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Written by Karen Anderson, 2002. Design by Oticon, 2007

ELF – Early Listening Function

Discovery tool for parents and caregivers of infants and toddlers (4 months to 3 years)

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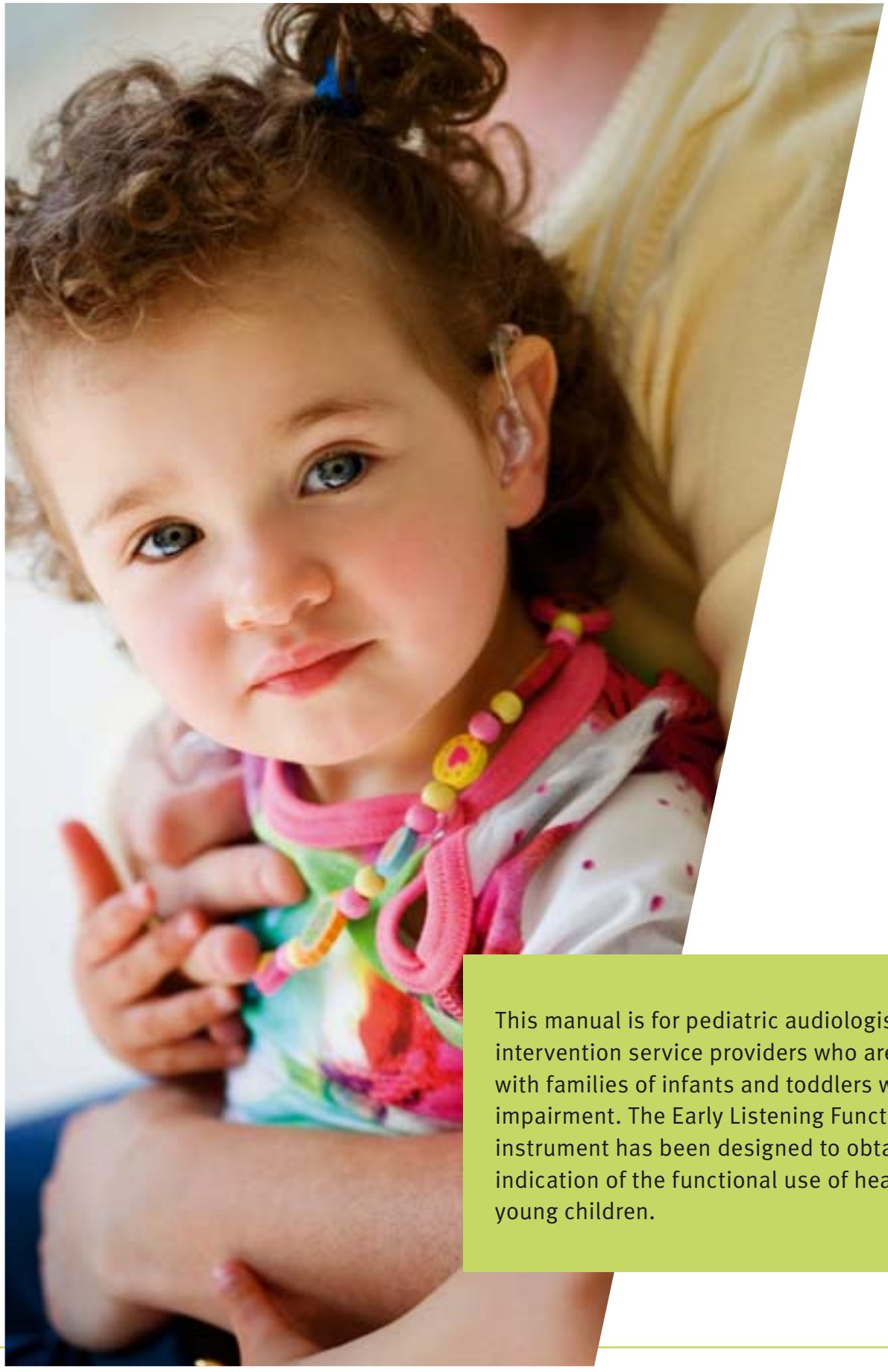
PEOPLE FIRST



This manual is for pediatric audiologists and early intervention service providers who are working with families of infants and toddlers with hearing impairment. The Early Listening Function instrument has been designed to obtain an indication of the functional use of hearing in very young children.

