Speech intelligibility prediction

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Why should we predict speech intelligibility?

„How does the (impaired) auditory speech processing work?"

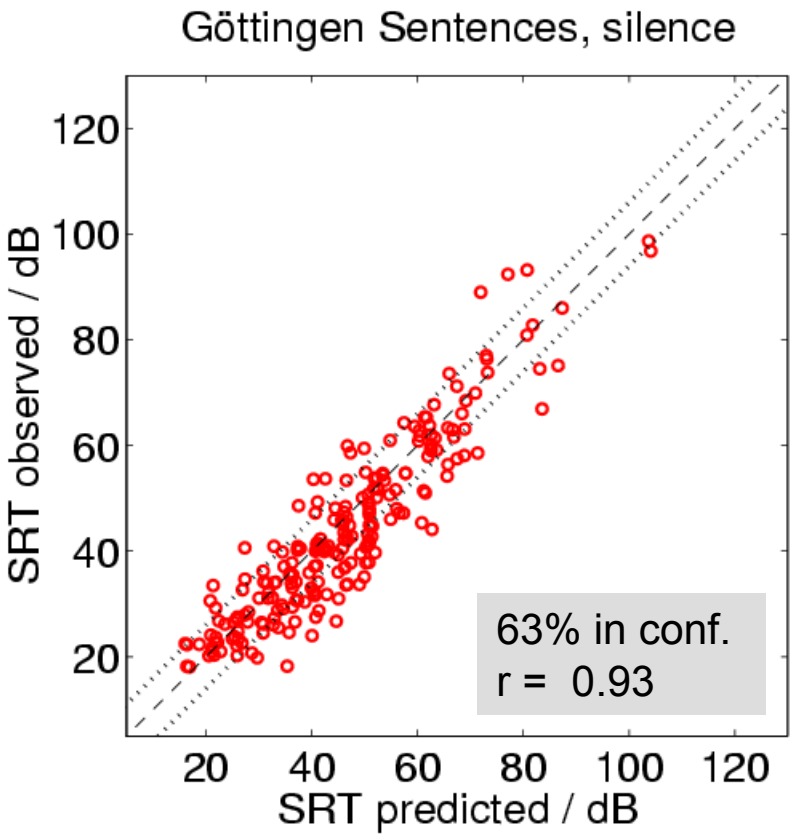
Characterization of subjects with a minimal set of measurements

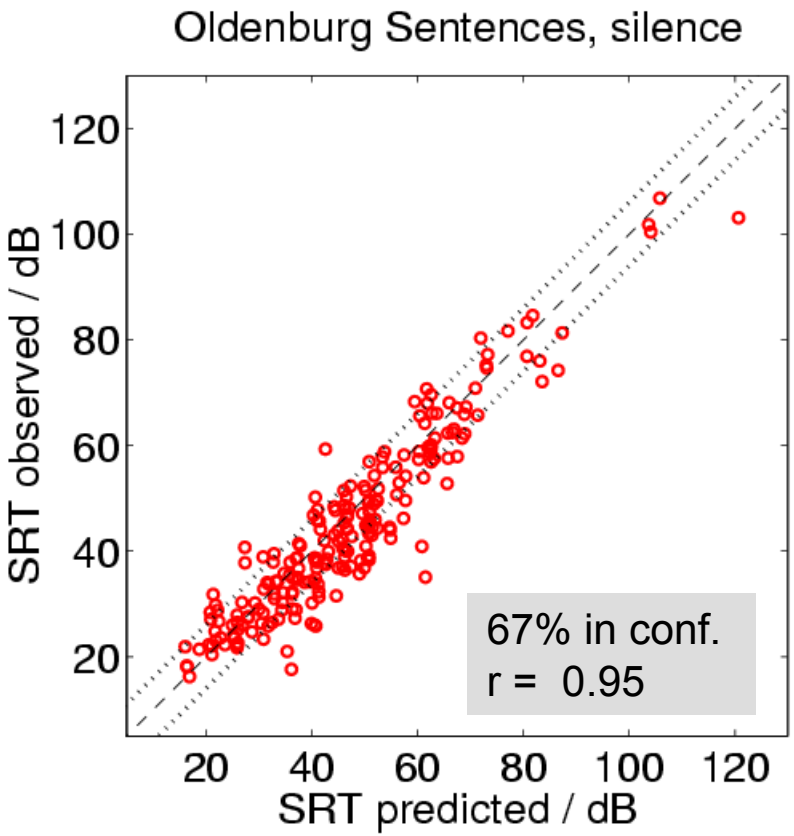
Diagnosis of peripheral and central components of hearing loss

