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## Prelude

A few weeks ago, I was having dinner with several friends in a lovely little Italian restaurant. When our server arrived at the table a few moments later, my friend, Sandy, and I both said, "Would you please turn the music down?" We looked at each other and laughed. Here's the thing. Sandy has a cochlear implant and I am a musician with normal hearing. Yet, we both found the music to be distracting to the conversation that was unfolding at the table. For Sandy, it cluttered the listening environment and made it difficult for her to pick out the words our friends were saying from the words the singer was crooning. For me, because I have been taught to listen to music critically all my life, it was hard to ignore, even though it was in the background. Now, Sandy typically enjoys listening to music through her implant and, in fact, really liked the music that was playing in the restaurant that evening. But, we both concluded that music sounds best when you can actively listen to it.

Recently, I have had many opportunities to talk with people who use cochlear implants. I am curious to know what listening to music is like for them. Do you know what I found? I've discovered that (not unlike their hearing peers) it's different for everyone. One says, "I love Rap." The other says "I like everything but Rap." Someone else says, "I used to listen to Mozart, but now, it just sounds confusing to me." And yet, another says, "I've started playing my cello again and I love it!"

What accounts for the wide ranging and sometimes bipolar responses to music listening between CI users? Well, there are probably a number of reasons. For instance: What kind of experience with music did the listener have before the implant? How much residual nerve survival does the listener have? What type of device and strategy does the listener use? How complex is the music that is being listened to? Is it a familiar piece of music? What is the listening environment like? Does the listener spend time actively listening to music? Is the sound equipment and medium of adequate quality? Each of these factors can have an effect on the enjoyment quotient of the listening experience.

**\*Highly Recommended\***

"Is it music to your ears?" Kate Gfeller, Bionic Beat, Vol. 2, Issue 1, 2005

This series of guides is an attempt to equip you, the CI user, with information on ways to understand and actively listen to music so that it has more meaning and enjoyment. It's hard for me to imagine life without music and now I've heard from many of you that you feel the same way.

So now, as Maria sings in *The Sound of Music*, "Let's start at the very beginning"...

### Music Perception

What is this "organized sound" that we call music? Let me start by telling you what it is not. It is not a universal language. There, I said it. We've all heard that expression a hundred times, but it's not true. Here's why. The rules that govern how music is created in the Western world are different from those in the Eastern world. Opera at the New York Met sounds as different as night and day from opera at the Beijing Opera House. A professional musician from the New York Opera would have an impossible time trying to fill in for a musician at the Beijing Opera Company and vice versa. However, music is universal. Every known culture has a musical tradition that is unique to its people. And even more amazing is that we all have an innate ability to learn the language and music of the culture we are born in to! With enough exposure, we actually begin to internalize the rules and codes that govern our linguistic and musical tradition.

We hear music first as a series of vibrations or frequencies that are assigned names according to their place on a high/low continuum. These are called pitches or tones. When strung together in certain ways, they become melodies. When multiple pitches or melodies are heard simultaneously, we have harmony. Pitches can be of different durations and grouped together into rhythms. These rhythms can be played at any speed or tempo. When we listen or dance to a piece of music, we feel the steady pulse, or beat, and notice that certain beats feel stronger than others over time which demonstrates meter. Meter is usually organized into groups of three, as in a waltz, and groups of two or four, as in a march. We are able to distinguish a violin from a tuba or a man's voice from a woman's by its tone color, or timber (rhymes with amber). The dynamics of a piece allow it to sound loud, soft, or anything in between. I realize that this is a very brief description of what we know to be the building blocks of music. But, at least it will give us a starting point to begin talking about how best to listen to music.

**\*Highly Recommended\***

This is *Your Brain on Music: The Science of a Human Obsession* by Daniel J. Levitin

## Music Perception through the Cochlear Implant

Music perceived through the cochlear implant is undoubtedly different than through a typically hearing ear. Much of this has to do with the requirements needed to perceive something as complex as music. Take pitch, for example. Do you remember when you learned that if all the primary colors of light are blended together the result is white light? Well, it's similar with pitch. When we hear an A played on a violin, (440 Hz) we are actually hearing many different frequencies sounding at the same time, it's just that the frequency that is A440 is the strongest, slowest vibrating or fundamental pitch we hear. These simultaneous vibrating frequencies are called harmonics or overtones and occur according to a system defined by physics. (You can take my word for it, or read more about it in Levitin's book) The harmonics of each instrument give it a unique sound.

The strongest sense of pitch in normal hearing individuals is between 55 Hz (the second A from the bottom on a piano) to 2000 Hz (roughly the next to the highest C on the piano).

