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## Auditory-Verbal Therapy for the New Generation of Children with Hearing Impairment

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**Presenter:**  
Denise Wray, Ph.D., CCC-SLP, LSLS, Cert. AVT

**Moderated by:**  
Amy Hansen, M.A., CCC-SLP, Managing Editor, SpeechPathology.com




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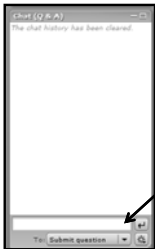
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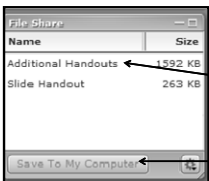
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**Auditory-Verbal Therapy: Philosophy  
and Application for the New  
Generation of Children with Hearing  
Impairment**

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Cert. AVT  
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School of Speech Pathology & Audiology  
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**The University of Akron's Auditory-Verbal Clinic:  
Training Parents as Language Facilitators**



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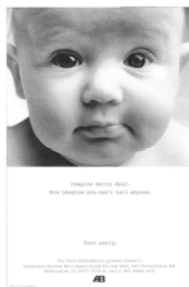
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**And today....**



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**UA's Auditory-Verbal Clinic**  
***"Hear from the Start, Talk for a Lifetime"***  
(A. G. Bell Association for Deaf & Hard of Hrg.)  
([www.agbell.org](http://www.agbell.org))



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## **The Question to Ask Families is: What is Your Vision for Your Child?**

**95% of children with hearing loss are born into  
hearing and speaking families; they are  
interested in having their child talk and read.**

**If we know that listening, speaking and literacy  
are desired outcomes, the next conversation is –  
what will it take to achieve those outcomes?  
This is today's discussion...**

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**THE NEW POSSIBILITIES  
THAT ARE FOUNDATIONS  
FOR SPOKEN LANGUAGE** (FLEXER, 2007)

- *Because of technology*, the SLP's and audiologist's roles have expanded in pediatric sectors (i.e., digital hrg. aids & cochlear implants).
- *Because of technology*, today's infants represent a new and different generation of children who are deaf; UNBH exists in all 50 states.
- *Because a family's right of choice is always respected*, the indicated treatment and appropriate technologies relate to the desired outcomes expressed by the family.

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**UNDERLYING THEMES**  
*Information to convey to families:*  
(Flexer, 2007)

- Hearing is a first-order event for the development of spoken communication and literacy skills
- Anytime the word "hearing" is used, think "auditory brain development"!!
- We hear with the brain; the ears are just a way in
- Acoustic accessibility of intelligible speech is essential for brain growth; thus, there's a need for *early* amplification technology

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**Early Intervention Outcomes**

- Emerging data from the Colorado Project are showing that children born with a profound hearing loss who obtain a cochlear implant before they are 2, have close to a 100% chance of obtaining intelligible speech.
- This outcome is based on having the cochlear implant mapped appropriately and worn consistently.
- Direct, repetitive auditory skill instruction as part of an effective early intervention program also is critical. **That is, "extra" auditory stimulation is necessary.**

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### Effects of Early Auditory Experience on Spoken Language at 3 Years

(Nicholas & Geers, 2006-*Ear & Hearing*)

- Longer use of a cochlear implant in infancy and very early childhood (i.e., before age 3) dramatically affects the amount of spoken language exhibited by 3.5 year old children with profound hearing loss, even more so than a greater amount of pre-implant intervention given to children wearing hearing aids
- Key factor: early cochlear implantation optimizes spoken language

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### Summary of Neuroplasticity

(Flexer, 2007; Sharma & Nash, 2009)

- There is a “**sensitive**” or “**critical**” period of 3.5 yrs. during which implantation occurs into a highly plastic system-greatest in the first 3 ½ years of life
- Implantation after age 7 yields significantly reduced outcomes
- Central auditory pathways change rapidly after stimulation
- Early implantation reveals rapid development of the neural pathways and normal development over a period of time
- The younger the infant, the greater the neuroplasticity
- Rapid infant brain growth requires prompt intervention, typically including amplification and a program to promote auditory skill development.
- In the absence of sound, the brain re-organizes itself to receive input from other senses, primarily vision – “**cross-modal re-organization**” – that reduces auditory neural capacity.
- The major factor in shaping the development of the cortex is **competition**, not deprivation: it’s competition that causes the reorganization of the cortex.