Basis of algorithms and fitting rules for hearing aids

SRT in silence

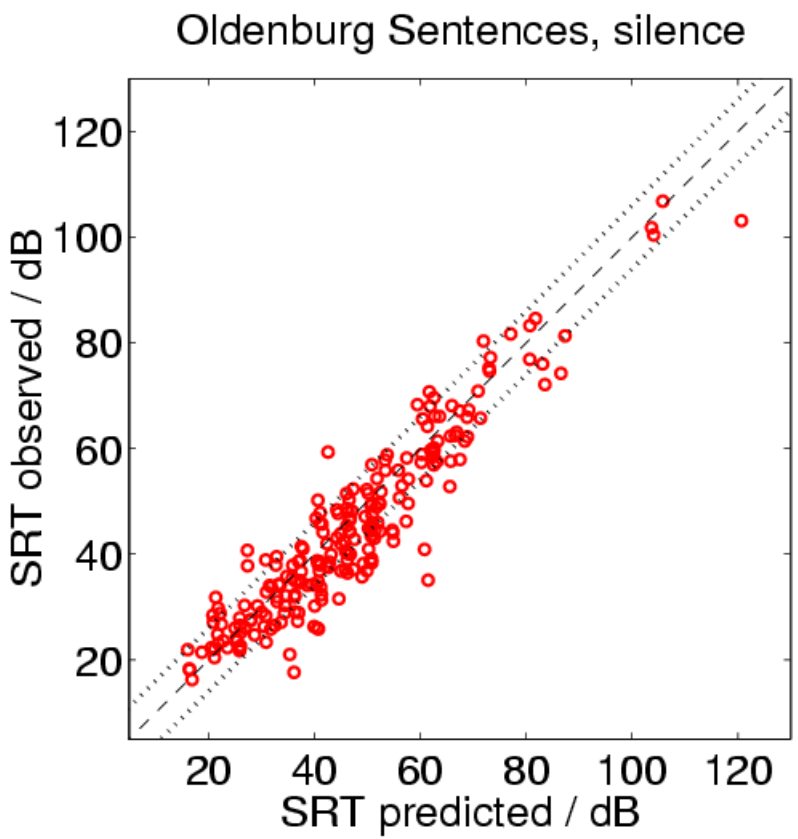
Prediction of SRTs for hearing impaired listeners using the SII



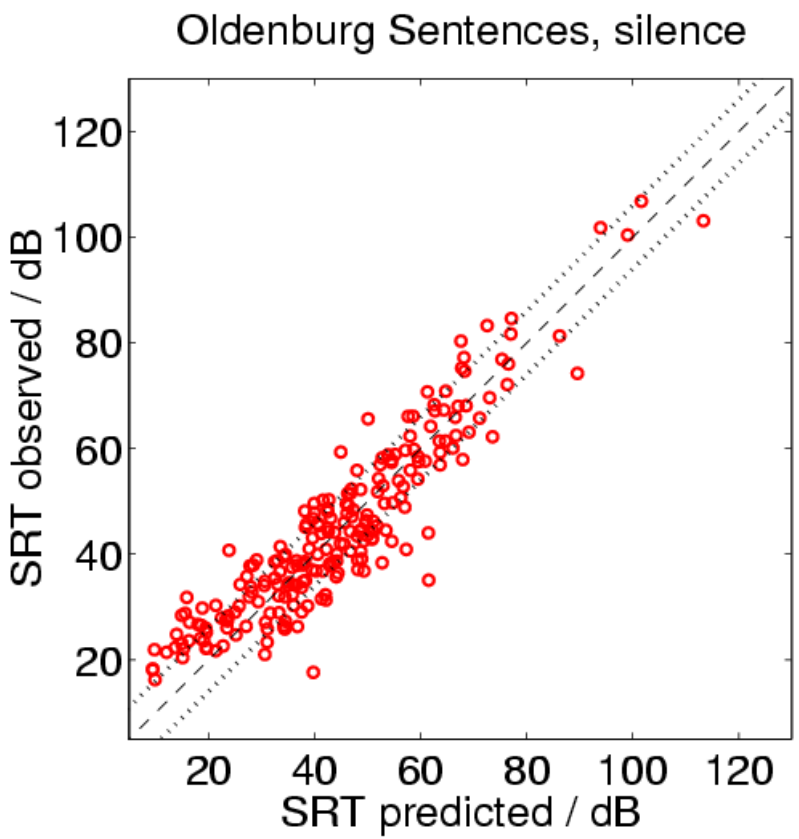


SII (ANSI S3.5, 1997) compared to AI (Fletcher & Galt, 1950)

