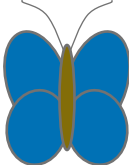
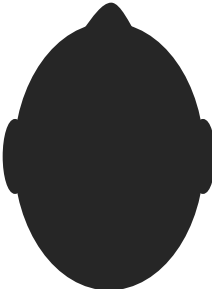


PRESERVING NATURAL PINNA CUES WITH DIGITAL PINNA

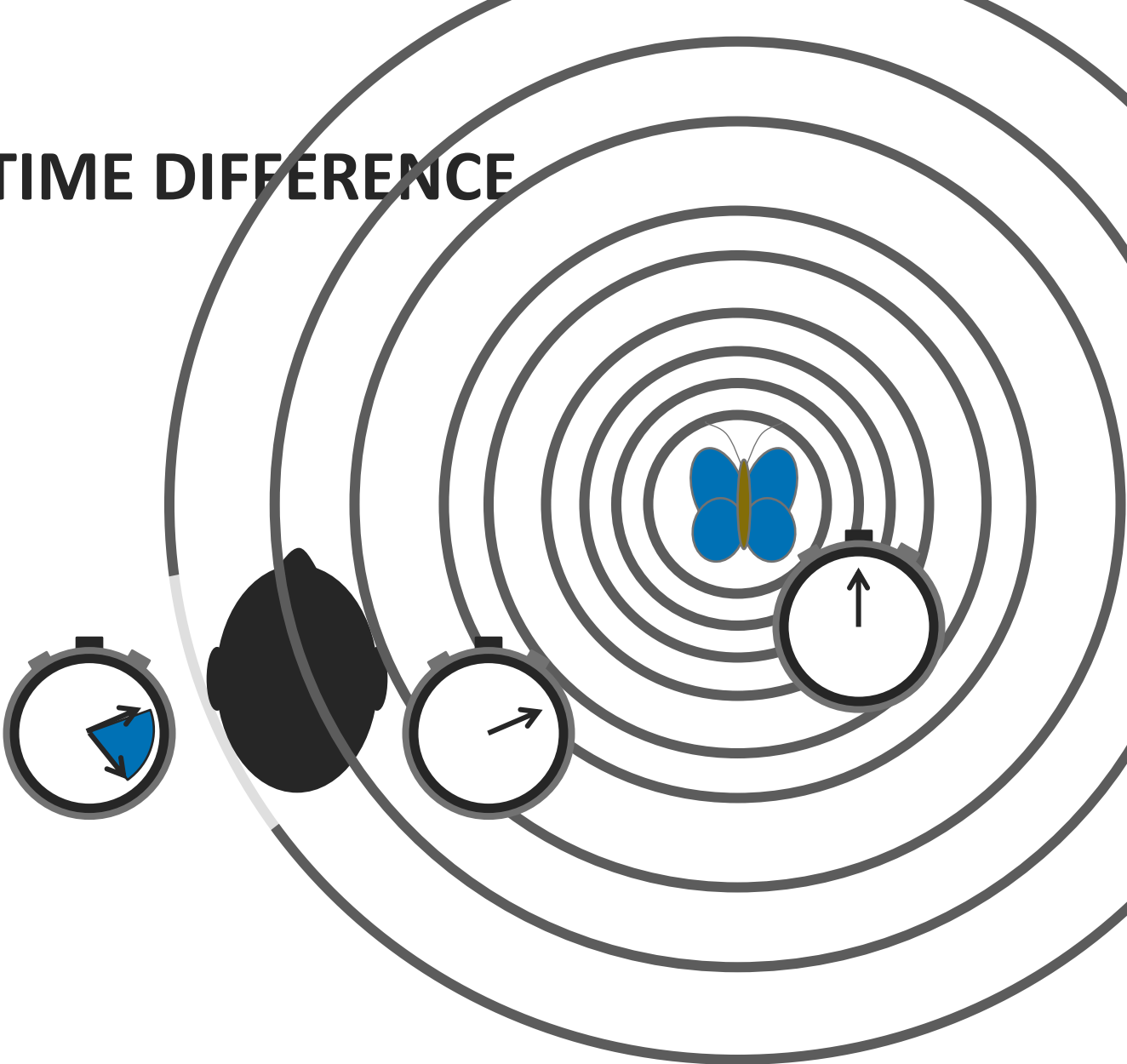
Petri Korhonen

Widex, Office of Research in Clinical
Amplification (ORCA-USA)

