

Rehabilitating SSD

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the royal victorian
eye and ear
hospital



THE UNIVERSITY OF
MELBOURNE



Patient's issues & ENT's options

Hear on the
deaf side

Hear in
background
noise

Directional
Hearing

Sound
quality

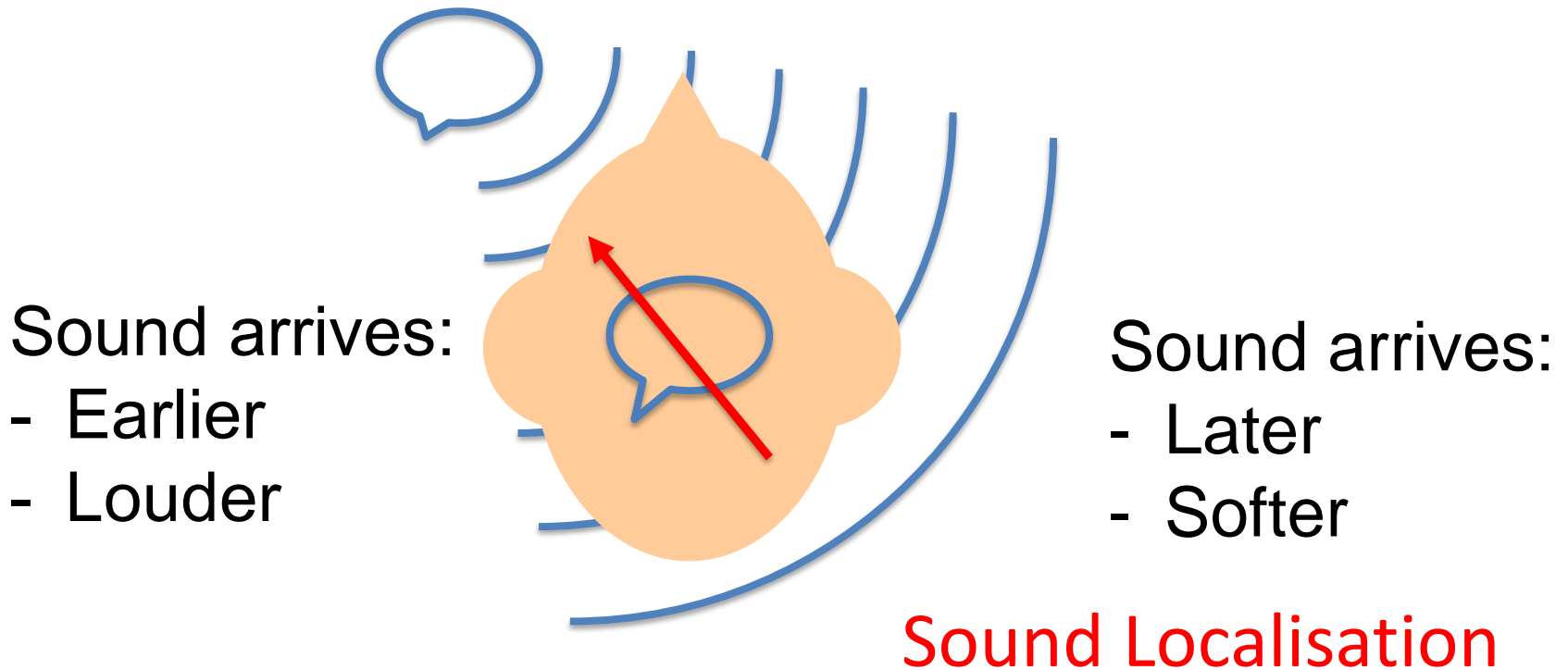
Tinnitus

CROS

Bone
conduction

CI

Understanding binaural hearing is now a clinical necessity



Sound arrives:
- Earlier
- Louder



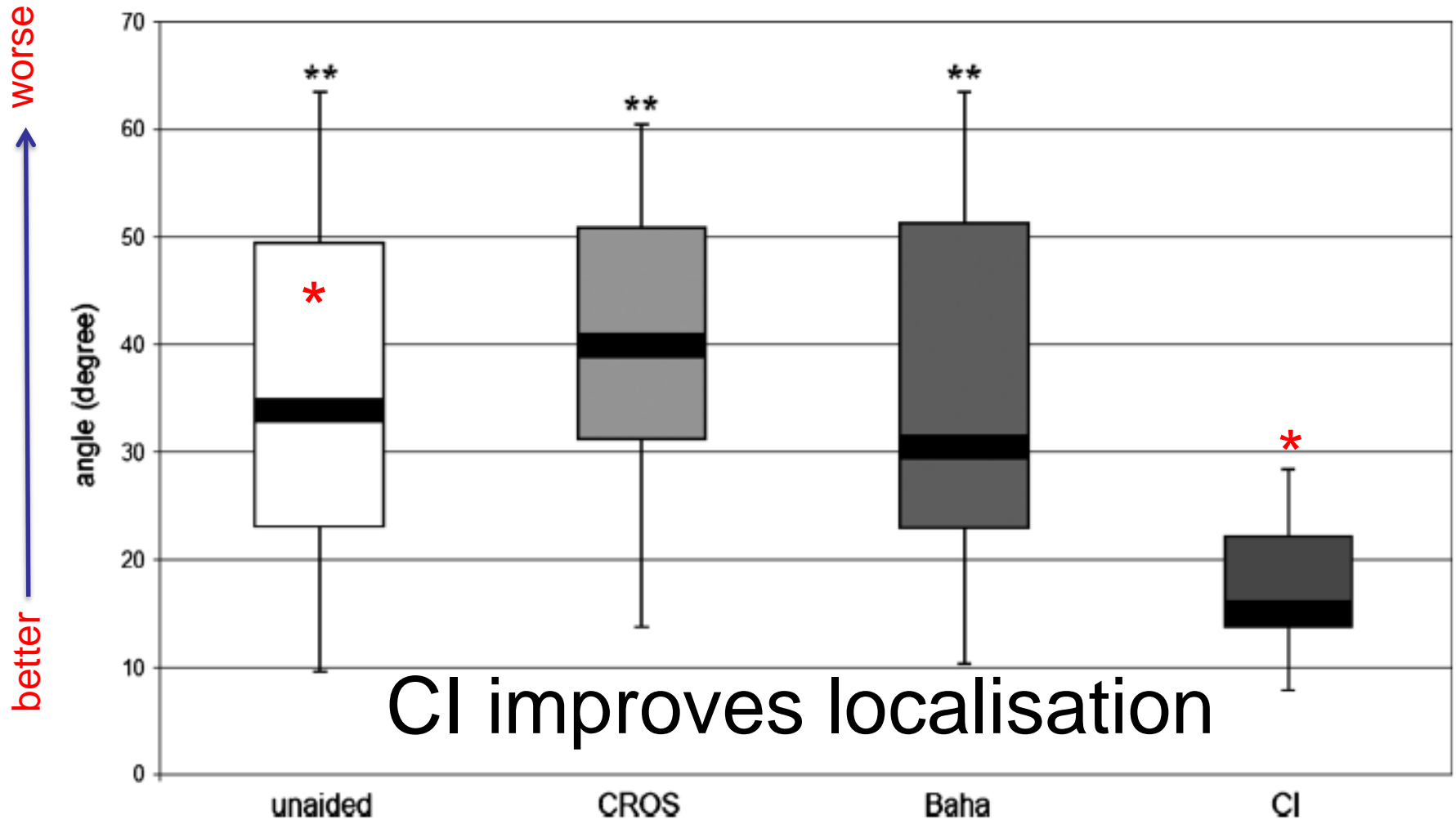
Sound arrives:
- Later
- Softer

Sound Localisation

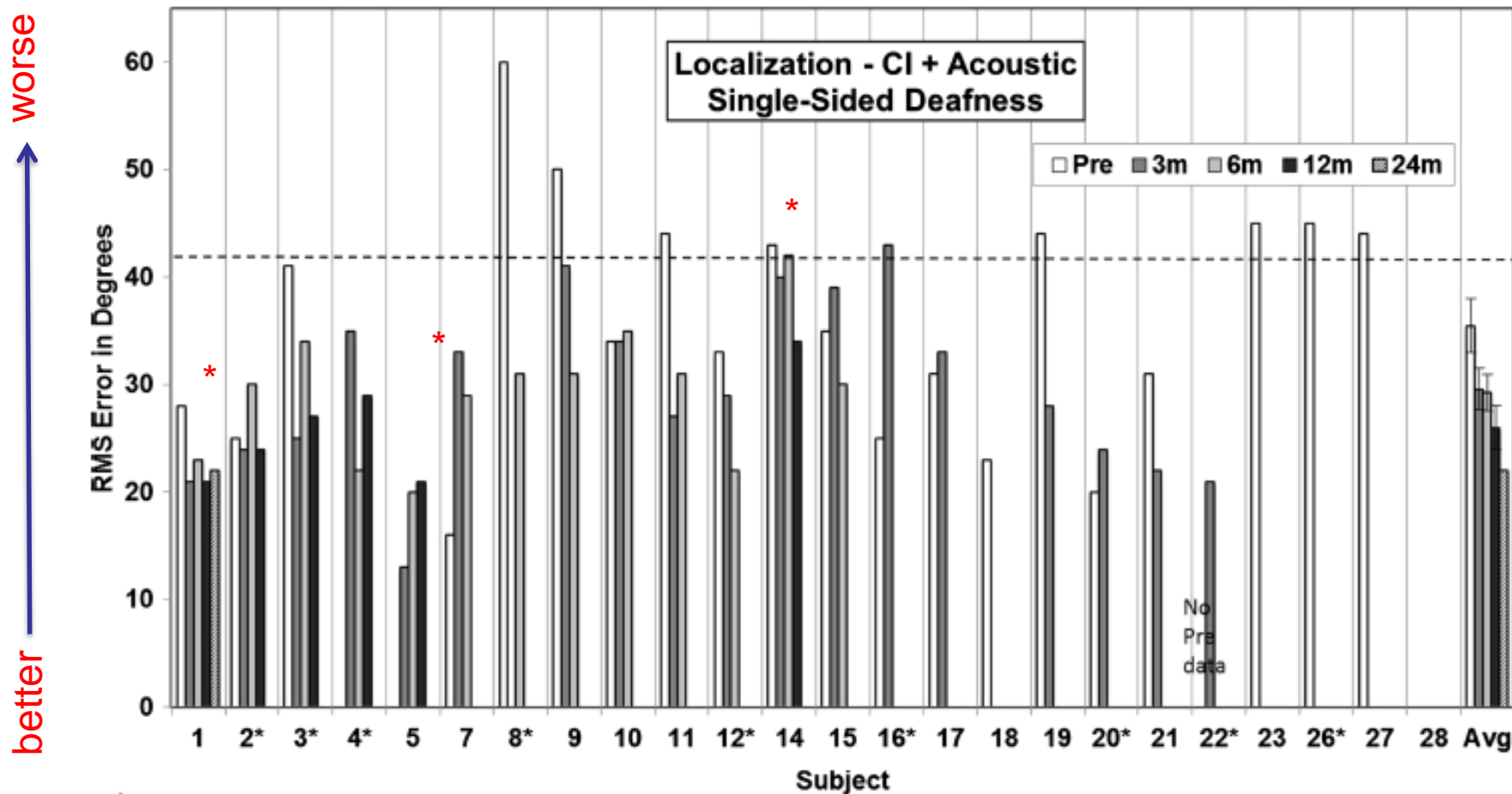
