ACOUSTICS2008/2095
A model with compression for estimating speech intelligibility in quiet and in noise

Koenraad Rhebergen[a] and Johannes Lyzenga[b]

[a]AMC - Dept. of Clinical and Experimental Audiology, AMC, Clinical and Experimental Audiology, 1105 Amsterdam, Netherlands

[b]Vrije Universiteit Medical Center, Boelelaan 1117, 1081 HV Amsterdam, Netherlands

For speech reception thresholds (SRTs), measured in normally-hearing listeners using various types of stationary noise, the Speech Intelligibility Index (SII, ANSI S3.5-1997) model predicts a fairly constant speech proportion (of about 0.3) necessary for sentence intelligibility. For SRTs in quiet, the estimated speech proportions are often lower, and show a larger inter-subject variability, than found for speech in noise near normal speech levels. This might be related to the fact that cochlear compression is larger at normal speech levels than near the threshold for speech in quiet. The SII model does not take this into account. The present model attempts to alleviate this problem by including cochlear compression. It is based on a loudness model for normally-hearing and hearing-impaired listeners [ANSI S3.4-2007]. It estimates internal excitation levels of the speech, accounts for the compressed effective dynamic range of the internal speech signal, and calculates the proportion of speech above threshold using similar spectral weighting as used in the standard SII. The present model and the standard SII were used to predict SRTs in quiet and noise for both normally-hearing and hearing-impaired listeners. The present model predicted speech intelligibility with less variability than the standard SII.