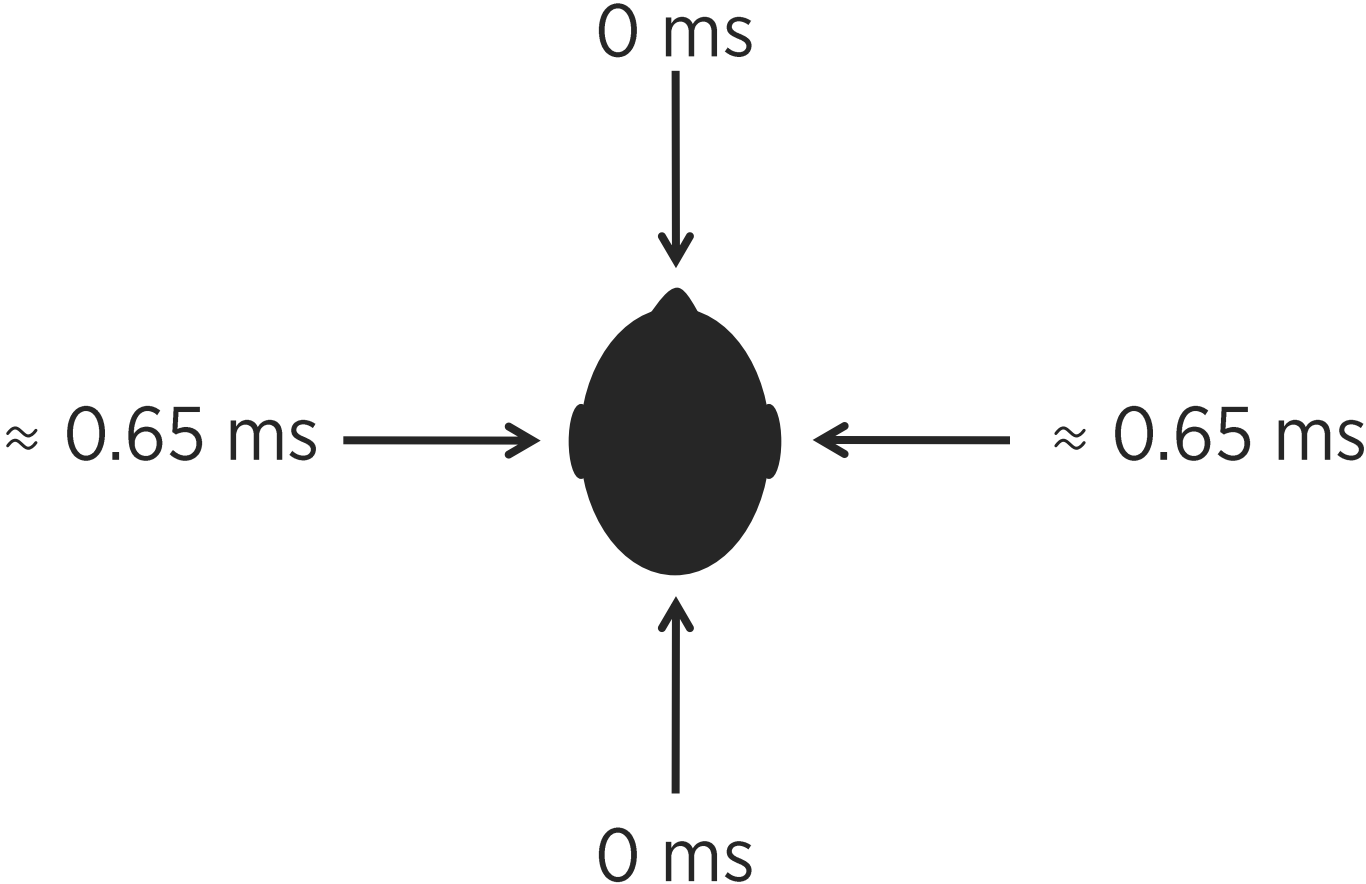
DIRECTIONAL HEARING



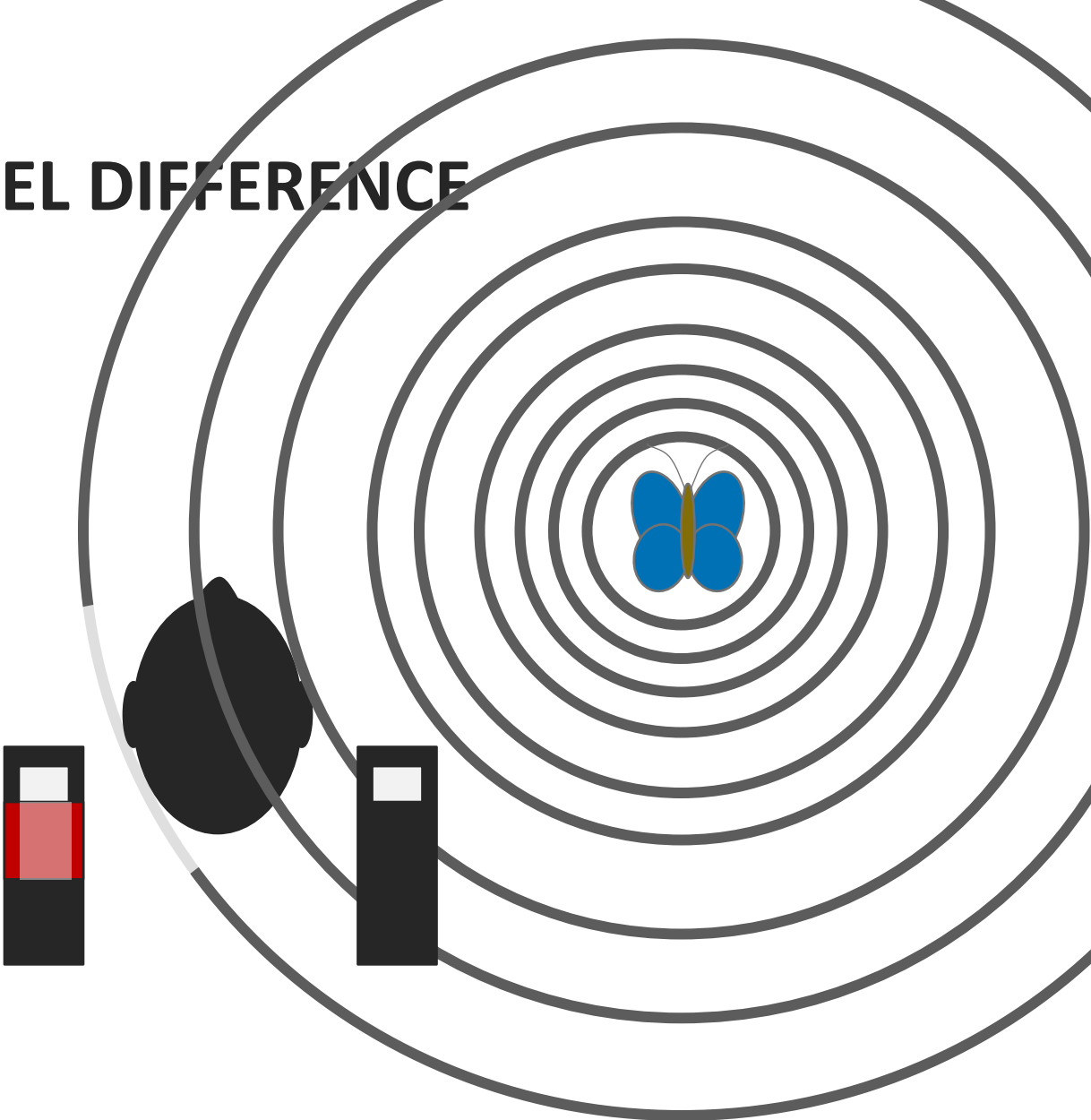
INTERAURAL TIME DIFFERENCE



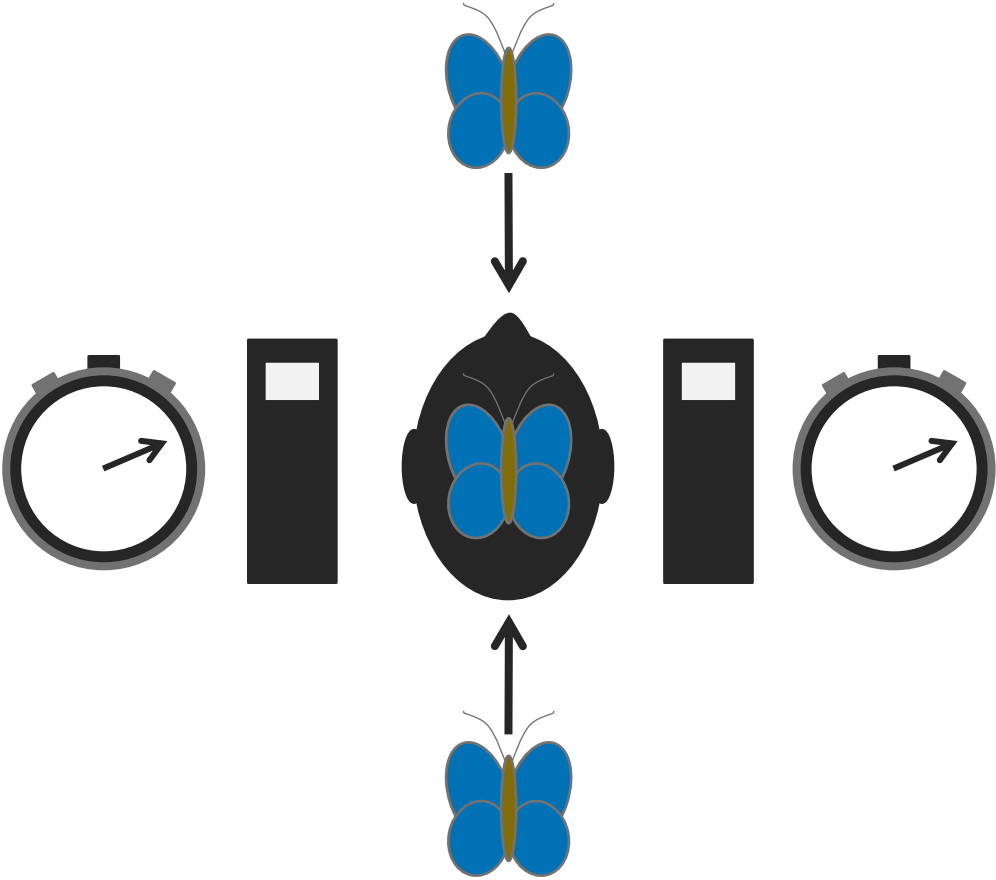