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The ELF has three primary purposes:

1. Parent involvement and empowerment

With universal newborn hearing screening, infants with hearing loss are being identified in the first month of life and parents are typically not prepared for the diagnosis of hearing loss in their newborn.The adjustment to having a child with hearing loss and the eventual acceptance of the hearing loss as an integral feature of the child's life comes with the understanding of how the hearing loss may affect the child. Gaining the parents' involvement and participation in the discovery process of how the child functions auditorily can be very beneficial to the adjustment and acceptance process of the parents. It also establishes a partnership between the parents and audiologist as the team who identifies the child's hearing abilities and current limitations and growth (change) over time. Through this participation, parents are empowered to be involved in observing their child's hearing behavior. This can then lead to a deeper appreciation of the nature of communication and to readiness to become informed about effective parent-child interaction strategies and techniques to facilitate auditory development. For children with mild or unilateral hearing loss, the ELF can assist the parents in recognizing the limitations of the hearing loss, which may motivate them to consider amplification use seriously. Children with the best language outcomes are those who have parents that are intimately involved in all areas of early intervention and hearing loss management. As the child's pediatric audiologist, you have entered into a partnership to manage the child's hearing needs as they grow and develop throughout childhood.

2. Estimating amplification benefit

Although diagnostic procedures are improving for young infants, there remains a degree of uncertainty about the exact hearing thresholds of most infants at the time they are fit with their first hearing instruments. The range of technologies available to audiologists to choose from when fitting young children has also increased. Real-Ear-to-Coupler Difference (RECD) measures provide targets for hearing aid fitting. With involvement and careful observation by the parents and daily caregivers of the child, useful information can be gathered that can develop confidence in the

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optimal adjustment of the hearing instruments for daily use. The ELF can also be useful in determining if a personal FM system would be of benefit as the ELF activities raise the awareness of the parents about the daily situations and listening conditions would benefit from FM system use. The ELF can also be used as a pretest and posttest for comparing hearing instruments or FM system benefit.

3. Tracking improvements in auditory development

Understanding the effect of hearing loss on communication access in daily situation by the parents and caregivers can only support the eventual communication outcomes of the child with hearing loss. Development of verbal language depends on consistent communication access. For parents that choose an auditoryoral or auditory-verbal communication option for their child, a strong focus on auditory development is necessary. Like any other developing part of the body, the auditory system de-velops as it is stimulated consistently over time. The ELF can assist parents and early interventionists in tracking a child's functional use of early auditory skills in the home. Recognizing the importance of proximity to the child during communication and how the listening bubble may affect the child's responses to auditory stimuli, may assist in realistic step-by-step auditory skills goal setting.
Although the ELF listening activities are detection activities, other activities encouraging identification, discrimination, and comprehension of sound can be introduced in the same manner (close, far, quiet, typical,noisy) once the parent has become accustomed to the structure of presenting the ELF listening activities. Knowing the child's typical auditory behavior can also help the parent in detecting possible changes in hearing status due to otitis media with effusion or hearing loss progression. Finally, hearing loss is invisible and is difficult to explain in a clearly-understood manner. The structure of the ELF may provide parents a clear and meaningful way to describe their child's hearing impairment to family and friends so that they may respond knowledgably to a comment like "I've seen the baby hear and don't think he needs the hearing aids."

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Appropriate Use of the ELF

Audiologist or early interventionist should discuss these points with parents prior to giving them the ELF

The premise of the ELF is to identify if a child is able to detect certain types of sounds from different distances in both quiet and noise. Infants like to listen to sounds and voices, however, the behavioral response when a 1-month old perceives sound will be somewhat different than an older infant. In order for the ELF to provide appropriate results, parents need to have a clear idea of what the activities are, how to do them, and what responses to expect. Discuss this information with the parents to prevent their possible frustration or misunderstanding of what they have observed. Some parents may need to have their early intervention services provider assist them in doing the ELF listening activities and observing the child's behavior. The ELF responses should be shared with the early intervention team to enhance the child's program. Also, discuss with the parents if they or you will be expected to complete one or both of the ELF score sheets. Not all families, audiologists, or early interventionists will want to track performance over time. Therefore, the audiologist needs to tailor ELF score sheet use for the individual familiy.

Listening Activities

The child must not be able to see the person making the sounds, their shadow, or be able to detect the sound by feeling their breath, air moving, or other vibrations.

