

# Incorporating Functional Auditory Measures into Pediatric Practice



*An introductory guide for pediatric hearing professionals*

By: Anne Marie Tharpe, PhD, Vanderbilt Bill Wilkerson Center and  
Traci Schmidtke Flynn, MA, Oticon A/S





# Incorporating Functional Auditory Measures into Pediatric Practice

With the advent of universal newborn hearing screening, hearing loss in infants is being identified earlier than ever before. This early identification has increased the need for timely audiological care for the pediatric population. An ongoing comprehensive assessment is required to accurately diagnose the hearing status of infants in order to provide appropriate treatment. This assessment should include physiological, behavioural, and functional auditory measurements. These functional measurements should take place in the clinic as well as in the child's daily environment.

## Functional Assessment Measures

For older children, speech perception testing is the most common method used to determine a child's auditory capacity, or use of functional hearing. However, because of developmental limitations inherent in the infant population, there are few formal tools available for assessing their auditory potential and capabilities. As a result of this limitation, alternative means of assessing infant auditory skills continue to be developed.

Functional auditory measures have been developed to meet the need of infant assessment and to expand our test battery for children. These assessments evaluate listening behavior in real world settings - outside the confines of the soundproof booth where most formal audiological testing takes place. The goal of functional assessments is to tell us not only *what* a child hears but, more importantly, how the child *uses* what is heard in everyday situations. In addition, information can be obtained about how listening behavior might change in different settings, under different conditions, or with different speakers.

This information can then be used to guide our management plans for infants and children with hearing loss. Typically, this information can be accessed through self-assessment, parent, or teacher questionnaires. If the purpose of the assessment is to document perceived benefit from amplification or other interventions then subjective metrics, also known as *outcome measures*, are used. Of course, assessment of speech and language skills should also be part of a comprehensive assessment of treatment outcome. It is assumed that all children with hearing loss are under the management of a speech-language pathologist and such assessments are not included in this document.

Functional assessment can be part of the comprehensive audiologic test battery used to

- determine individual needs (i.e., use of FM or other technologies)
- indicate if environmental modifications are needed
- demonstrate benefit from amplification.

Although some functional assessments still lack the validation needed for widespread use, some examples of the more commonly used tools are listed at the end of the guide. Also provided are tables, delineated by degree of hearing loss, developmental age of the child, and respondent illustrating tools that might be used to assess a child's real-world use of hearing. These tables can be used to assist in the selection of developmentally age-appropriate functional assessment tools in your practice.



**Infant (0-3 years)**

	<b>Minimal loss</b>	<b>Moderate loss</b>	<b>Severe-to-profound loss</b>
<b>PARENT</b>	LittIEARS PEACH	LittIEARS PEACH	ELF IT-MAIS LittIEARS PEACH
<b>TEACHER/ CAREGIVER</b>	TEACH	TEACH	ELF TEACH

**Preschool (3-5 years)**

	<b>Minimal loss</b>	<b>Moderate loss</b>	<b>Severe-to-profound</b>
<b>PARENT</b>	ABEL COW	ABEL CHILD COW ELF PEACH	ABEL CHILD COW ELF LittIEARS MAIS PEACH
<b>TEACHER/ CAREGIVER</b>	COW Pre-School SIFTER	COW Pre-School SIFTER TEACH	COW TEACH

## School (5+ years)

	<b>Minimal loss</b>	<b>Moderate loss</b>	<b>Severe-to-profound loss</b>
<b>CHILD</b>	CHILD COW LIFE LSQ	CHILD COW LIFE LSQ P-APHAB	CHILD COW LIFE LSQ P-APHAB PEACH
<b>PARENT</b>	ABEL CHILD COW LSQ	ABEL CHILD COW LSQ	ABEL CHILD COW LSQ MAIS PEACH
<b>TEACHER/ CAREGIVER</b>	COW LIFE SIFTER	COW LIFE SIFTER	COW LIFE TEACH

*See Quick Guide for further information of the listed tools*

### Age

*The ages in this table refer to the child's developmental, as opposed to chronological age level.*

