# The effect of acoustic cue-weighting strategy on listening effort in acoustic simulations of cochlear implants

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Abstract: This study examined the relation between listening effort and speech comprehension level of cochlear implant (CI) acoustic simulations at different levels of perceptual difficulty, and whether listeners' acoustic cue-weighting strategies affected the behavioural gain from increase in cognitive effort.

#### Background

- Big individual differences in speech comprehension and life quality for CI fitting outcomes
- Listeners' temporal and spectral cue-weighting patterns affect speech comprehension and might also affect listening effort

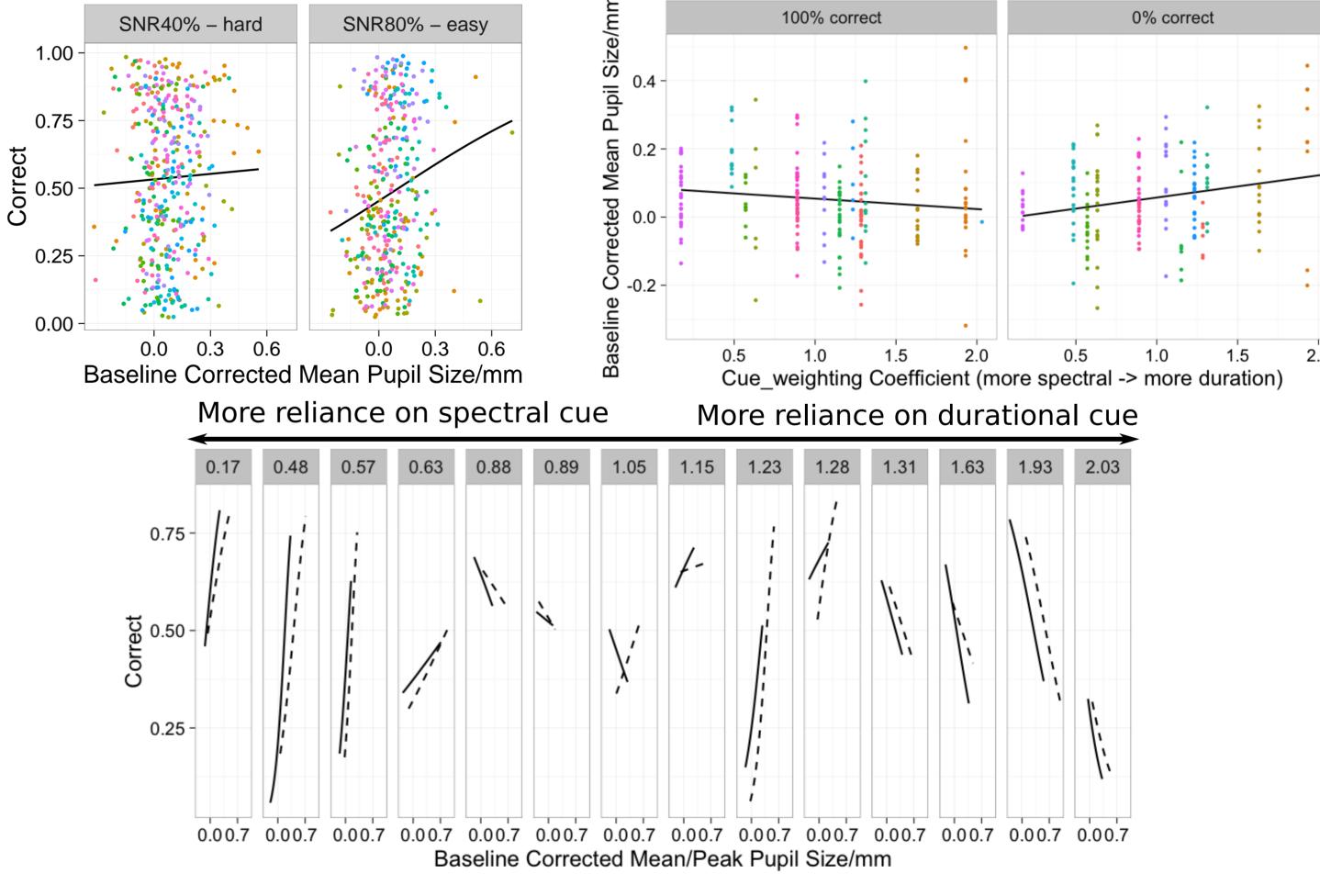
### Analysis

Mixed effect models using R package lme4 with fixed effects: **pupillary responses** (peak, mean, latency), **individual cue-weighting coefficients**, **condition** (easy SNR80% and hard SNR40%), **sentence correct levels** and random effect **listener** and **sentence** 

## Testing Procedure • 14 normal hearing native Southern British English speakers, all stimuli 8-band 4-mm frequency-shifted and noise-vocoded Processed CAL sentences in quiet to determine individual best performance level SRT tests in noise tracking 80% of individual SRT tests in noise tracking 40% of individual performance level performance level Fixed SNR CAL sentences tests at either SNR40% or SNR80% with pupillary and verbal responses recorded respond baseline (2s) wait peak (2s) intertrial (1s) Word discrimination test using /i/-/I/ continuum with orthogonally paired duration and spectral values cue-weighting coefficient = Please click the word you freq\_slope / dur\_slope bit beat

Step in Duration/Spectral Value

#### Results & Discussion



- For listeners weighting more on spectral cues, expending more cognitive effort was associated with better degraded speech perception performance.
- Listeners were more efficient in using explicit cognitive effort to enhance degraded speech perception performance when perceptual difficulty level was low.