These listening activities are not "calibrated" sounds. However, it is important that the parent or caregiver attempt to use the same sound intensity during all presentations. For example, if a child responded to a whisper at 3 feet but not at 6 feet, the parent should not make the whisper louder to obtain a response at 6 feet. Only if the child responded more than once out of several presentations at 6 feet would the parent mark the response as a 'maybe.'

A radio set on a talk station or the television on in the background would be appropriate when presenting listening activities in noise. Try to have this background noise on in the same room or an adjoining room with the door open when presenting the listening activities. The point is to see if the child who responds in quiet can also respond when noise is present.

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The signal to noise ratio is expected to be typical for the home, rather than a calibrated stimulus. Responses to the ELF listening activities will be most pronounced for children who have a flat configuration of hearing loss or at least a mild degree of hearing loss across all speech frequencies.

Children who have normal hearing through the low frequencies may have robust responses to most or all of the listed ELF listening activities. The audiologist or early interventionist working with the parents must be aware of this potential and may choose to not use the ELF if there is an island of normal or minimal hearing loss. Alternatively, the audiologist or early interventionist may work with the family to include or replace some of the existing items with high frequency listening activities such as:

- Quiet ‚tsk, tsk, tsk' sound in number 3 rather than quiet clucking tongue
- Mommy saing ‚sss, sss, sss' quietly in number 4 rather than ‚buh, buh, buh'
- Contrasting a child's responses to a caregiver making the sound of a duck quacking with the sound of a snake hissing rather than clapping hands together in number 7 (only record response for hissing sound).
- Response to shh-shh, shh-shh rather than „ship ship ship" in number 8.
- Saying ‚sss-shh, sss-shh, sss-shh' rather than, shoe-buh' in number 9.

In discussing the activities with the parents, if the parents do not feel comfortable with any of the listening activities, discuss with them what a suitable replacement activity with quiet, typical, loud, or high or low frequency characteristics might be from their own environment.
The activities should be easy to do and easy to repeat over time. For an example of rough use of frequency range, 'buh buh buh' is considered a lower frequency speech stimulus and 'ship ship ship' a higher frequency speech stimulus.The phrase 'shoe-ba, shoe-ba, shoe-ba' is considered to have both low and high frequency elements.

Caution the parents to hit the frying pan or do a loud door knock from a distance first. These loud sounds should be presented close to the baby's head only when more distant responses were not observed, especially when amplification is worn. Take the time to warn the parents about the dangers of loud sounds on hearing and comfort.

Expected Responses

Young children respond best to voices, especially the voices of their parents. Developmentally, newborns and children with normal hearing who are under 5 months of age do not respond to very low intensity sounds.

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The quiet listening activities listed may produce no response beyond six inches or three feet, especially if a moderate hearing loss or greater is present.

Reassure the parents to not be concerned about these quiet activities until the child is at least 4–5 months old. Reinforce that the baby needs to be quiet and content. Even when in the most receptive state, a baby may only respond once or twice to the listening activity. It is expected that the ELF will take a concerted effort over a period of days to complete. If there is an audiology appointment scheduled in two weeks, urge the parents to complete as much of it as possible. Their level of participation can provide insights into their state of grieving or real life priorities in the family.

Model for the parent or describe what to look for in the young infant's responses. The following responses are some of the easier behaviors to observe:

1) Moro response or startle reaction resulting in a full body jerk,

2) cessation of activity, stopping movement, cessation of sucking, quieting of random or intentional movements,

3) starting to suck or initation of limb movements if the infant had been relatively still.

Infants older than 6 months will have clearer responses to sound and the use of the ELF listening activities by the parents may be more successful then.

For children with normal hearing, rudimentary headturns can be expected at a developmental age of 5 months, only on a lateral plane, and a listening attitude may be present, including more interest in quiet voices. Developmentally, at 7-9 months the baby begins to be highly responsive to quiet voices and may localize to the side and indirectly below to either side. At 9-13 months of age to either side localization includes indirectly above. At 13-16 months developmental age and beyond, localization to the sides, below, and above is an expected response.

The ELF is just one of the many tools and techniques available to elicit impressions about a young child's hearing ability. It is not intended to be a diagnostic tool or a formal screening measure to detect hearing impairment or replace appropriate Real-Ear-to-Coupler Difference amplification verification techniques. The ELF is intended to involve the parents or caregivers of a child with identified hearing loss in gathering information on how the young child is able to use his or her hearing ability under contrived listening situations in their environment.

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Why?

