# COMMON MISCONCEPTIONS ABOUT HEARING

By: Marek Roland - Mieszkowski, Ph.D., Digital Recordings-Advanced R & D
5959 Spring Garden Rd., Suite 1103, Halifax, Nova Scotia,B3H-1Y5, Canada

## GENERAL MISCONCEPTIONS ABOUT SOUND AND HEARING

, **Loud sound is not dangerous, as long as you don't feel any pain in your ears.**

**Not true :** Our threshold for pain is at about 120 -140 dB SPL but sound begins to damage our hearing when it is above 85 dB SPL (for a 8 hour period).

, **Hearing loss after sound exposure is temporary.**

**Not true :** Some of the hearing loss will be permanent. Indication of damage is ringing and noise in the ears (called tinnitus) after sound exposure. This is a clear indication that sound exposure took place. Another indication of that is the difficulty to communicate on the phone and in the noisy restaurant or cafeteria.

, **If you have a hearing loss already, you don't have to protect your hearing any more.**

**Not true :** Hearing loss accumulates. More exposure to loud sounds leads to more hearing loss.

, **Hearing loss is mostly caused by aging.**

**Not true :** Research shows that accumulative exposure to loud sounds, not age, is the major cause of hearing loss.

, **Hearing loss can be repaired by medicine, surgery or hearing aids.**

**Not true :** Although certain improvements can be obtained by the use of hearing aids. In the case of hearing losses inflicted due to the noise exposure, the resulting quality of hearing will be far from normal. So far no drugs or therapy can correct noise induced hearing loss. This could affect your professional performance as a musician, sound engineer, medical doctor, air traffic controller, telephone operator, pilot and driver or in any other profession where performance depends on good hearing. Also, your enjoyment of music would suffer.

, **Loud sound only damages your hearing.**

**Not true :** Loud sound can change your heart rate, vision and reaction time. It may make you more aggressive and in general, negatively affect you.

## COMMON MISCONCEPTIONS ABOUT "SOUND ENGINEERS" AND SOUND REINFORCEMENT

, **They know what they are doing, when adjusting sound.**

**Not true :** Most of so-called "sound engineers" (about 99%) have no formal training in acoustics and sound reinforcement. The operation of sound systems does not require any licence or qualifying exam, yet the operators are in control of a potentially very damaging form of energy.

, **They adjust sound to safe levels.**

**Not true :** Most (about 99%) don't use sound level meters to measure intensity. Instead they judge the sound level "by ear", an inexact procedure even if we assumed they had no hearing loss. Research in Halifax night spots showed in 1986 that a risk of hearing loss for patrons was present in 64% of all tested locales during 1 hour of exposure and in 95% during 4 or more hours of exposure (a typical evening at a night club lasts 4 hours).

, **Equalization and adjustments of sound parameters are properly done.**

**Not true :** Many of the so-called "sound engineers" have significant hearing losses. Sound adjusted to their liking may be far from well-balanced sound. This could further increase the danger of exposure to harmful sound levels.

, **Sound systems have built-in safety features.**

**Not true :** Most sound systems are tremendously powerful and are capable of producing sounds much louder than adjusted levels. However, these systems have no built-in protection against surges in sound due to feedback or accidents.

, **There is a law to protect the public against unsafe sound levels.**

**Not true :** In Canada, no law exists to protect patrons who frequent entertainment premises (such as: clubs, concerts, school dances etc.) from harmful sound exposure, which could result in permanent hearing loss. Although there is a law governing the safety of workers, it appears not to be enforced in the entertainment industry.

## COMMON MISCONCEPTIONS ABOUT "WHAT PEOPLE LIKE" AND PEOPLE'S RIGHTS

- **Most people like their music loud.**

  **Not true :** Although some people like loud music, especially if they already have a hearing loss. Most audiences note little perceptible difference between sound levels of 85 dB SPL and 100 dB SPL. However, 100 dB is much more dangerous than 85 dB sound, having 32 times more destructive power (115 dB sound found in many clubs has 1000 times more destructive power than 85 dB sound).