SII

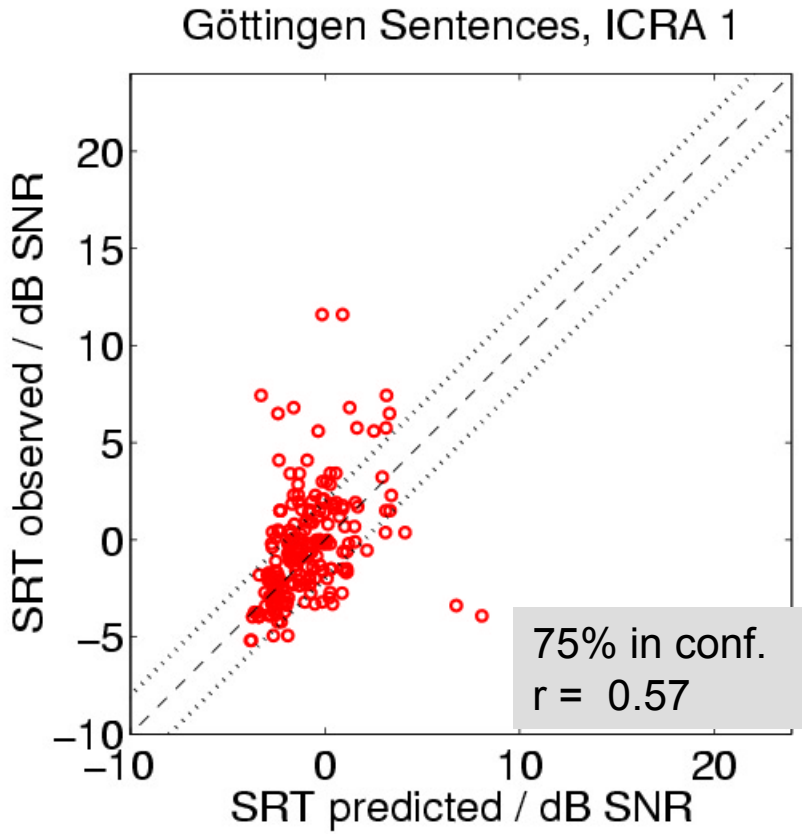


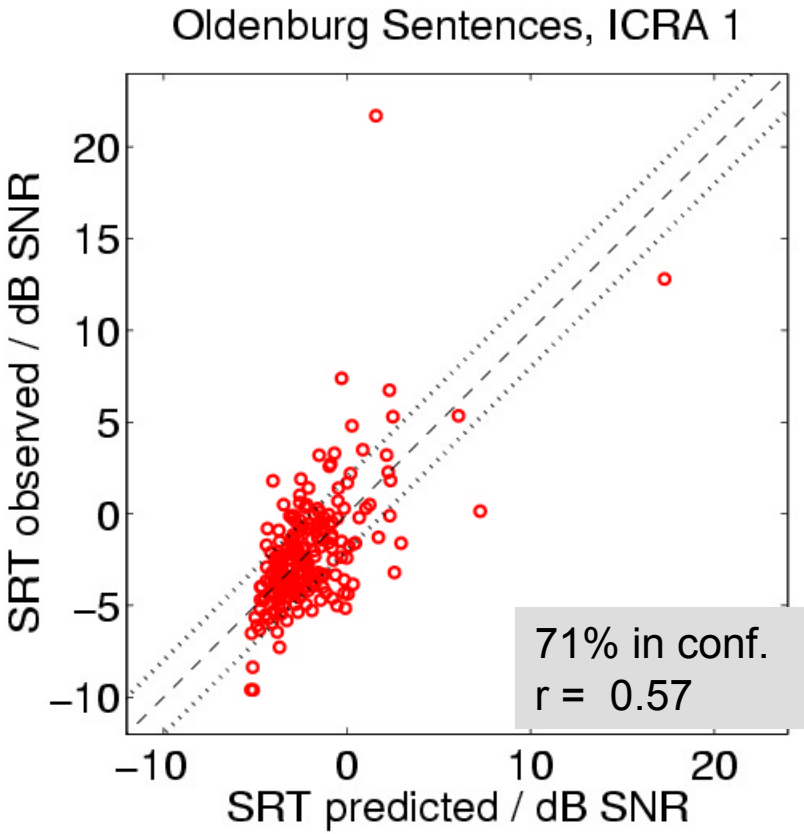
AI



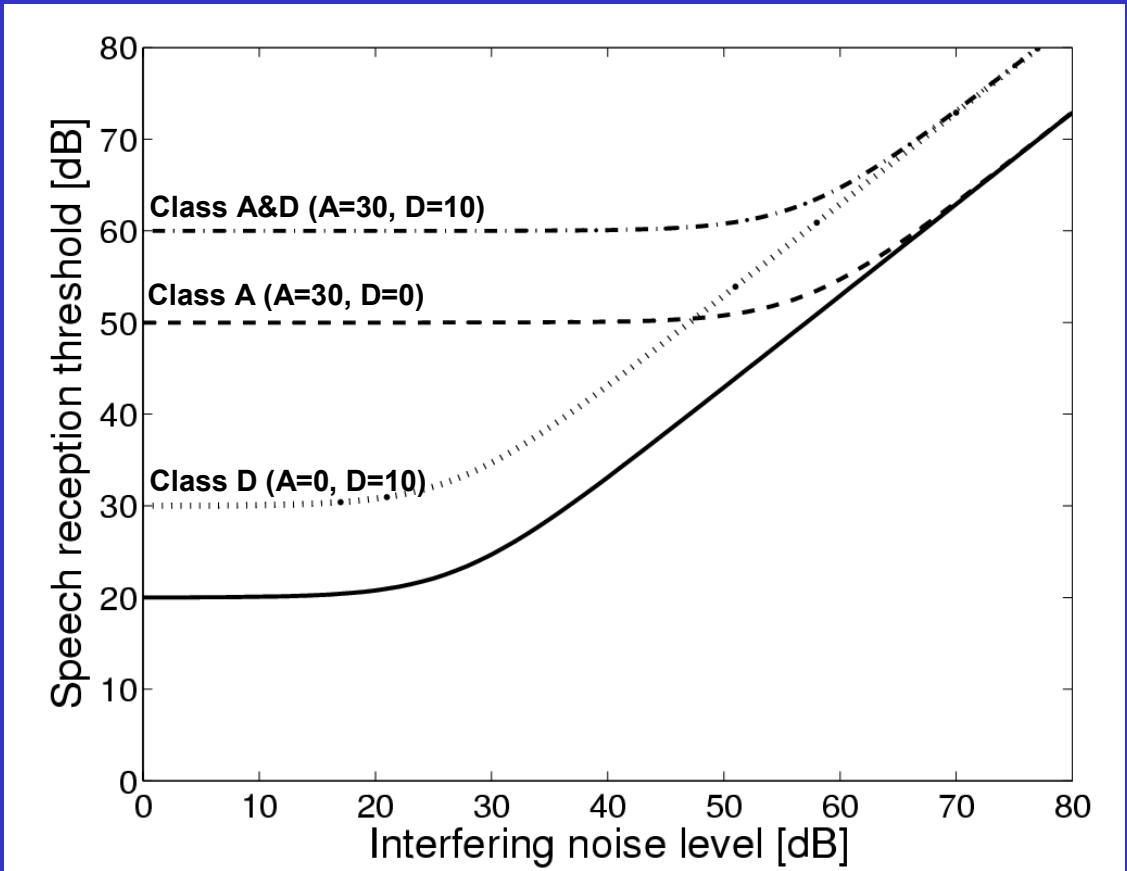
SRT in noise

Prediction of SRTs in noise using the SII





Plomp Model (JASA No 63, 1978):
Attenuation and distortion component of hearing loss for speech



