

Are there binaural consequences of speech envelope enhancement?

Boston University College of Health
& Rehabilitation Sciences: Sargent College
Department of Speech, Language & Hearing Sciences

Lucas S Baltzell, Daniel Cardosi, Jayaganesh Swaminathan and Virginia Best
Department of Speech, Language & Hearing Sciences



BACKGROUND

A number of speech enhancement strategies operate by altering the amplitude envelope. Here we consider two complementary approaches:

Envelope expansion (EE) exaggerates speech modulations to enhance intelligibility in noise (e.g. Fu & Shannon 1998; Lorenzi et al 1999; Apoux et al 2001; 2004; Wiinberg et al 2018).

Envelope compression (CE) can improve intelligibility by increasing the audibility of low-level consonants (e.g. Vandali 2001; Desloge et al 2017; Goldsworthy et al in press).

The potential **binaural** effects of these speech enhancement strategies have not previously been explored.

Given the clear influence of envelope properties (fluctuations, onsets, rising slopes, etc) on binaural perception, there may be binaural “side effects”.

Certain alterations to the amplitude envelope may **increase** the salience of binaural cues and could enhance the spatial perception of speech (and others may **reduce** binaural salience).

METHODS

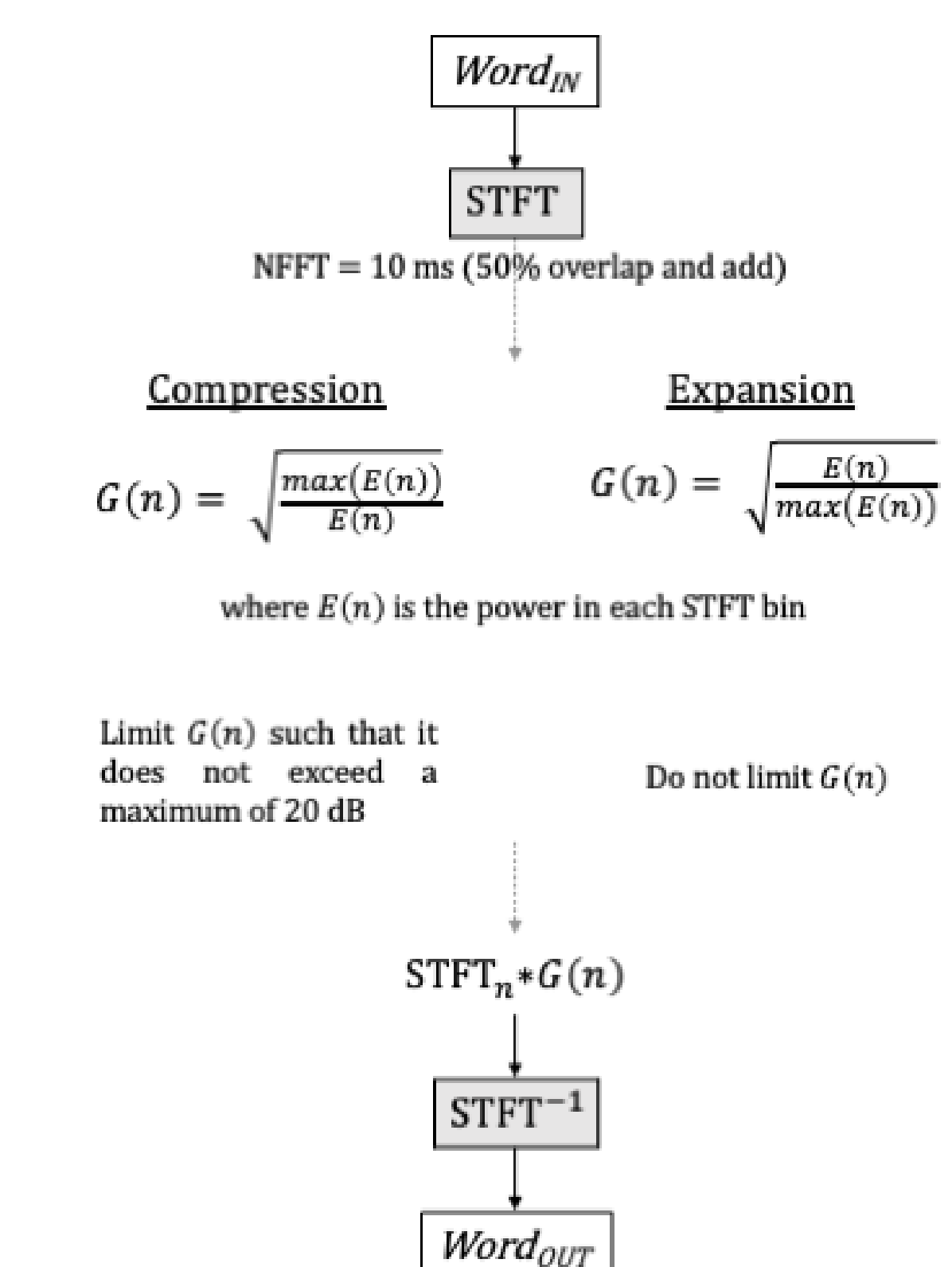
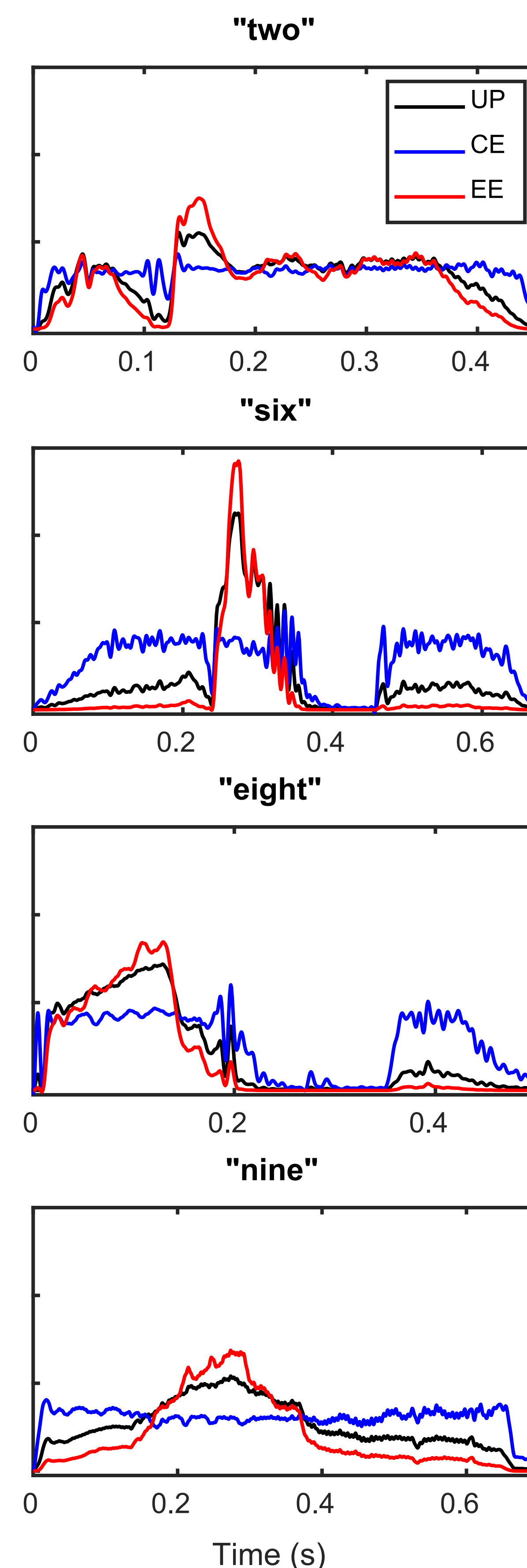
Sensitivity to interaural time differences (ITDs) were measured adaptively.

Stimuli were broadband single words (“two”, “six”, “eight”, “nine”) that were either unprocessed (UP) or processed with CE/EE.

Thresholds measured in quiet, in the presence of multi-talker babble, and for a vocoded condition with interaurally decorrelated carriers, designed to limit the availability of fine-structure ITDs.

