



An auditory feedback device for all ages

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Based on the Nasoscope developed by Jessica Linck, Jonathan Cross,
and Ann W. Kummer at Cincinnati Children's Hospital Medical Center.

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Table of Contents

Introduction	1
Assembly Instructions	2
Oral Feedback - Directions for Use.	3
Nasal Feedback - Directions for Use	4
Auditory Perception and Discrimination in Speech Production.	5
Perceptual Training	5
Using the <i>Oral & Nasal Listener™</i> in Treatment.	6
Treating Various Disorders with the <i>Oral & Nasal Listener™</i>	12
Cleaning the <i>Oral & Nasal Listener™</i>	13
Clip-On Photo Cues	14



Introduction

The ***Oral & Nasal Listener™***, developed at Cincinnati Children's Hospital Medical Center, is a unique, latex-free tool that provides high quality auditory feedback for the client (child or adult) during speech evaluation and therapy. The *Listener* allows the client to hear his or her own speech loudly, clearly, and distinctly even if this speech is very quiet. Unlike other feedback devices, the *Listener* amplifies either oral speech or abnormal nasal aspects (hypernasality or nasal air emission) of speech. Since speech is an auditory event, this is a more direct way to provide feedback about aspects of velopharyngeal dysfunction (VPD) than the visual feedback provided by other devices.

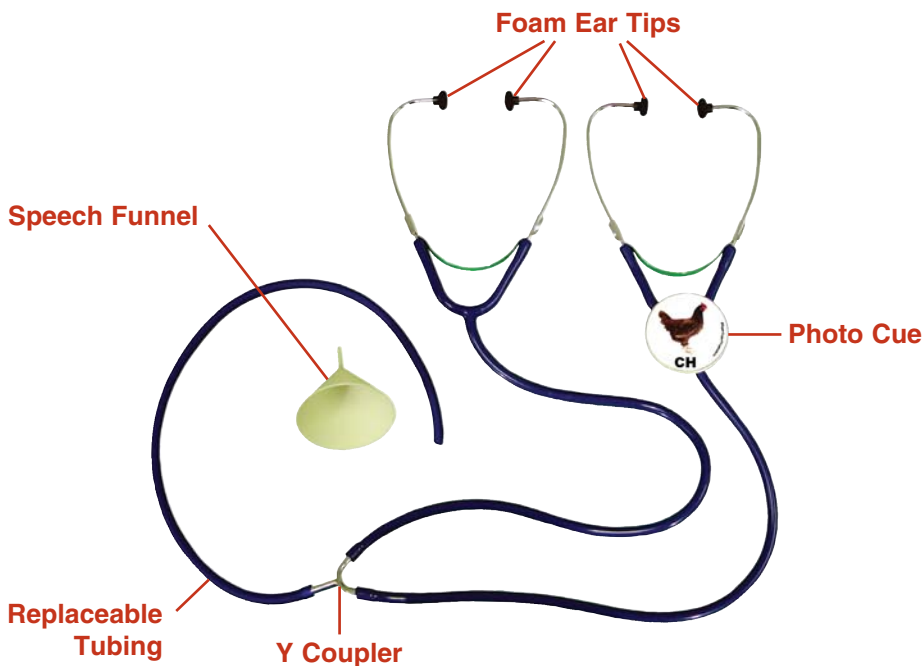
The ***Oral & Nasal Listener™*** kit includes:

- ***Oral & Nasal Listener™***
- Speech Funnel
- Instruction Manual
- 20 Clip-On Photo Cues
- 20 Feet of Replaceable Tubing
- Carrying Case
- 40 Soft Foam Ear Tips

The ***Oral & Nasal Listener™*** has these unique features that make it different from other feedback devices.

