
Are the detrimental effects of reverberation on speech intelligibility in noise more important for hearing-impaired than for normal-hearing listeners?

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Abstract

Speech intelligibility in noise can be severely reduced by several effects of reverberation. Most of these effects have been thoroughly studied for normal hearing listeners. It is not always the case for hearing impaired listeners, who often complain about important difficulties to understand speech in noisy and reverberant rooms. Two monaural effects of reverberation were investigated here. The first one is the temporal smearing of the target speech, which decreases its intelligibility. This effect is usually found to be greater for hearing-impaired listeners. The second one is the temporal smearing of the noise. When the temporal envelope of the noise masker is modulated, this effect of reverberation lowers the benefit obtained from listening in the masker dips. This effect has almost never been studied for hearing impaired listeners. These two phenomena were studied separately and in combination, by applying reverberation either only on the target speech, only on the noise masker, or on both. The intelligibility scores of 32 normal-hearing and 32 hearing-impaired listeners were measured at several SNRs, with several reverberation times and noise maskers. The hearing-impaired listeners were tested without their hearing aids, but received a linear amplification that partly compensated their hearing loss. The intelligibility scores of both groups were analyzed with Bayesian tests, to detect for the presence and absence of effects. The effect of the temporal smearing of the speech was found similar in both groups, which indicates that the linear amplification seems sufficient to compensate the differences experienced by hearing-impaired and normal-hearing listeners. The temporal smearing of the noise seemed less important for hearing-impaired than for normal-hearing listeners and was greatly affected by the SNR used.

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