



MOSAICS

Hearing Matters



Polarity effects on facilitation of the auditory nerve and behavioural responses in Cochlear implant recipients

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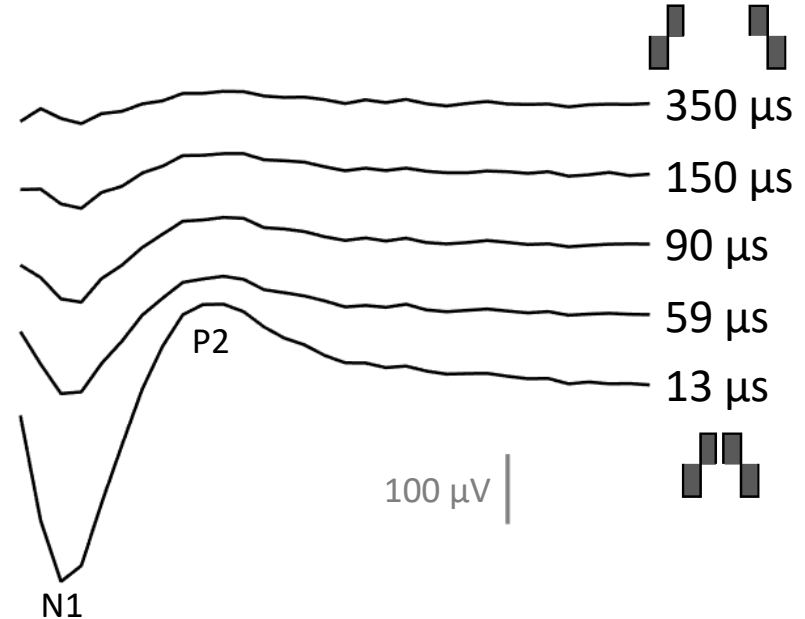
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 860718.



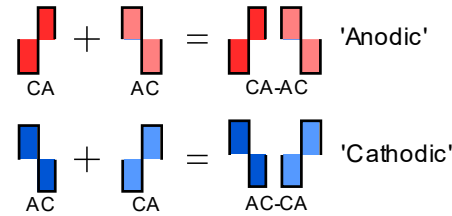
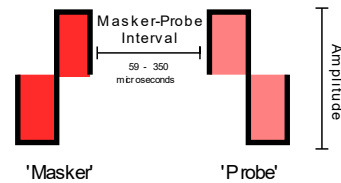
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Introduction

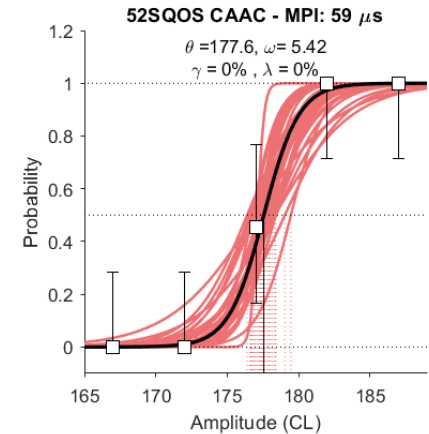
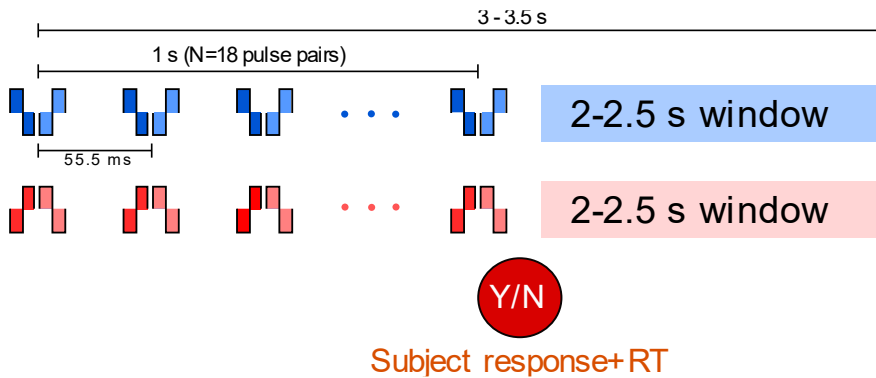
- Facilitation is the effect by which subthreshold stimulation increases nerve excitability
 - Distance between pulses should be small ($<$ Abs. Refractory period)
- Can be measured in Cochlear implant recipients (Cohen 2009, Hey et al. 2017, Tabibi et al. 2019)
- What is the effect of relative polarity between masker and probe in an eCAP setup?
 - Behavioural studies: Karg et al. (2013), Guerit et al. (2020)