INTERAURAL TIME DIFFERENCE



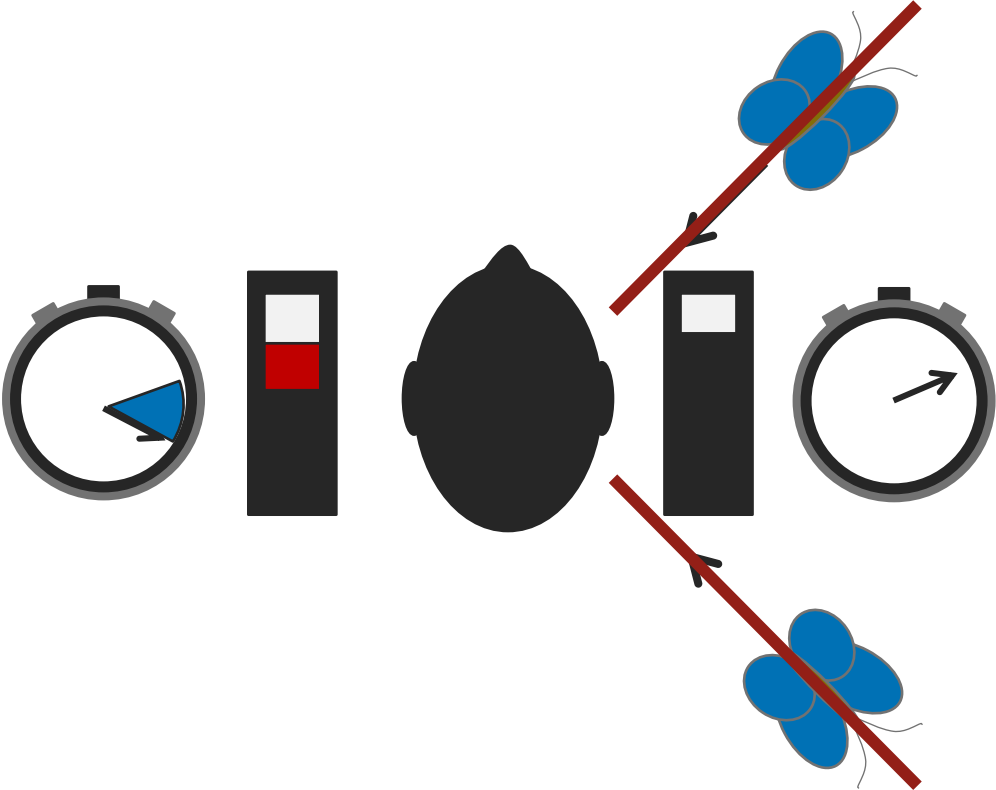
INTERAURAL LEVEL DIFFERENCE



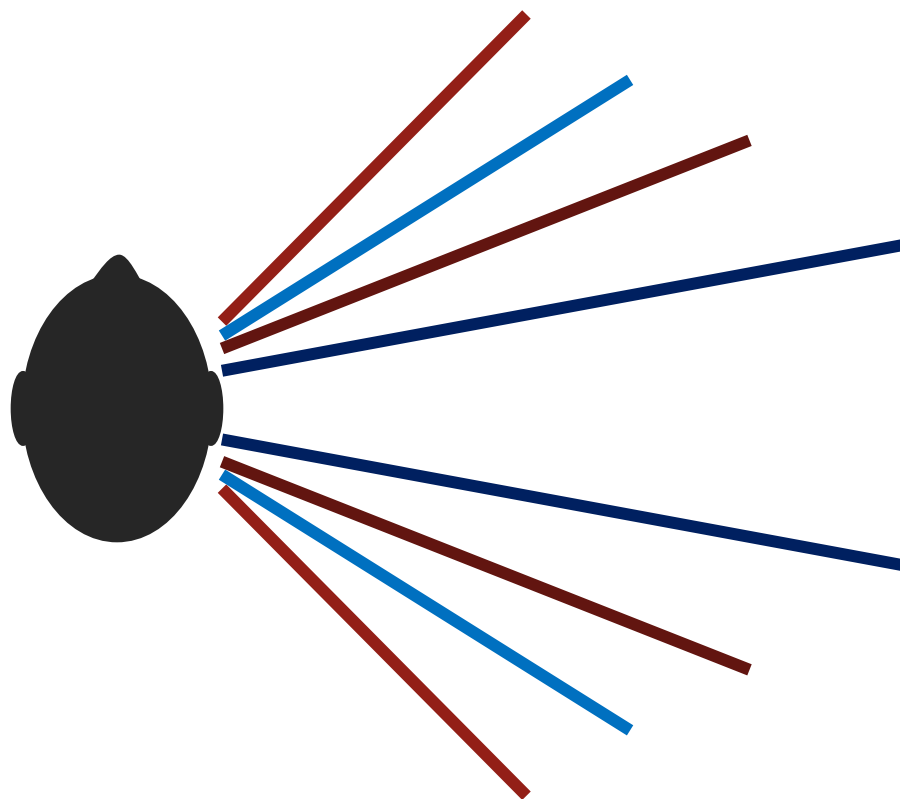
FRONT / BACK?



