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Loudness Perception and Sound Levels

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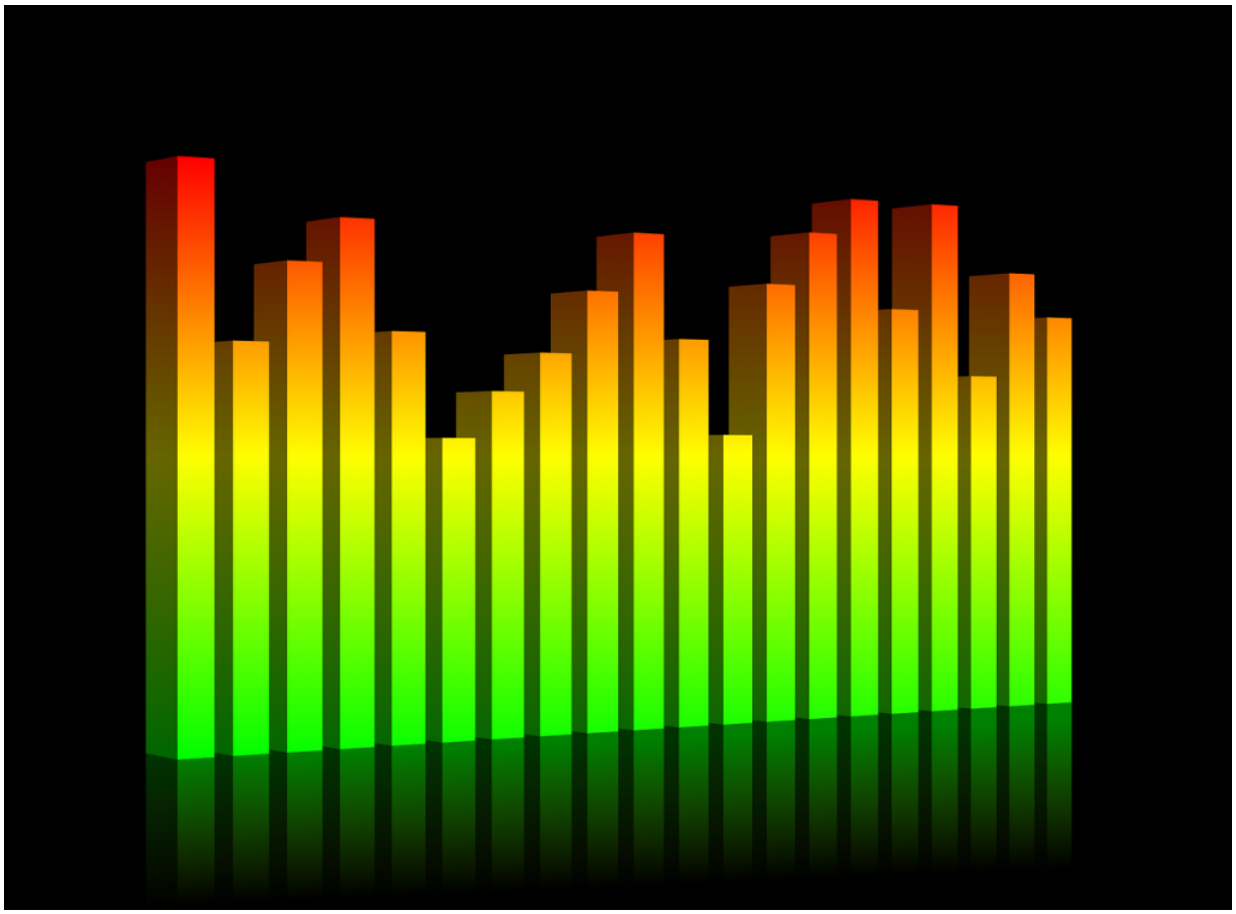

There is a (false) belief that the perception of how loud is a noise is only related to its sound level. There is a relation: the louder it is, the higher is its sound level. However, there are other characteristics, some objective and some subjective, that may be as important. Examples of the objective are the frequency content, the temporal pattern and the repetition rate. Some subjective characteristics are the familiarity with the noise and the expectancy of its presence.

This is the case with occupational noise. It is perceived as a “necessary evil” and, as such people tend to accept and ignore it. Also, a given noise that is acceptable in a restaurant may not be acceptable in a library. And, finally, totally unacceptable sound levels are common phenomena in sports events and most of the attendees don’t even realize that the noise is present.

Divergence between noise levels and their perception both has been the subject of many studies worldwide. Here, closer to home, two studies were recently performed by students from the School of Occupational and Public Health at Ryerson University under the direction of Prof. Chun-Yip Hon. One was conducted in indoor swimming pools, while the second was done in several local

meat-processing facilities. Spot sound levels were measured in both studies and questionnaires were presented to individuals present during the measurements. Among some of the questions, participants were asked about their perception of the severity of the noise.

The first study[1] was conducted in eight indoor public swimming pools in the Greater Toronto Area. Two sound level meters (SLM) were used. One of them was located in the swimming area and the other close to the public viewing or seating areas. Depending on the pool activity L_{AEq} was measured for a time varying between 1:00 and 2:30 hrs. The attendance (between public and swimmers) varied between 32 and 72. Measurements of L_{AEq} ranged between 74 and 82 dBA, with maximum sound levels of 102 – 122 $dBA_{Peak.}$

A total of 45 persons filled the questionnaires. Of them only 4% stated that their comfort was largely affected by the noise, while 24% reported that they were not affected at all. A total of 41% of the participant were neutral concerning the issue of noise in the facilities.

The measured sound levels were well below values that could be considered dangerous to hearing. However, they could be classified as annoying or interfering with speech. Regardless, the majority of the participants appeared to be unaffected.

The second study[2] was performed in four meat-processing facilities located in the Greater Toronto Area. Among other goals, the study was aimed at relating the workers' perception of the noise environment to the measured noise levels. To achieve this, several workers from each section of the facility were interviewed, while at the same time spot noise levels were measured at locations where these workers normally perform their activities. Twenty-two workers participated in the study; the range of the measured sound levels was 62–100 dBA, with an over-all average sound level of 84 dBA.

It was found that 6 workers in an environment with an average sound level of 88 dBA found the place very noisy. Seven workers exposed to an average of 81 dBA, were not bothered by the noise and 9 workers in an environment with at an average of 92 dBA, found their place not noisy at all. Interestingly enough, all workers agreed that the noise is an important occupational health and safety issue and that people need education/awareness regarding this topic.

This is a serious issue, especially in a workplace environment. To be successful, a hearing conservation program requires the workforce to be conscious of the risk high noise levels can pose to their hearing. However, their perception of the severity of the noise cannot be used as a measuring tool; sound level surveys are the only way to properly assess the environment.

References

1. Lowry J and Hon C-Y. The public's exposure to and perception of noise in aquatic facilities: a pilot study. Environ Health Rev 2018;61(4):98-103. https://doi.org/10.5864/d2018-026

2. Hon C-Y, Tchernikov I, Fairclough C, and Behar A. Convergence of noise measurements with workers' attitudes and perceptions towards noise: Understanding their collective impact on hearing conservation efforts. Int J Environmental Res Public Health, (in press).