Methodology



- Behavioural Thresholds (N=6)

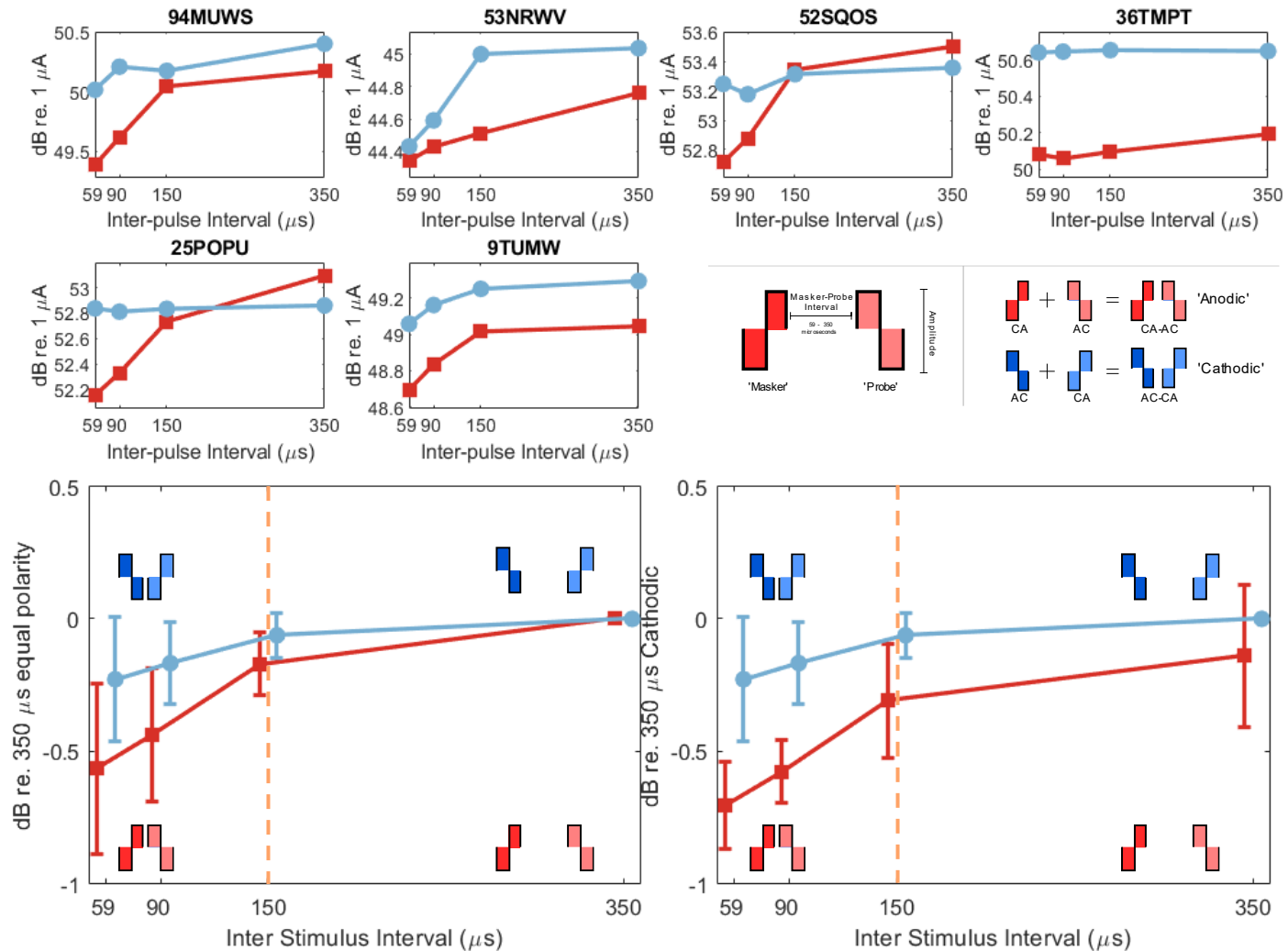


- Electrophysiology (subset N=3)