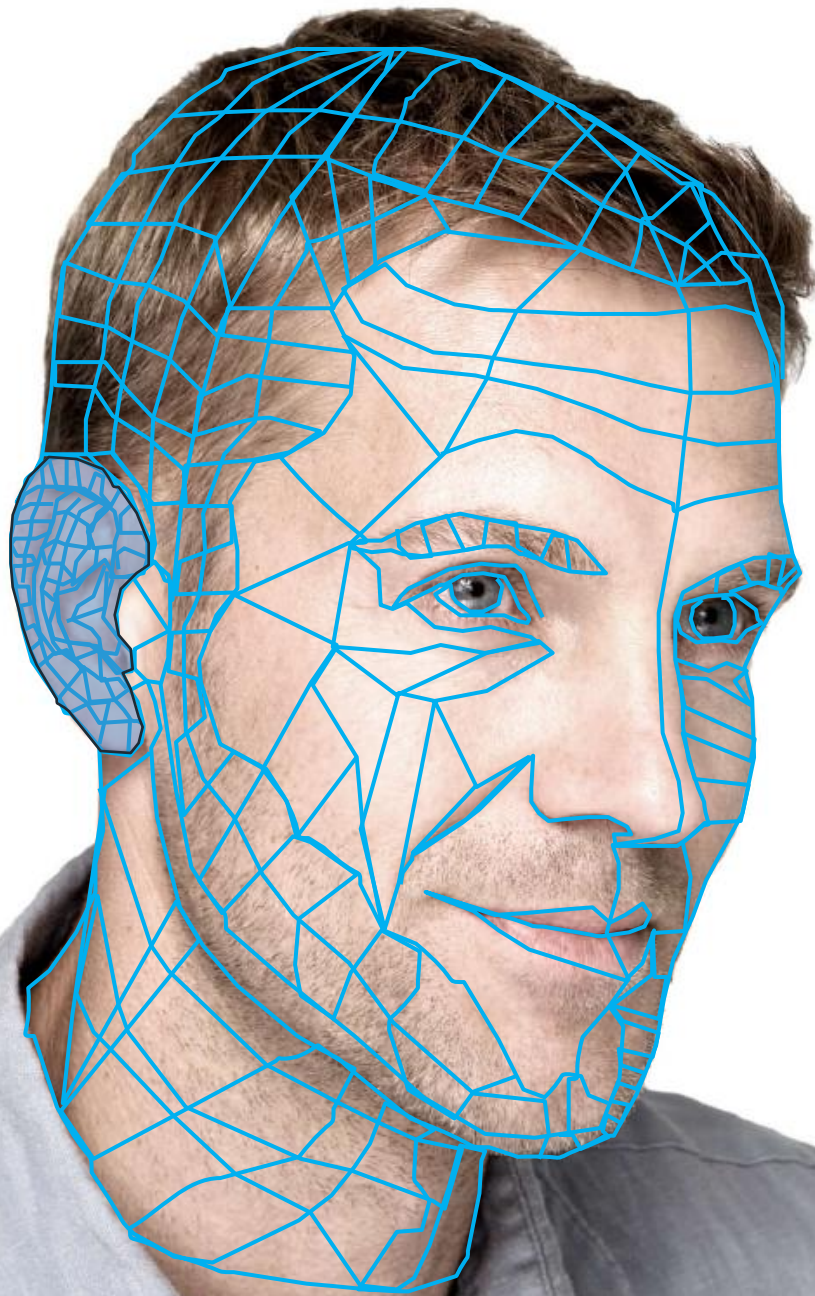
CONE OF CONFUSION



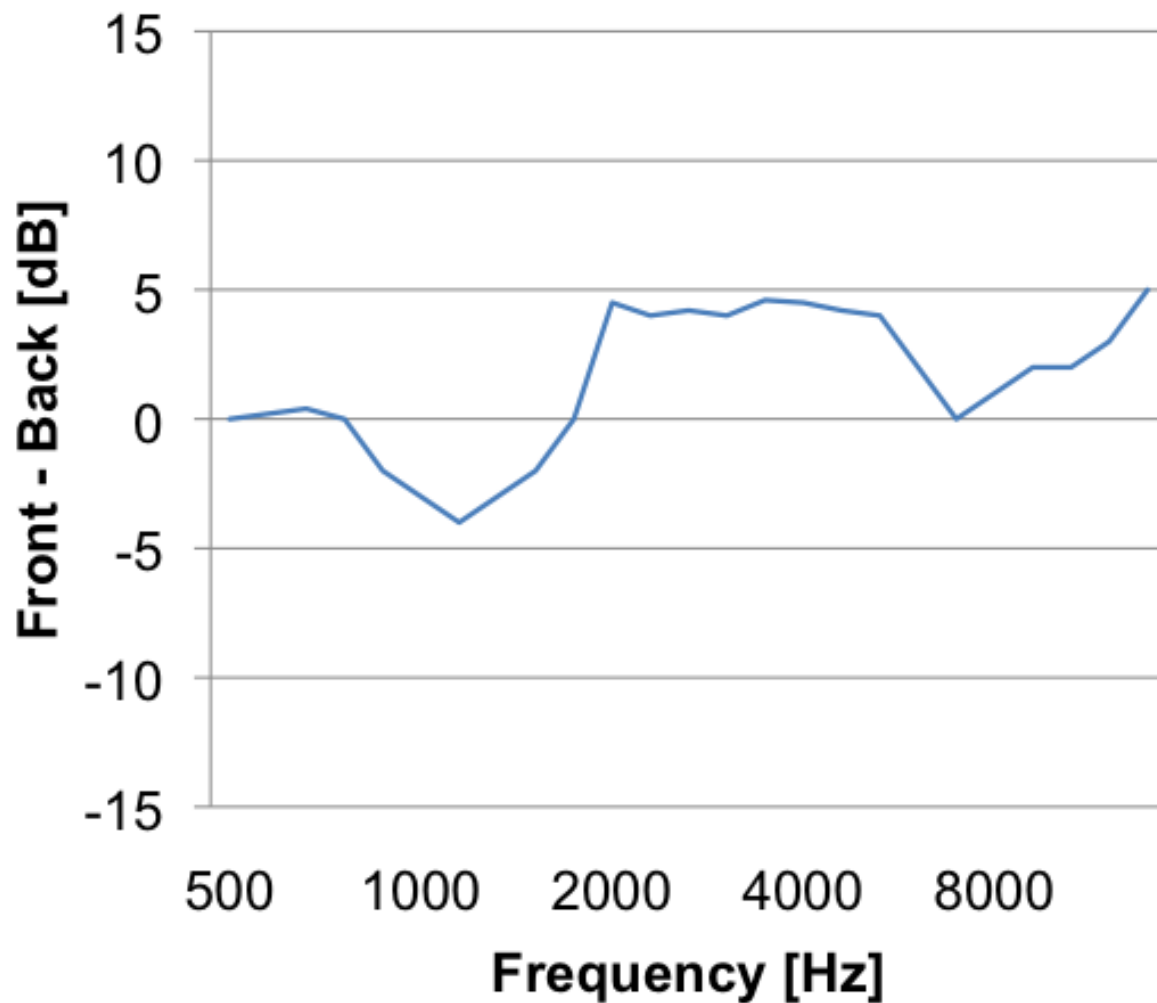
CONE OF CONFUSION



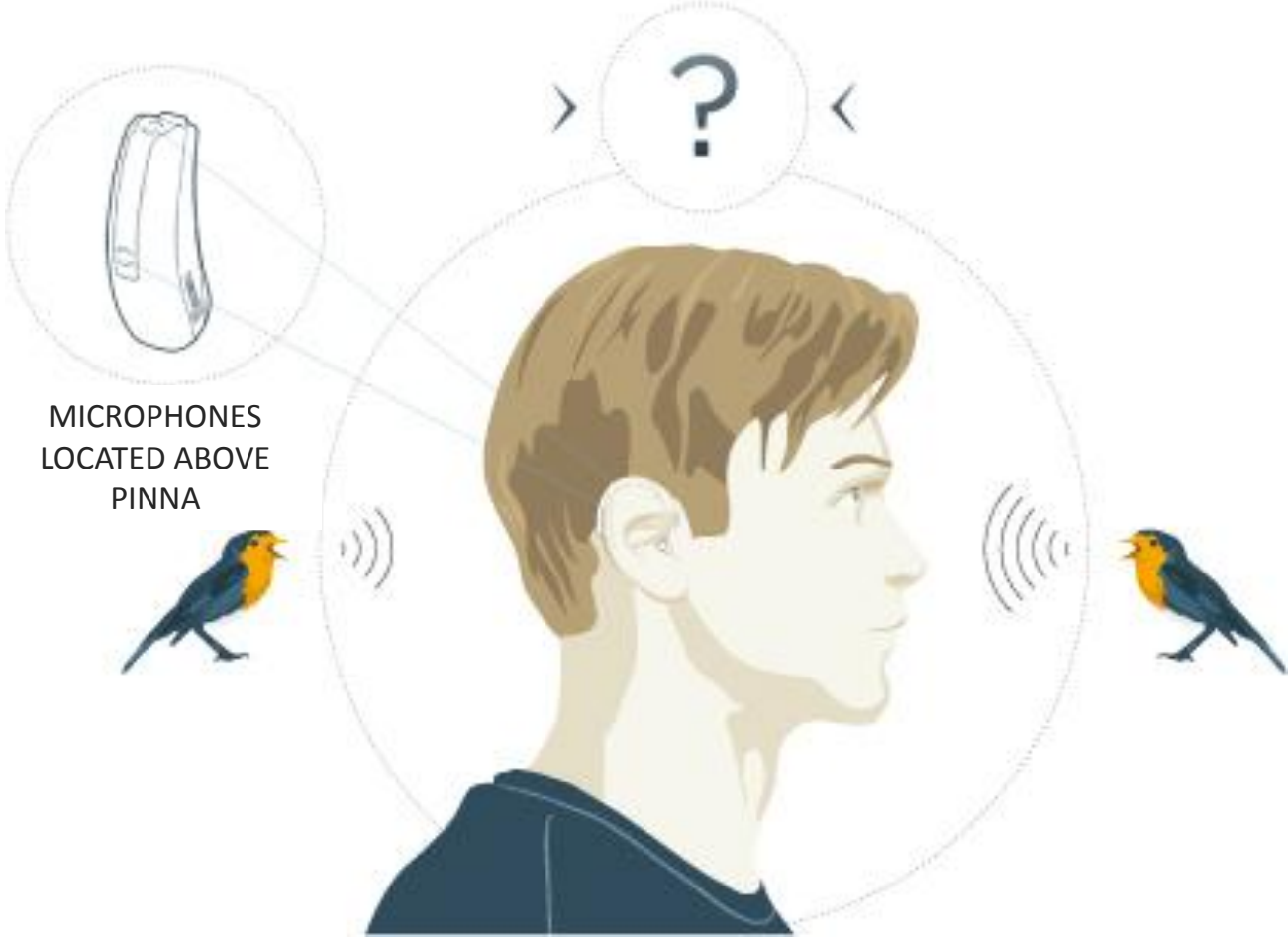
The pinna
effect



THE AVERAGE PINNA EFFECT



PINNA CUE IN BTE FITTINGS



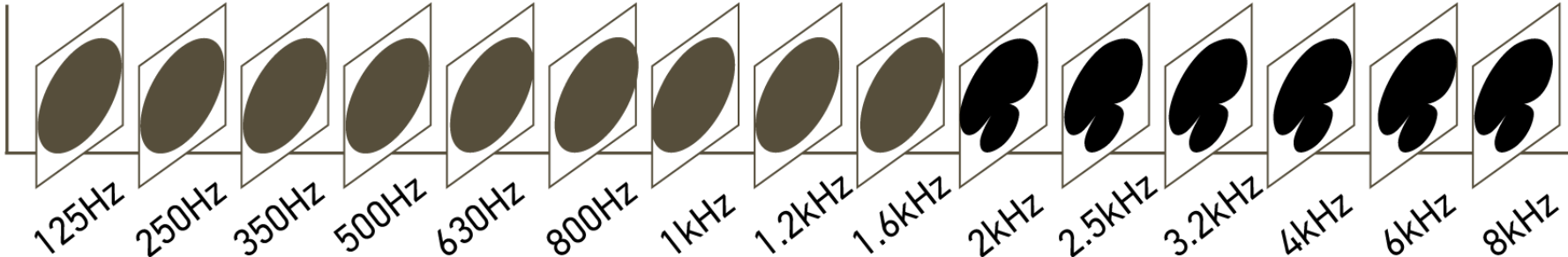
MICROPHONES
LOCATED ABOVE
PINNA



DIGITAL PINNA

