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Application of psychoacoustical models for speech intelligibility prediction

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Hearing-Impaired listeners have tremendous communication problems in a cocktail party situation.This talk will review current models that predict cocktail party performance in normal listeners and also describe the degradation of performance in sensorineurally hearing-impaired listeners. The models can be validated by comparing human performance with numerical model predictions of auditory perception for normal and hearing-impaired listeners and with computer speech recognition.A good approximation of human auditory performance in cocktail parties seems to be an adaptive two- microphone array with a lossy dynamic compression followed by an optimum detector. A straight-forward implementation of this idea is the model by v. Hövel (1984) which has recently been updated and applied to more complex acoustic situations in our lab. It employs a filterbank with independent Equalization- and Cancellation mechanisms in each frequency band that are numerically adjusted to optimize the signal-to-noise ratio at the output. Another important issue is the prediction of speech intelligibility in fluctuating noise as a function of the individual'sspeech reception threshold in quiet and in stationary noise (Wagener, 2003): The best prediction of human performance is obtained with a two-stage model of sentence recognition, where in a first stage the individual subunits of each word is perceived with a certain error probability. In a second stage, the recognized items are combined in a more or less faulty way to form the complete recognized words and sentences.

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