- eCAP responses using **masked response extraction method** (Miller et al. 2000)
- Obtained amplitude Growth functions:
 - Masker-Probe intervals: 13, 59, 90, 150, 350, 10000 μ s

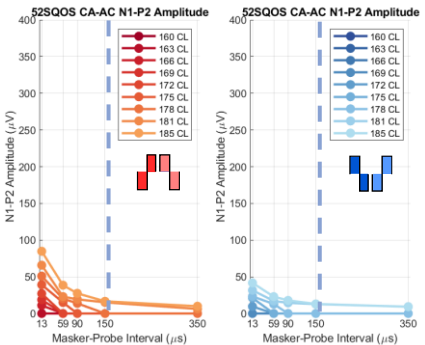
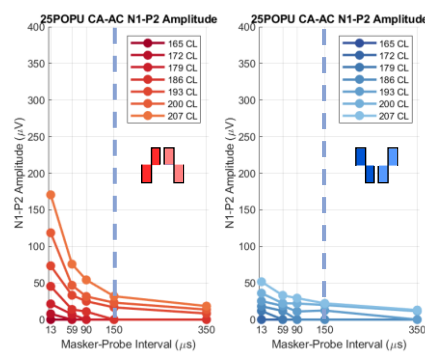
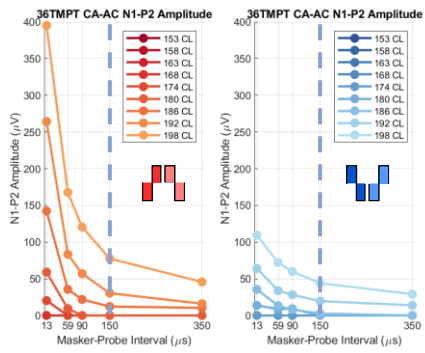
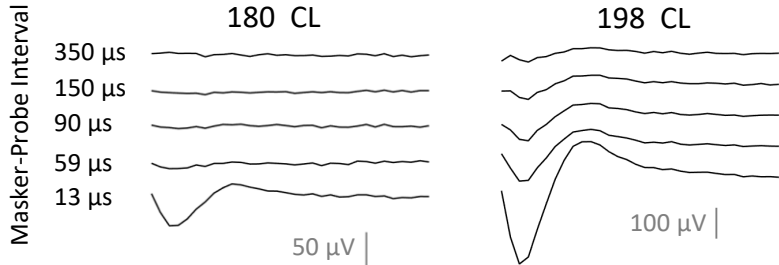
- All subjects were experienced CI users.