omni directional

hypercardioid



POTENTIAL BENEFITS OF DIGITAL PINNA

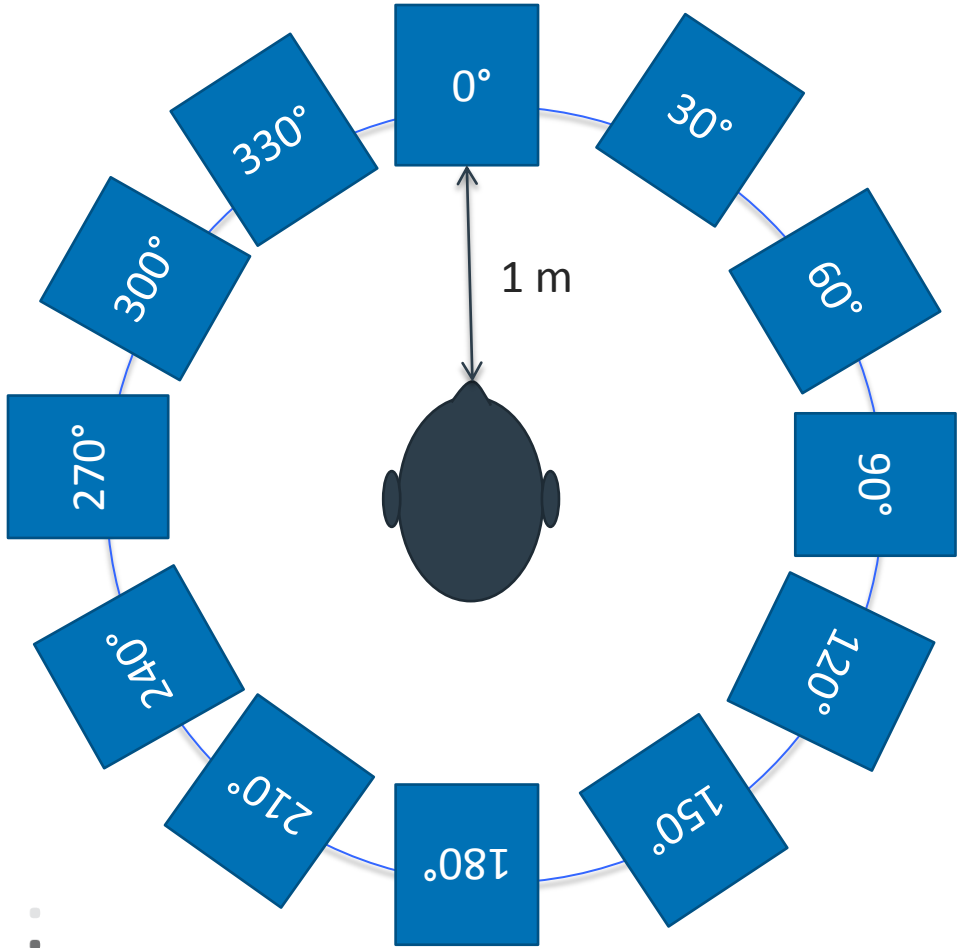
Processing outcome	Listener benefit
Mimic the natural pinna effect	Improved front-back localization
Attenuates high frequency sounds arriving from the back	In noisy surroundings, provide noise reduction for improved intelligibility