- Amplifies oral speech sounds through a simple funnel attachment, (*Speech Funnel*) making it perfect for working on articulation skills or improving phonological awareness.
- Allows the client to clearly hear hypernasality or nasal air emission (if it occurs during speech) through a tube, which is placed at the entrance of one nostril.
- Provides amplification of the client's speech for two people at the same time! This typically includes the client (speaker) and the treating speech-language pathologist (SLP) during the therapy session. Parents and other family members may use the *Listener* during home practice sessions. Because the sound is loud and clear, the *Listener* increases the parent's accuracy and confidence in providing appropriate help and feedback to their child during practice sessions.
- Increases the client's attention and focus on auditory stimuli and auditory instructions.
- Amplifies speech through the use of tubing, similar to a stethoscope; therefore, there is no need for batteries or electricity, and the components require minimal care and maintenance.
- Uses Clip-On Photo Cues to provide cues for correct sound production. (To see all Photo Cues, go to page 14.)

Figure 1. Parts of the *Oral & Nasal Listener™*



Assembly Instructions

1. Cut approximately 1½ to 2 feet of tubing. Fit one end over the Y Coupler that connects both of the stethoscopes as shown above in **Figure 1**. (Hint: You may want to label this piece of tubing with the client's name for infection control purposes.)
2. Place the *Soft Foam Ear Tips* on the earpieces of each stethoscope and one of the stethoscopes in your ears.
3. If you would like to use one of the *Clip-On Photo Cues*, clip it on the tube of the stethoscope you are wearing so the client can see it easily. See **Figure 1** above for correct placement of the *Photo Cue*.
4. Place the other stethoscope in the client's ears.
5. See the directions for providing oral feedback on page 3 and the directions for providing nasal feedback on page 4.

Oral Feedback – Directions for Use

The *Listener* amplifies oral sounds during speech production. This can be useful for work on articulation, phonological awareness, auditory processing, resonance, or voice. Both the client and the SLP (or parent) can hear the sound at the same time and in the same way. The *Clip-On Photo Cues* are excellent for cuing and reinforcing correct sound productions. See **Figure 2** below for an illustration of how to use the *Listener* to provide oral feedback.

To use:

1. Fit the *Speech Funnel* on the end of the *Replaceable Tubing*. Hold the *Speech Funnel* up to your mouth or the client's. See **Figure 2** for correct placement of the *Speech Funnel*.
2. If you would like to use one of the *Clip-On Photo Cues*, clip it on the tube of the stethoscope you are wearing so the client can see it easily. See **Figure 2** below for correct placement of the *Photo Cue*. Place this stethoscope in your ears.
3. Place the other stethoscope in the client's ears.

Figure 2. Use the *Oral & Nasal Listener™* to provide oral feedback for the client and the SLP (or parent).



Nasal Feedback – Directions for Use

The *Listener* amplifies hypernasality or nasal emission during speech. This helps the SLP when conducting a speech or resonance evaluation. In speech therapy, the *Listener* gives the client and SLP (or parent) immediate, phoneme-specific feedback when nasality occurs. This is particularly helpful when the goal is to eliminate these characteristics.* See **Figure 3** below for an illustration of how to use the *Listener* to provide nasal feedback.

*Note: Speech therapy will only correct hypernasality or nasal emission when the cause is misarticulation or mislearning. Speech therapy will not correct even mild velopharyngeal insufficiency (which is due to a structural deficit) and will rarely improve velopharyngeal incompetence (which is due to a neurophysiological disorder). In those cases, surgical or prosthetic management is indicated before therapy can be effective. Therapy is effective for the learned compensatory misarticulations that often remain after surgical or prosthetic correction. It is also effective for learned misarticulations that result in phoneme-specific hypernasality or nasal emission.

To use:

1. Have the client hold the end of the *Replaceable Tubing* near one nostril. See **Figure 3** for correct placement of the tubing. (*If the client is working on identifying/perceiving nasality, then hold a clean tube near your nose.*)
2. If you would like to use one of the *Clip-On Photo Cues*, clip it on the tube of the stethoscope you are wearing so the client can see it easily. See **Figure 3** for correct placement of the *Photo Cue*. Place the soft foam ear tips of this stethoscope in your ears.
3. Place the *Soft Foam Ear Tips* of the other stethoscope in the client's ears.

Figure 3. Use the *Oral & Nasal Listener™* to provide nasal feedback to the client and SLP (or parent).