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### Summary of Neuroplasticity

- Explosion in understanding neural bases of language driven by development of functional neural imaging such as positron emission tomography (PET) or functional magnetic resonance imaging (fMRI) that measure changes in metabolic activity and blood flow in specific brain regions while subject involved in cognitive tasks.
- Early amplification/implantation stimulates a brain that has **not** been reorganized and will be more receptive to auditory input = greater auditory capacity (Sharma & Nash, 2009).

Early implantation synchronizes activity in the cortical layers.

*Therefore, identification of newborn hearing loss should be considered a **neurodevelopmental emergency!!*** (Flexer, 2008)

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### **The goal of auditory-verbal philosophy...**

Is that children with hearing impairments can grow up in regular learning and living environments that enable them to become independent, participating, and contributing citizens in mainstream society.

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“Auditory-Verbal therapy is the application and management of technology, strategies, techniques, and procedures to enable children with hearing impairments to learn to listen and understand spoken language in order to communicate through speech.”

- Warren Estabrooks (2006)

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### **An A-V Approach to Listening and Spoken Language Involves:**

(Ellen Thomas, 2011)

- Early identification- capitalizing on the neuro-plasticity of the young brain
- Aggressive audiological management
- 1:1 therapy with parent coaching
- Parent involvement
- The team working for the development of a functional auditory system

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### **Our Approach to Intervention is Changing...**

(Flexer, 2008)

- *Because of technology and brain neuroplasticity, the audiologist's and speech-language pathologist's role have expanded in pediatric sectors as we increasingly work with technology.*
- *Because of technology and brain neuroplasticity, the landscape of deafness has changed.*
- *Because of technology and brain neuroplasticity, today's infants represent a new and different generation of children who are deaf.*
- *We are in a position to provide to the world a new and expanded vision of hope and possibility regarding intervention outcomes.*

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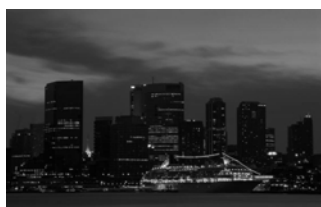
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***“The best way to predict the future  
is to create it.”***

***Peter Drucker***



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### **Principles of Auditory-Verbal Practice**

*Adopted by the AG Bell Academy for Listening and Spoken Language,  
November 6, 2009*

*\*Adapted from the principles originally developed by Doreen Pollack in  
1970*

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## Auditory-Verbal Principles

### Principle 1:

Promote early diagnosis of hearing loss in newborns, infants, toddlers and young children, followed by immediate audiologic management and Auditory-Verbal therapy.

### Principle 2:

Recommend immediate assessment and use of appropriate, state-of-the-art hearing technology to obtain maximum benefits of auditory stimulation.

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### Auditory-Verbal Principles 1 & 2: Early Diagnosis and Aggressive Audiologic Management



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## Auditory-Verbal Principles

### Principle 3:

Guide and coach parents to help their child use hearing as the primary sensory modality in developing listening and spoken language.

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**Auditory-Verbal Principle 4:** Guide and coach parents to become the primary facilitators of their child's listening and spoken language development through active, consistent participation in individualized Auditory-Verbal therapy.



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**Auditory-Verbal Principle 5:** Guide and coach parents to create environments that support listening for the acquisition of spoken language throughout the child's daily activities.



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**Auditory-Verbal Principle 6:** Guide and coach parents to help their child integrate listening and spoken language into all aspects of the child's life.



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## Auditory-Verbal Principles

### Principle 7:

Guide and coach parents to use natural developmental patterns of audition, speech, language, cognition and communication.

### Principle 8:

Guide and coach parents to help their child self-monitor spoken language through listening.

