## Hearing Loss and Understanding Speech

#### By Susan Healea

The following three articles were published in the Roundalab Journal in the Winter 2011, Spring 2012, and Summer 2012 issues. Susan Healea is a cuer and Clinical Audiologist. A clinical audiologist works to find the causes of hearing loss and develops a treatment plan for patients. As round dance leaders and square dance callers, we must all be aware of dancers that may not hear our instructions or our calls or cues and are unwilling to either tell us or suffer in silence.

### What Did You Say?

### By Susan Healea

This article was published in the Roundalab Journal, Winter 2011 issue.

Hearing loss is a hidden disorder. It is impossible to look at someone and know whether or not they have hearing loss unless you see them wearing a hearing device. It is estimated that 38 million Americans have some hearing loss and more than 50% of people over age 50 have a hearing loss significant enough to impact their understanding of speech, especially in a background of noise. Although age is a major cause of hearing loss, there are many other reasons that may not be related to aging.

People will seldom tell the round dance leader that they are having trouble hearing or understanding, especially if others appear to be hearing. This is particularly true in people who have some hearing loss, but have not fully accepted the loss and/or are not willing to do anything about it themselves. Several studies have shown that it takes a person an average of seven years between the time they have a hearing loss significant enough to impact their communication until the time they are willing to take steps to help the loss. Some people accept the condition sooner and some later, but the average is seven (7) years. This fact means that in all probability there are dancers in almost every club who are experiencing significant hearing loss but are not taking any steps to enhance their hearing. Often pride will not allow them to indicate they are having difficulties. Others, who are willing to admit to their

hearing impairment, may not wear amplification due to the type of hearing loss they have, financial reasons, or a personal choice not to pursue treatment.

Thus, as round dance leaders, we should use the concept of universal assumption. Universal assumption means that we assume everyone has some difficulty hearing or understanding, and thus we make our presentations and sound quality the best we can at all times. We understand that not all dancers actually have hearing loss, but we "assume" they may. Even if a dancer has perfect hearing, anything we can do to provide the best sound quality possible will make the auditory experience more enjoyable for the dancer, as well as for the hearing impaired dancer.

Every person is unique, and so is their hearing loss and the way the loss impacts them. Sometimes people with relatively slight amounts of documentable hearing loss have serious difficulties understanding communications, while other people with much more loss will state that they feel they hear fine. In reality, the latter group probably does not realize what they are missing. Some people have difficulty hearing all voices while others only have trouble with the bass tones or treble tones. Higher frequency hearing loss is the most common, but all configurations of loss exist. Sometimes people hear the same with both of their ears, and others have very different hearing in each side. Future articles will delve further into the various types of hearing loss and the impacts of each.

Regardless of the configuration or extent of hearing loss that one may have, or whether or not amplification is worn, some techniques are helpful to aid in communication and some are not. Following is a listing of issues and techniques along with an explanation as to how you can help or hinder your listeners.

LOUDNESS – Typically, turning the volume up beyond generally comfortable levels is not the answer. Sound should be loud enough to be sufficiently heard and understood, but not uncomfortably loud. Excessively loud sound distorts and makes listening uncomfortable for all. A future article will explore this topic more fully.

**REPHRASE, DO NOT REPEAT** – For our purposes, *Repeat* means to say again, using the same exact wording as the first time. *Rephrase* means to say again but using different wording or order of words. If the hearing impaired person did not hear some of the sounds in the first words you said, it is very possible they will miss those same sounds if you simply repeat the statement. Instead, you should rephrase – giving the same information using different wording. This is a good teaching technique for all students but especially for the hearing impaired.

SHADOWS – You should avoid being in a shadow when speaking. Do **not** stand or sit with your back to a light source such as an open door or window that allows sunlight in or other bright lights. When the speaker's face is in a shadow, it is difficult for the listener to pick up the subtle facial cues and to lip read. Contrary to most people's beliefs, we **all** lip read. That is how we learned to talk when we were babies and we continue that process throughout our lifetime. Hearing impaired persons simply rely on lip reading more than normal hearing individuals. (Whether they think they do or not, they do!)

**LIPSTICK** – It is helpful if females wear lipstick (or males, if they choose), as this will make the lips easier to see from a distance.

**PROJECTION** – Project the voice and breathe from the diaphragm. Stand or sit up straight and place your cue sheets at "eye level" to aid in this process. Even if you are using a microphone, these techniques help listeners to more easily understand speech.

**RATE OF SPEECH** – When speaking to a group, speak a little slower than your average speech cadence and finish one word completely prior to starting the next word. You should clearly articulate your words. Do not mumble or run your words together.

USE A PUBLIC ADDRESS (PA) SYSTEM – Voices that are no amplified do not travel well in large rooms. If you have to raise your voice at all to communicate with your audience, you should not shout. Instead, use a PA system to help the listener, and it is also easier on your voice. This advice is true while cueing, teaching, or making announcements.

**COMPETING SOUNDS** – Attempt to reduce background noise when possible. This topic will be discussed in more detail in a future article.