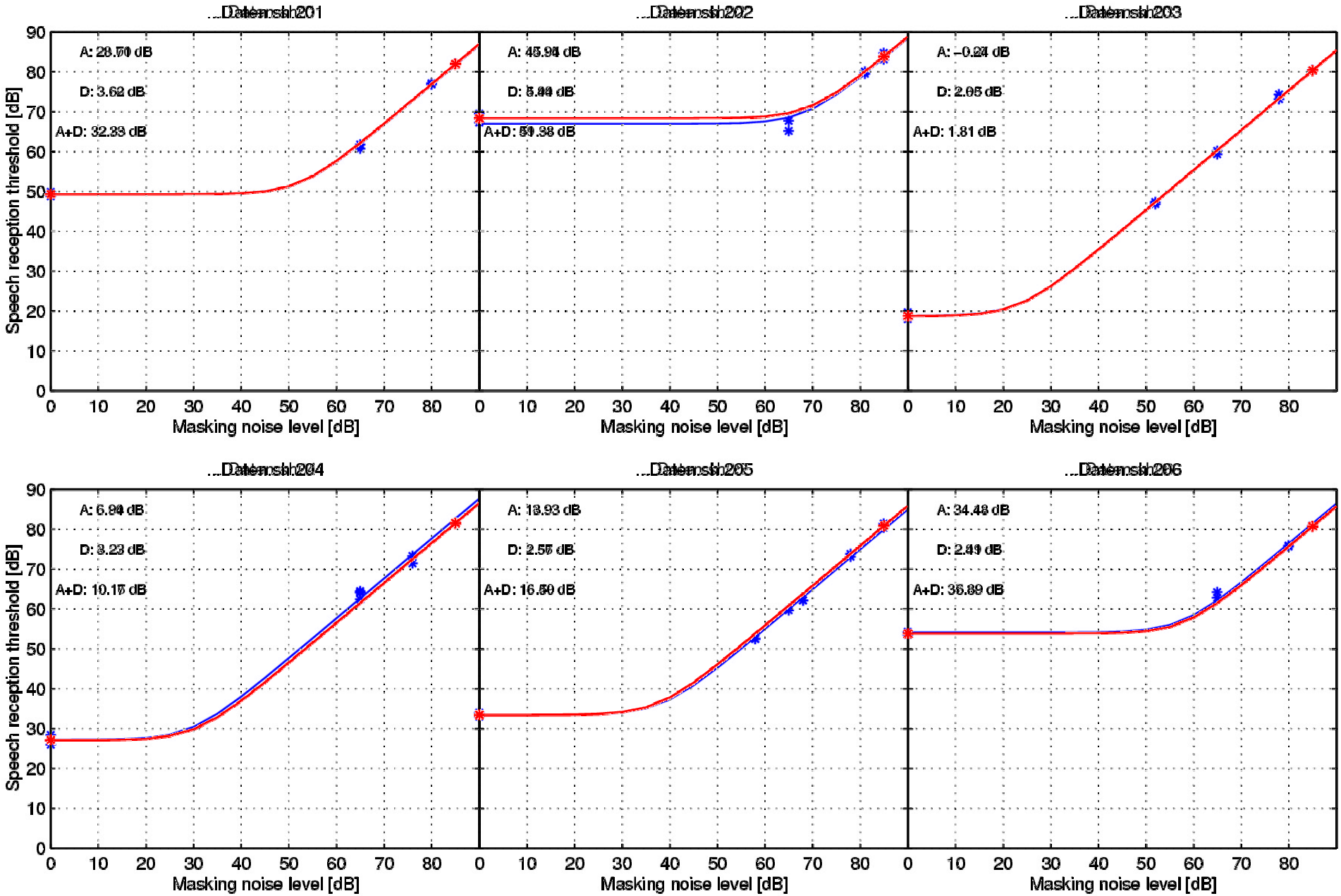
Oldenburg sentence test

L_0 = 20 dB

ΔL_{SN} = 7.1 dB

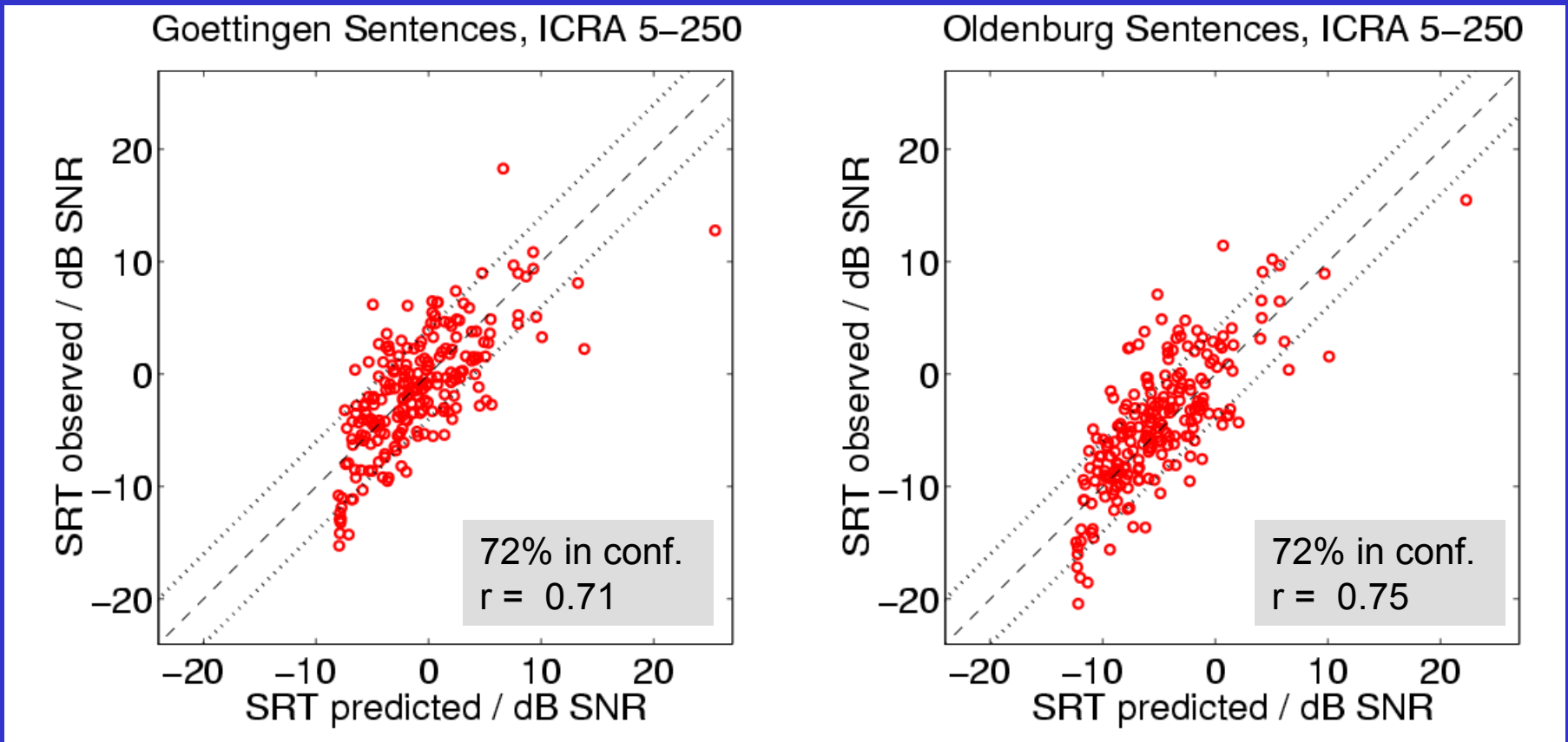
$$SRT_{A+D} = 10\log(10^{(L_0+A+D)/10} + 10^{(L_n-\Delta L_{SN}+D)/10})$$