- **Most patrons of night clubs enjoy being immersed in loud music.**

  **Comment :** Most of the patrons attend night clubs for the social interaction. They are not interested in music performed so loudly that they are unable to carry on a conversation. In many environments which were tested during our "Sound Survey", normal conversation was impossible. People were shouting in each others ears, further increasing the danger of receiving a significant hearing loss. I would strongly suggest that bars cash in on "safety zone" advertising (no more then 85 dBA sound level).

- **Everyone has a right to decide what sound level to listen to.**

  **Comment :** It could be argued that patrons who choose to attend night clubs, especially young adults, are unaware of the potential danger. On the other hand, those who knowingly expose themselves to overly loud sounds are creating future medical problems for themselves. In my opinion, this burden should not be put on the average taxpayer.

  In the range of safe sound levels (let's say up to 85 dBA for a 8 hour exposure) adjustment should not be restricted. However, levels above 85 dBA are dangerous and can cause permanent hearing damage. Given the choice, most sensible people would not knowingly choose to put themselves in an environment that was considered hazardous to their health. However, many patrons are unaware of the potential danger of sustaining permanent hearing loss and are also unaware of the fact that noise levels over 85 dBA are dangerous.

  An informed public, coupled with rational behavior, are key ingredients in the protection of individuals from both hearing loss and extra health costs. Unfortunately, existing legislation does not require informing patrons of potential health hazards that could harm them, thereby eliminating the concept of "informed consent". Enforcement of existing work place laws should protect nightclub employees, patrons, teachers, musicians, D.J's or any other individual who may be exposed to dangerous noise levels that could pose a potential health hazard. Regretfully, such laws are very seldom implemented or enforced.

## FACTS ABOUT SOUND AND HEARING

- **Frequency range :** With normal hearing, one can hear frequencies from 20 Hz to 20,000 Hz. ( 20 cycles/sec to 20,000 cycles/sec ).

- **Intensity range :** With normal hearing, one can hear intensities from 0 dB to 140 dB. This corresponds to power ratio (defined as ratio of the highest audible intensity to the lowest audible intensity) equal to 100,000,000,000,000.

  **Recommended maximum allowable exposure times ( by Nova Scotia Department of Labour ) are :**

  | | | |
  |---|---|---|
  | **16 hours** | **for** | **80 dBA sound** |
  | **8 hours** | **for** | **85 dBA sound** |
  | **4 hours** | **for** | **90 dBA sound** |
  | **2 hours** | **for** | **95 dBA sound** |
  | **1 hour** | **for** | **100 dBA sound** |
  | **30 min** | **for** | **105 dBA sound** |
  | **15 min** | **for** | **110 dBA sound** |
  | **7.5min** | **for** | **115 dBA sound** |
  | **0 min** | **for** | **above 115 dBA sound** |

  **(there should be no exposure at this level)**

- **Number of channels :** We often characterize sound systems by number of channels. Mono means 1 - channel system, stereo means 2 - channel system, quadro means 4 - channel system. We have two ears, so one can think,that auditory system is stereo (2 channel), but as a matter of fact sound in each ear is divided into 24 discrete channels called critical bands. Therefore auditory system (hearing system) acts as 48 - channel system.

  Critical bands allow discrimination of different sounds simultaneously. Also they allow to hear sounds in noisy situations (for example conversation during party or in the cafeteria). Hearing loss is often accompanied by damage to the critical bands,which in some situations can profoundly change ear's selectivity. Hearing aids (HA's) act like 1-channel devices since they can't feed signals directly to separate critical bands. Therefore they do not compensate for this deficiency.

- **Illustration of hearing loss (intensity) :** Let's assume that a single bird sitting far away in the tree produces a sound level 0 dB (barely audible). A person with hearing loss (after going to "bad clubs") requires a minimum sound level of 40 dB in order to hear the sound. How many birds have to sit in the tree in order for this person to hear them ?

  Answer: 10,000. For the person with 50 dB loss it will take 100,000 birds and with 60 dB loss it will take 1,000,000 birds.

- **Potential dangers :** Hunting and target shooting, power tools,noisy vehicles, loud music (concert, club, walkman, stereo system at home or in the car). Please wear hearing protection in the situations like that.