

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

Zhang, Yue and Rosen, Stuart
Speech, Hearing and Phonetic Sciences
University College London



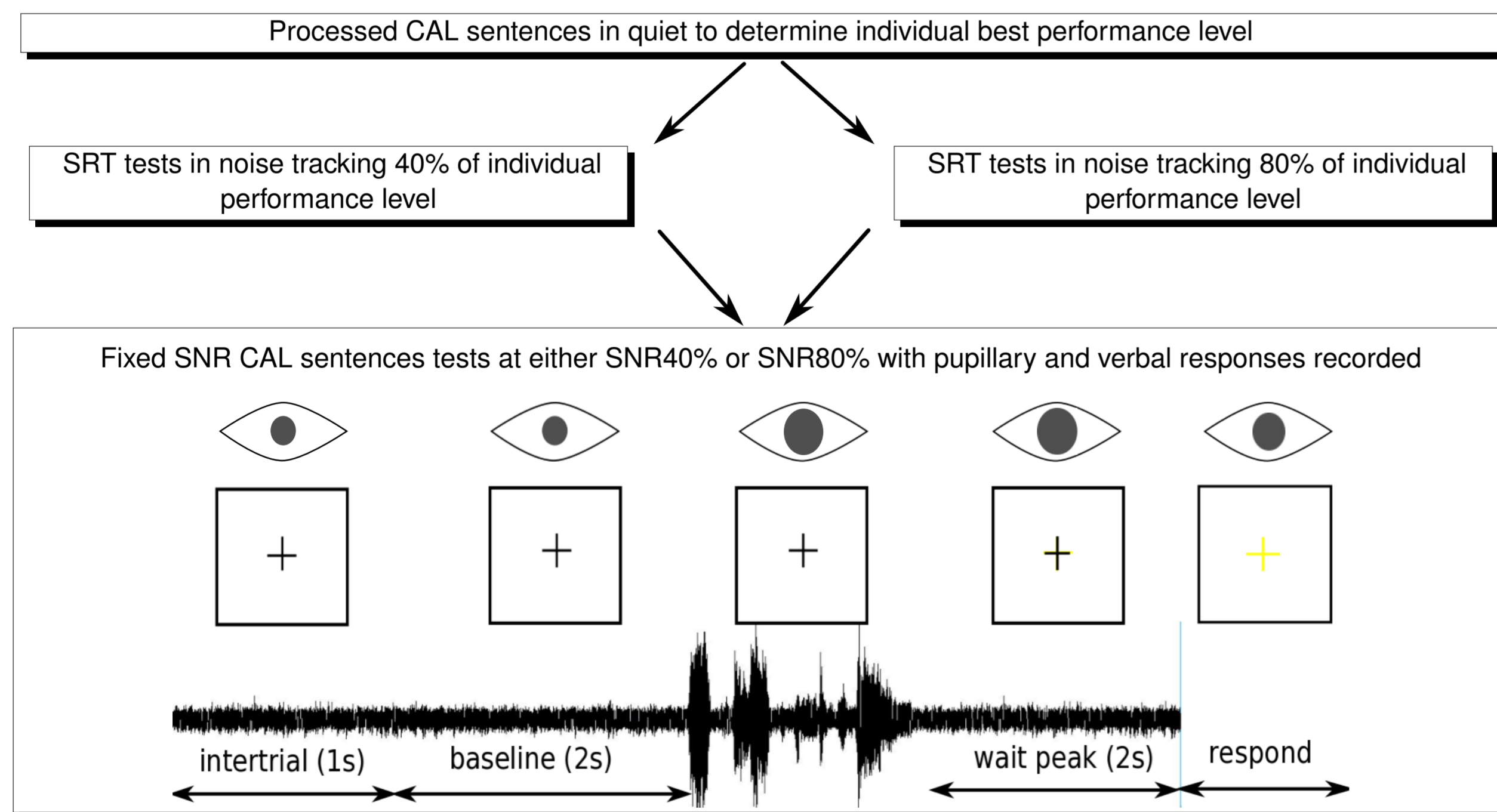
Abstract: This study examined the relation between listening effort and speech comprehension level of cochlear implant (CI) acoustic simulations at different levels of perceptual difficulty, and whether listeners' acoustic cue-weighting strategies affected the behavioural gain from increase in cognitive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