Auditory Perception and Discrimination in Speech Production

Most speakers are not conscious of the fine details of their articulation or overall speech production. Instead, they attend primarily to the message they are trying to convey when they speak. However, if the speaker has a “slip of the tongue” and produces a word in a way that is different from the norm for that speaker, he or she will usually recognize the error, stop, and self-correct.

In contrast, individuals with articulation errors are usually unaware of the fact that they produce speech sounds differently than others. In fact, their productions, although abnormal, seem normal to their own auditory feedback system. This is why individuals with a lisp or distorted /r/ sound are often totally unaware that their speech differs from others.

Generally, the articulation errors are primarily due to faulty learning. Over time, these errors become a habit. Concurrently, there is a learned acceptance of these errors as normal, so that the abnormal production is not only accepted, but it continues to be reinforced by the auditory feedback system.

Even when individuals become aware that they have speech errors, they are usually unable to determine exactly how their productions are different than the norm, or how to change their productions. This is also true of many speakers who are trying to learn a foreign language. Although they may perceive their productions of the new language to be like a native speaker's, their speech often continues to show signs of an “accent” to others.

Perceptual Training

Due to difficulties with self-awareness and monitoring, perceptual training is often the first step in the remediation of speech sound disorders, abnormal resonance, and deviant voice quality. Perceptual training is also important for foreign language speakers who are interested in “accent reduction.”

The primary aim of perceptual training is to help the individual to listen carefully and recognize differences in his or her speech production when compared to others. Since the individual initially accepts his or her own production as correct, there is often a need to improve self-perception of speech in order for the individual to be able to compare that perception to models of typical speakers. The individual must be able to recognize both normal and abnormal speech productions before correction of abnormal speech patterns can occur.

Using the *Oral & Nasal Listener*[™] in Treatment

When the SLP (or parent) wants the client to listen to amplified speech sound productions, the *Speech Funnel* is held in front of the client's or SLP's mouth (depending on the goal). Both the client and the SLP will hear the speech production clearly, and at the same time, through the *Listener*.

If the goal is to eliminate nasal emission or hypernasality due to misarticulations or mislearning, the tube is placed at the entrance of the client's nostril. The goal is to NOT hear any sound through the stethoscope during the production of oral sounds. If there is even slight nasality, it will be heard loudly through the stethoscope.

Here are some examples of using the *Listener* with specific pediatric populations (and for specific adult populations as well).

1. Phonological Awareness Training

Use the Listener to identify sounds in isolation or in words. The client listens for a particular sound in isolation or in the beginning, ending, or middle of each word. The SLP presents these words by speaking through the *Speech Funnel*. The client responds when he/she hears the target sound.

For example, the SLP asks the child to listen for the /b/ sound as in "bee." Then, the SLP reads a list of words to the client with and without the /b/ sound. The client signals the SLP when he/she hears the sound. To cue the client, the SLP can use the "bee" *Clip-On Photo Cue*.



2. Articulation/Phonology Training

Use the Listener to determine correct and incorrect productions in isolation, words, phrases, and sentences. The client listens to the SLP, who produces the sound correctly and incorrectly through the funnel. The client evaluates the production as right or wrong. This can be done verbally (i.e., good/bad, right/wrong, correct/incorrect) or by pointing to a symbol (i.e., happy face/sad face).

For example, when working on a lateral lisp, the /s/ sound can be produced correctly and incorrectly by the SLP. The client then has to identify whether the production was correct or incorrect based on what he/she hears through the *Listener*. To cue the client, the SLP can use the "sock" *Clip-On Photo Cue*.



Use the Listener to identify speech sounds. The client listens for the target speech sound and the contrast between that sound and other

speech sounds. The contrast could be the sound that the client typically substitutes for the target sound.

For example, if the client substitutes /t/ for /k/, the SLP asks him/her to listen for the difference between the /t/ and /k/ sound, as amplified through the *Listener*. The client may identify the sound heard by naming the sound, or by pointing to the letter or a visual symbol. To cue the client, the SLP can use the “cow” *Clip-On Photo Cue*.