Validation of Plomp Model

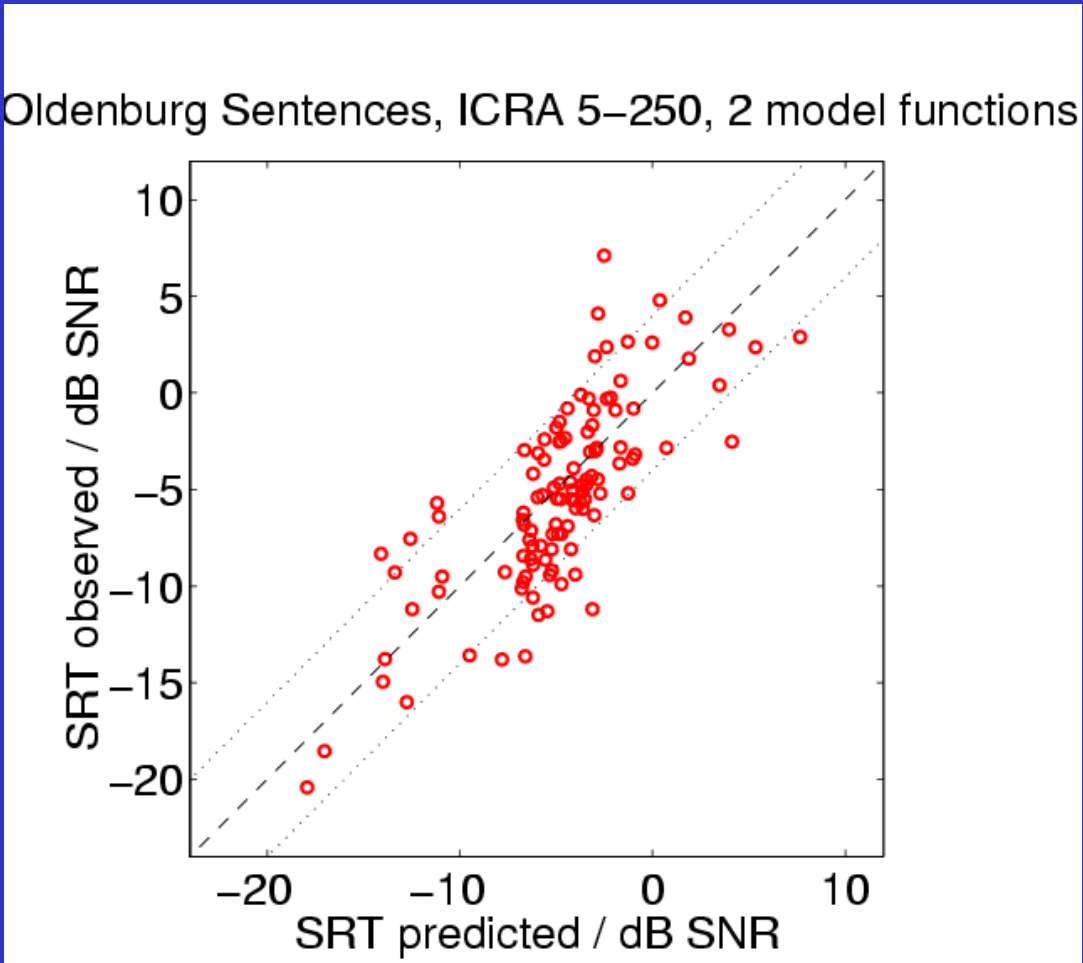


SRT in modulated noise

Prediction of SRTs in modulated noise using a modified SII

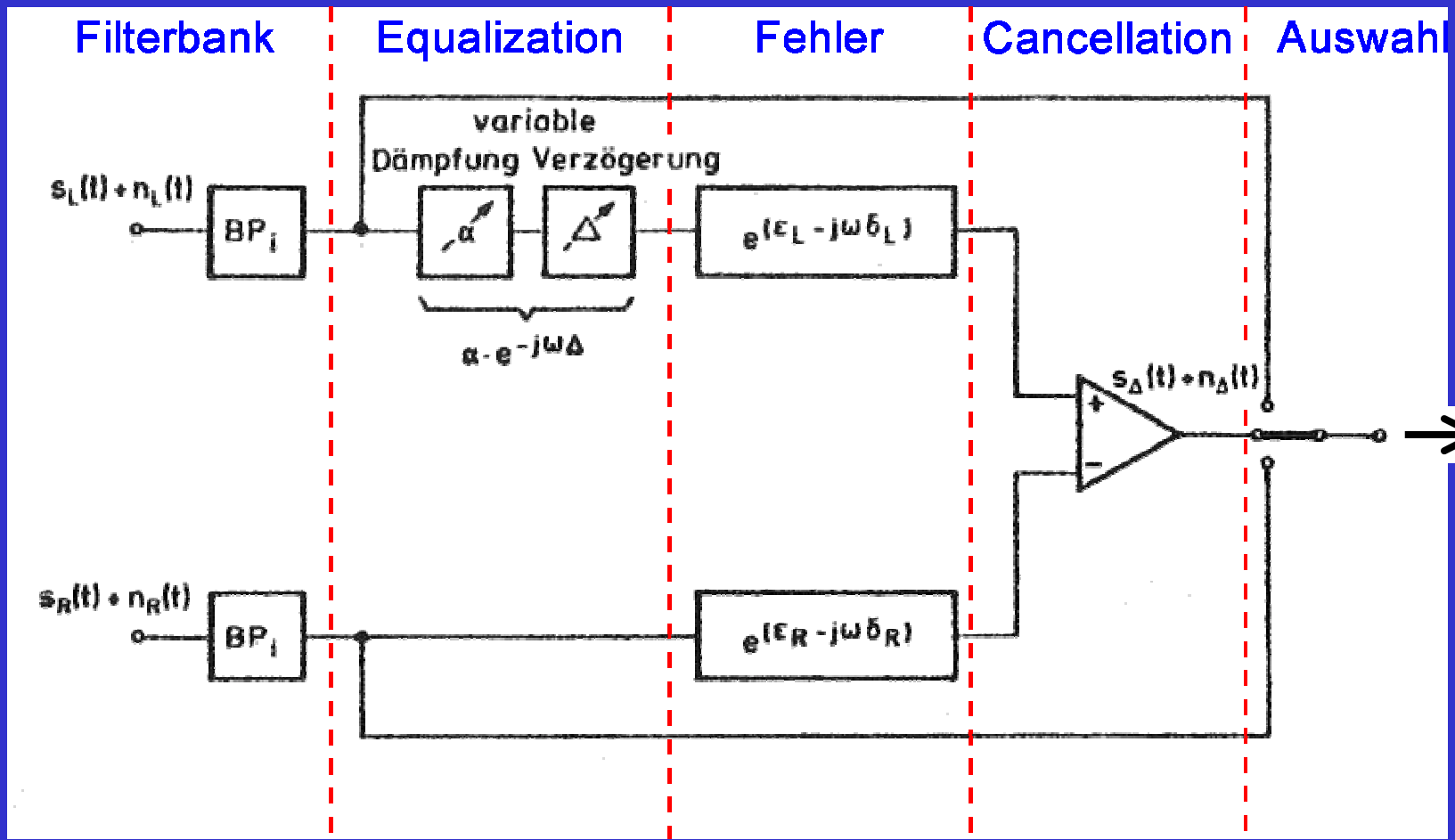