You cannot localise sound with one ear

Melbourne experience (28 patients) $p=0.035$

Objective comparison



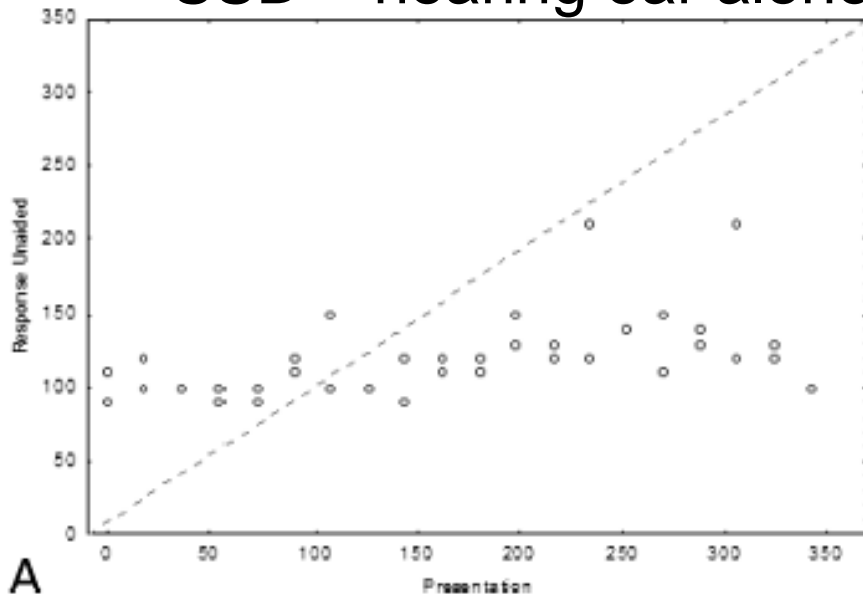
But not for everyone



Hanson et al, Otol Neurotol 2013, 34:1681-1687

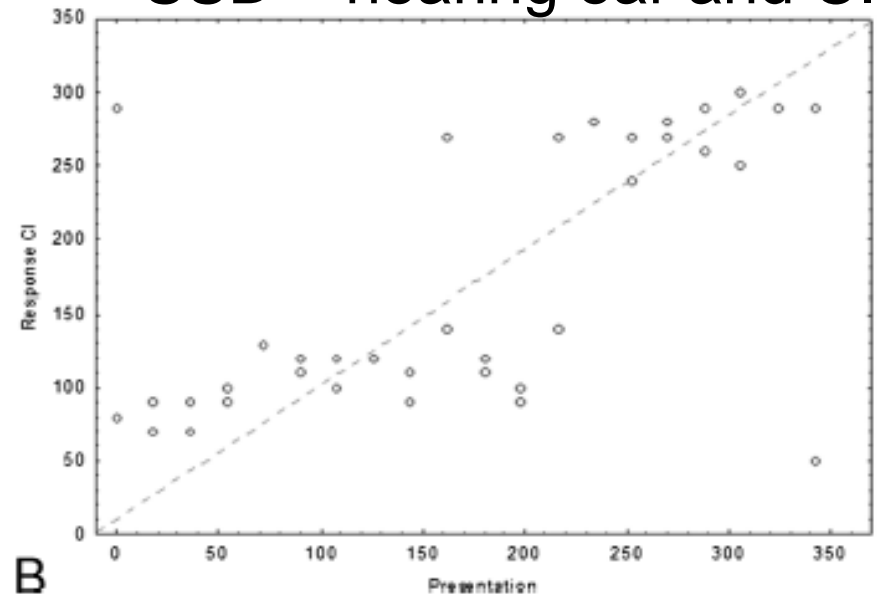
In fact, many adults just *lateralise* sound

SSD – hearing ear alone



A

SSD – hearing ear and CI

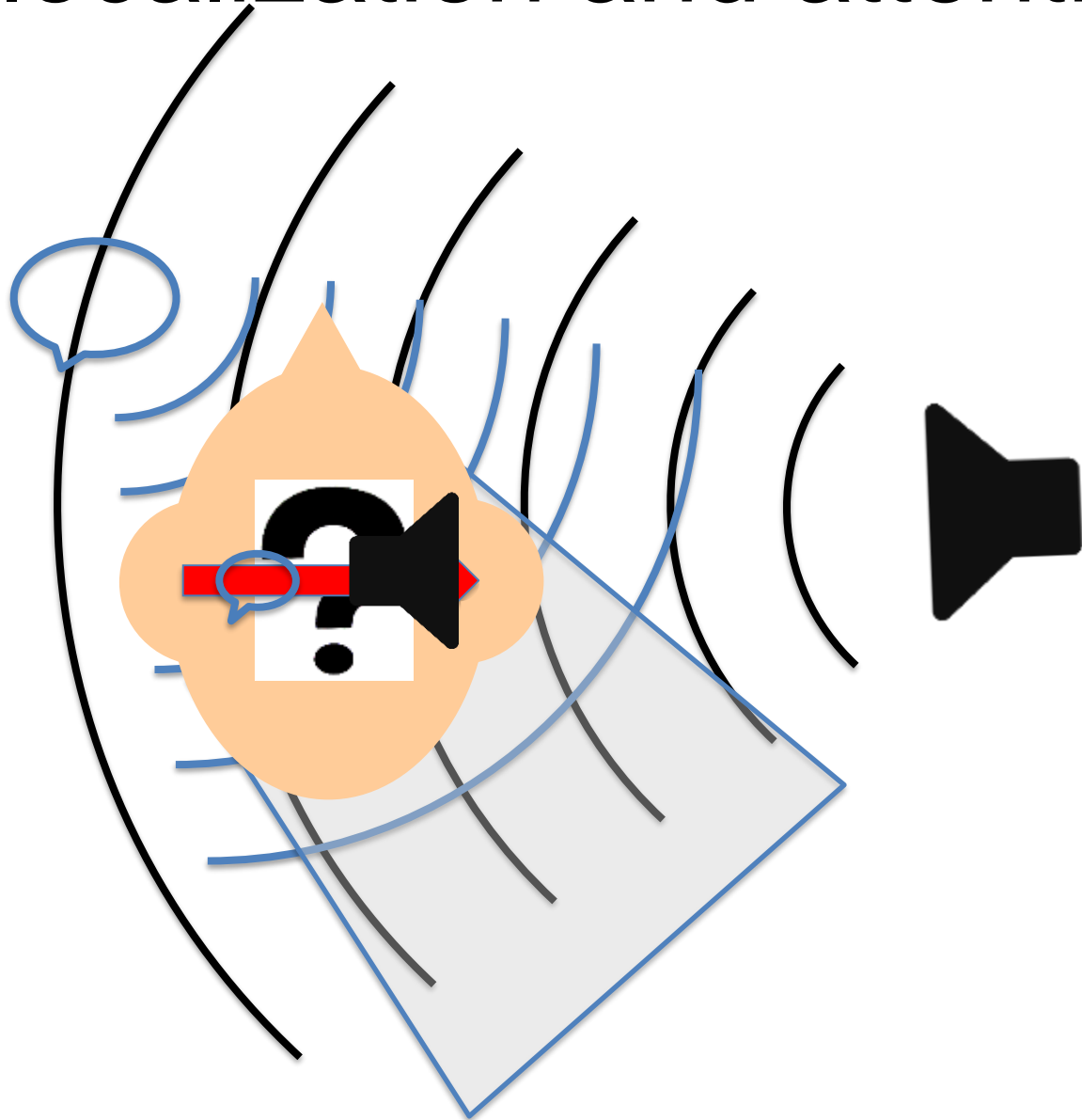


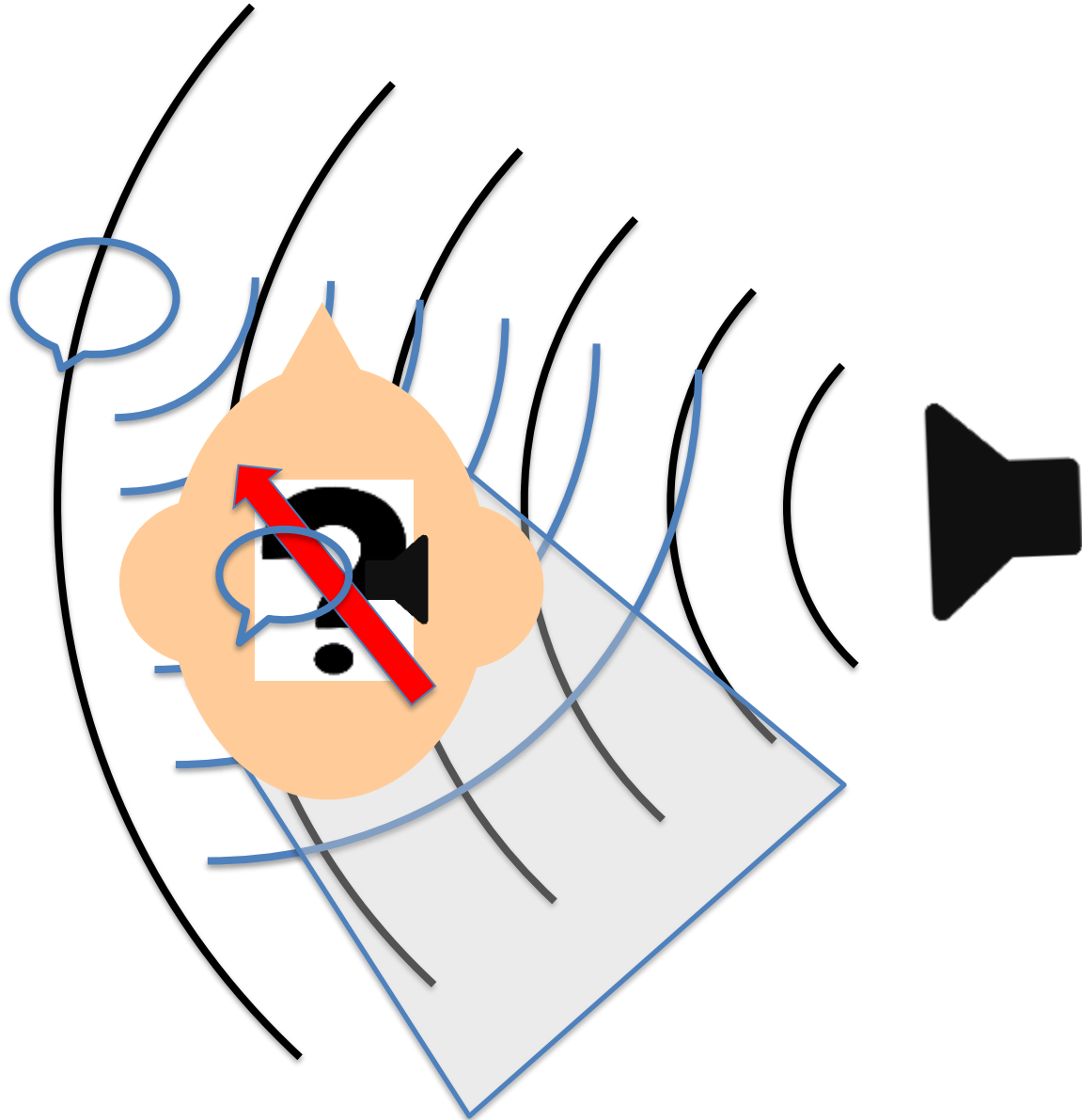
B

Responses from speaker array
Nawaz, Otol Neurotol 2014; 35:271-276

Sound lateralisation ***is not*** true localisation
but clinically useful!