There is some evidence that music with a strong steady beat and a rhythmic pulse is preferred by CI users. The reason being that the implant does a better job of reproducing the temporal aspects of music (beat and rhythm) than the spectral aspects (pitch).

**\*Highly Recommended\***

Bringing Music to Life: A Four Part Webinar Series at [www.bionicear.com](http://www.bionicear.com)

### Music Preference

By age two, children are already beginning to show a preference for music of their own culture. By adolescence, those preferences are more clearly defined so that by 18-20 years old we become pretty set in our ways over what we like to listen to. As we age, we remember fondly the music that defined our teen years. This is not to say that preferences can't change, it's just that it will take some effort. Here's an example: As a teen, I studied Classical music, played in a Bluegrass band and listened to Rock and Roll. That pretty much defined what I continued to listen to as an adult. Then, I took a job teaching music at the International School of Indiana, where I heard music from all over the world. It made me realize how limited my musical tastes were just because I had never been exposed to much of the world's music. Now, I'm constantly seeking out indigenous music from every corner of the Earth.

We also tend to judge what music we like by its complexity. This is why we don't typically seek out Nursery Songs as adults. They sound too simple to our ears. However, it may also be the case that some of us don't seek out avant-garde jazz or atonal music because of its complexity. No, we tend to take the Goldilocks Approach and look for music that seems just right; not too simple, but not too complex. When the mix of instruments used in a particular piece of music becomes too complicated, it makes it difficult to pick out individual sounds.

Timbre and pitch also color our decision about musical preference. This is particularly true for cochlear implant users. Some instruments just sound better than others. The low rumble of a string bass over the high pitches of a piccolo may be preferred. Or, the mellow sound of the saxophone may be enjoyed more than the raucous electric guitar. Or not. People who use implants often report that instruments they used to enjoy just don't sound the same anymore. Fortunately, there are hundreds of instruments in the sea and some will sound just fine.

We also base our love of music on the positive or negative experiences we associate with a particular piece. Here's what I mean. When I was lying in the operating room just before I "went under", the surgeon was listening to a particular piece of music called Pachelbel's Canon in D. When I hear that piece today, I immediately feel the cold steel table beneath me and the bright lights of the operating suite burning above me and the masked faces all peering down at me. It's not a memory I wish to visit often. On the other hand, when my son was born on Christmas Day in 1989, Tchaikovsky's Nutcracker Suite was playing in the operating room. I love to listen to that every Christmas season because it reminds me of the joy I felt at his birth (as opposed to seventeen years later!!) You have made your own positive or negative associations over the years.

Rhythm can also attract us to a certain genre. For some implant users, the driving beat of Hip-Hop may feel good, to others it may be the steady and predictable sound of Rock and Roll drums. Rhythm, probably more than pitch, may help define your musical tastes.

We also prefer some music because of the social opportunities it offers us. Sharing music with others is important. Singing in a choir, playing in a band, attending a concert, or just listening to music with friends can shape a particular fondness for a certain kinds of music. How many time have you thought, "Hey, they're playing our song?"

## Musical Styles

Classical, Popular, Country, Jazz, Rap, Rock, and Folk are just a few of the musical styles, or genres, that exist. Each of these categories can be broken down further still. For instance, in the Jazz category, we have Cool Jazz, Avant-garde Jazz, Swing, Big Band, Blues, etc. Each of these subcategories has enough in common with the other that when we hear music of that style we say, “Oh, yeah, that’s jazz.”

Sometimes, the delineation isn’t as clear cut, particularly in the case of Popular, Rock and Country which often sounds as if they are fused together. Then we rely on the marketing of the individual artist to help guide us in determining the musical style.

## Tips for Active Listening

OK, now that you have armed yourself with some knowledge about music perception, preferences and styles, it’s time to start listening! Remember, it will take time, trial and error, and most importantly practice. Here are some ideas which may be useful:

1. Use high quality sound equipment and media when listening
2. Listen in a quiet environment
3. Keep the volume at a comfortable level
4. Use a direct connect system
5. Seek out live performances or videos for additional visual cues
6. Start by listening to something familiar, perhaps a piece of music you listened to before the implant
7. Start simply. A solo singer, or instrument may be preferable to an orchestral or highly produced piece of Pop music
8. Then, when ready, try listening to different styles, composers, performers and instruments. Trial and error will be important in finding the “right” sound
9. Try listening to music that has a strong beat and move your body as you do
10. Learn something about the music you listen to. Understanding and analyzing a piece of music may help you listen with “different ears”
11. Be creative in your approach to listening. If something isn’t working, try another way
12. Ask your audiologist for help in finding the best strategy and mapping available.
13. Practice, practice, practice!