

See no Evil, Speak no Evil, Hear Nothing

“Welcome to the end of your career in music. You have effectively driven off your fan base and damaged them so much that they are unable to enjoy most types of music and in some instances cannot understand spoken word. All of your hard work, the hours you spent practicing, the days you spent riding that crappy van across the eastern United States eating fast food were for nothing. “

No entertainment marketer or musician would like to hear a statement like the one above but we are drawing ever closer to hearing those exact words. The enjoyment of music is not dependant on intellect or status but it is directly linked to the auditory processes that allow us to hear. We are wiping out our fan base by destroying their ears. Over the past fifty years advances in technology and generational changes have all seemed to culminate in to music, from classical to rap, becoming louder. Horn manufactures are creating ever-larger instruments to produce the volume levels and tone quality that is asked for by the conductor. Speaker companies have advanced to the point that the sound reproductions coming from a good speaker system can rival any seat in the world's greatest concert halls. Clubs and bars have installed massive P.A. systems in order to increase customer attendance.

Unfortunately, for the many people involved in the entertainment business we tend to promote short-term gain instead of longevity. Before we can attempt to cull the problem we must address some issues directly related to hearing loss. A brief overview of the increasing volume levels in the world is needed to place this subject in context while an understanding of the physical processes we go through to hear a sound wave is needed to pinpoint what may be damaged. Finally some prospective cures and suggestions for ridding ourselves of this problem and insuring the longevity of music careers around the world are given.

Louder....Louder....

With the advent of industry and mechanization at the turn of the 19th century new sounds were introduced to the ears of the populous. Internal combustion engines, spinning flywheels, and thousands of other new noises soon stamped out the previously heard sounds. Before industrialization there was noise, lots of it, but in most instances it was short lived and one could remove themselves from it with little effort. Industry places itself in one location where it continually produces noise and products.

If we flash forward to the 1950's we see larges advances in sound technology and speaker design. The consumer begins to reach a point where there is little to no sound distortion at whatever volume level they choose. Previously a person's peak playback volume was limited to the point at which the speaker distorted the sound to unintelligible levels. Over the next 50 years sound technologies were refined and re-engineered to produce the highest in fidelity and in many cases the loudest decibel levels possible.

Loud decibel levels coupled with the brain's ability to quickly acclimatize itself to new sounds and volume levels, which is why we tend to continually turn music up louder, creates a recipe for disaster. If we continue to abuse our audience's ears as well as our own we will eventually collapse the careers we have so carefully built. Before we discuss ways to fix the problem a quick review of the anatomy of the human ear is needed to determine why our hearing doesn't return.

Anatomy of the Human Ear

The ear consists of three main systems which all work to help us perceive sound. The outer ear consists of the cartilaginous structure that is attached to our heads as well as the ear canal. The middle ear houses the Tympanic Cavity, more commonly referred to as the eardrum. Also contained in the middle ear are three small bones: the incus or anvil, the malleus or hammer and the stapes or stirrup. The inner ear contains the snail-shaped cochlea membrane and ossicles, which are filled with fluid and help with balance.

Sound waves are directed to the ear canal by the shape of the projections on our outer ear. Once the sound has traveled the length of the ear canal it vibrates the eardrum (Tympanic Membrane); which is a very delicate membrane that divides the outer ear from the middle ear. The eardrum is connected to the malleus bones which in turn are connected to the ossicles and cochlea. The anvil, hammer and stirrup act as a pre-amplifier and mechanically boost the sound waves so that they can move through the fluid filled cochlea. This mechanical advantage is needed to boost the sound waves since sound is muffled in liquids. The cochlea contains the organ of Corti that houses hair cells. When the hairs and hair cells are moved by a vibration a nerve impulse is generated in the auditory nerve which sends an impulse to the brain.

Ways our ears can be damaged

One sure fire way to damage and infect your ears is to stick objects in them such as q-tips and fingers. These can puncture the eardrum, impact earwax or cause an infection. In cases dealing with high decibel levels the eardrum can be ruptured or deformed. More commonly the tiny hairs (approximately 15,000 in number) in the cochlea sustain damage causing hearing loss. Extremely high volume levels, such as an explosion, can kill the hair cells and result in partial or total hearing loss. Of more interest to musicians is the fact that over time loud, decibel levels can have the same affect on the hairs as an explosion permanently damaging or disabling them.

Ways to prevent hearing damage:

Preventing hearing damage is much easier and cheaper than attempting to repair damaged hearing.

Ear Plugs: Earplugs, depending on the type, can lower volume levels by 5-25db for extended periods of time. They are cheap and readily available at drugstores around the

country. Cons against earplugs are that many people find them uncomfortable and musician's earplugs can be expensive (though much cheaper than a hearing aid). If worn incorrectly earplugs provide little protection.

Turning the volume down: The simplest method, depending on the venue size, is to turn the overall volume of the performance down. You protect both the musician's ears as well as those of the audience. You may reap other benefits as well such as increased equipment longevity since you are not taxing electronics. Unfortunately you may lose some of the "traditional" cool factor that you get from playing "loud" music. Also, people might actually begin to listen to your music instead of just being in awe of the volume levels. I would like to think that the pros of keeping your paying audience and your performers healthy would outweigh the cons but current practices speak differently.

Options for those with damaged hearing and costs for those who are currently damaging their ears.

Hearing aids have been in production since the 1950's. Success rates have varied in use but technologies are improving which help to restore **some** hearing to those who have lost it. As a human being our hearing naturally degrades as we age but I don't know of any 30 year old person who would like to wear a hearing aid. Cochlear implants can be used in extreme cases of hearing loss but their price is astronomical, quickly reaching the \$50,000+ range. The cochlear implant works by bypassing the ear and directly stimulating the nerves that direct signals to the brain. In many instances the implants only allow a person to detect speech (on 11 channels of sound) with no hope of hearing music. The sound spectrum is compressed so that only the most often used pitches, those that correspond with human speech, are decoded by the computer. Recently an article in *Wired Magazine* (11/2005) elucidated the advancements in cochlear implant technology. Software developments have allowed scientists to upload 111 channels of sound to a cochlear implant that allows the user to hear music as well as differentiate between different kilohertz scales. The software updates are not yet available to the 1,000's of people who currently have cochlear implants and the quality of hearing will never reach that of an undamaged ear.

Conclusion:

Many of these problems discussed above could be avoided by lowering the volume levels that we perform at. I implore every musician to rise to the occasion and treat their audiences as professionally as they treat their music. Without the ability to hear we lose not only our audience and income streams but also functionality in society. The health of our audience rests in the hands of the performers, managers, and in the audience members themselves. We must work to ensure that all members of society throughout their entire lifetime can safely enjoy music. It is only a matter of time before venue owners and musicians will be sued for damaging their customers hearing. It will be an unfortunate day for all involved when that happens especially since the remedies to the problems are so simple.