Sound localization and attention





You can **choose** the sound to **attend to** if
know **where** the sound is coming from

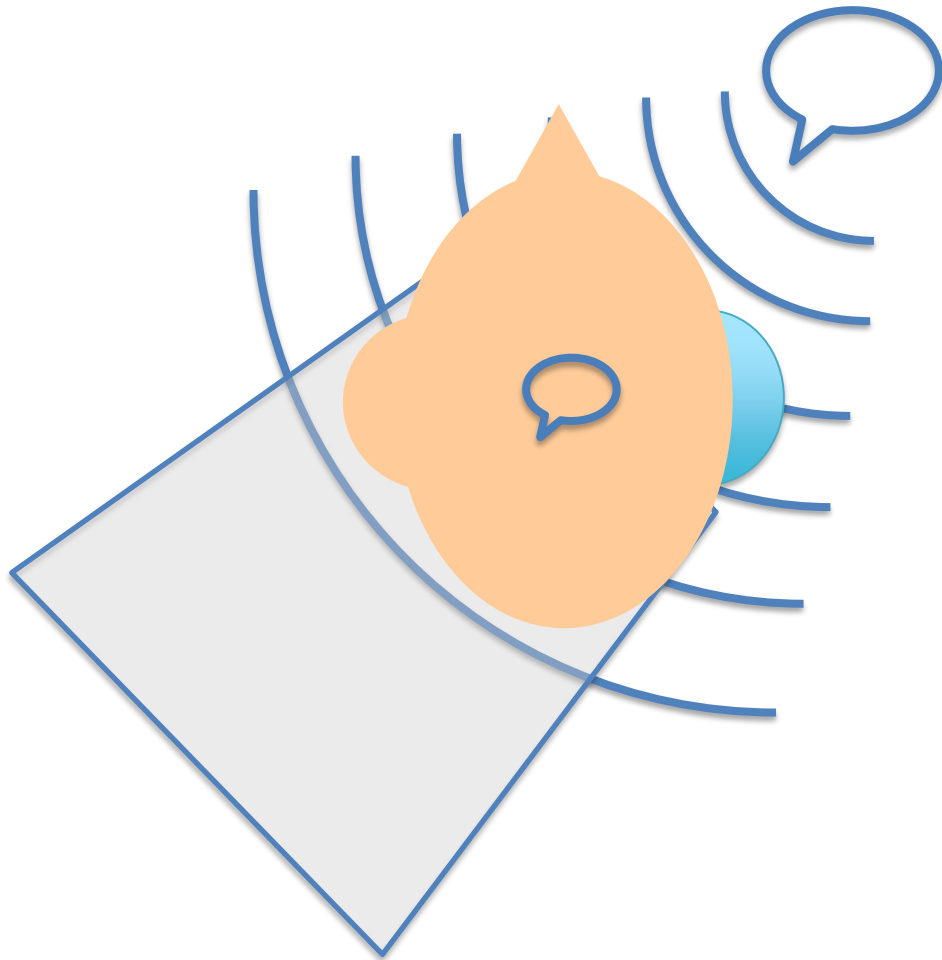


You cannot do this with one ear

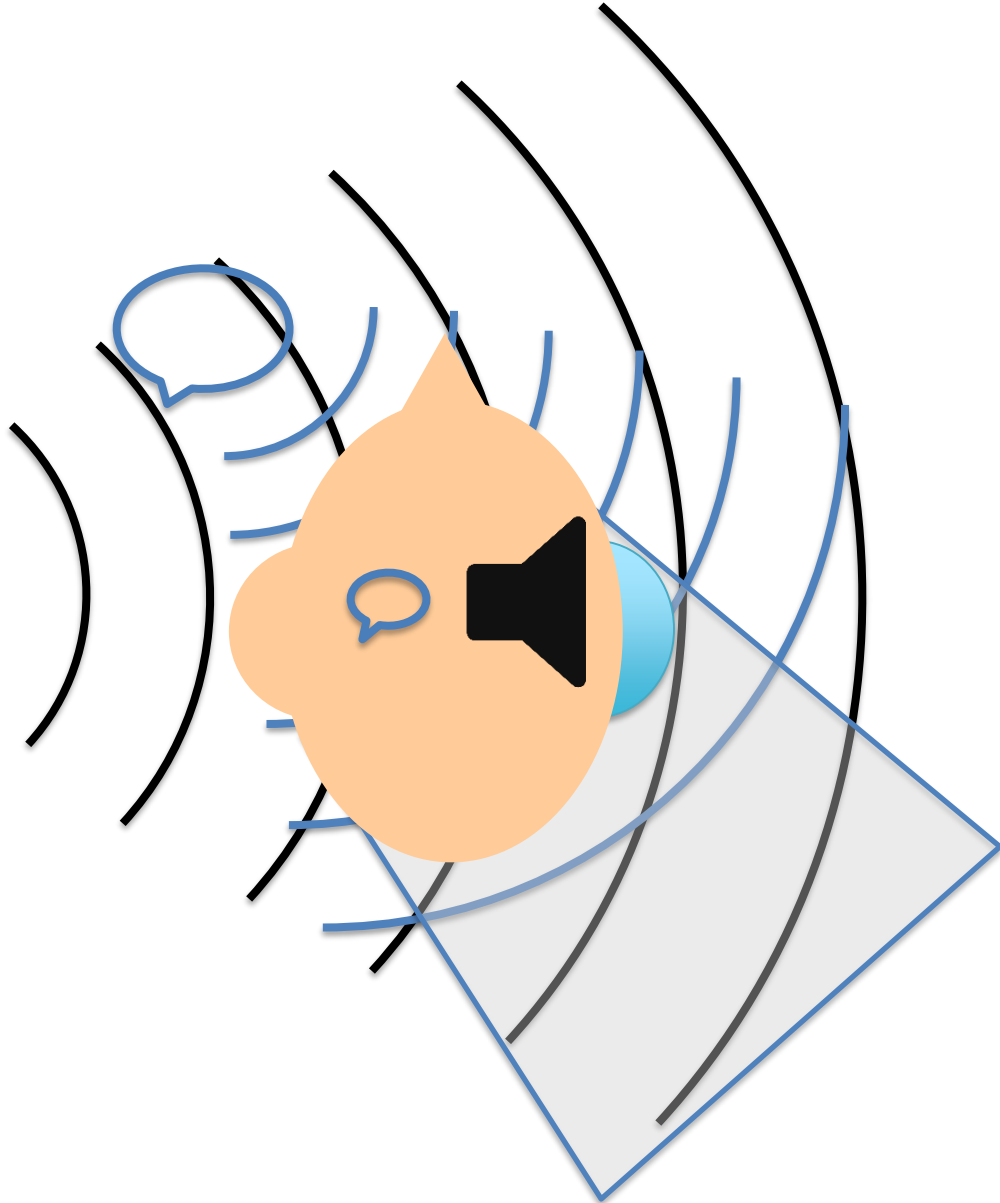
Real-life soundscapes with a dead ear

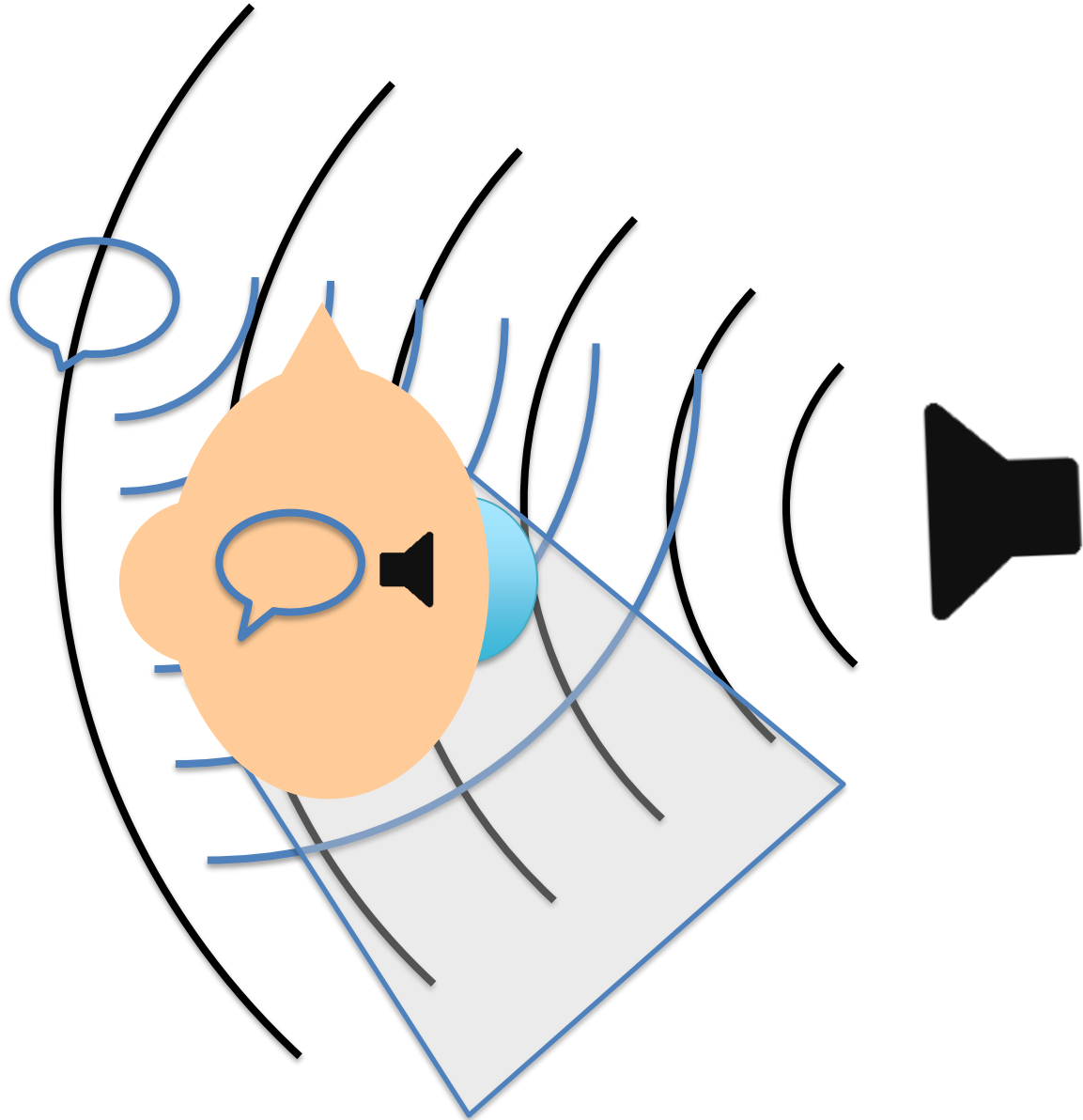


“Head Shadow”

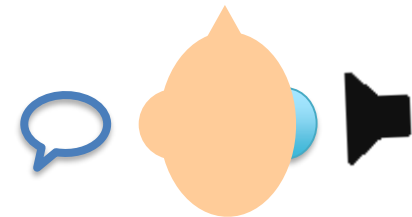
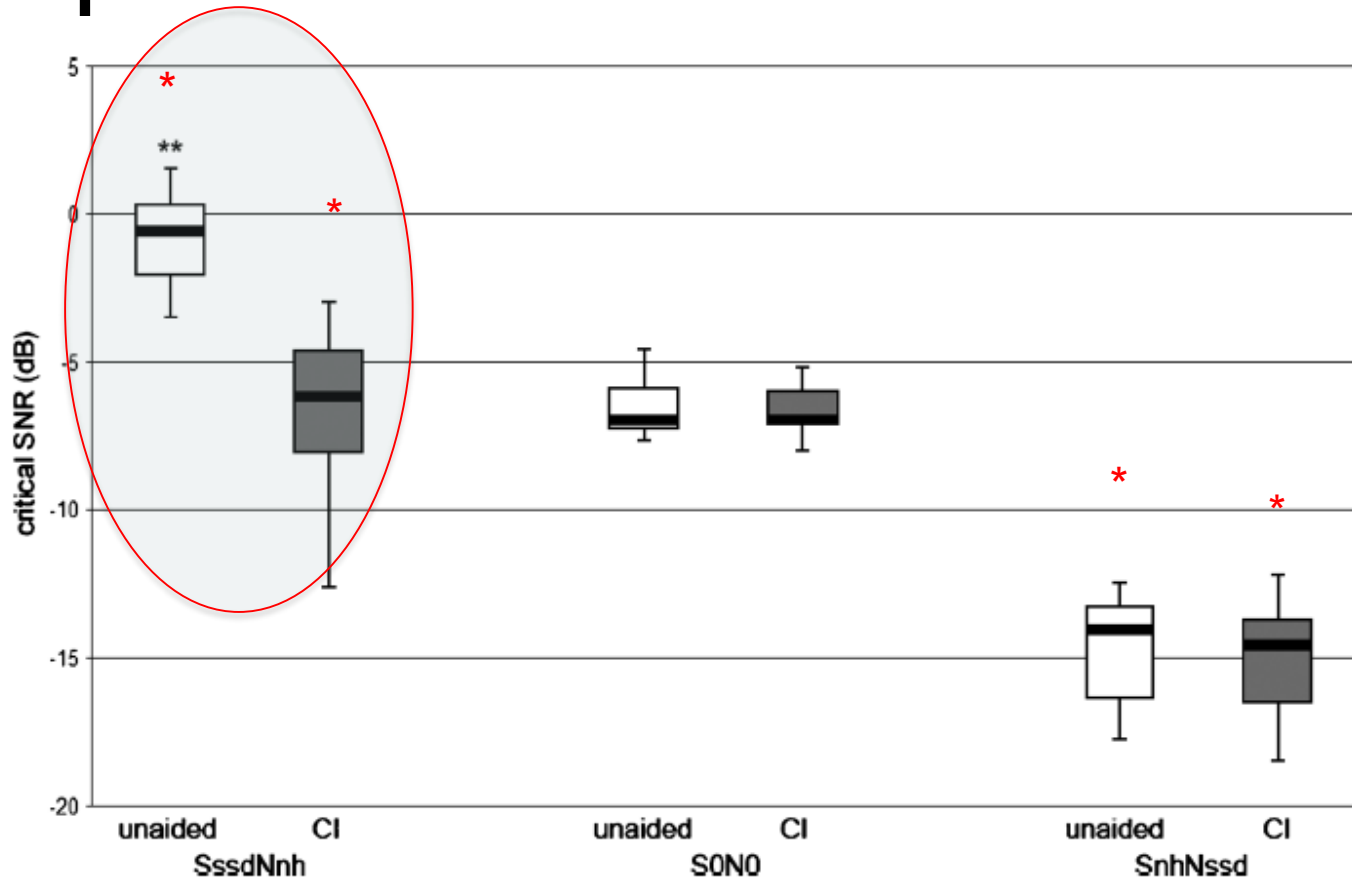