ATTENTION – Get people's attention prior to speaking. People who know you are going to speak and have their attention focused on you before you start will understand more of your message. This advice is true for everyone, especially the hearing impaired who need every bit of information they can get to understand the auditory information.

USE VISUAL AIDS – It is often helpful to combine visual and auditory information. A visual aid may be demonstrating a figure while explaining it or holding up a flyer while announcing an upcoming event.

**HEARING ENHANCEMENT** – Provide hearing enhancement systems for those wishing to use them. Hearing enhancement is another topic which will be discussed in greater detail in my third article, Understanding Speech in a Background of Noise.

### Understanding the Spoken Word

#### By Susan Healea

This article was published in the Roundalab Journal, Spring 2012 issue

"I can hear, but I can't understand." This is a commonly heard statement, but what are the reasons for it? Shouldn't one be able to hear or not hear? Typically the answer to that last question is "no." Most people have partial hearing loss, not a total hearing loss. Thus, they may be receiving part of the message, but not all of it. This article focuses on reasons why some people with hearing loss may have trouble understanding, even when they feel that they "can hear."

Let's first talk a little bit about speech, since it is hearing speech that is most important to the hearing impaired. Adult males typically have lower pitched voices than adult females or children and within each person's voice range, some sounds are naturally lower pitched while others are higher.

In the English language, vowel sounds tend to be lower pitched. When a person uses their voice to produce a consonant sound, such as the consonants shown below:

r

th

d m n

These sounds tend to be lower to middle pitched. There are also consonant sounds that a person does not use any voice when producing, such as the following consonants:

f k s

These consonant sounds are higher pitched and generally softer as there is no voice to the sound.

To better understand this concept, say all of the sounds which are listed above out loud. Do not say the "name of the sound", just make the actual sound as if you were saying the sound in a word.

Can you hear the difference between the voiced and the unvoiced sounds? Can you also tell the differences in pitch between the various sounds?

Speech clarity also contributes to understanding. Speech clarity is affected by many things, such as the loudness of the speech, the projection of the person speaking, the speaker's enunciation, the distance between the sound source and the listener, and the acoustics of the environment. Clarity is also affected by the hearing capability of the listener.

The human ear has thousands of nerve endings inside the inner ear or cochlea. Depending upon the location of the nerve ending within the cochlea, a particular nerve picks up impulses from certain pitched sounds. The cochlea is "tuned" to receive different pitches in different areas of the structure. Sound that is received in the ear is then sent through the auditory nerve and the message is received in the brain. This process requires functioning nerves in every area. Nerves along any of the points may be damaged for a wide variety of reasons. Some common reasons for damage or degeneration of the nerves of the auditory system are aging, noise exposure, heredity, disease processes, and affects of medications. Although other problems can cause hearing loss, nerve losses, known as sensorineural losses, are the most common source of hearing loss among adults.

Aging and noise exposure most commonly produces higher frequency hearing loss. That means that a person may hear bass tones much better than treble sounds. Persons with this hearing loss configuration may hear the low and middle frequency sounds of the English language quite well, but due to a reduced hearing perception of the higher pitched sounds, may miss some or all of the higher pitched consonants. In such cases they may hear something like "In Maneuver; Impetu to Emi," rather than "Spin Maneuver; Impetus to Semi." In this case, the "t's" that were close to the vowels had enough strength for the person to hear them, but the "s" and the "p" at the beginning of the words were not carried by a vowel and were not audible to the person. Because the listener knew what was probably being said by the cuer and because there were only so many possibilities for those words, they were able to piece together the information and execute the figures, possibly without realizing that they had missed some of the consonants in the message.

A hearing impaired person pieces together auditory information all day long, and may not even realize when they didn't receive the full message. A noticeable degradation of perception, however, begins to occur when a person misses just a little more of the message. Then the person doesn't have enough information to piece it together or make a good guess if there is more than one possibility for the words.

My favorite example is "Twist Vine" versus "Quick Vine". Although the Roundalab Preferred Cue Term is "Twisty Vine" (for a good reason, as it adds the "e" sound at the end of Twist), many cuers choose to say "Twist Vine." Both the word "twist" and the word "quick" start and finish with unvoiced consonants, and the sounds in the middle of the words (in this case the w-i sounds) are very similar, "t-w-i-s-t" and "k-w-i-k." In round dancing, both figures may be danced from the same position and are danced in the same rhythms. There are rarely other pieces of information to help the hearing impaired individual "guess" at which one the cuer may have said when they only heard the middle of the first word and get "wi vine."

A person's ability to decipher speech is also dependent upon the amount of competing noise in the background. However, that topic will have to wait until the next article, Understanding Speech in a Background of Noise.

# Understanding Speech in a Background of Noise

### By Susan Healea

This article was published in the Roundalab Journal, Summer 2012 issue.

