RESPONSE TO COMMENTS ON "*VALIDATION OF THE CSAZ107.56 STANDARD METHOD FOR THE MEASUREMENT OF NOISE EXPOSURE FROM HEADSETS*" VOL. 41, NO. 3 (2013)

Gabe Nespoli, Alberto Behar, & Frank A. Russo
Department of Psychology, Ryerson University, 105 Bond St, Toronto, Ontario, Canada, M5B 1Y3

We wish to report an error in Figure 4 of our paper entitled "Validation of the CSA Z107.56 Standard Method for the Measurement of Noise Exposure from Headsets", published in Volume 41 of Canadian Acoustics (Nespoli, Behar, & Russo, 2013). The figure caption states that the plotted values represent sound level increases attributable to speech, or the "effective listening SNR" as indicated in the CSA Standard. However, the values that are plotted represent the difference between the sound level under the cup of the headset and the sound level of the background noise, or $L_{headset} - L_N$. The revised figure displayed here is consistent with the original caption.

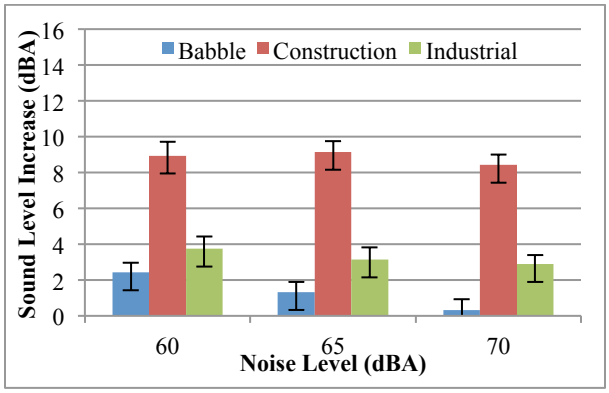

Figure 4a-revised. Increase of sound level due to speech for the low-attenuation headset.

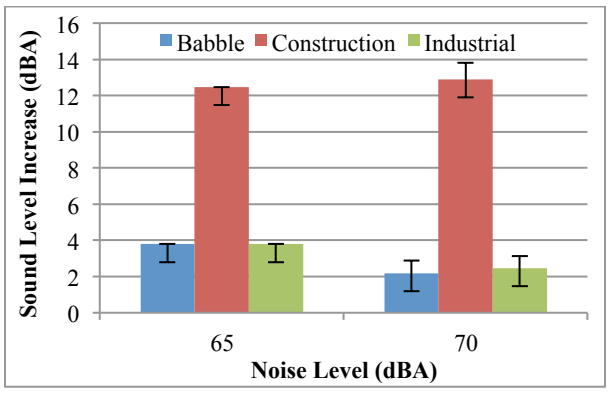

Figure 4b-revised. Increase of sound level due to speech for the high-attenuation headset.

In light of the response to our paper by C. Giguère, it also seems prudent to clarify some additional aspects of the study. First, our experimental configuration involved only two loudspeakers (see Figure 1 from the original paper), which limited the level of distortion-free sound that we were able to obtain in the lab. Second, our primary intention was to investigate the effects of different background noises and headsets on noise exposure, particularly as it pertains to the estimation method in Clause 7.3.4 of the Standard. To reiterate, the method in the Standard ascribes a single value (15 dBA) for the effective listening SNR, regardless of type of background noise or headset. This value was derived empirically on the basis of a meta-analysis of field studies (Giguère et al., 2012).

We observed a wide range of of SNRs for the different types of background noises and headsets tested, which led us to suggest caution in the use of the estimation method. Although the average increase we observed for construction noise (10.39 dB) fell within the range reported in the meta-analysis (13.7 dB ± 5.9 dB) that was conducted by Giguère et al. (2012), the babble and industrial noises fell below this range (2.01 dB and 3.21 dB, respectively). It is notable that the industrial noise sample possesses more high-frequency energy between and 1 and 4 KHz than the other two background noises (see Figure 3 from the original paper). Considering the importance of this frequency region for speech intelligibility (ANSI S3.5, 1997; Warren, Bashford, & Lenz, 2005), we would therefore expect that construction noise would lead to higher SNRs than babble and industrial noises.

The other contribution of our study that we wish to highlight is the effect of the type of headset. In particular, the high-attenuation headset led to larger exposure increases due to speech. This is an expected finding if we assume that listeners possess some internal criterion for total tolerable sound level. In other words, the effective listening SNR appears to be moderated by the overall level of sound exposure. Specifically, the effective listening SNR is smaller when the background noise is louder.

We acknowledge that the absolute values obtained in our study were consistently lower than the average determined by Giguère et al.'s (2012) meta-analysis upon which the estimation method is based. There are numerous potential reasons for this discrepancy that have already been described in Giguère's letter ranging from (a) our artificial ear method, (b) the relatively low level of background noise, and (c) the artificiality of the lab-based testing environment. Nonetheless, the differences we observed across background noises and headsets remain, and are interpretable. These differences lead us to recommend caution in the application of a single value to estimate the effective listening SNR for workers wearing headsets.

REFERENCES

American National Standard Methods for Calculation of the Speech Intelligibility Index. New York: American National Standards Institute; 1997.

CAN/CSA Z107.56-13. “Measurement of Noise Exposure,” Canadian Standard CAN/CSA Z107.56-13, Canadian Standards Association, Mississauga.

Giguère, C., Behar, A., Dajani, H. R., Kelsall, T., & Keith, S. E. (2012). Direct and indirect methods for the measurement of occupational sound exposure from communication headsets. *Noise Control Engineering Journal, 60(6),* 630–644.ANSI S3.5.

Nespoli, G., Behar, A., & Russo, F. A. (2013). Validation of the CSA Z107.56 standard method for the measurement of noise exposure from headsets. *Canadian Acoustics, 41*, 31–36.