NOISE



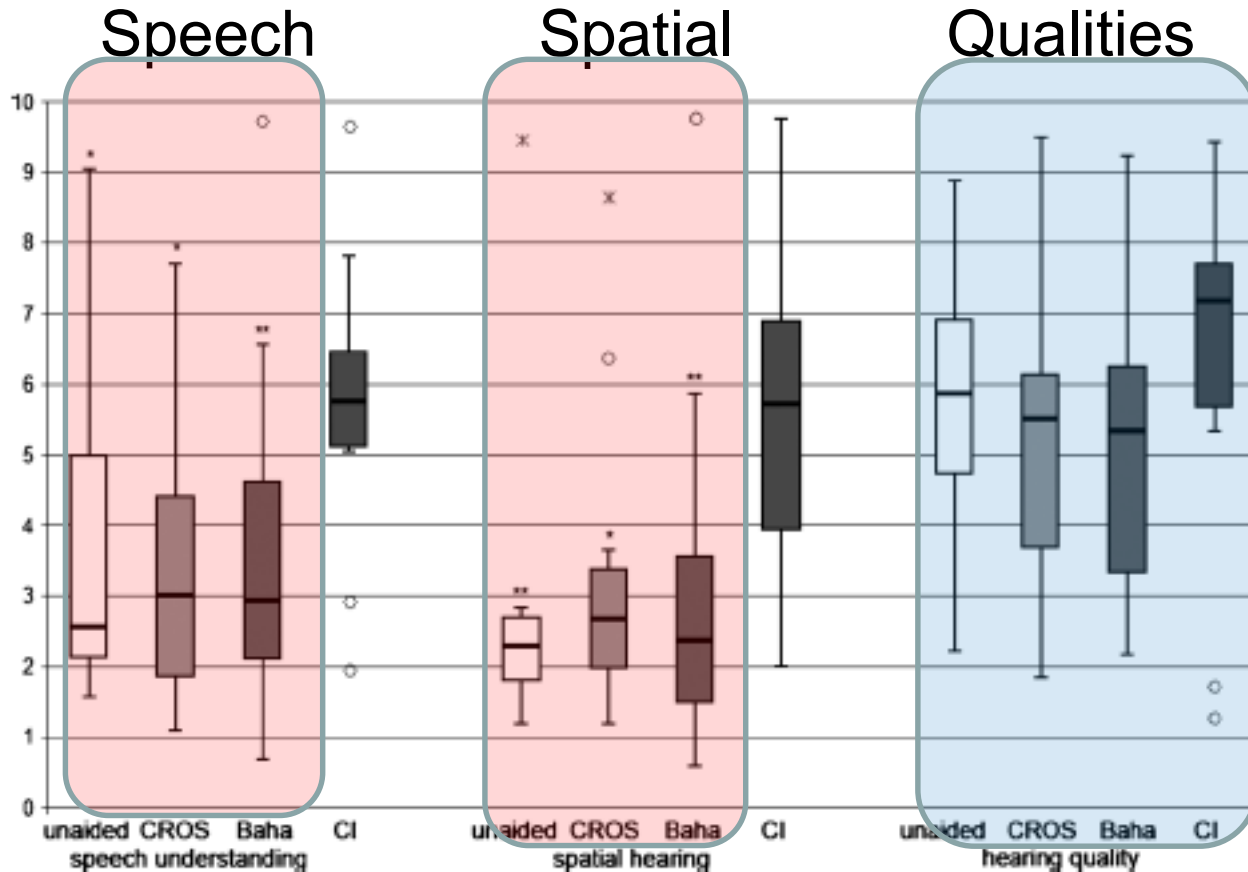


Speech in noise and the CI



Melbourne Experience

Quality of life- comparing options



Speech, Spatial Qualities of hearing questionnaire

* Sound & Baha significantly better than CI

Normal
contralateral
ear

Hear on the
deaf side

Hear in
background
noise

Sound
quality

Directional
Hearing

Tinnitus

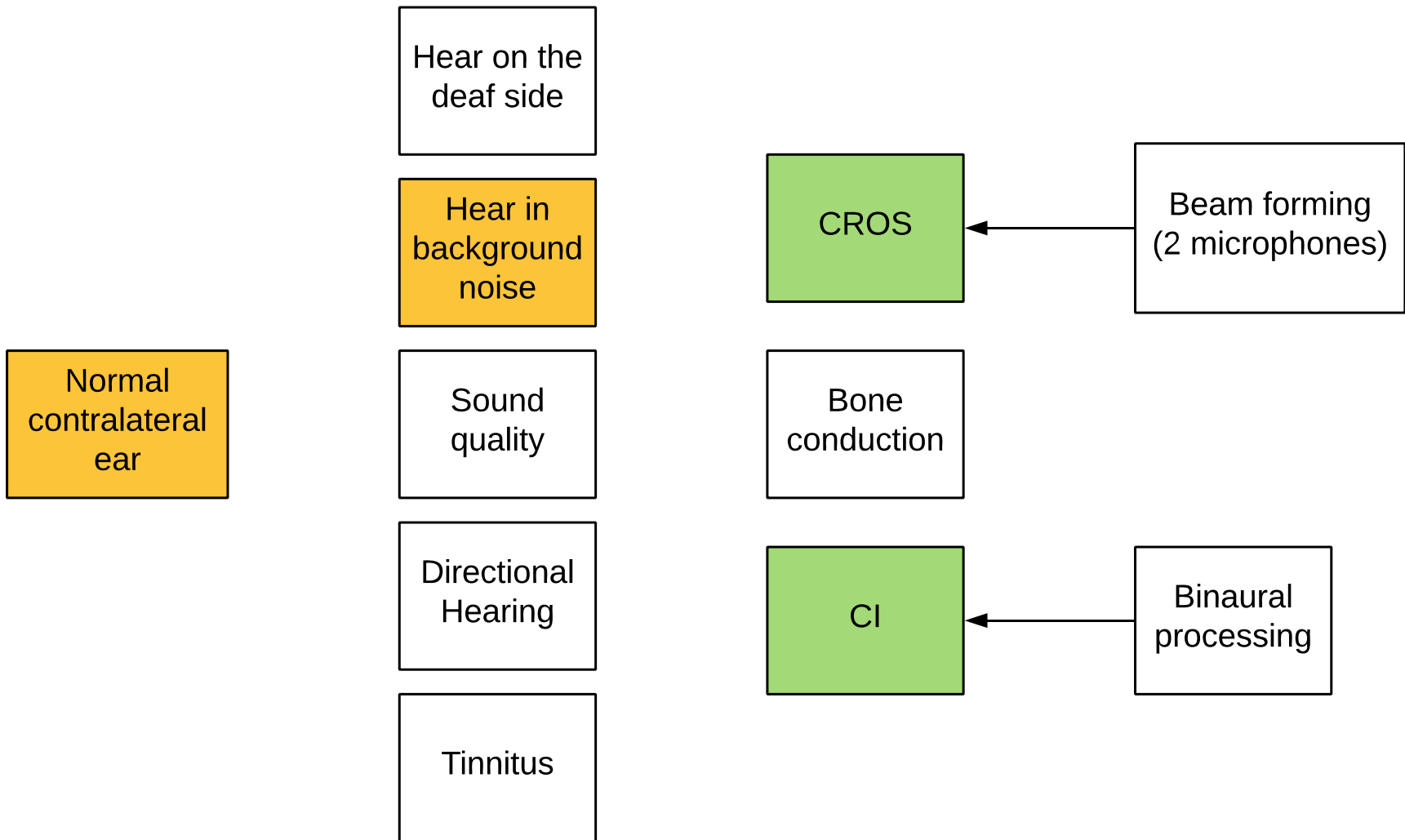
(Bi-CROS)