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**Auditory-Verbal Principle 9:** Administer ongoing formal and informal diagnostic assessments to develop individualized Auditory-Verbal treatment plans, to monitor progress and to evaluate the effectiveness of the plans for the child and family.



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**Auditory-Verbal Principle 10:** Promote education in regular schools with peers who have typical hearing and with appropriate services from early childhood onwards.



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Options in Life—"And You're the One Who'll Decide Where to Go" (Dr. Seuss, 1990)



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### How Do Children Learn Sophistications of Language?

- Immersion with good speech-language models
- Hearing language repetitively from significant others in a natural setting
- Hearing language in a meaningful context



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### Key Study by *HART AND RISLEY (1995)*: The Lines of Demarcation are Drawn Early On...

"Meaningful Differences in the Everyday Experience of Young American Children"

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## Hart and Risley, 1995

- Frequently cited study that investigated the relationship between a child's development of vocabulary and the parent's language use in the home
- 42 children from families described as professional, working class, or poverty level were observed in their home environment for an hour once a month while the talk that took place was recorded
- The average age of the children at the beginning of the study was 9 months and observations were ended when the child was 36 months (average of 28 months of observation for each family)
- Results of the study revealed there was a 32 million word difference between the highest amount of speaking (in the professional families) and the lowest amount of speaking (in the welfare families)

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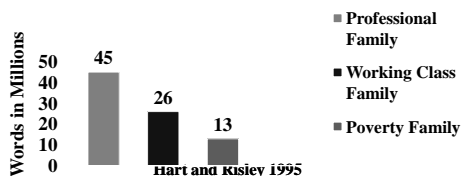
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## Cumulative Words Addressed to a Child in the First Four Years




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**Vocabulary** is one of the biggest predictors of kindergarten success...therefore, early intervention is not about the child, it is about the family learning about vocabulary development.

Think of early intervention as “adult education.”

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## Number of Words Understood by Children who are Typical

*Gard, Gilman & Gorman (1980)*

<u>Age</u>	<u># of Words</u>
2	300 words
2.5	500 words
3	900 words
4	1,500 words
5	2,500 words
6	13,000 words
7	20,000 words

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## Reading Outcomes for the Deaf and Hard of Hearing

- Deaf or hard of hearing 17- and 18- year- old students in a normative sample for research done by Gallaudet Research Institute demonstrated literacy skills that were equivalent to a 4<sup>th</sup> grade level
- In a study of 181 elementary students who received a cochlear implant before age 5, over half (52%) had age-appropriate reading scores (Geers, 2006)
- In high school, 47-66% obtained reading scores at or above average range compared to hearing peers

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## Project Hope Results (1999)

• The best estimate of severe to profound hearing impairment in the U.S. is at least 664,000 persons but possibly as many as 738,000 persons

**Family Income**

• Most of the severely to profound hearing impaired population are on average, poorer than other Americans.  
 • Fifty-three percent of the study population has a family income of less than \$25,000 compared to 35 percent of the general U.S. population.

**Education**

• Of the severely to profoundly hearing impaired population, about 44% did not graduate from high school, compared to only 19% in the general population.  
 • 46% of the study population did graduate from high school and reported some college attendance, compared with 60% of the general population.

**Labor Force Participation**

• 42% of those with severe to profound hearing impairment between the ages of 18 and 44 years are NOT working compared to 18% of the general population.  
 • 54% of those aged 45 to 64 years are without jobs, compared to 27% of the general population.

Source: Project Hope Center for Health Affairs, (1999). The Severity to Profoundly Hearing Impaired Population in the United States: Prevalence and Demographics

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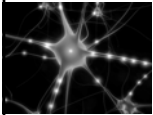
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It's a new generation of  
children who are deaf/hard of  
hearing...because it is all  
about the BRAIN.

Hearing loss is not about the ears; it's  
about the brain!

Hearing aids, FM systems and  
cochlear implants are not about the  
ears; they are about the brain!

(Flexer, 2008)



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**Critical Keys to a Successful Spoken  
Language Outcome:**

\*Access the Auditory Centers  
of the Brain as Early  
and Completely as Possible;

\*Then, Practice, Practice, Practice Listening  
and Talking...