### Child, Parent, Teacher/Caregiver

*The tools are listed according to who is designated to complete the measure. Whenever possible, it is desirable to have measures completed by more than one individual in order to reflect the child's auditory behavior in a variety of listening environments.*

### Hearing Loss

*The tools are listed according to hearing loss of the child, as the outcome of the tool will provide different information depending on the child's degree of hearing loss. The tools listed for minimal hearing loss target the decision of the need of amplification, while the tools listed for moderate and severe-to-profound hearing loss aid in indicating if environmental modifications are required and in demonstrating benefit from amplification.*

### Summary

Using functional assessments expands our battery of tests for children and allows for assessing what the child hears and how the child uses its hearing. Going beyond the clinical setting into the child's everyday life, enables the clinician to provide the best possible solution.

## Quick Guide to Tools

Below is a summary, listed alphabetically, of all the functional assessment tools referenced in this document.

### **ABEL: Auditory Behaviour in Everyday Life**

*Age range:* 2-12 years

*Purpose:* Twenty-four item questionnaire with three subscales (Aural-Oral, Auditory Awareness, Social/Conversational skills) which evaluates auditory behaviour in everyday life.

*Reference:* Purdy, S., et al. 2002. ABEL: Auditory Behaviour in Everyday Life, *American Journal of Audiology*, 11:72-82.

### **CHILD: Children's Home Inventory for Listening Difficulties**

*Age range:* 3-12 years. (Recommended for children 7-12).

*Purpose:* Questionnaire for the child and for the parent with 15 situations which rate how well the child understood speech.

*Reference:* Anderson K.L, Smaldino J.J. (2000). Children's Home Inventory for Listening Difficulties (CHILD). [www.hear2learn.com](http://www.hear2learn.com).

### **COW: Children's Outcome Worksheets**

*Age range:* 4-12 years

*Purpose:* Three worksheets (child, parent, and teacher) are requested to specify 5 situations where improved hearing is desired.

*Reference:* Williams, C. (2003) The Children's Outcome Worksheets - an Outcome measure focusing on children's needs (Ages 4-12). *News from Oticon*, January 2005. [www.oticon.com](http://www.oticon.com).

### **ELF: Early Listening Function**

*Age range:* 5 months - 3 years

*Purpose:* Twelve listening situations in which the parent and audiologist observe the child and record the distance the child responds to the auditory stimuli.

*Reference:* Anderson, K.L. (2000). Early Listening Function (ELF). [www.hear2learn.com](http://www.hear2learn.com).

### **IT-MAIS: Infant Toddler Meaningful Auditory Integration Scale**

*Age range:* Birth to 3 years

*Purpose:* Parental interview with ten questions that evaluates the meaningful use of sound in everyday situations (vocal behaviour, attachment with hearing instrument, ability to alert to sound, ability to attach meaning to sound).

*Reference:* Zimmerman-Phillips, S., Osberger, M.F., & Robbins, A.M: (1997). Infant-Toddler: Meaningful Auditory Integration Scale (IT-MAIS). Sylmar, CA: Advanced Bionics Corp. [www.agbell.org](http://www.agbell.org)

### **LIFE: Listening Inventory for Education**

*Age range:* 6 years and up.

*Purpose:* Questionnaire which identifies classroom situations which are challenging for the child. There are two formats of the questionnaire: a teacher questionnaire with 16 items and a child questionnaire with 15 items.

*Reference:* Anderson K.L., Smaldino, J.J. (1996). Listening Inventory for Education; An efficacy tool (LIFE). [www.hear2learn.com](http://www.hear2learn.com).

### **Little Ears**

*Age range:* 0 years and up

*Purpose:* Questionnaire for the parent with 35 age-dependant questions that assesses auditory development.

*Reference:* Kühn-Inacker, H., Weichbold, V., Tsiakpini, L. Coninx, S., D'Haese, P. (2003). Little Ears: Auditory Questionnaire. Innsbruck, MED-EL

### **LSQ: Listening Situations Questionnaire**

*Age range:* 7 years and up

*Purpose:* Questionnaire for the parent and child with eight situations. Responses focus on help of amplification, difficulty of understanding, and satisfaction of amplification.