CLINICAL TRIALS

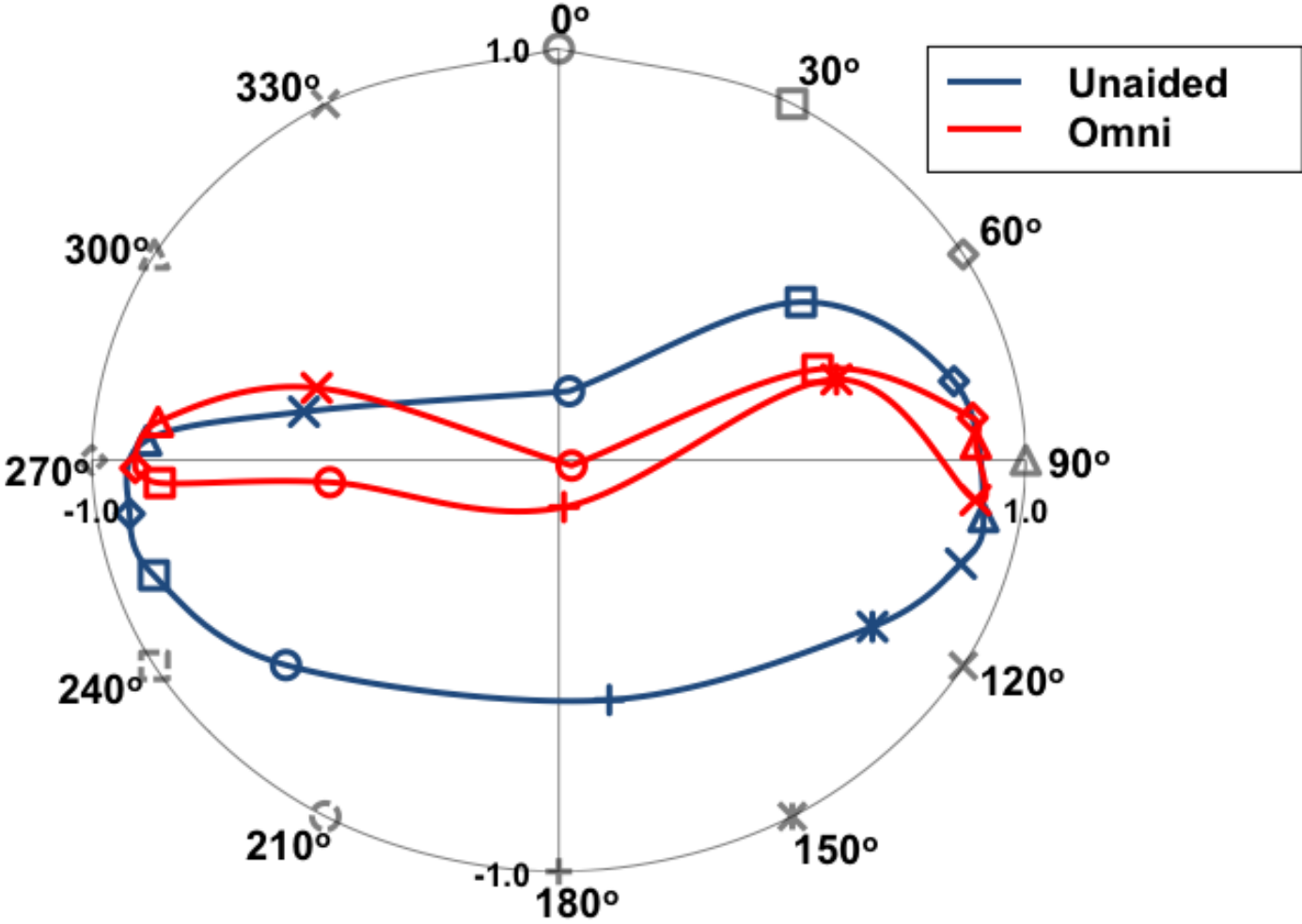


HORIZONTAL LOCALIZATION

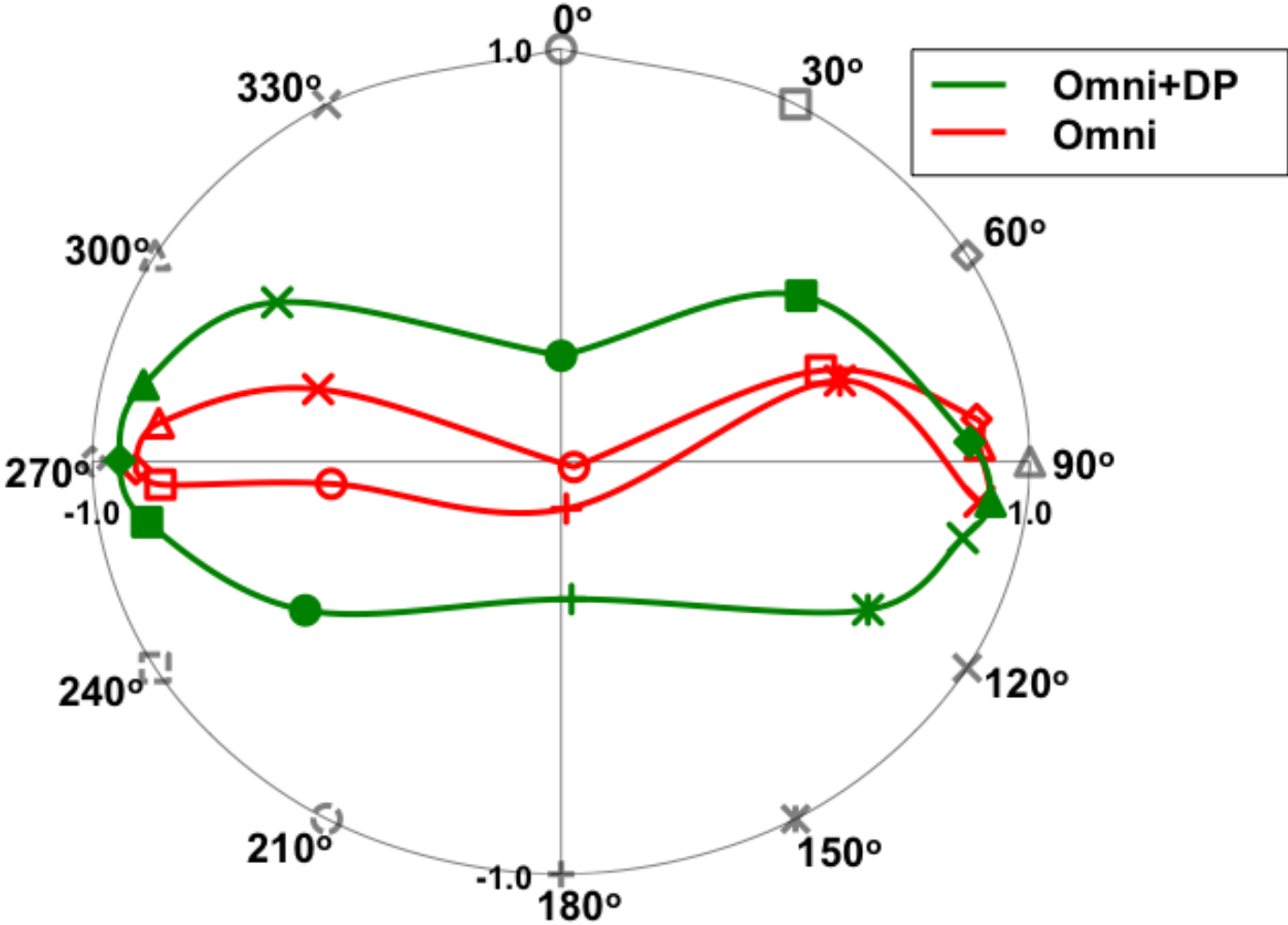


N = 15
Stimulus “Search for the sound from this speaker”