Behavioural Thresholds



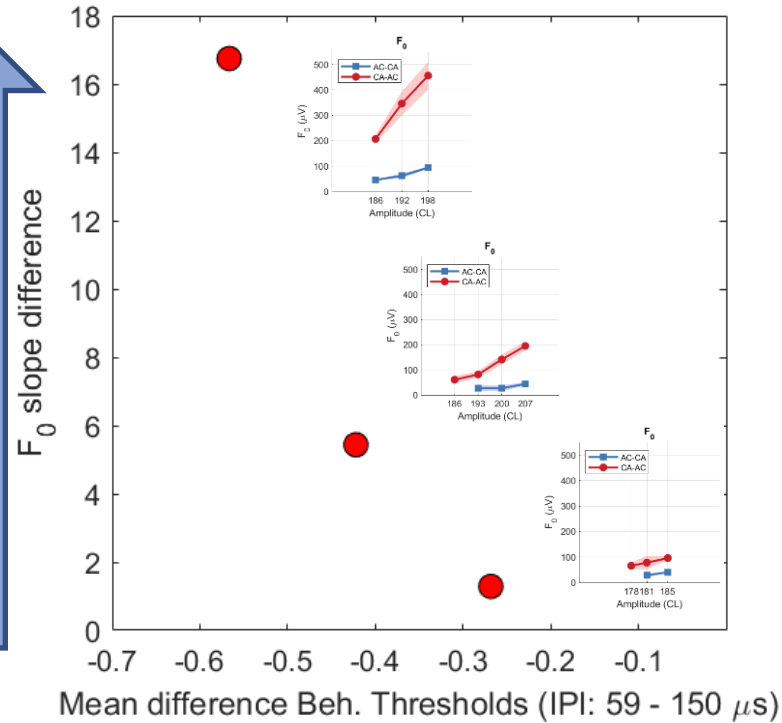
CAP data and exponential model

Example CAP data – Subject 36TMPT



$$A(IPI) = F_0 e^{-\frac{IPI}{\tau}} + \phi$$

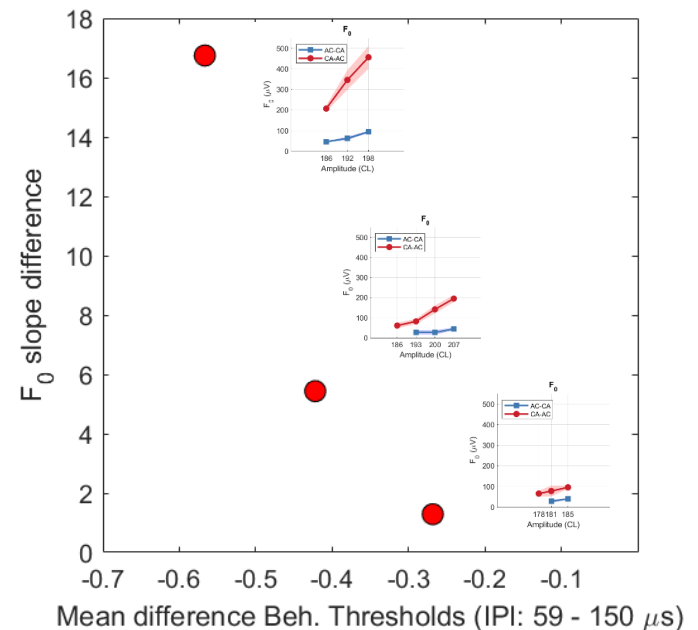
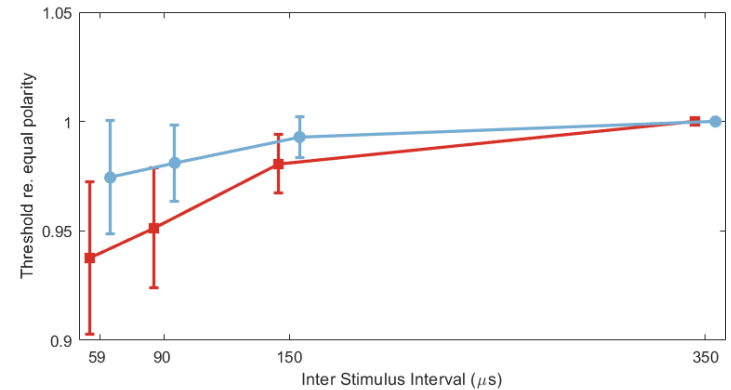
Steeper slope in eCAP response for Anodic



Lower mean behavioural threshold for Anodic in 'facilitation range'

Conclusion

- Behavioural data is in line with previous research (Karg et al. 2014)
- Anodic centered pulses produce larger eCAP responses as the MPI is reduced.
- Strength of facilitation appears to be consistent with behavioural thresholds
 - Both could be indicators of polarity sensitivity.



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- Facilitation of the auditory nerve could provide further insights to evaluate neural health.
 - Unravel paths to identify poor-performance



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Thank you for your attention!

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