Bone
conduction

CI

Legend

Appropriate
Inappropriate



Normal
contralateral
ear

Hear on the
deaf side

Hear in
background
noise

Sound
quality

Directional
Hearing

Tinnitus

CROS

Bone
conduction

CI

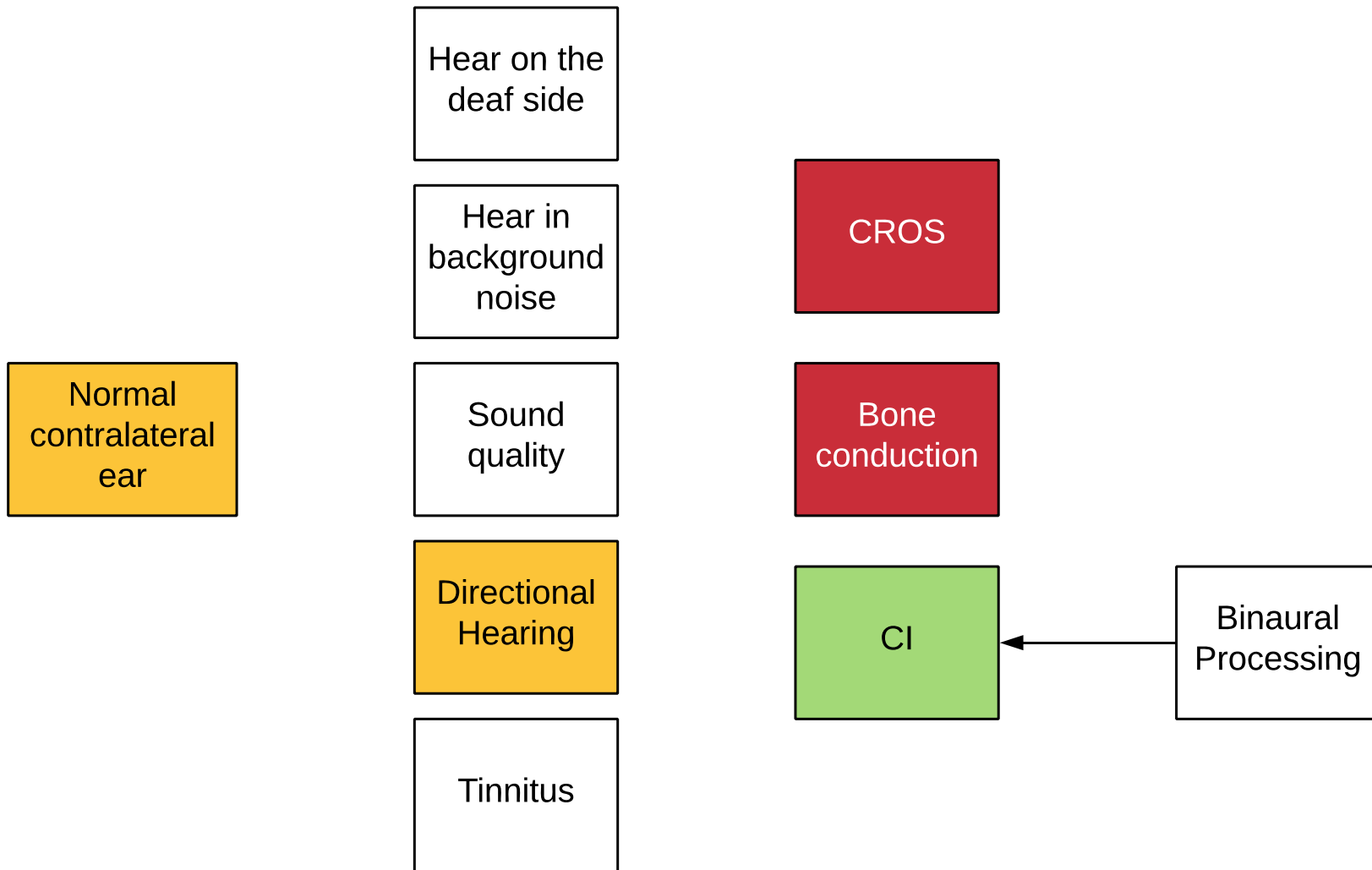
Occlusion
Effect

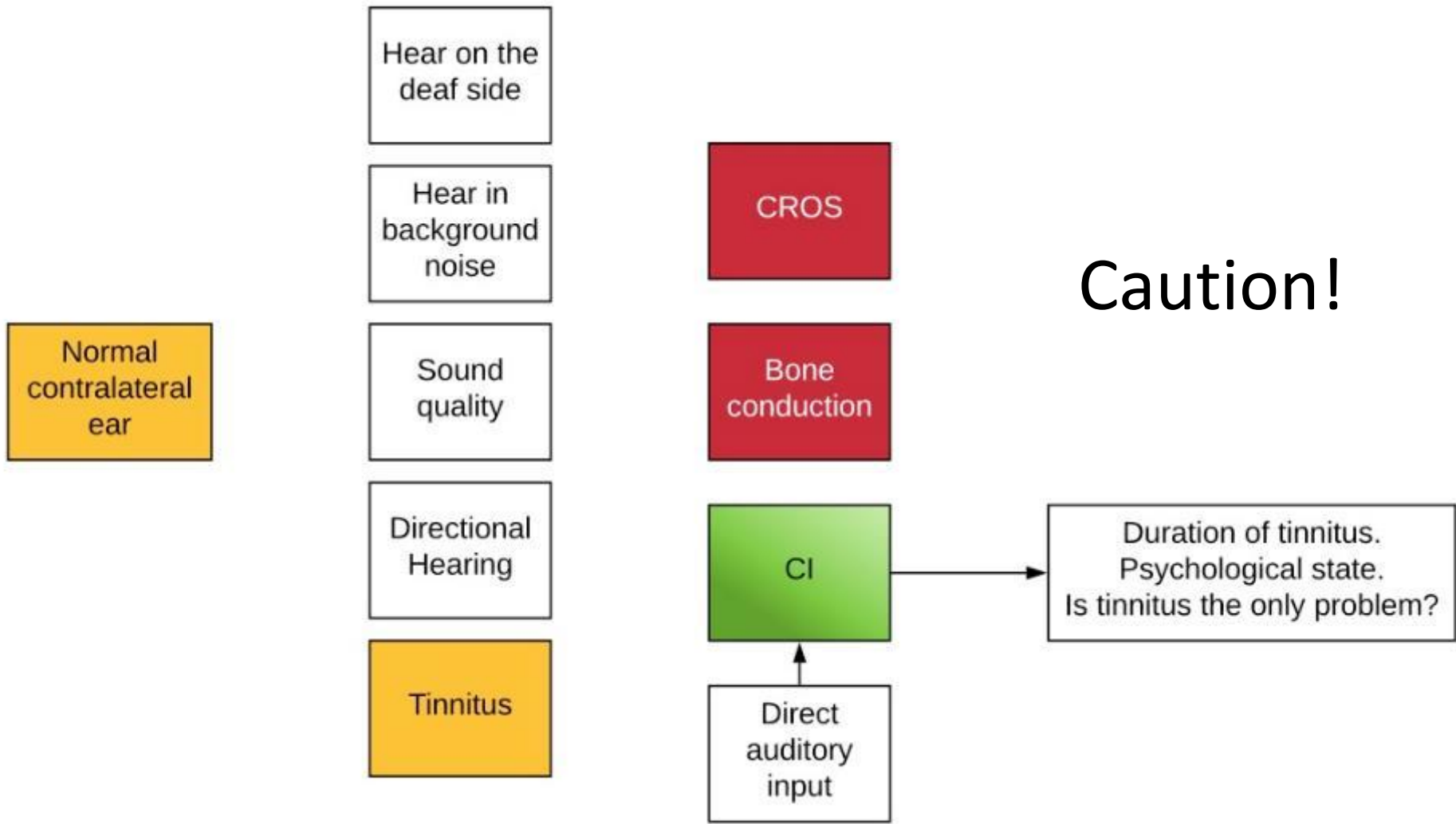
**Variable
adaptation
to electric
hearing**

← Yes

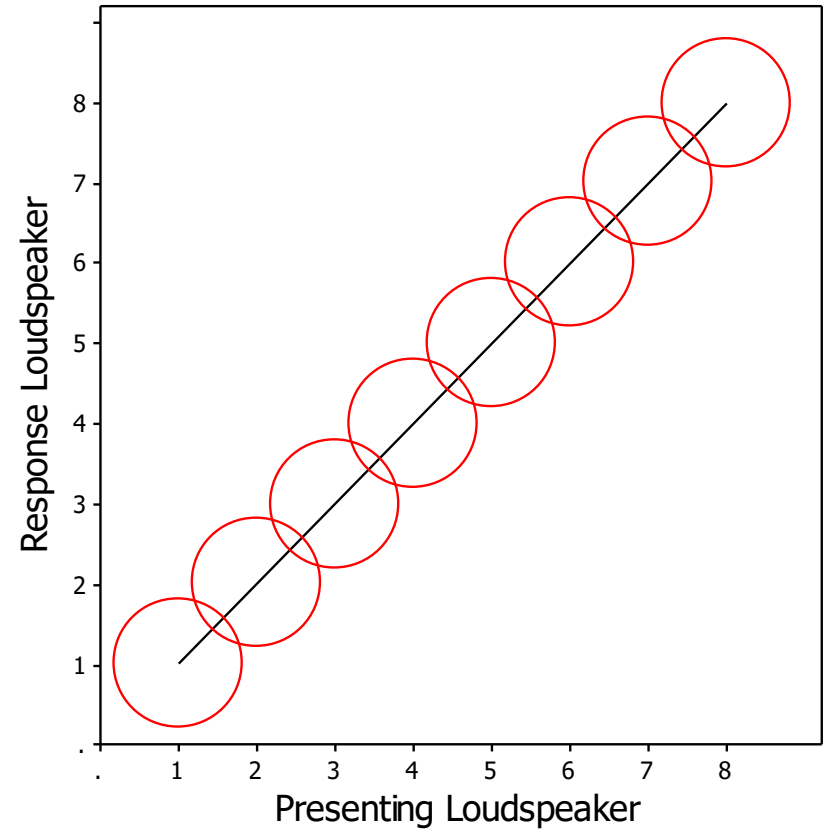
← None

←





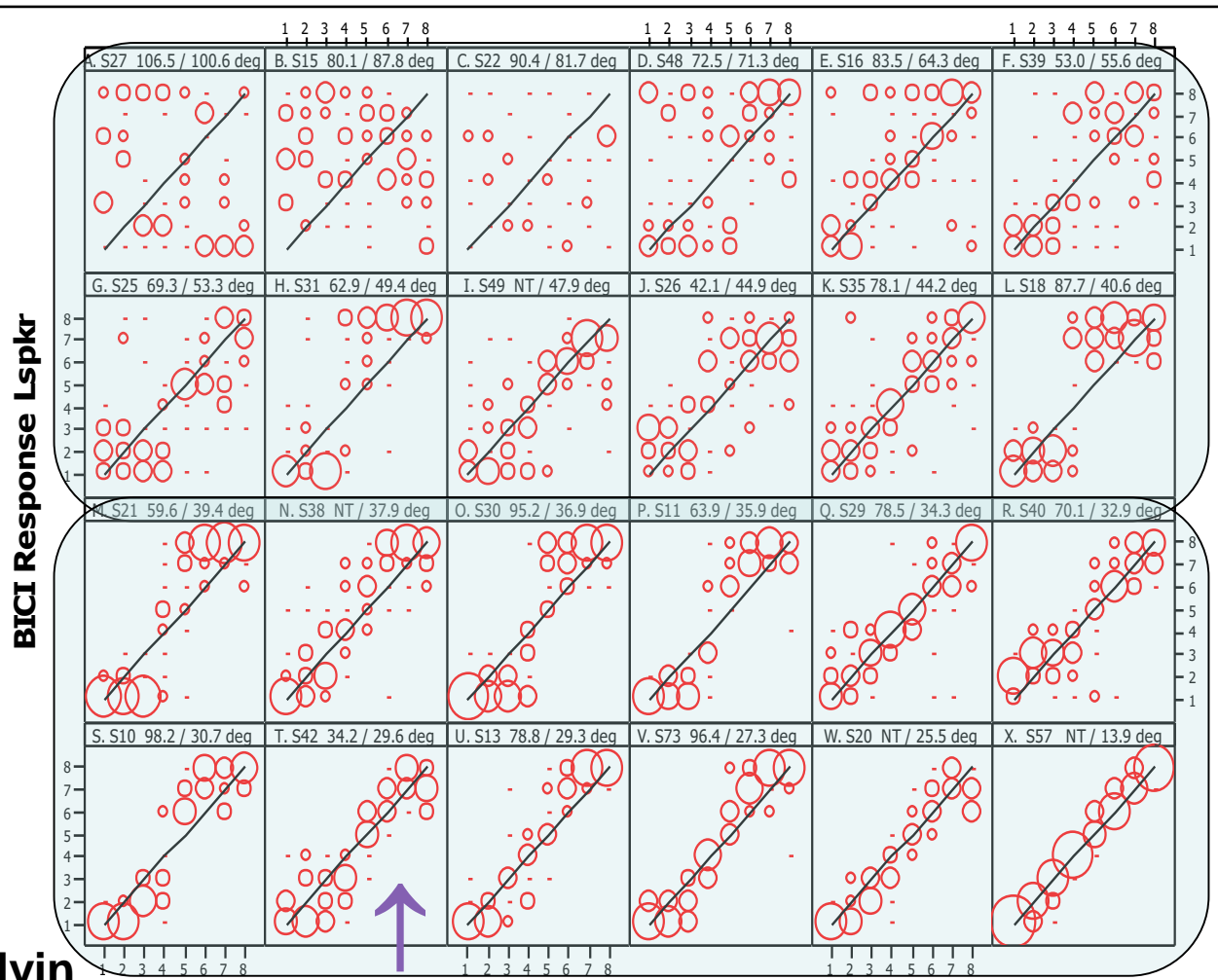
Directional hearing and long-term hearing loss



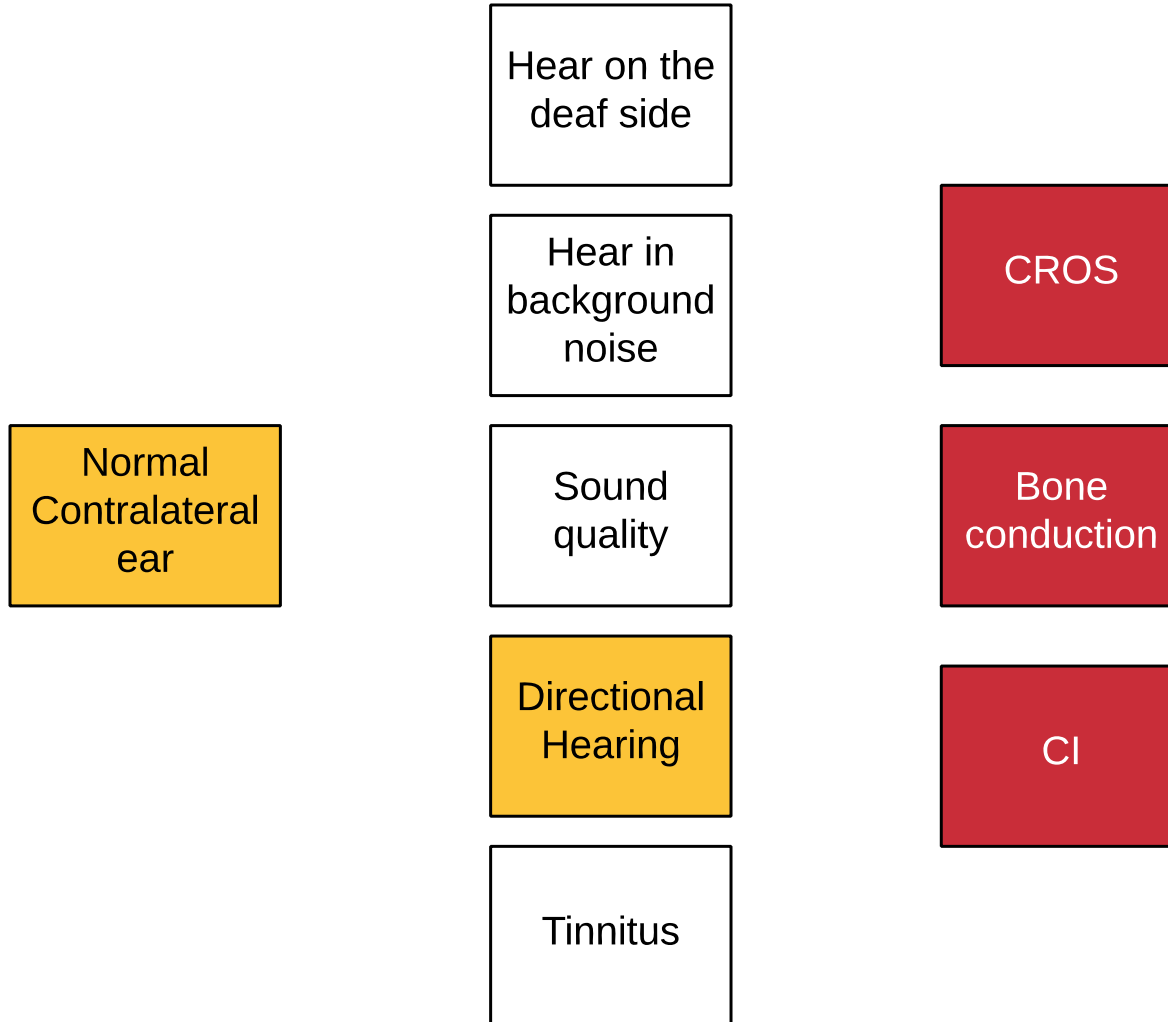
Young children *can truly* localize but only if 2nd CI is within a few years

