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The Use of Virtual Acoustics in the Evaluation and Development of Binaural Hearing Aid Algorithms

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The development of noise reduction algorithms for hearing aids (HA) is not longer only related to the improvement of signal to noise ratio, but also to the quality of hearing, e.g. binaural aspects of hearing. This is very important for the recognition of the localization of sound sources but also for an improved speech intelligibility in noisy situations due to spatial release from masking effects. New design and signal processing algorithms for binaural HA's need to be tested and validated in different acoustical scenarios. As it is too laborious and time consuming to perform sufficient numbers of perceptual evaluations in different rooms with different acoustical parameters, advanced acoustic modeling of different virtual acoustical environments might be needed. Virtual acoustics in our research relates to the convolution of the measured or simulated binaural signals (head related transfer functions - HRTF's) with the impulse response generated from a computer model of a room (using ODEON® software) to simulate binaural sounds. This study investigates the usage of virtual acoustics in the framework of developing algorithms for binaural hearing aids. It evaluates and quantifies the fidelity of binaural signals generated by commercially available virtual acoustics software with respect to the localization of sound and speech intelligibility in different acoustical scenarios.