Hearing is a distance sense and a child with a hearing loss will have a reduced hearing range, or a smaller listening bubble, than a child with normal hearing. When you hear your young child fuss in the crib or bed when you are in another room, you are using your hearing range. In other words, you have a listening bubble that includes hearing sounds of that loudness and at that distance. People with hearing loss have smaller listening bubbles. How well young children with hearing loss function varies between individuals and typically

The size of a child's listening bubble is based on his or her degree of hearing loss and consistent, daily use of amplification.

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shows some improvement with listening experience. Audiologists test to find out what tones or pitches of sound (from low to high) a child can detect. Only someone who is with the child for hours everyday can observe how the child is using his/her hearing ability in every day situations. Babies can react to sounds even while in the womb, so no child is too young to observe for responses to sound. Hearing aids will improve the size of the listening bubble. With use of amplification during all waking hours, auditory skills will usually improve over time, including how well a child is able to use sound for speech and verbal language.

Who?

With another adult, try the following activities with your child. Infants or young children may react to a new sound only once, so you will need to try these different activities over a number of days. At least one adult, like mom or the daily caregiver, should be doing all of these activities with the child. The helper can be dad, the early intervention teacher, grandma, a neighbor, etc. Two activities ask for mom and dad's voice. If it is not possible for a parent to do this, a female and male voice should be used. If there is no male voice available, a female voice can be used, but the pitch of the voice used should be very low.The purpose is to find out if your child responds better to lower or higher pitch sounds.

The size of a child's listening bubble is based on his or her degree of hearing loss and consistent, daily use of amplification.

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What?

As you watch your child's reaction to sound, a response may be obvious, like startling or jerking the whole body when a louder sound is present, or very subtle. For young infants, a change in breathing speed, sucking on a bottle and stopping when the sound occurs, eye widening or blinking, stopping all movement, movements of the arms or legs at the onset of the sound, or small frowns can all be subtle signs that a 1-4 month old baby heard a sound. The baby may do this only once or twice and then, even if the sound is heard, will probably not respond again for awhile. Young children respond best to voices. They do not respond to quiet sounds as well as older infants as this skill develops with listening experience. Due to this, an infant may seem to have more hearing loss at first than he really does. This is why it is important to remember that the ELF activities are meant to look at functional responses to sound. Starting at about 5 months, the child may purposefully turn in the direction of a sound, looking for the sound source. People need two ears with the same level of hearing to localize sound. If the child does not look for sounds as you would expect, there maybe different hearing ability in each ear.

When?

All activities should be tried when the baby is settled – awake but quietly sucking on a bottle, alert and looking at something interesting or playing with soft, quiet toys. A fussy baby, a toddler on the run, or a young child who is sleeping, is not ready to respond to sounds. You know your child best! You are more aware than anyone else of when your child responds best to things going on around him or her. Take 5 minutes when the baby seems most responsive to try some of these listening activities. There are many different listening situations that we are exposed to everyday. It is important to determine your child's ability to respond to sounds under quiet and noisy listening conditions. What is meant by quiet is having the television, music, or radio off, picking a time when any other children in the house are doing quiet activities in another part of the living area. Look for short, calm periods over time in which to administer the quiet activities. Noise refers to the typical busy household activities, such as when the TV is on or children are playing.

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How?

The activities were developed with a typical household in mind. You will be trying to get an idea of how your child will respond to sound at each distance, at first in quiet. Then introduce activities in noise. Start with the sounds at 6 inches, beginning with the quietest sound and then introducing the typical loudness sounds. If you know your baby responds readily to an activity at a quiet or typical loudness, assume that he or she will also respond when the loud activity is presented at that distance. Loud sounds can cause discomfort or an adverse response. In some circumstances, loud sounds especially for long periods over time may actually damage hearing. Therefore, introduce the loud sounds at 15 and 10 feet first. Do not produce a loud sound (hitting a frying pan) close to your young child unless you see no response to the quieter listening activities or no response to the loud sounds at the farthest distances. You will need to try to get two or more reactions to sound for each activity to be sure that the child was actually reacting to sound, and didn't just happen to move for any of a number of reasons other than noticing the sound you just made. Babies in their first couple of months can seem completely unaware to sound, even when they have some hearing. Children with hearing loss are often very aware of other sensory input such as visual (movements/motion) or tactile (vibrations/feeling). When you are doing the listening activities you need to be sure that you are behind the child so that your baby cannot see you. Be sure your shadow is not visible or your breath or other vibrations are not felt by the child, causing a reaction, rather than the response being a specific auditory response. Doing the listening activities within six inches to three feet of your child will be the trickiest! Try to be consistent about how loud you make the noises as you present them at different distances. Your opinion based on watching your child respond to sound is important!