Error >40deg
2nd CI: 6.9y
time b/w 4y

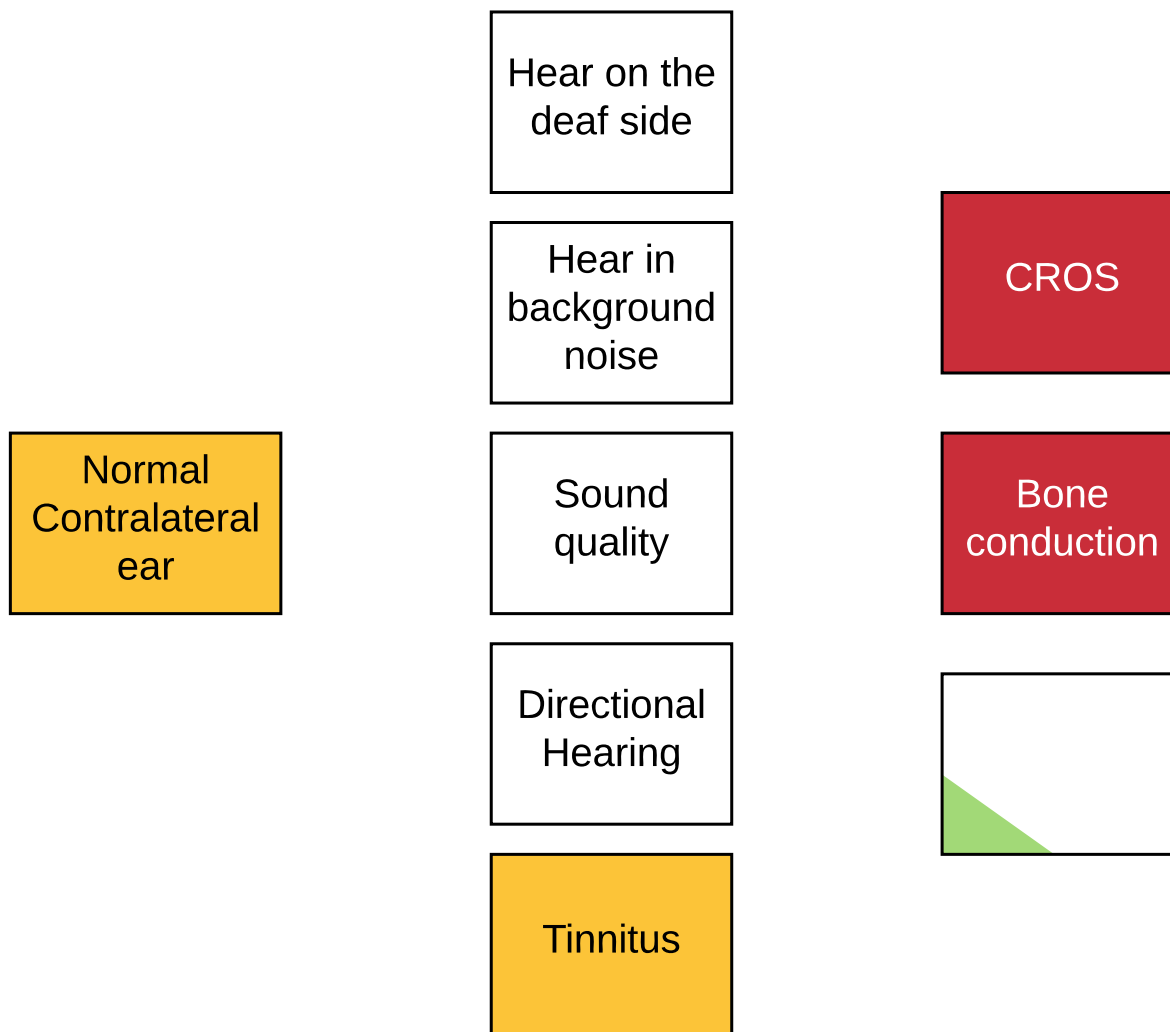
Error <40deg
2nd CI: 3.6y
time b/w 2.1y



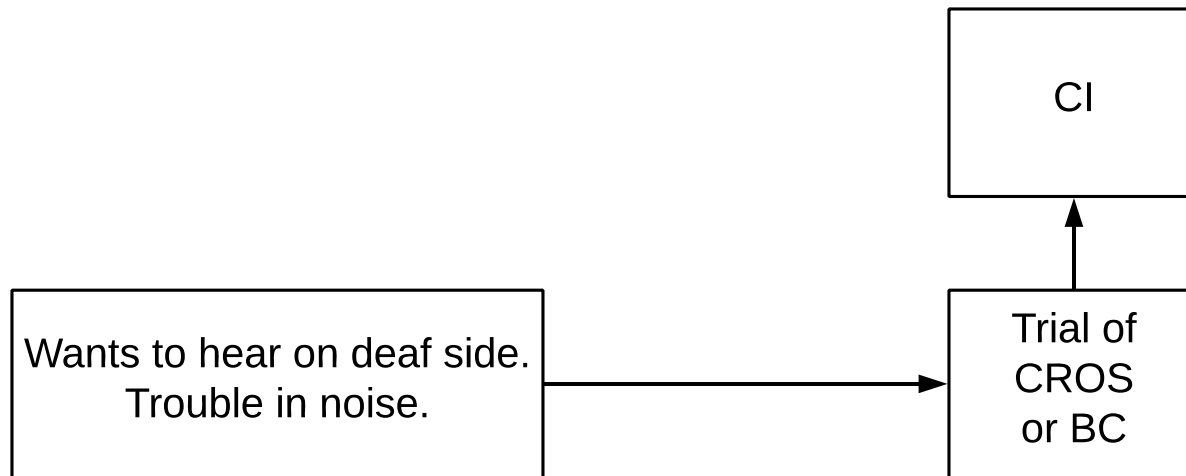
Long-term deaf ear



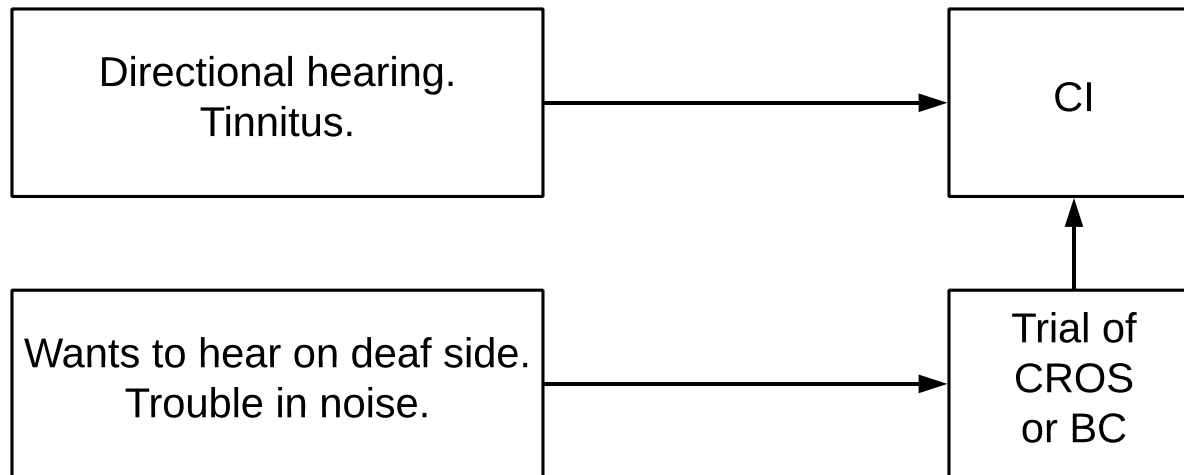
Long-term deaf ear



Summary (1)



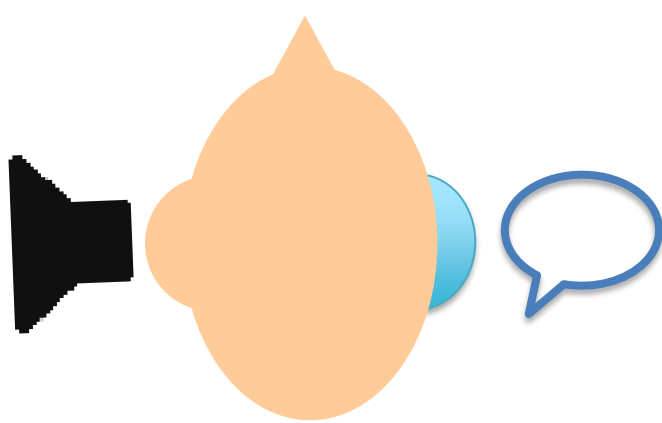
Summary (2)



Cases

Binaural testing in clinical practice

Melbourne normative data



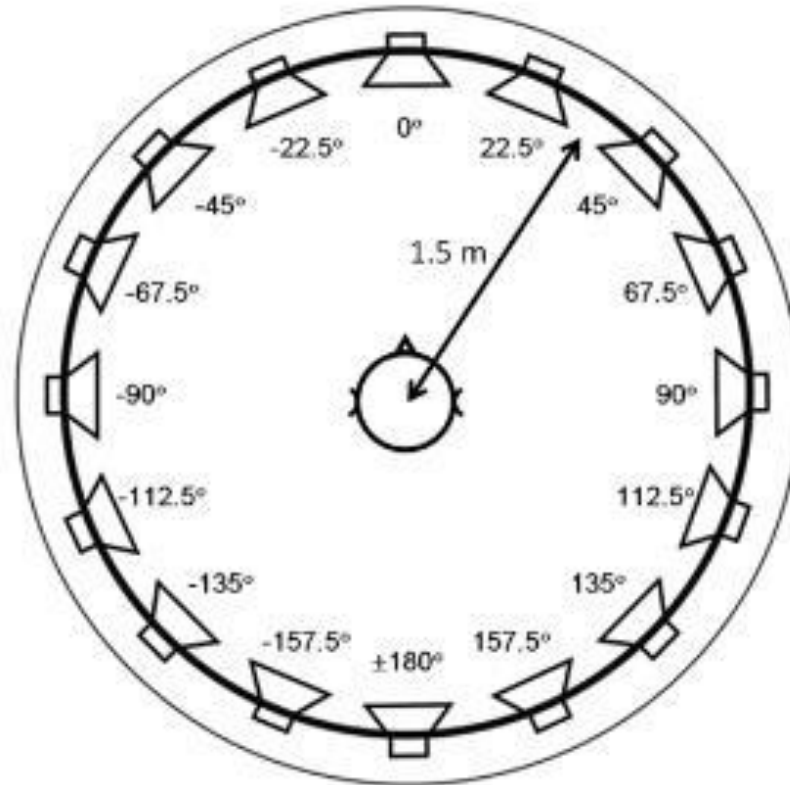
Pre-CI: S/N*: 4.7 dB
Post-CI: S/N -0.3 dB
(p = 0.003)