3. Self-Correcting Speech Sounds

Use the Speech Funnel attachment to help the client self-correct his/her speech errors and monitor articulation. Have the client hold the funnel of the *Listener* in front of his/her mouth. Again, both the client and the SLP will be able to hear the amplified production at the same time through the *Listener*.

For example, if the client is working on correct production of /g/, have him/her practice saying the /g/ sound in isolation, words, phrases, or sentences while holding the funnel near his/her mouth. Have the client evaluate each production as correct or incorrect. Shape the client’s productions as you continue having him/her imitate and listen to the sound with increased auditory feedback.

Use the Listener to help a client correct error sounds of misarticulated sibilant sounds (/s/, /z/, /ʃ/, /ʒ/, /tʃ/, /ʒ/) and phoneme-specific nasal emission. Misarticulated sibilant sounds are commonly seen in clients with articulation disorders. Common errors include stopping of sibilants (i.e., /t/s), a frontal lisp, and a lateral lisp. Fronting occurs when the client uses a plosive rather than a fricative or affricate sound. Therefore, there is no airflow during production. A frontal lisp is produced when the tongue tip touches the incisors, thus restricting the amount of airflow during production. Finally, a lateral lisp occurs when the tip or dorsum of the tongue articulates against the alveolar ridge or the palate during the production of sibilant sounds, thus interfering with the anterior emission of the airstream.

Additional errors include the use of a pharyngeal or posterior nasal placement for sibilant sounds. This faulty placement results in “phoneme-specific nasal air emission.” This type of nasal emission can occur in clients with velopharyngeal dysfunction (VPD) or a history of cleft palate due to a compensatory articulation strategy. However, it is also seen in non-affected clients as an articulation error due to mislearning.

To correct these misarticulated sibilants, the individual must learn to change articulation placement of these sounds so that the airstream flows between the tip of the tongue and alveolar ridge. With correct placement,

the airstream is emitted through the central incisors and not laterally or through the nose.

Working on articulation placement of sibilants, particularly /s/ and /z/, can be difficult because the client cannot see the placement, and feeling the placement is very difficult. Therefore, the best way to work on these sounds is to start with a sound that the client can produce, and provide strong, clear auditory feedback.

The steps for correcting sibilant sounds are as follows:

1. The SLP (or parent) puts the end of the tube of the *Listener* at the front of his or her own closed incisors. The SLP then produces an /s/ or /ch/ sound. The client (and adult) should hear the airstream from the sound clearly through the *Listener*.
2. The client then puts the end of the *Listener* tube in front of his/her closed incisors and prolongs an /s/ sound. If there is a lateral, pharyngeal, or nasal production of this sound, the airstream will not be heard through the *Listener*. If there is stopping, the airflow will be heard, but will not be prolonged.
3. If there is a lateral lisp, the tube should then be moved to various points on the side of the client's closed teeth until the airstream can be heard. If there is a pharyngeal or nasal production, the tube should be placed at the entrance to a nostril, where the airstream will be heard.
4. Next, the client puts the tube at the front of his/her closed incisors and produces a /t/ while keeping the teeth closed. The client is told to push the air into the tube during production.
5. The client then produces the /t/ with the teeth closed, but prolongs the production until it is a /tsssss/. All the while, the client is pushing the air anteriorly through the oral cavity and into the tube.
6. The client should try to be aware of the airflow over the tongue and also listen to the air through the tube of the *Listener*.
7. The client then tries to produce a prolonged /s/ through the tube without starting with the /t/. The client continues to try this until he/she consistently hears the airflow through the *Listener* during the /s/ production.
8. Once the /s/ is established, the same techniques can be used to achieve other sibilant sounds.

Note: It is sometimes easier to start with the /tʃ/ sound, because this sound contains the /t/ sound (/tʃ/ = /t/ + /ʃ/). The same procedures are used as noted above, but the client must be sure to round the lips during production. If the /tʃ/ sound is corrected first, the next step would be to work on a prolonged /ʃ/ and then go to the other sibilant sounds.