Prediction of SRTs in modulated noise based on the Plomp model



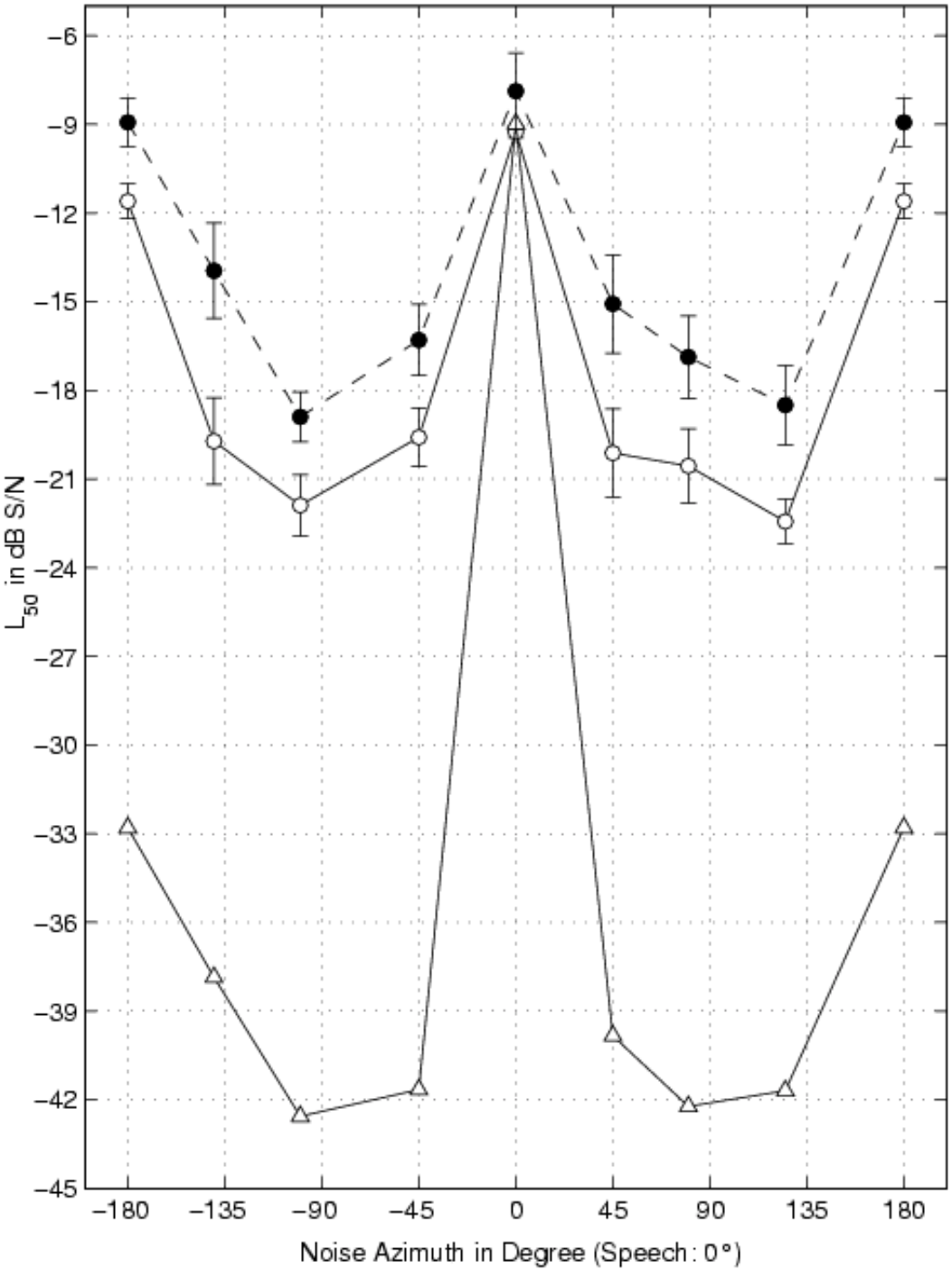
Binaural speech intelligibility and room acoustics