Testing Procedure

- 14 normal hearing native Southern British English speakers, all stimuli 8-band 4-mm frequency-shifted and noise-vocoded



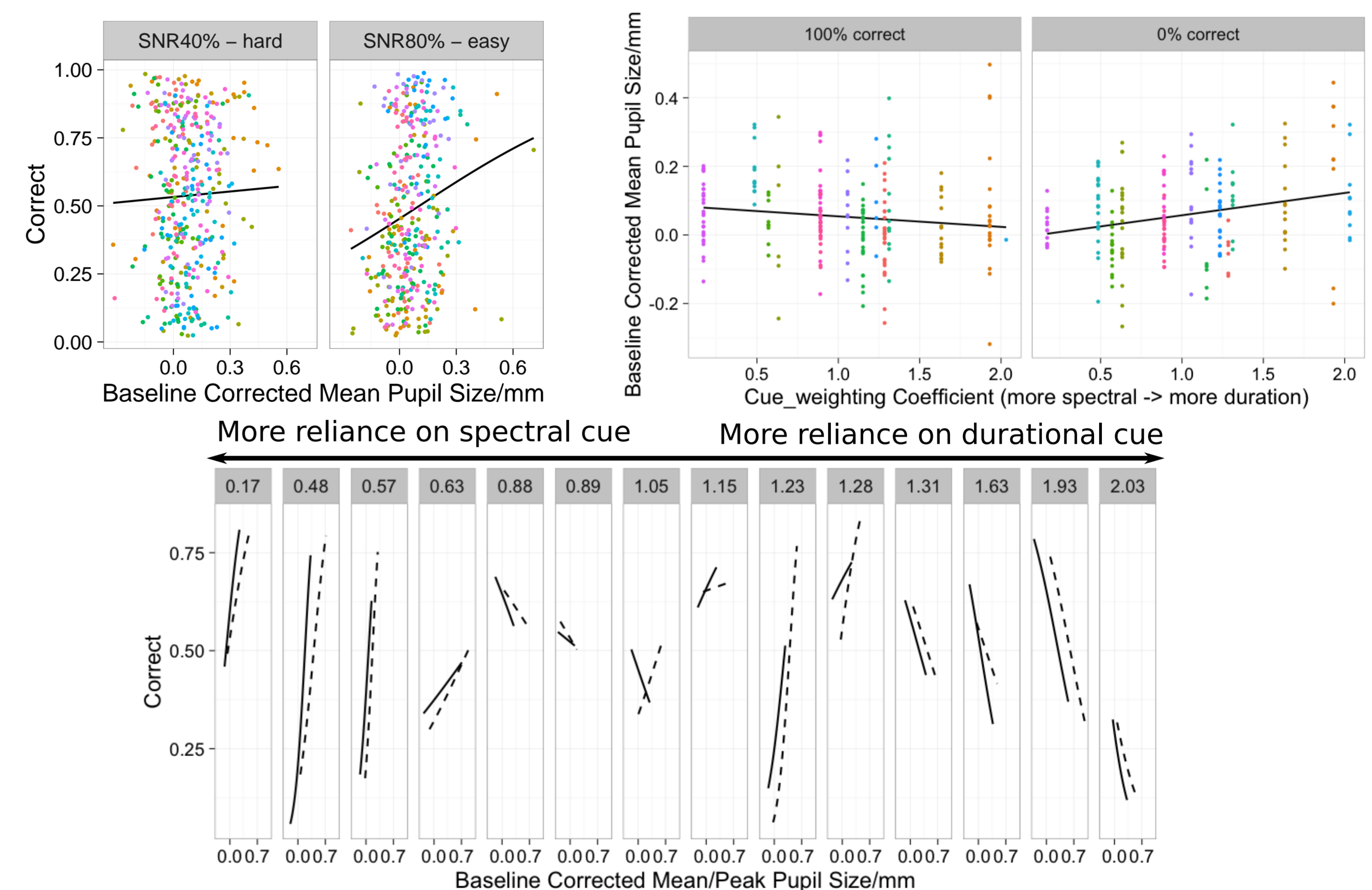
Word discrimination test using /i/-/l/ continuum with orthogonally paired duration and spectral values

cue-weighting coefficient = $\frac{\text{freq_slope}}{\text{dur_slope}}$

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**

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.