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Child's name:

Child's birthdate:

Observer(s):

Place(s)

Date(s) of ELF observations:

1

You will be watching how your child responds to 12 listening activities you will present in your home or wherever the child is much of his or her waking hours.

2

Children who are alert, but not fussy are in the best state to respond to sound. These responses can be very subtle. Most of the time the child will only respond once or twice to the sound and then will not pay attention again for awhile. It may take observing your child over the course of a week before you have presented the sounds enough times to feel fairly certain about your child's capability to respond.

3

Loud sounds can cause adverse responses or discomfort. In extreme cases, a very loud sound could harm hearing. Therefore, it is important to not present the loud sounds close to your baby unless you have observed no responses to quieter sounds at near distances. Watch for responses in noise only after responses in quiet have been observed.

4

The favorite and most interesting sound for a baby is the voice of the parents or daily caregivers. Finding out how well your voice is heard by the baby is important to know for encouraging the development of auditory and verbal communication skills.

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5

Even babies with normal hearing who are less than 5 months of age do not respond to quiet sounds. Instead, they tend to startle at loud noises and may or may not respond to sounds at typical loudness. If you do not observe a response to sound, keep observing the child as his or her auditory system develops. The ELF listening activities will be easiest for babies to respond to if they are at least a developmental age of 5 months.

6

For most children with hearing loss who are listening in a quiet setting there will be no response to the quiet sounds or distant listening activities, especially when no amplification is used. Even children with mild or unilateral hearing loss will have some limitations listening to distant sounds or in noise. When the typical loudness sounds are presented close, it is anticipated that a child with a mild or moderate hearing loss will respond. The child may have inconsistent responses to the distant sounds when no amplification is used, and may respond to some quiet sounds with working amplification. Children who have a severe or profound degree of hearing loss may have few responses, even to the loud sounds.

7

Put a Y in the box, meaning YES, if you have observed the child responding to the specified listening activities most of the time (e.g., 4 of 5 times). Put an M in the box, meaning MAYBE, if you have observed the child responding to some sounds, but only about half of the time (e.g., 2 or 3 of 5 times). Put an N in the box, meaning NO, if you have observed no sure responses to the listening activity.

8

If you know your child responds to the quiet sounds, put a Y in the box for the louder sounds. If he or she responded to the distant sounds for an activity, assume the child will respond to those sounds when near. If you know your child was unable to respond to the loud sounds, put an N in the box for the quieter sounds. If the child did not respond to near sounds, assume that he or she will not respond to far sounds.

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Listening Activities Sheet

Parents Response Form

Based on the child's responses to sound, place Y (Yes), M (Maybe) or N (No) in the boxes below

		Listening activities at different distances					
		6 ins.	3 ft.	6 ft.	10 ft.	Next room (15+feet)	Closest distance child responded in noise (none, › 6 ft)
Quiet Activities	1. Mommy saying "sh,sh"quietly						
	2. Hands together, palms rubbing together briskly						
	3. Quiet clucking tongue						
	4. Mommy saying 'buh buh buh' quietly						
Typical Loudness Activities	5. Turning water full on (kitchen sink, bathtub)						
	6. Mommy singing a song (i.e., Mary had a Little Lamb)						
	7. Clapping hands together in quiet applause						
	8. Daddy saying 'ship ship ship' in normal voice loudness						
Loud Activities	9. Daddy says 'shoe-buh, shoe- buh' in loud voice						
	10. Loud door knock with knuckles						
	11. Hold 2 spoons together back-to-back by their ends and hit them hard on your palm twice						
	12. Hitting a frying pan or pot with a wooden or metal spoon						

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ELF – Checklist

Parents Response Form

Infant & Young Child Amplification Use Checklist

Child's name:

Child's birthdate:

Date completed:

Parents please complete this form each time your child uses new hearing aids, hearing aid settings, features, programs or other amplification devices, like FM systems or a cochlear implant map. Amplification devices are set precisely, however, some minor adjustments may be needed for optimal listening ability. Your observations can assist in determining improvements how well this amplification is meeting your child's listening needs in his or her every day environments. Complete these items approximately 4 to 10 days after your child begins to listen with the new or newly adjusted amplification. If possible, ask your child's other caregivers and the early intervention specialist that works with your family about what changes they observe. Share the completed form with the audiologist and be sure to discuss any questions you may have about the child's hearing or use of the amplification instrument.