\*Approach it as a “*Neurodevelopmental  
Emergency*” (Flexer, 2008)

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**Intelligibility vs. Audibility**

(Cole and Flexer, 2008)

- **Audibility:** ability to detect the presence of sound; “I can hear someone talking.”
- **Intelligibility:** ability to discriminate the word-sound distinctions of speech sounds; “I can hear what is being said.”
- Persons with hearing loss typically have the most difficulty hearing unvoiced, low energy but high-frequency consonant sounds (e.g., “f”, “t”, and “s”)
  - Consonants, particularly high frequency ones, contain 90% of the information needed to perceive differences among sounds which contributes to intelligibility skills.

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### Parents as Partners



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### Role of Parents in AVT

*(Estabrooks, 2006)*

- Six/ten principles involve parents directly
- Model techniques
- Plan strategies/understand goals
- Be interpreters/partners
- Manage behavior
- Develop confidence in their interactions
- Advocate for child
- Record and discuss progress

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### A-V Teaching Techniques

*(Estabrooks, 2006; Pollack et. al, 1997)*



- Audition first through technology
- Parents as partners
- Use of “hand cue”
- Listen prompts
- Acoustic highlighting – whispering, singing, auditory spacing
- Consideration of hearing or listening age

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- Follow an auditory hierarchy-see later slides
- Aggressive audiologic management
- Attention to the listening environment
- Diagnostic therapy
- Normal language milestones
- Immediate feedback
- Move close to the microphone




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- Waiting and/ or pausing for responses
- Rewording, providing alternatives, repeating previously heard information
- Putting spoken language directly back into hearing after cueing
- Changing the set type, size, and # of items




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## Hierarchy of Listening Skills (Erber, 1977)



- **Detection:** Ability to respond to presence or absence of sound
- **Discrimination:** Ability to perceive similarities & differences among 2 or more speech stimuli
- **Identification/Recognition:** Ability to reproduce a speech stimulus by pointing at a picture, writing, or by repeating the speech heard
- **Comprehension:** Ability to understand the meaning of speech by answering questions, following directions, paraphrasing or engaging in conversation

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## Detection

- Awareness of sound...we're growing the BRAIN, BRAIN, BRAIN!
- Teach conditioned play response and spontaneous alerting responses
- However....First obtain a BASELINE...
- MED-EL: **Auditory Checklist Questionnaire** (one for parents and one for professionals-www.medel.com-out of Innsbruck, Austria) to establish auditory goals and objectives for treatment plan
  - **IT-MAIS** (Osberger, McKonky-Robbins, Zimmerman-Phillips)
    - Infant-Toddler Meaningful Auditory Integration Scale
    - Interview style with 10 probes
    - Assesses
      - Vocalization behavior
      - Alerting to sounds
      - Deriving meaning from sounds
      - Available from **ADVANCED BIONICS**  
(800) 678-2572 or [www.bionicear.com](http://www.bionicear.com)




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## Detection...Environmental Sounds



- **Listening Walks- "I Hear That!"**
- Set the Stage for an Auditory Lifestyle:
  - **Top 10 Strategies for Parents** by Jill Bader
    - [jbaderconsultant@aol.com](mailto:jbaderconsultant@aol.com)
    - 303-841-7987
    - **Jabber Journal**: kept by the parent
  - Parent reports sounds the child detects
  - Parent reports sounds the child makes
  - **Listening is Fun! A Guide for Parents & Families**- CD with training manual by Med-El

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## Detection...Speech Sounds

