such decisions must be based on the individual needs of each child. As clinicians, our goal remains steadfast: to foster the development of life-long communicative competence in children with cochlear implants.

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References

- Archbold, S, Nikolopoulos T, Tait, M, O'Donoghue G, Lutman M, Gregory S. (2000). Approach to communication, speech perception and intelligibility after pediatric cochlear implantation. Brit J Audiology 34: 257-264.
- Bollard, P, Chute, P. Popp, A, Parisier, S. (1999) Specific language growth in young children using the Clarion cochlear implant. *Annals of Oto Rhino Laryng.* Suppl 177, Vol. 108, No. 4, Part 2, 119-123.
- Boothroyd A, Geers A, Moog J. (1991) Practical implications of cochlear implants in children. *Ear & Hearing* 12:81S-89S.
- Dowell, R, Blamey P, Clark, G (1996) Potential and limitations of cochlear implants in children. *Annals of Oto Rhino Laryng*, Suppl. 166, Vol. 104 No. 9 324-327
- Geers, A, Nicholas, J, Tye-Murray, N, Uchanski, R, Brenner, C, Davidson, L, Toretta, G, Tobey, E. (2000) Effects of Communication Mode on Skills of Long-Term Cochlear Implant Users. *Annals of Oto Rhino Laryng.* Suppl. 185, Vol. 109, No.12, Part 2.
- Geers et al (In press). Effects of educational choices on the speech and language development of children implanted before age 5. *Language Speech Hearing Services in Schools.*
- Hochberg, I & Schmidt J. (1983) A Model Inservice-preservice training program to improve the speech of hearing-impaired children. In Hochberg, Levitt, Osberger (Eds.) *Speech of the Hearing Impaired.* Baltimore: Univ. Park Press.
- Koch, M. (1999). *Bringing sound to life.* Baltimore: York press. (800) 962-2769.
- Moeller, MP, Osberger, M, Eccarius M. (1986). Receptive language skills. In Osberger (Ed) *Language and Learning Skills of Hearing Impaired Students*, ASHA Monograph 23, 41-530.
- Osberger, M & Fisher, L. (2000). Preoperative Predictors of Postoperative Implant Performance in Children. *Annals of Oto Rhino Laryng.* Suppl. 185, Vol. 109, No.12, Part 2.
- Osberger, M, Zimmerman-Phillips, S, Fisher, L. (2000). Relationship between Communication Mode and Implant Performance in Pediatric Clarion Patients. In Waltzman & Cohen (Eds.), *Cochlear Implants.* New York: Thieme Medical
- Osberger, M Robbins A, Todd S, Riley A. (1994). Speech intelligibility of children with cochlear implants. *Volta Review*, 96, 169-180.
- Robbins, A, & Osberger, M (1991). *Meaningful Use of Speech Scale.* Indiana University School of Medicine, Indianapolis, IN
- Robbins, AM, Bollard, P, Green, J. (1999). Language development in children implanted with the Clarion cochlear implant. *Annals of Oto Rhino Laryng* Suppl 177, Vol. 108, No. 4, Part 2113-118.
- Robbins, AM (2000). Rehabilitation after implantation. In Niparko (Ed.) *Cochlear Implants*: Principles and Practices. Philadelphia: Lippincott Williams & Wilkins.
- Robbins, AM, Svirsky, M, Miyamoto, R. (2000). Aspects of linguistic development affected by cochlear implantation. In Waltzman & Cohen (Eds.) *Cochlear Implants.* NY: Thieme Medical
- Svirsky, M, Robbins, AM, Kirk, KI, Pisoni, D, Miyamoto, R. (2000) Language development in profoundly deaf children with cochlear implants. *Psychological Science*, Vol 11, No. 2, 153-158.
- Young, N, Grohne, K., Carrasco, V, Brown, C. (2000). Speech Perception in Young Children using Nucleus or Clarion Cochlear Implants: Effect of Communication Mode. *Annals of Oto Rhino & Laryng.* Suppl. 185, Vol. 109, No.12, Part 2.
- Zimmernan-Phillips S, Osberger, M, Robbins, AM. (1997). Infant-Toddler Meaningful Auditory Integration Scale. Sylmar, CA: Advanced Bionics Corp.
- Zimmerman-Phillips S, Osberger, M, Robbins AM, Kishon-Rabin, L (2001). Measuring auditory progress in infants and toddlers. Presented at 8th Symposium Cochlear Implants in Children, Los Angeles.

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