Describe current amplification used (new settings, etc.):

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A listening check of the amplification instruments is typically performed by an adult_____times per (day) or (week)
(e.g., battery check, listening with stethoset, watching for child responses to m, aw, oo, ee, sh, s, t sounds, checking settings, earmold fit, etc.)

Are parents/caregivers comfortable using the amplification system?

_____ _____ _____ _____ ____
(very) (mostly) (somewhat) (not really) (no)

Are parents/caregivers comfortable with how to check and maintain?

_____ _____ _____ _____ ____
(very) (mostly) (somewhat) (not really) (no)

On a typical day, my child wears amplification_____hours out of approximately_____waking hours

Describe specific situations when you noticed improvements in listening ability:

	Not Observed				
	Disagree		**No change**		**Agree**
My child appears to:					
1. Be more aware of my voice	(-2)	(-1)	(0)	(1)	(2)
2. Be more aware of environmental sounds	(-2)	(-1)	(0)	(1)	(2)
3. Search more readily for the location of my voice	(-2)	(-1)	(0)	(1)	(2)
4. Have an increased amount of babbling or talking	(-2)	(-1)	(0)	(1)	(2)
5. Have more interest in communicating	(-2)	(-1)	(0)	(1)	(2)
During ELF listening activities, the size of my child's listening bubble:					
1. Has improved for quiet sounds voices	(-2)	(-1)	(0)	(1)	(2)
2. Has improved for typical sounds and voices	(-2)	(-1)	(0)	(1)	(2)
3. Has improved for loud sounds and voices	(-2)	(-1)	(0)	(1)	(2)
4. Has improved for listening in background noise	(-2)	(-1)	(0)	(1)	(2)

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ELF – Score Sheet

Professional Response Form

Child's name:

Child's birthdate:

Date completed:

Audiologist or Early Interventionist:
If desired, a child's observed responses to ELF listening activities can be converted to a numeric form and compared across time as the child develops auditory skills, experiences fluctuating hearing, or is fit with amplification instruments.

Count and multiply responses on the ELF parent response form to obtain weighted scores for quiet listening and bonus listening in noise points.

Listening in Quiet:
Count the number of Y's and M's for each distance. If both are present only transfer the number of Y's.

Listening in Noise:
Transfer the amount of responses where the child responded at a distance › 6 ft.

Step 1:
Transfer numbers from Parent Response Form

Step 2:
Multiply by weight factor

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Date(s) .....

Listening in Quiet (Y = Yes / M = Maybe)

	Quiet				Typical				Loud				TOTAL (100 possible)
	No. of Yes	Multiply x 10	No. of Maybe	Multiply x 8	No. of Yes	Multiply x 7	No. of Maybe	Multiply x 5	No. of Yes	Multiply x 3	No. of Maybe	Multiply x 1	Add multiplied numbers
6 Ins.													
3 Ft.													
6 Ft.													
10 Ft.													
Next room													

Listening in Noise

	Quiet Responses noted		Typical Responses noted		Loud Responses noted		Total noise bonus points (200 possible)
	› 6 feet	Multiply x 25	› 6 feet	Multiply x 15	› 6 feet	Multiply x 10	Add multiplied numbers

Hearing Status .....

* New diagnosis, new amplification, parent detected possible ear infection, check auditory development, etc.

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Hearing Loss Management Considerations Discussed by audiologist/interventionist:

Date(s) .....

☐ Size of listening bubble (proximity for communication) in quiet needs to be at_____distance or closer when no amplification is used.

☐ Size of the listening bubble (proximity for communication) in quiet needs to be at_____distance or closer when amplification is worn consistently.

☐ Control of background noise needed when communicating, especially when distance between baby and speaker is beyond_____feet.

☐ Trial of hearing aid(s): type or special features.

☐ Trial or continued use of hearing aid(s): type or special features.

☐ Improvement noted due to early auditory development or progress in auditory skills.

☐ Potential cochlear implant user, suggest parents contact implant team for more information.

☐ Potential user for an FM system, due to difficulties listening in noise and to speech at a distance. Parent or caregiver has demonstrated willingness to use FM during the child's waking hours.

☐ Hours use throughout the day: _____

Other: .....

.....

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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.

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