- **Child's Name...The Calling Game**
  - **Start Listening: A guide to pediatric rehabilitation**
    - FREE DVD from COCHLEAR AMERICAS
    - (303) 790-9010 or [www.cochlear.com](http://www.cochlear.com)
- **The Ling 6 Sound Test-free pictures from Med-El and Advanced Bionics**
  - Adaptable to any age
  - Can be paired with "Learning to Listen" sounds as bridge to identification and sound/object association (Pollack, 1985; 1997); Dave Sindrey's explanation:
- [www.hearingjourney.com/userfiles/file/ling6screeninstr.pdf](http://www.hearingjourney.com/userfiles/file/ling6screeninstr.pdf)
  - **Suprasegmentals of speech**
    - Pitch, duration, intensity, timing, and stress
  - Learning to Listen Sounds/Objects-"Tools for Schools" (Advanced Bionics)
    - Ooh = ghost
    - Aah = airplane
    - Eee = slide, vacuum, Chinese yo-yo
    - Sss = snake
    - Shh = baby
    - Mmm = ice cream cone, any food

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## Goals for Identification Skills

(Estabrooks, 2006)

- Suprasegmentals
  1. Prosodic features of speech
  2. Loudness and pitch
  3. Angry vs. sad vs. happy voices
  4. Male vs. female vs. children's voices
- Segmentals
  1. Initial sound vocabulary-Learn to Listen sounds (Pollack 1985; 1997)
  2. Words varying in number of syllables-acoustic contrasts
  3. One-syllable words varying in vowel and consonant content

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## Identification Skills- cont.

- Words in which the vowel is constant and the consonants contrast in manner, place & voice
- Two critical elements in a phrase
- Auditory monitoring of segmentals



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## Comprehension Skills

(Estabrooks, 2006)

- Familiar expressions/common phrases
- Single and two-step directions
- Classroom instructions
- Sequencing three-step directions
- Directions with multi-elements
- Sequencing three events in a story
- Answering questions about stories: open and closed sets
- Exercises in noisy environments

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### ***History of the A-V Philosophy***

*Estabrooks, (2006) & Goldberg, (1993)*

- Pioneers included: Victor Urbantschitsch in 1895 from Germany and Max Goldstein, founder of CID in 1914 who founded the Acoustic Method in 1939.
- Daniel Ling and Agnes Phillips, first from Britain and then Montreal, Canada.
- Doreen Pollack, initially NYC, then Univ. of Denver and then Porter Hospital in Denver.
- Helen Beebe first in NYC and then Easton, Pa.

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### ***History (cont.)***

- In 1978, a two day conference at the Beebe Center in Easton, PA. brought together pioneers Daniel Ling, Doreen Pollack, and Helen Beebe for the first time.
- The International Committee on Auditory-Verbal Communication was formed.
- From 1981-1986 they joined AGBell as a “special committee”, but broke off and created Auditory-Verbal, International (AVI).
- In 2005, AVI was dissolved and integrated with the A. G. Bell Association for the Deaf & Hard of Hearing

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### ***History (cont.)***

- Beebe published *A Guide to Help the Severely Hard of Hearing Child* (1953)
- Pollack published *Educational Audiology for the Limited Hearing Infant* in 1970
- Ling first published *Speech and the Hearing-Impaired Child: Theory and Practice* in 1976 and coined the phrase “auditory-verbal”
- Principles of auditory-verbal practice were adopted from Pollack (1970;1985; 1997) and were revised in 2009 by AG Bell’s Academy for Listening and Spoken Language; AGBell certifies *Listening and Spoken Language Specialists* ([www.agbellacademy.org](http://www.agbellacademy.org))

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## Factors Affecting Spoken Language Outcomes

- Research reports to date may already be obsolete due to rapid changes/advancements of technology.
- Difficult to generalize results due to the relatively rare occurrence of children with cochlear implants.
- The age at identification of hearing loss in infants has been reduced from an average of about 24 months to less than 6 months!

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## Factors Influencing Spoken Language: Summary

- The amount of benefit is a product of:
  - What the child brings to the learning environment.
  - What is provided by the implant itself.
  - What is provided by the child's rehabilitation team.