*Reference:* Grimshaw, S. (1996). The extraction of listening situations which are relevant to young children, and the perception of normal-hearing subjects of the degree of difficulty experienced by the hearing impaired in different types of listening situations. Nottingham: MRC Institute of Hearing Research.

### **MAIS: Meaningful Auditory Integration Scale**

*Age range:* 3 to 4 years and up.

*Purpose:* Parental interview with ten questions that evaluates meaningful use of sound in everyday situations (attachment with hearing instrument, ability to alert to sound, ability to attach meaning to sound).

*Reference:* Robbins, A.M. Renshaw, J.J., & Berry, S.W. (1991). Evaluating meaningful integration in profoundly hearing impaired children. *American Journal of Otolaryngology*, 12 (Suppl): 144-150.

Robbins, A.M. Renshaw, J.J., & Berry, S.W. (1998). Meaningful auditory integration scale. In W. Estabrooks (Ed.), *Cochlear implants for kids*. (373-386) Washington DC, AG Bell Assoc. for the Deaf, Inc.

### **PEACH: Parents' Evaluation of Aural/oral performance of Children**

*Age range:* Preschool to 7 years

*Purpose:* Interview with parent with 15 questions targeting the child's everyday environment. Includes scoring for 5 subscales (Use, Quiet, Noise, Telephone, Environment)

*Reference:* Ching, T.C., Hill, M., & Psarros, C. (2000). Strategies for evaluation of hearing aid fitting for children. Paper presented at the International Hearing Aid Research Conference, August 23, Lake Tahoe, USA. ([www.nal.gov.au](http://www.nal.gov.au))

### **P-APHAB: Pediatric Abbreviated Profile of Hearing Aid Benefit**

*Age range:* 10 to 15 years

*Purpose:* Questionnaire with 24 situations completed by the child in regards to use of a hearing aid and no use of a hearing aid. It includes scoring for four sub-scales (ease of communication, background noise, reverberation and aversion)

*Reference:* Kopun, J. and Stelmachowicz, P.G. (1998). Perceived communication difficulties of children with hearing loss. *American Journal of Audiology*, 7, 30-38.

### **Preschool SIFTER: Preschool Screening Instrument For Targeting Educational Risk**

*Age range:* 3 to 6 years

*Purpose:* Questionnaire with 15 items completed by the teacher which identifies children at risk for educational failure with five subscales (academics, attention, communication, participation, behaviour).

*Reference:* Anderson, K.L., & Matkin, N. (1996). Screening Instrument for Targeting Educational Risk in Preschool Children (Age 3-Kindergarten) (Preschool SIFTER). [www.hear2learn.com](http://www.hear2learn.com).

### **SIFTER: Screening Instrument For Targeting Educational Risk**

*Age range:* 6 years and above.

*Purpose:* Questionnaire with 15 items completed by the teacher which identifies children at risk for educational failure with five subscales (academics, attention, communication, participation, behaviour).

*Reference:* Anderson, K.L. (1989). Screening Instrument for Targeting Educational Risk (SIFTER). [www.hear2learn.com](http://www.hear2learn.com).

## **TEACH: Teachers' Evaluation of Aural/oral performance of Children**

*Age range:* preschool to 7 years

*Purpose:* Interview with teacher with 13 questions targeting the child's everyday environment. Includes scoring for five subscales (Use, Quiet, Noise, Telephone, Environment)

*Reference:* Ching, T.C., Hill, M., & Psarros, C. (2000). Strategies for evaluation of hearing aid fitting for children. Paper presented at the International Hearing Aid Research Conference, August 23, Lake Tahoe, USA. ([www.nal.gov.au](http://www.nal.gov.au))

## **Resource articles**

*Robbins, A.M. (2002)* Empowering parents. *Hearing Journal*, 55:55-59.

*Stelmachowicz, P.G. (1999).* Hearing aid outcome measures for children. *Journal of the American Academy of Audiology*, 10:14-25.

*Tharpe, A.M. (2004).* Who has time for functional auditory assessments? We all do! *Volta Voices*, Vol.11, 7: 10-12.



*People first*



We believe that it takes more than technology and audiology to create the best hearing instruments. That's why we put the individual needs and wishes of people with hearing loss first in our development of new hearing care solutions.