The world is a noisy place. We deal with background sounds in our environment virtually all of the time. Sometimes the background sounds are louder than other times, but we are rarely in complete silence. Often we ignore the sounds of our environment, such as the noise of traffic, fan motors on heating systems, or the sound of someone walking across a floor. Sometimes we enjoy the sounds of a gentle breeze in the trees, birds singing, or a babbling brook. Sometimes, however, the background noises may cover up sounds that we wish to hear. This may prove frustrating to everyone but is particularly frustrating to those with hearing loss.

If we are in a relatively quiet room having a conversation, our voices will typically be 40-50 decibels louder than the other sounds in the room. Decibels are the unit of measurement for sound; the larger the number, the louder the sound. When we are in a loud, noisy environment, we typically only speak loud enough to hear ourselves above the room noise and attempt to project to those in our immediate vicinity. Our voices simply cannot get 40-50 decibels above the background noise in those situations, and it is uncomfortable for us to try. Consequently, we may only be speaking an average of 5-10 decibels louder than the competing noise of the environment.

As was discussed in the Spring 2012 Roundalab Journal, not all sounds in the English language have equal loudness or projection. Thus, if we are talking at an average of 5-10 decibels above the background noise, a few of the louder sounds in the words may actually be peaking at 15 decibels or more above the background, and some of the softer sounds may be below the loudness of the background noise. For this reason, it may be impossible for anyone to hear all of the sounds of the words when there is excessive background noise. Our brains fill in the gaps when we miss an occasional sound, but receive most of the information. We do this through the content of the sentence, our knowledge of the subject, the redundancy of the English language, and sometimes simply by guessing. If a person does not hear enough of the sounds of a word, they will be unable to identify the word.

There are a variety of levels of understanding speech proceeding from normal hearing to not hearing at all:

- Hearing and understanding the spoken word
- Hearing part of the spoken word and correctly filling in the gaps
- Hearing part of the spoken word and incorrectly filling in the gaps
- Hearing part of the spoken word but with not enough hearing to attempt to fill in the gaps for understanding
  Net hearing at all
- Not hearing at all

When a listener misunderstands speech and then assumes the topic is different than what was said by the speaker, the listener is then using a new topic as their basis of filling in the gaps for future sentences. If they continue to receive only part of the actual sounds and are filling in the gaps based upon incorrect assumptions, eventually the listener is on a totally different subject than the person speaking.

The greater the competition for one's attention and the more auditory stimulation that is being received at a time, the more difficulty one has staying on track. If someone is in a room full of people talking, their auditory system may have difficulty recognizing whether the various voices coming in are the ones they want to listen to or if they belong to others. That situation is particularly true of hearing aids.

Many hearing aids manufactured today are able to manage constant background noise and keep it at a comfortable level while attempting to bring the speech through at an increased level. Only the more sophisticated hearing instruments, however, are capable of attempting to amplify primarily the dominating voice in a room full of people talking. Some of the most sophisticated hearing aids currently on the market are now able to increase the loudness difference between the dominating voice and the background noise. If the desired speech originates at 10 decibels above the background noise, the hearing aid may actually be able to bring that difference up to 12-15 decibels. In this case, every decibel counts.

An issue occurs when the hearing aid cannot tell which voice in the room the listener may wish to hear. There are no hearing aids that can read the wearer's mind and know who they want to hear! If a person is in a group and there are two conversations going on at the same time and at the same general loudness, a hearing aid can't tell them apart and will more than likely amplify both to the same extent. This is also true if a hearing aid wearer is attempting to carry on a conversation on the sidelines while a cuer is cueing at a dance. The cuer's voice may be the dominating voice in that circumstance. Even the most state-of-the-art hearing aids may enhance the cuer's voice more than the voice of the spectator that the person wishes to hear. Ways to help this situation for the hearing aid wearer include moving the conversation to a quieter area, dancing rather than talk, moving closer to the desired speaker to allow their voice to become the dominating voice, and adjusting the hearing aid (if they are able to do so).

The same dilemma of two voices being too close in intensity for a hearing aid to differentiate may occur when the music contains a vocal and the cuer is cueing the dance. If the cuer does not ensure that his or her voice is constantly at a significantly louder level than the vocal on the music, then the two sounds may mesh together for the hearing impaired listener. Once again, this happens more often in the hearing aid user, because the hearing aid may be deliberately attempting to amplify both voices to a set level in the hearing aid, to ensure the listener can hear the "speech in the room." With most hearing aids, if the cuer keeps his or her voice substantially, yet comfortably, louder than the vocal in the music, that original difference will be maintained or at least not obliterated when the signal is processed in the hearing instrument. Problems tend to occur when there is too little difference in loudness between the two inputs into the hearing aid (cuer's voice and vocal on the music). The hearing impaired individual needs a greater amount of difference between the two inputs than the normal hearing person, regardless of whether or not the hearing impaired individual is wearing a hearing aid. This difference is important to understand when setting sound for a hall full of dancers, some of whom may be hearing impaired. It is critical that the cuer's voice is constantly louder than the music.

Hearing aid technology is developing in leaps and bounds and in no way am I suggesting that hearing aids are not beneficial for dancers to use while round dancing. I am suggesting just the opposite; hearing aids can be of great benefit for hearing impaired dancers.