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## RESOURCES

- April 2003 and Vol. 27, #3, 2006; *Ear and Hearing*
- *Archives of Otolaryngology – Head and Neck Surgery*. May 2004.
- The Volta Review, Vol. 106, Spring 2006; & Summer 2010
- Flexer, C. (1999). *Facilitating Hearing and Listening in Young Children*, 2<sup>nd</sup> ed. San Diego: Singular Publishing Group. Go to: [www.carolflexer.com](http://www.carolflexer.com)
- Robertson, L. (2009). *Literacy and Deafness: Listening and Spoken Language*. Plural Publishing
- Ellen Rhoades' website: [www.auditoryverbaltraining.com](http://www.auditoryverbaltraining.com) & [www.listen-up.org](http://www.listen-up.org).

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## RESOURCES (cont.)

- **Children with Hearing Loss Developing Listening & Talking, Birth to Six—E. Cole & C. Flexer, (2008), 2nd. Ed., Plural Publishing.**
- **Speech Perception Instructional Curriculum and Evaluation (SPICE)—J. Moog, J. Biedenstein, & L. Davidson (1995). Central Institute of the Deaf.**
- **Developmental Approach to Successful Listening II—G. Stout & J. Windle (1992). Houston School for the Deaf.**
- **Word Associations for Syllable Perception (WASP)—M. Koch (1999). Advanced Bionics at [www.bionicear.com](http://www.bionicear.com).**

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### Additional Resources

*The Volta Review* (Vols. 110, Number 2). Wash., D.C.: AG Bell  
**Professional Preparation for Listening and Spoken Language Practitioners** (2010)  
 By K.T. Houston & C. B. Perigoe  
**Listen to This- Volume 1** (2004) – Book and DVD  
 By Warren Estabrooks, Karen MacIver-Lux, Lisa Katz, and Maria Emilia De Melo  
**Listen to This- Volume 2** (2006) – Book and DVD  
 By Warren Estabrooks, Karen MacIver-Lux, Lisa Katz and Maria Emilia De Melo  
**The Baby is Listening** (2003) – Book and DVD  
 By Warren Estabrooks, M.Ed., Dip. Ed. Deaf, LSLS Cert. AVT, and Judith Marlowe, Ph.D., FAAA  
**Pediatric Audiology Casebook** (2011)  
 By Jane Madell and Carol Flexer

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**Ed. Aud. for the Limited-Hrg Infant & Preschooler: An Auditory-Verbal Prog-** 3rd Ed. (1997)  
 By Doreen Pollack, Donald Goldberg, and Nancy Caleffe-Schenck  
**Children with Hearing Loss: Developing Listening and Talking Birth to Six** (2008)  
 2nd Edition, By Elizabeth Cole and Carol Flexer  
**Speech and the Hearing-Impaired Child: Theory and Practice- 2nd Edition** (2002)  
 By Daniel Ling  
**Auditory-Verbal Practice: Towards a Family Centered Approach**  
 By AG Bell members Ellen Rhoades, Ed.S., LSLS Cert. AVT, and Jill Duncan, Ph.D., LSLS Cert. AVT  
**ABCs of AVT: Analyzing Auditory-Verbal Therapy**  
 By Warren Estabrooks, M.Ed., Dip. Ed. Deaf, LSLS Cert. AVT, and Rhonda Schwartz, M.A., S-LP(C)  
**Auditory-Verbal Therapy and Practice** (2006)  
 By Warren Estabrooks

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Websites  
 Cochlear - <http://www.cochlear.com/>  
 Support Link- HOPE - <http://hope.cochlearamericas.com/>  
 MED – EI - <http://www.medelus.com/>  
 User Support -<http://www.medel.com/us/show4/index/id/4/title/USER-SUPPORT>  
 Advanced Bionics – <http://www.advancedbionics.com/>  
[www.hearingjourney.com](http://www.hearingjourney.com)

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**Recommended DVDs**

- *Hear the Difference* ([www.oraldeafed.org](http://www.oraldeafed.org))
- *Dreams Made Real* ([www.oraldeafed.org](http://www.oraldeafed.org))
- Call: 1-877-oraldeaf for FREE resources
- *Do You Hear That?* ([www.agbell.org](http://www.agbell.org))
- *Listen to This-Volumes I and II* ([agbell.org](http://agbell.org))
- *The Baby is Listening* ([agbell.org](http://agbell.org))

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