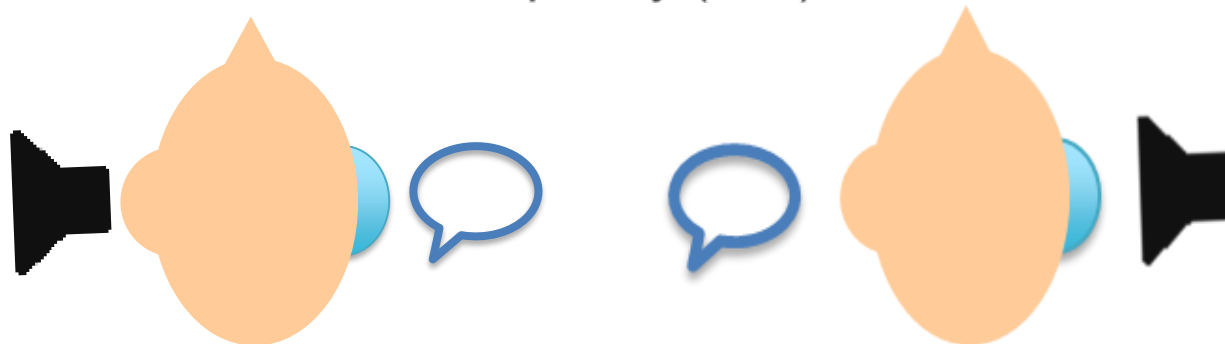
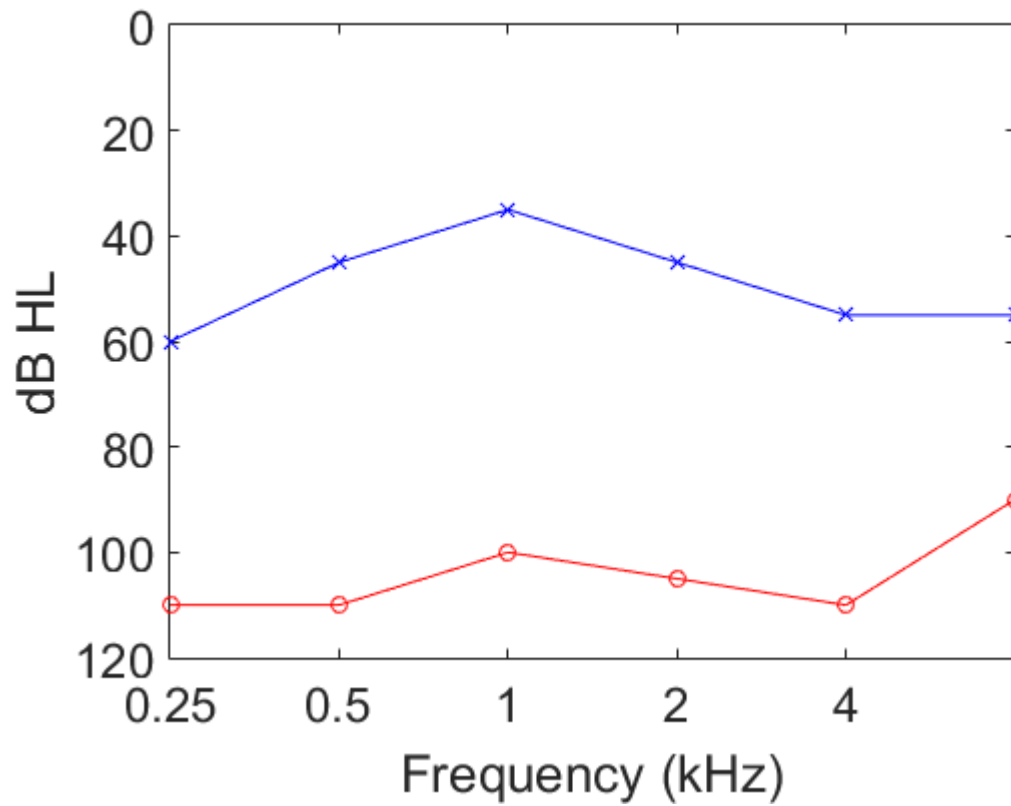
Pre-CI: -8.7 dB
Post-CI -9.8 dB
(p=0.026)

* Free-field testing
Signal-to-Noise at 50% word recognition

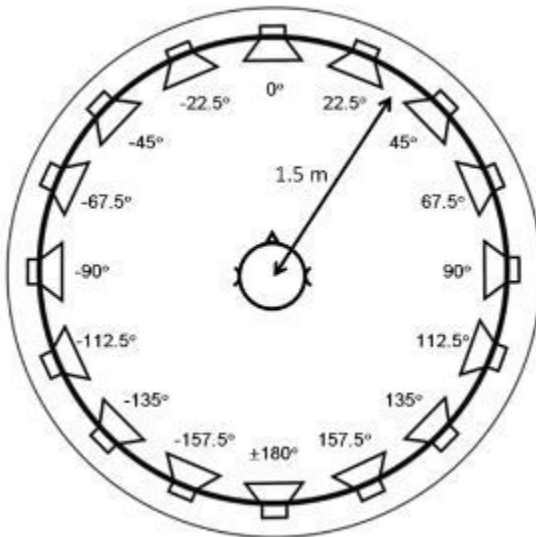
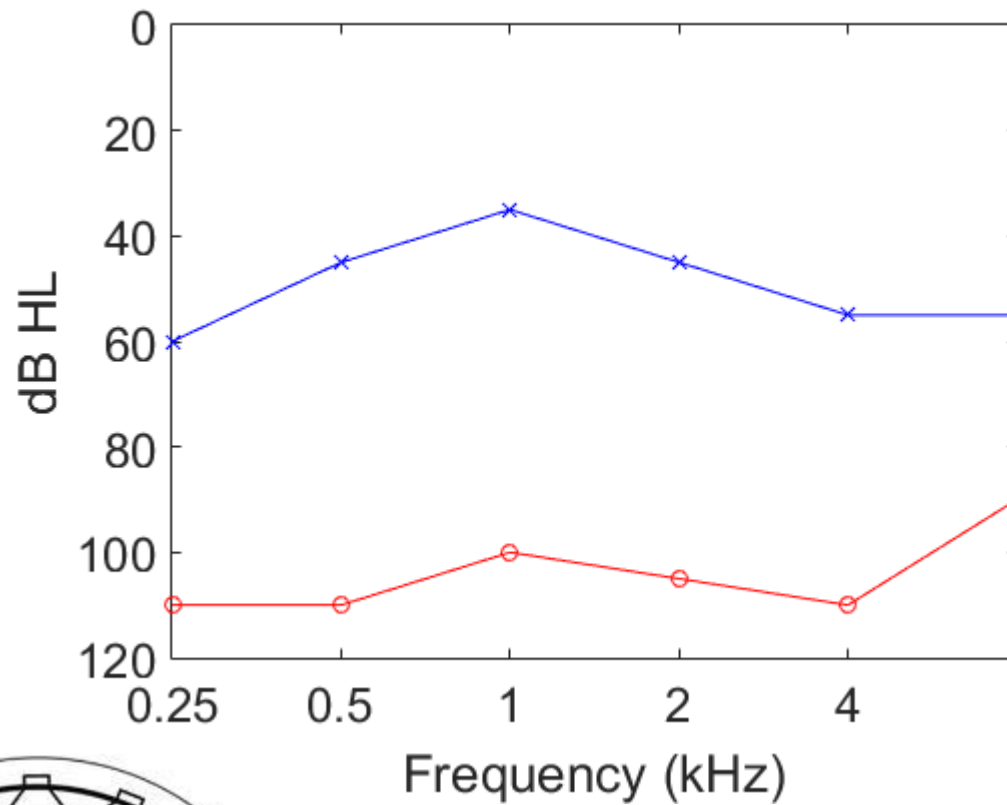
Sound Localisation with CI Melbourne normative data



	Pre-operative	Post-operative
Localisation	40.4° RMS	30.6° RMS



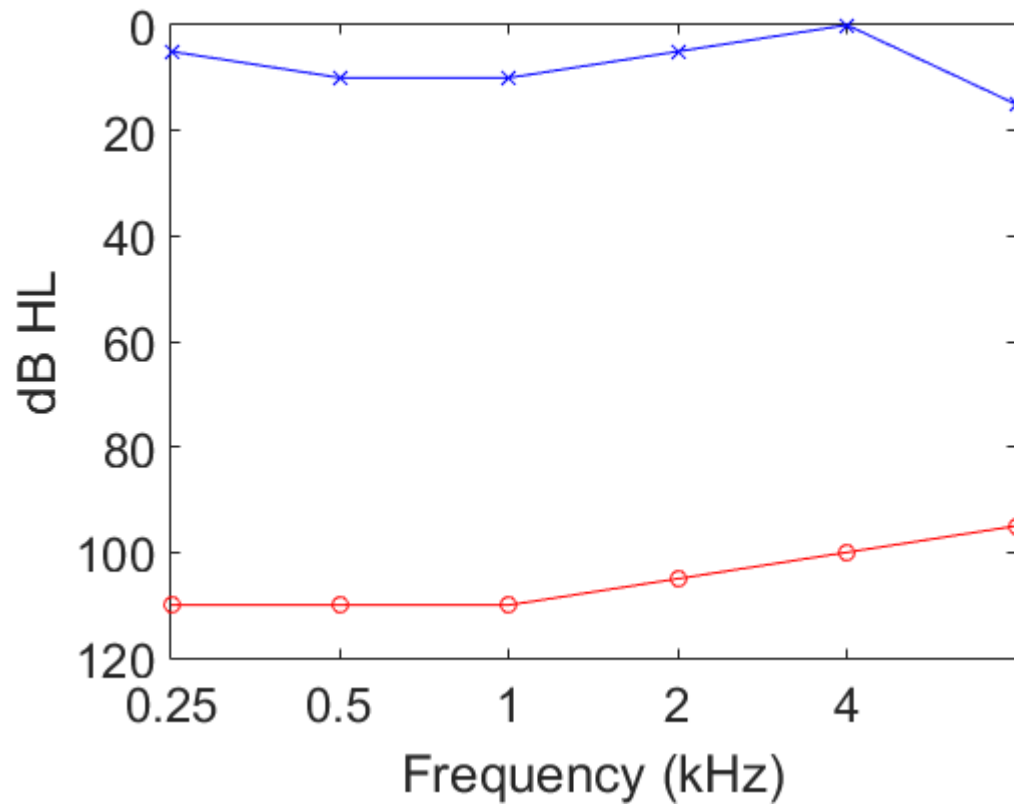
Pre-CI	15 dB	4.6 dB
Post-CI	2.3 dB	-4.9 dB