EC–model according to v. Hövel

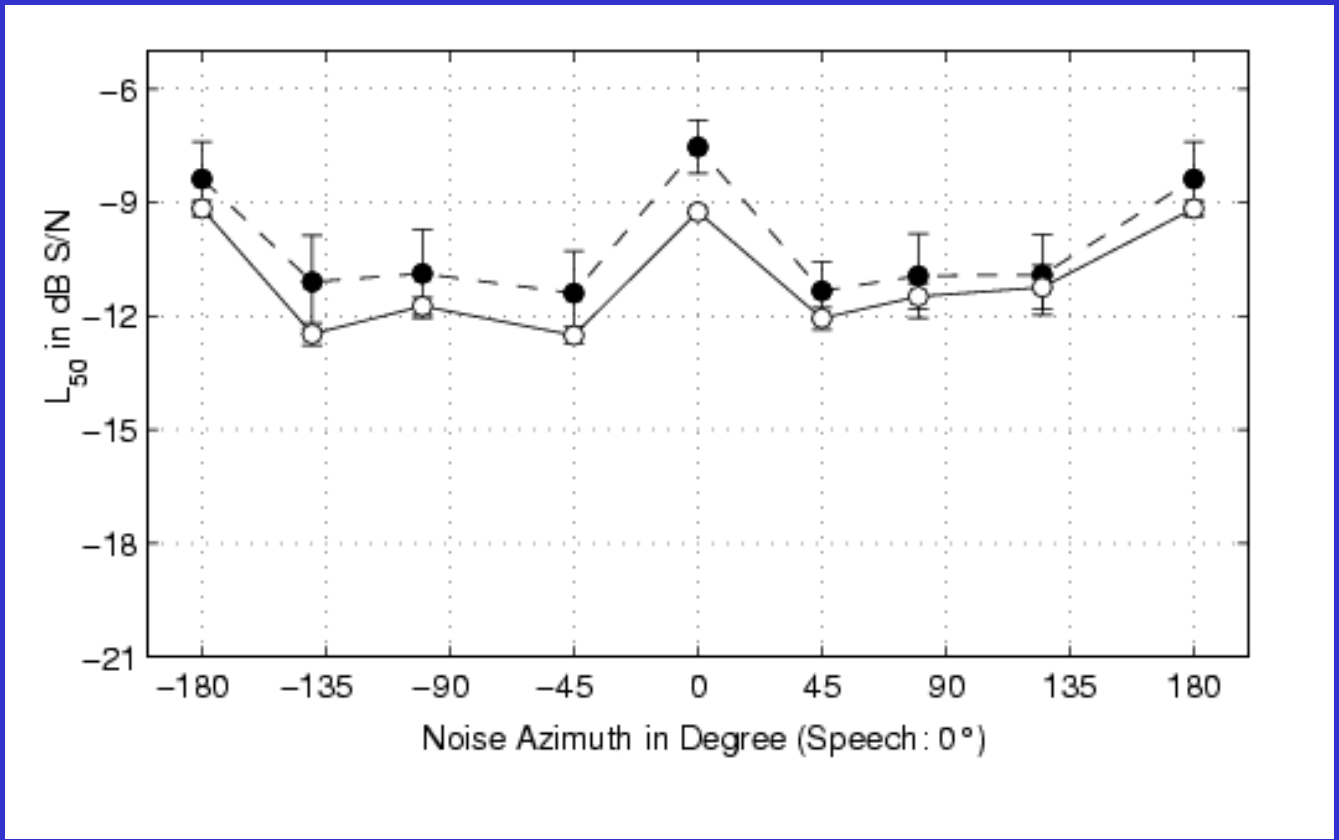


Binaural speech intelligibility

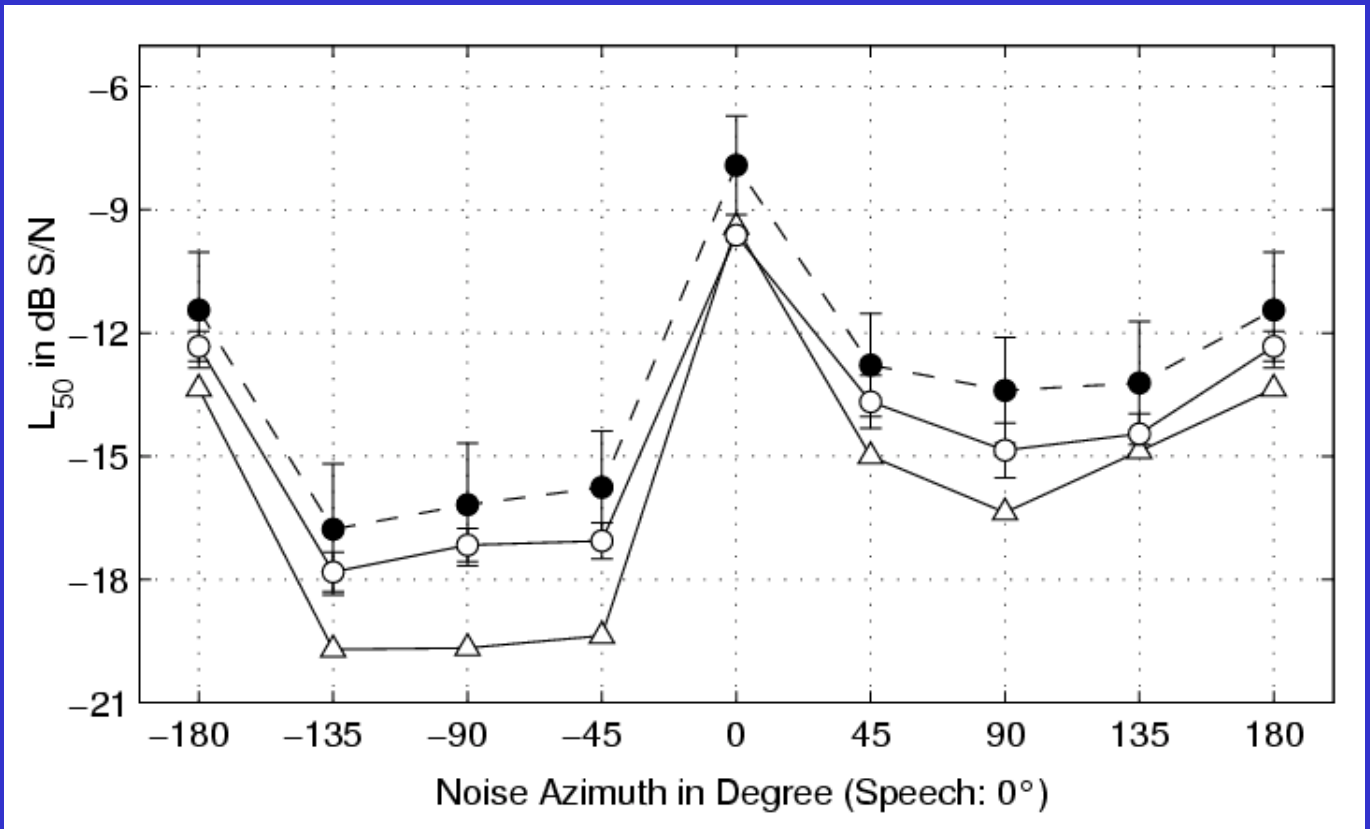
non-reverberant room



Office room


−6
−9
−12
−15
−18
−21
L_{50} in dB S/N
−180
−135
−90
−45
0
45
90
135
180
Noise Azimuth in Degree (Speech: 0°)

Cafeteria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L_{50} in dB S/N
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135
180
Noise Azimuth in Degree (Speech: 0°)

Conclusions and outlook

Conclusions:

- SRT in silence is predictable for NH and HI listeners
- Predictions in noise are difficult for hearing impaired listeners
- Binaural gain is predictable for normal hearing listeners and for different room acoustics

Outlook:

- Inclusion of SII into "Oldenburg Measurement Software"
- Generalization of binaural model for hearing impaired listeners
- Use of more models (e.g. Müsch's SRS Model, "Oldenburg Perception Model")