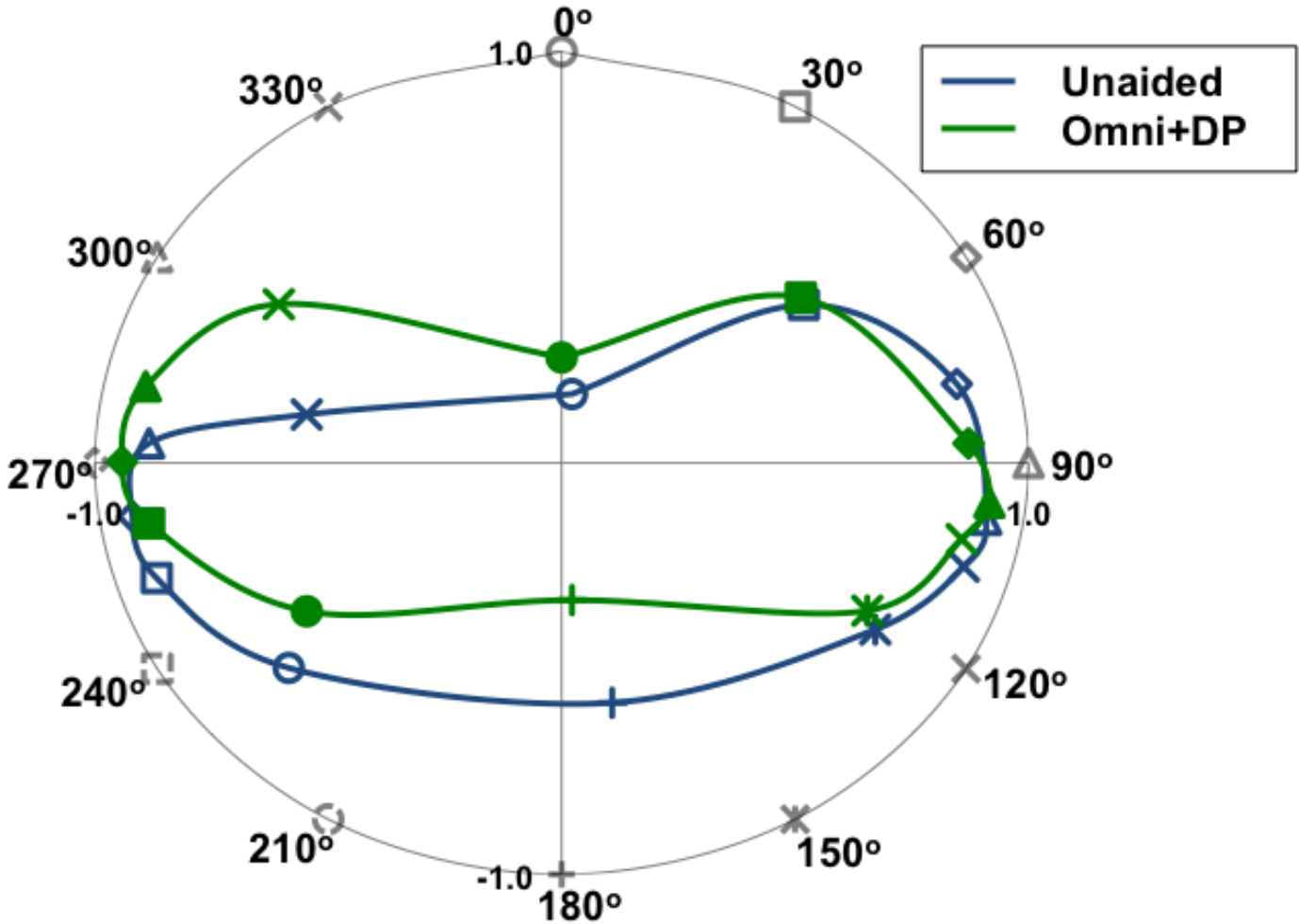
OMNIDIRECTIONAL MICROPHONE



EFFECT OF DIGITAL PINNA

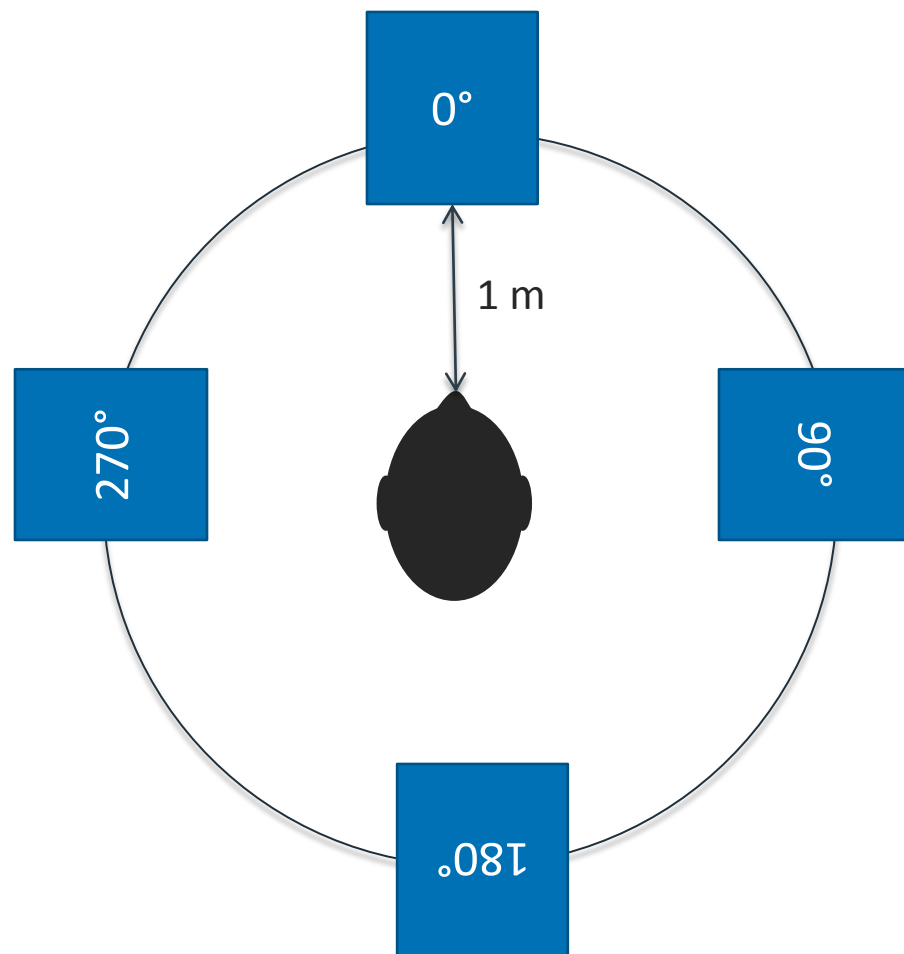


RESTORING NATURAL LOCALIZATION

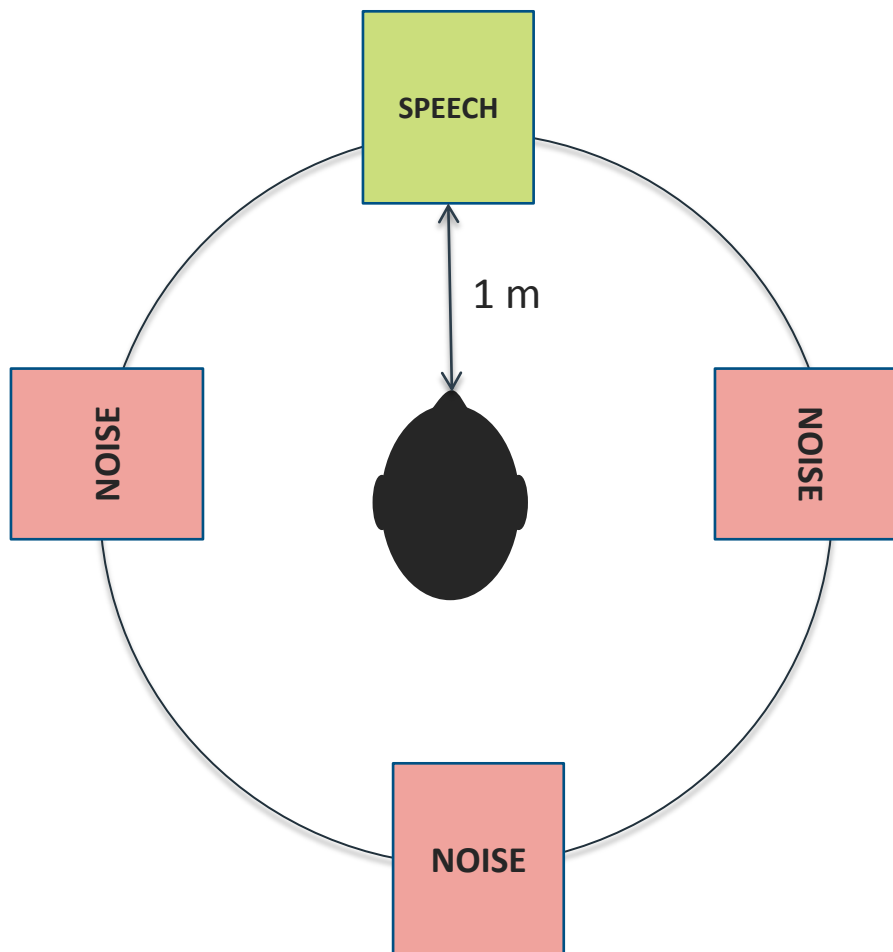


SPEECH IN NOISE

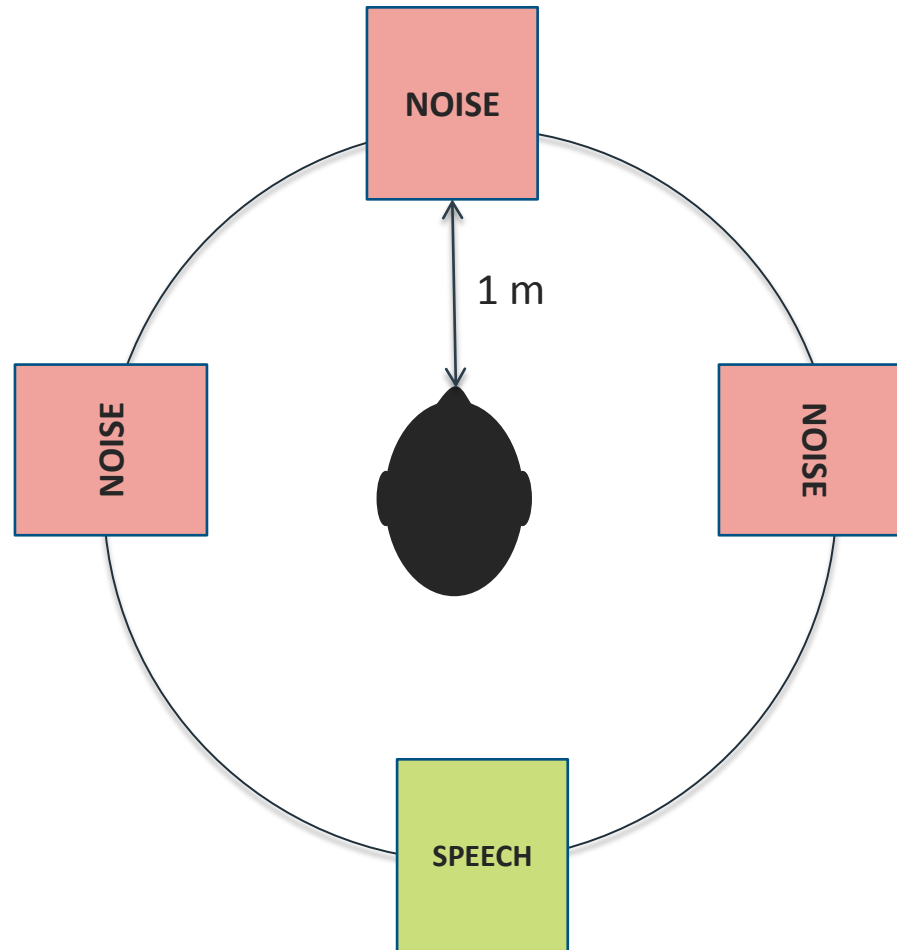
- The Hearing In Noise Test (HINT)
- Speech weighted continuous noise at 68 dB SPL
- The level of speech adjusted for 50% correct



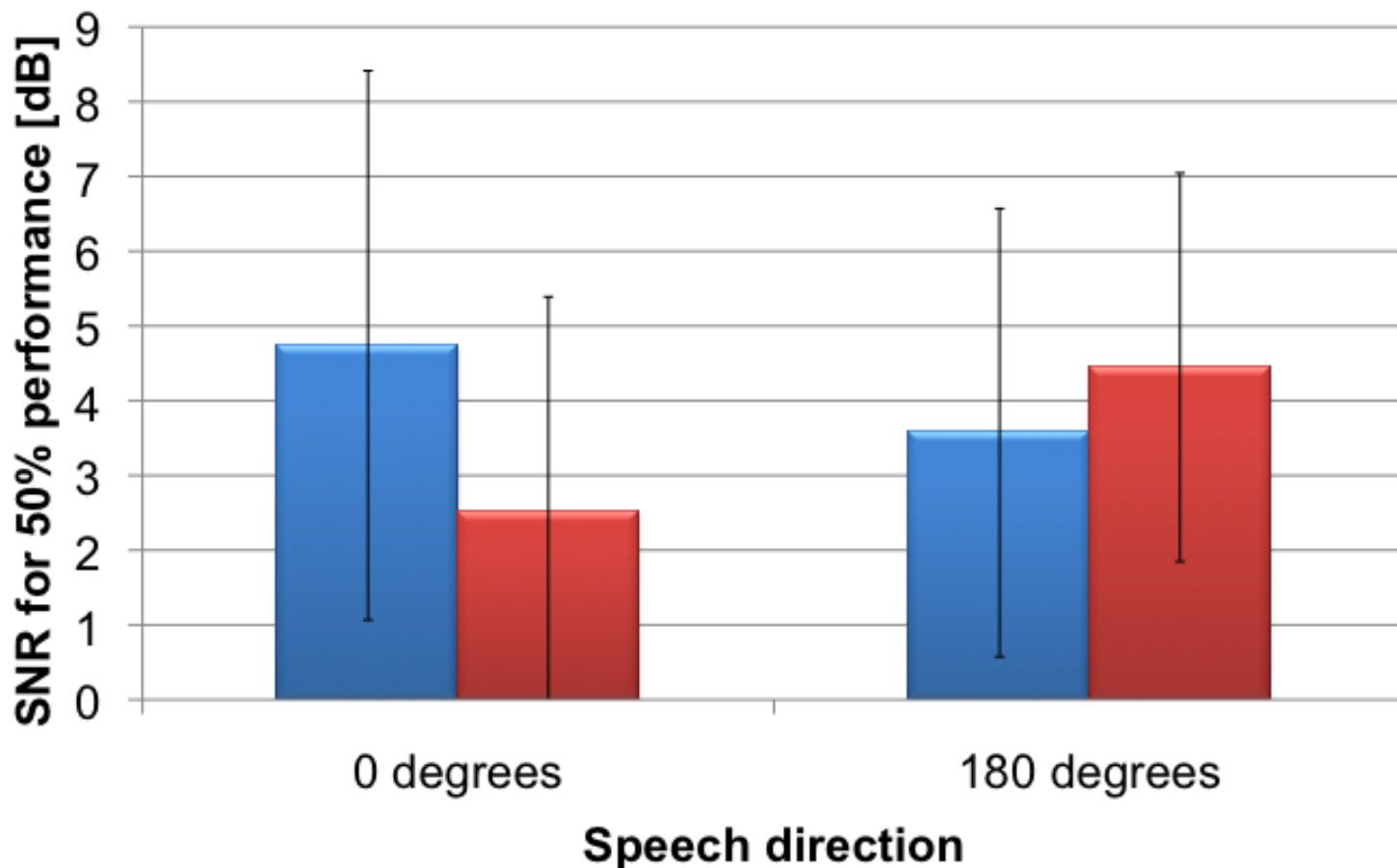
TEST 2: SPEECH IN NOISE – SPEECH FRONT



TEST 2: SPEECH IN NOISE – SPEECH BACK



SPEECH IN NOISE



N = 18

■ Omni ■ Omni with Digital Pinna

SUMMARY

- Pinna attenuation is used in front-back localization
- Pinna cue is lost when using a BTE hearing aid with a omnidirectional microphone located on top of the pinna
- Digital pinna feature mimics the natural attenuation of the pinna for BTE hearing instruments

Two dimensions affected by digital pinna:

- DP improved front-back localization performance
- DP improved speech performance in diffuse noise when speech was in the front