4. Increasing Oral Resonance During Speech

Using the *Speech Funnel*, the client tries to increase oral resonance on oral sounds by increasing the volume that he/she directs through the funnel of the *Listener*. This should be done by first working on vowel sounds because they are the primary resonance sounds. The high vowels (such as /i/ as in “feet”) are more likely to be hypernasal than low vowels, so they should be the first focus of therapy.

One strategy to increase oral resonance is to use the “yawn technique.” With this technique, the client first produces an exaggerated yawn. With a yawn, the velum goes up and the base of the tongue goes down, which is what is needed for oral speech. The client then co-articulates a yawn with a vowel sound. With this production, the client is able to hear the increased sound through the *Speech Funnel*, which indicates increased oral resonance.

5. Increasing Oral Pressure During Speech

Using the *Speech Funnel*, the client tries to increase oral pressure on oral sounds. This is done by increasing the air that he/she tries to force into the funnel of the *Listener* during the production of pressure sensitive sounds (plosives, fricatives, and affricates).

For example, if the client continues to nasalize plosives after a cleft palate repair, he/she produces the plosives in the funnel and attempts to increase the sound that is heard through the *Listener* during production. (This will be in the form of air pressure for voiceless plosives and sound for voiced plosives.)

6. Decreasing Nasal Air Emission or Hypernasality

Nasal amplification for auditory feedback is very helpful in eliminating hypernasality or nasal emission when the cause is misarticulation due to mislearning (substitution of nasal sounds for oral sounds or use of compensatory articulation productions or nasal sounds due to a history of velopharyngeal dysfunction).

In order to help the client recognize and eliminate nasality due to mislearning, the tube is held just under or in the client’s nostril. The client is instructed that he/she should try to eliminate any sound that he/she hears through the *Listener* during the production of all oral sounds. (It is important to avoid the nasal sounds [m/, /n/, /ŋ/] in the speech sample because there should be sound heard through the *Listener* during the production of the oral sounds.)

7. Auditory awareness of abnormal nasality

The client listens for the difference between oral speech and simulated nasal speech on certain sounds. By identifying the type of sound (oral or nasal), this helps the client to develop self-monitoring skills.

8. Self-correction of nasality on certain sounds

The client is asked to try to make adjustments in articulation to reduce or eliminate the abnormal nasality of his/her own speech that is heard through the nasal tube of the *Listener*.

9. Correction of phoneme-specific hypernasality on vowels

Nasalized vowels can be obligatory errors due to velopharyngeal insufficiency or incompetence (VPI). In this case, therapy is inappropriate. They can also be learned errors that cause phoneme-specific hypernasality. This typically occurs on high vowels, particularly /i/ (as in “feet”), due to a high tongue position in the back of the mouth. The steps in therapy are as follows:

1. Place the *Listener* tube in one of the client’s nostrils for feedback.
2. Ask the client to produce a big yawn, which pushes the back of the tongue down and the velum up.
3. Make the client aware of the “stretch” in the back of the mouth.
4. Have the client then produce a big yawn while producing a low vowel, such as /a/ (as in “father”).
5. Ask the client to continue to coarticulate vowels with a yawn, while trying to make sure that no sound is heard through the nasal tube of the *Listener*.

10. Correction of nasalized plosives or /ŋ/ for /l/ substitution due to faulty learning

Occasionally, plosives or the /l/ sound will be nasalized due to a history of velopharyngeal dysfunction that has been surgically corrected (but a compensatory articulation strategy still exists), due to faulty articulation, or as a result of apraxia. Correction of this using the *Listener* can involve the following steps:

1. Place the *Listener* tube in one of the client’s nostrils for feedback.
2. Ask the client to produce a big yawn, which pushes the back of the tongue down and the velum up.
3. Make the client aware of the “stretch” in the back of the mouth.
4. Then have the client produce an anterior plosive, such as a /b/ or the /l/ sound, with this posterior yawn movement.

5. Ask the client to try to produce these sounds without nasality, as heard through the nasal tube of the *Listener*.
6. Once anterior sounds are mastered, have the client work on posterior or velar plosives.