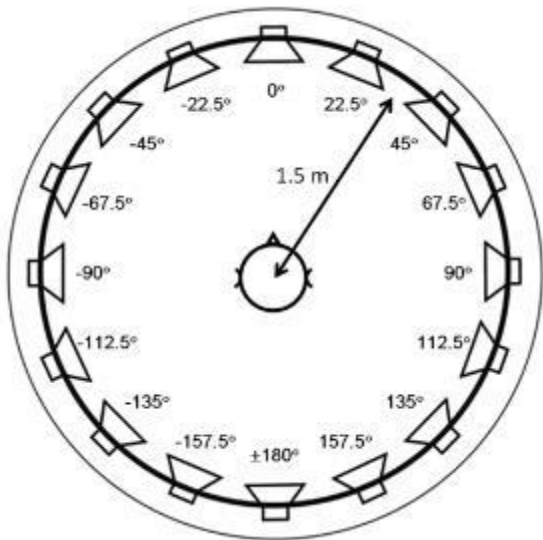
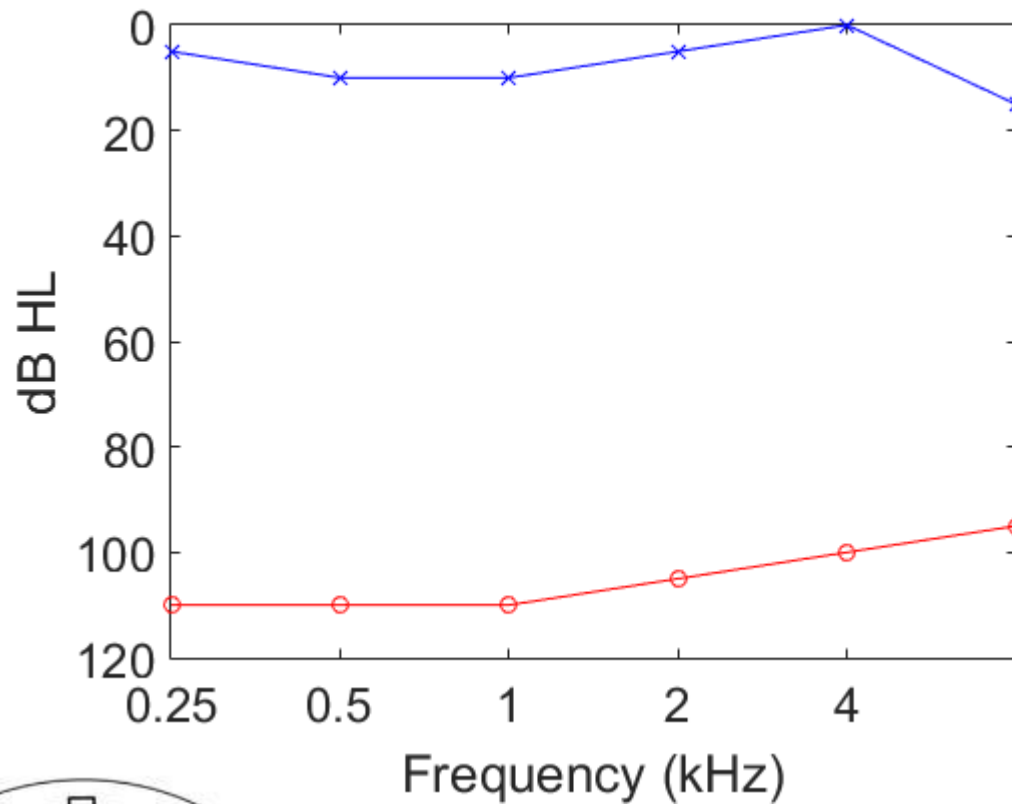
Sound Localisation

	Localisation
Pre-CI	41° (rms)
Post-CI	30.7° (rms)

CI: Better in noise in both ears, localisation a little better

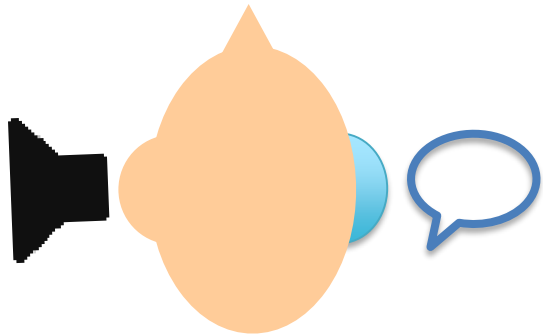
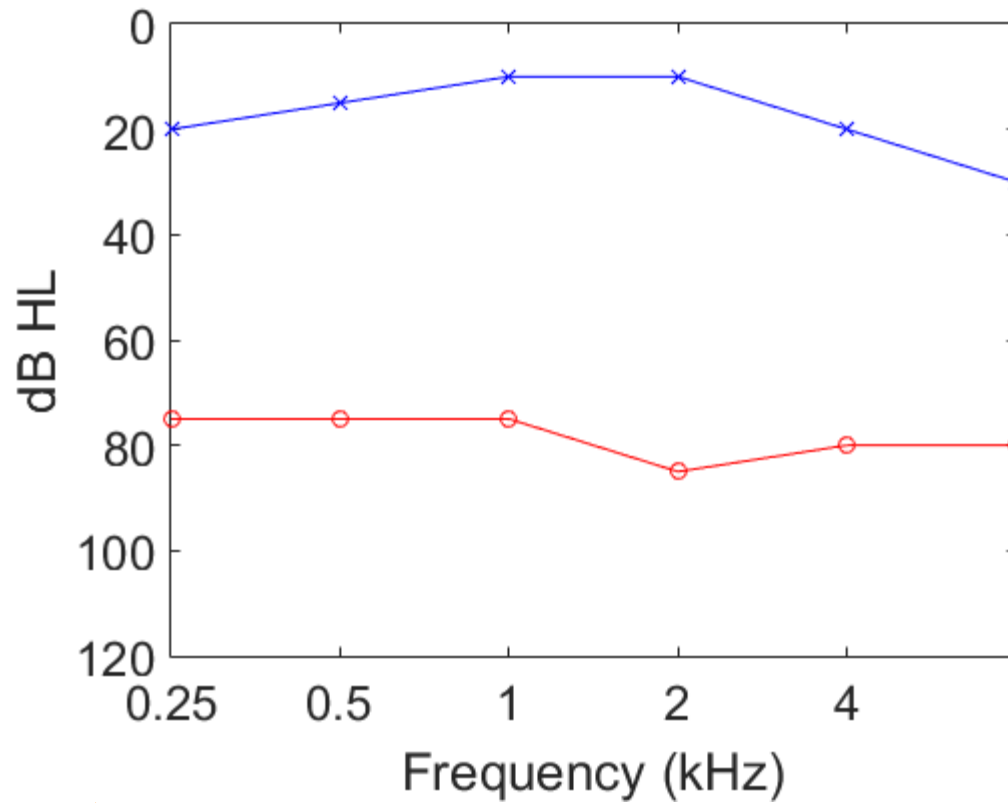


Pre-CI	-6 dB	0.2 dB
Post-CI	-13 dB	-1.5 dB



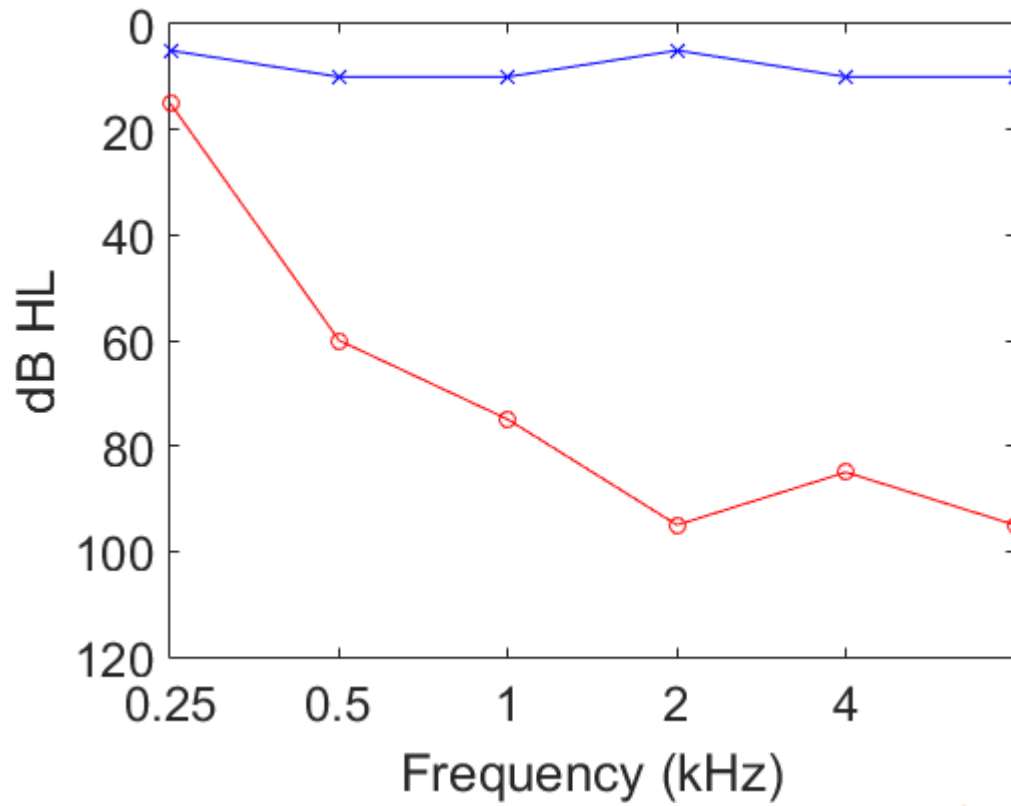
	Localisation
Pre-CI	84° (rms)
Post-CI	35° (rms)

CI: better when speech in bad ear. Localisation much better.



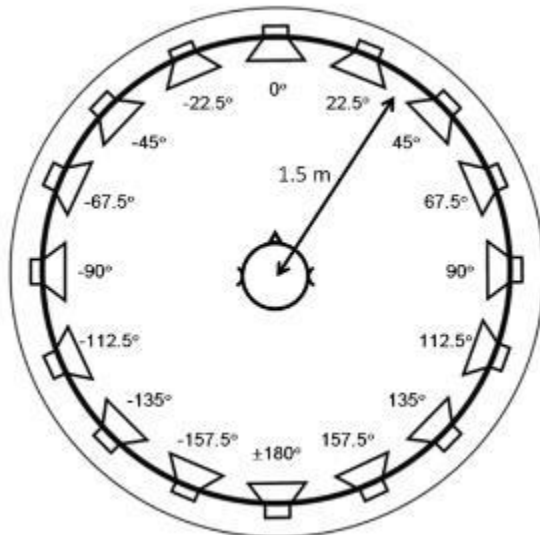
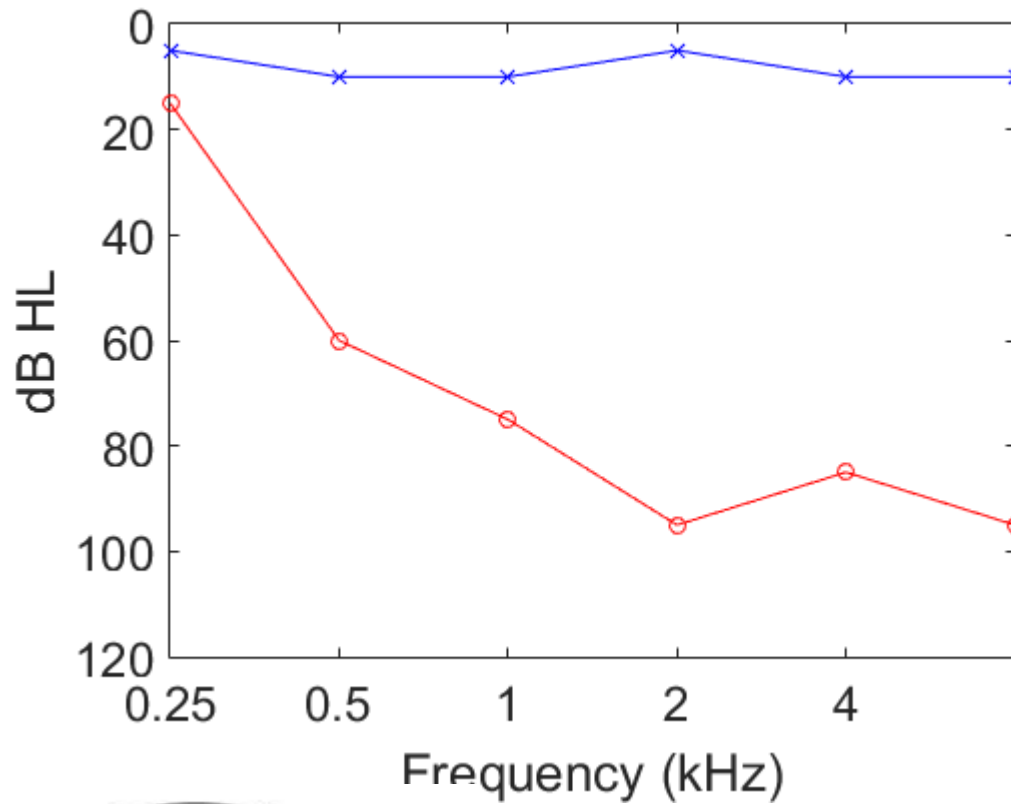
SRT: Doing better than CI with HA
 Localisation as good as CI with HA

	No hearing aid	Hearing aid
Signal-to-Noise	5.6 dB	0.4 dB
Localisation	81° (rms)	28° (rms)



SRT	-13 dB	- 8 dB
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Doing better than average CI patient (+8 dB) in deaf ear



Localisation	6.9° (rms)
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Is doing better than average with CI.
Patient has a lot to lose with CI.