ELF Early Listening Function USER'S MANUAL

The Early Listening Function instrument has been designed to obtain an indication of the functional use of hearing in very young children. 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 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 impairment, which may motivate them to consider amplification use seriously. As audiologists, we are aware that the 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 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 optimal adjustment of the hearing instruments for daily use. It can also be useful in determining if a personal FM system would be of benefit and raise the awareness of the parents under which daily situations and listening conditions it is most important for an FM system to be used. The ELF can be used as a pretest and post-test for comparing hearing instruments or FM system benefit.

(3) **Tracking improvements in auditory development:** For parents that choose an auditory-oral or auditory-verbal communication option for their child, a strong focus on auditory development is necessary. Like any other developing system, auditory skill development builds over time. The ELF can assist parents and early interventionists in tracking a child's functional use of 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 the 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 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." Development of verbal language depends on consistent communication access. Understanding the affect of hearing loss on communication access in daily situations, by the parents and caregivers can only support the eventual communication outcomes of the child with hearing loss.

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 score the response sheet.

Listening Activities:

a) 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.

b) These are **not** "calibrated" sounds. 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 and, if a response is received, consider it as a 'yes' or 'maybe' response. Only if the child responded twice out of several presentations at 6 feet would the parent mark the response as a 'maybe.'

c) 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. The signal to noise ratio is expected to be typical for the home, rather than a calibrated stimulus.

d) 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 easily done, repeatedly 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.

e) 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 to hearing ability.

Expected Responses:

a) Young children respond best to voices, especially the voices of their parents.

b) Developmentally, newborns and children with normal hearing who are under 4 months of age do not respond to very low intensity sounds. 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 months old.

c) 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 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.

d) 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 in a full body jerk, 2) cessation of activity, stopping movement, sucking, quieting of random or intentional movements, 3) starting to suck or limb movement 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 fruitful and reinforcing then.

e) For children with normal hearing, rudimentary head turns can be expected at a developmental age of 4 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. At 9-13 months of age 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 <u>not</u> 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 auditory impairment in gathering information on how the young child is able to use his or her hearing ability under contrived listening situations in their environment.

ELF Early Listening Function

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, or have a listening bubble that includes hearing sounds of that loudness and distance. People with hearing loss have smaller listening bubbles. How well young children with hearing loss function, varies between individuals and typically shows some improvement with listening experience. Audiologists test to find out what tones a child can detect, but only someone who is with the child for hours everyday can observe how the child is using hearing in daily situations. Babies can react to sounds even while in the womb, so no child is too young to observe for responses to sound. Hearing instruments 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 pitched very low. The purpose is to find out if your child responds better to lower or higher pitch sounds.

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 1-3 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 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 4 months, a child's head may 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 may be 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, and hoping for a few calm minutes. What is meant by noise is the typical busy household activities, such as having a radio or television on or other children playing in the room with you.

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, and then when you are comfortable observing, try the 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 they will also respond when the loud activity is presented. Loud sounds can cause damage to hearing so introduce the loud sounds at a distance 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 several 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 oblivious to sound, even when they have some hearing. Children with hearing loss are often very tuned into motions and vibrations. When you are doing the listening activities you need to be sure that you are behind the child and cannot be seen by peripheral vision, or out of the corner of his eye. 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 caused by the child hearing the listening activity. 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!

ELF Early Listening Function

FOR PARENTS AND CAREGIVERS TO OBSERVE AND COMPLETE

Child's Name _____ **Birthdate** _____ **Date Completed** _____

1. You will be doing the 12 listening activities below and then watching how your child responds to the sounds in your home environment. This is not a hearing test. It is a way for you to see how your child functionally uses his or her hearing in the everyday environment.
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 a while. You may need to observe your child over the course of week before you have presented the sounds enough times to feel fairly certain about your child's typical responses.
3. Loud sounds can cause hearing damage so 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 identified.
4. The favorite and most interesting sound for baby is the voice of the parents or daily caregivers. Finding the size of the child's listening bubble for your voice to reach the baby is important to know for developing auditory and verbal communication skills, if desired.
5. Even babies with normal hearing who are less than 4 months of age do not respond to quiet sounds. Instead, they tend to startle at loud noises and may respond to sounds at typical loudness. If you do not observe a response to sound, keep observing as the auditory system develops.
6. For most children with hearing loss who are listening in a quiet setting there will be no response to the quiet sounds or to distant sounds, 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 may have inconsistent responses to the distant sounds when no amplification used, and respond to most quiet sounds with working amplification. Children who have a severe or profound degree of hearing loss may have few responses, but their ability to tune into their audible sounds can be developed over time.
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 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.