11. Correction of nasalized /r/ (/ŋ/ for /r/ substitution):

The final /r/ sound is produced by articulating the sides of the back of the tongue against the gums that are just behind the molars. The mid-portion of the tongue forms a boat-like shape through which sound resonates. If the client raises the entire back of the tongue, the sound becomes an /ŋ/ sound, which results in nasal resonance. Suggested steps for correction are as follows:

1. Cup your hand to show the client how the shape of the tongue forms a boat. Explain that the back of the tongue must touch the gums on each side, just behind the molars.
2. Place the *Listener* tube in one of the client's nostrils for feedback and have him/her try to produce the sound.
3. If the client attempts to produce the sound with the entire back of the tongue elevated, resulting in an /ŋ/, he/she will hear the nasal sound clearly through the *Listener*.
4. Have the client work to produce the sound with only the sides of the tongue up, so that the sound can flow through the oral cavity, rather than the nasal cavity. The client will know immediately and clearly whether the sound was correctly produced based on what he/she hears through the *Listener*.

These therapy suggestions and others are found in the following text:

Kummer, A.W. (2008). *Cleft Palate and Craniofacial Anomalies: Effects on Speech and Resonance, 2nd Edition*. Clifton Park, NY: Thomson Delmar Learning.

Treating Various Disorders With the *Oral & Nasal Listener*[™]

The *Listener* is beneficial for individuals who demonstrate the following:

- articulation, apraxia, or phonological disorders, because it...
 - allows the individual to hear his or her own productions loudly and clearly, which improves self-evaluation and monitoring.
 - allows the individual to better hear the model productions from the SLP, teacher, or parent.
- auditory processing disorders, because it...
 - brings specific auditory stimuli into focus which helps to determine “figure-ground” relationship of auditory stimulation.
 - decreases auditory distractions.
 - improves listening skills.
- attention-deficit hyperactivity disorders (ADHD), because it...
 - focuses the client on the voice of the teacher, parent, or SLP.
 - eliminates outside distractions.
 - allows the client to read aloud quietly (to avoid distracting others).
- fluency disorders (stuttering), because it...
 - helps the individual to monitor and regulate fluency, rate, and vocal onset during speech.
- hearing impairments, because it...
 - amplifies sound without the use of a hearing aid.
 - focuses attention on the individual’s own speech or the speech of the teacher or SLP.
- resonance disorders or velopharyngeal dysfunction (VPD), because it...
 - allows the client and SLP (or parent) to hear nasal emission or hypernasality when it occurs.
 - gives the individual immediate, phoneme-specific feedback of resonance and velopharyngeal function.

- helps the individual to modify productions during attempts to close the velopharyngeal valve when the problem is mislearning rather than abnormal structure or physiology.
- voice (phonation) or prosody disorders, because it...
 - allows the individual to regulate vocal intensity and self-monitor pitch, quality, intonation, rate, and prosody.
- foreign accent reduction, because it...
 - allows the individual to hear the teacher's productions and then his or her own productions loudly and clearly, which improves self-evaluation and monitoring.

In addition to the above, the *Listener* is useful when working with clients who lack motivation or are uncooperative in speech therapy. It can also be helpful when performing speech therapy in a noisy environment.

Cleaning the *Oral & Nasal Listener*[™]

1. You should clean and disinfect the ***Oral & Nasal Listener*[™]** after every use.
2. First, remove the *Replaceable Tubing* and discard the tube if you do not plan to use the *Listener* with the client again. If you would like to use the tubing again, clean it using antibacterial soap and hot water, place the client's tubing in a Ziploc[®] bag with the client's name on the outside. Discard the tubing when you discontinue treatment.
3. If you used the *Speech Funnel*, clean it using antibacterial soap and hot water. Then, remove the ear tips from the stethoscopes and clean them using antibacterial soap and hot water or alcohol wipes.
4. Alternatively, remove the ear tips from the stethoscopes of the ***Oral & Nasal Listener*[™]** and place the stethoscopes on the top rack of the dishwasher and send them through a normal cycle for a thorough cleaning and disinfection. If you used it, you may also place the *Speech Funnel* on the top rack of the dishwasher.

Clip-On Photo Cues