Listening Activities at Different Distances	**6 inches**	**3 feet**	**6 feet**	**10 feet**	**Next room (15+ feet)**	**Observed response to listening activities in noise: none, responds ≤ 6 ft, responds > 6 ft**	
Based on the child's responses to sound, place **Y** (YES) **M** (MAYBE) or **N** (NO) in the boxes below							
Quiet Activities						**Quiet**	**Quiet Activities Responses in Noise**
1. Whispered voice						**Number All Yes**	
2. Hands together, palms rubbing together briskly						**Number All Maybe**	
3. Quiet clucking tongue							
4. Mommy saying 'buh buh buh' quietly							
Typical Loudness Activities						**Typical**	**Typical Loudness Responses in Noise**
5. Water running full on from kitchen faucet						**Number All Yes**	
. Mommy singing a song (i.e., Mary had a Little Lamb)						**Number All Maybe**	
7. Clapping hands together in quiet applause							
8. Mommy saying 'ship ship ship in a normal voice loudness							
Loud Activities						**Loud**	**Loud Activities Responses in Noise**
9. Daddy says 'mooo mooo' in a loud voice						**Number All Yes**	
10. Loud door knock with knuckles						**Number All Maybe**	
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 metal spoon							

Early Listening Function

Infant & Young Child

Amplification Use Checklist

Child's Name _____ **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 the child's hearing or use of the amplification instrument.

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

A listening check of the amplification instruments is typically performed by an adult ____ times per day
(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

My child appears to:	**AGREE**		**Not Observed NO CHANGE**		**DISAGREE**
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)

Describe specific situations when you noticed improvements in listening ability:

ELF Scoring

Early Listening Function

Child's Name_____ **Birthdate**_____

Audiologist or Early Interventionist: Count and multiply responses on the ELF parent response form to obtain weighted scores for quiet listening and bonus listening in noise points. Responses to noise should be categorized into three categories: no response (no points), responses observed at ≤ 6 feet, or responses at > 6 feet distant.

	STEP 1: transfer number from parent responses		**STEP 2:** multiply by weight factor	**Date 1**	**Date 2**	**Date 3**
Loudness of Listening Activities	**Count Number of Responses in Quiet Listening**		**Multiply for Weighted Score QUIET Listening**	Multiplied Scores	Multiplied Scores	Multiplied Scores
QUIET	Number Yes		Multiply x 12 =			
QUIET	Number Maybe		Multiply x 10 =			
TYPICAL	Number Yes		Multiply x 8 =			
TYPICAL	Number Maybe		Multiply x 6 =			
LOUD	Number Yes		Multiply x 5 =			
LOUD	Number Maybe		Multiply x 3 =			
			Total Possible is 100 Total QUIET =			
Loudness of Listening Activities	**Listening in NOISE Responses Observed**		**Multiply for Bonus Listening in NOISE points**	Scores	Scores	Scores
QUIET	Response noted > 6 feet		Worth 30 =			
QUIET	Response noted ≤ 6 feet		Worth 25 =			
TYPICAL	Response noted > 6 feet		Worth 25 =			
TYPICAL	Response noted ≤ 6 feet		Worth 15 =			
LOUD	Response noted > 6 feet		Worth 3 =			
LOUD	Response noted ≤ 6 feet		Worth 2 =			
			Total Possible is 100 Total NOISE =			

Today's Date	**Hearing Status** (i.e., new diagnosis, new amplification, parent detected possible ear infection, check auditory development, etc.)	**Total Score in QUIET**	**Total NOISE Bonus Points**	**Number of YES Responses for Quiet Sounds**	**Number of YES Responses for Typical Sounds**	**Number of YES Responses for Loud Sounds**	**TOTAL SCORE For Quiet + Noise**	**Audiologist Involved on Date of Service (initials)**
1.								
2.								
3.								

Hearing Loss Management Considerations Discussed by audiologist/interventionist: (Yes/No or Date)

_____ Size of listening bubble in quiet: The proximity for effective communication needs to be at a _____ distance or closer when amplification IS used and at a _____ distance or closer when NO amplification is used

_____ Improvement noted due to early auditory development or progress in auditory skills _____

_____ Control of background noise needed when communicating, especially when beyond _____ foot distance

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

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

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

_____ Potential cochlear implant user, suggest parents contact implant team for more information, date: _____

_____ Potential user for FM system, based on parental willingness to use throughout day in natural environments