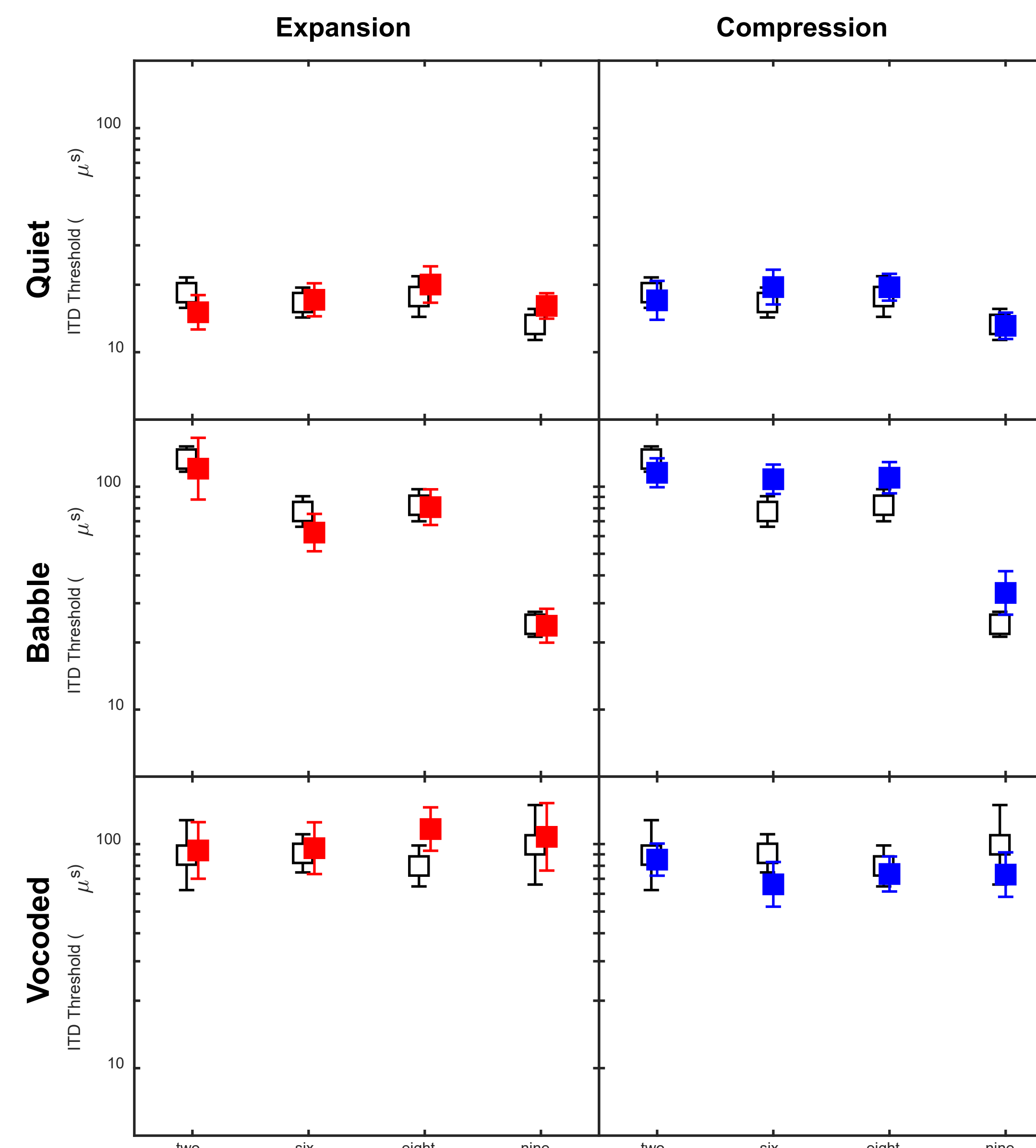
Participants were 10 young adults with normal hearing (NH; mean age 25 years). Preliminary results are also shown for 5 young adults with sensorineural hearing impairment (HI; mean age 22 years).

STIMULI



RESULTS - NH

For listeners with normal hearing, ITD sensitivity depended on the specific word token, but effects of EE and CE were small and non-systematic.



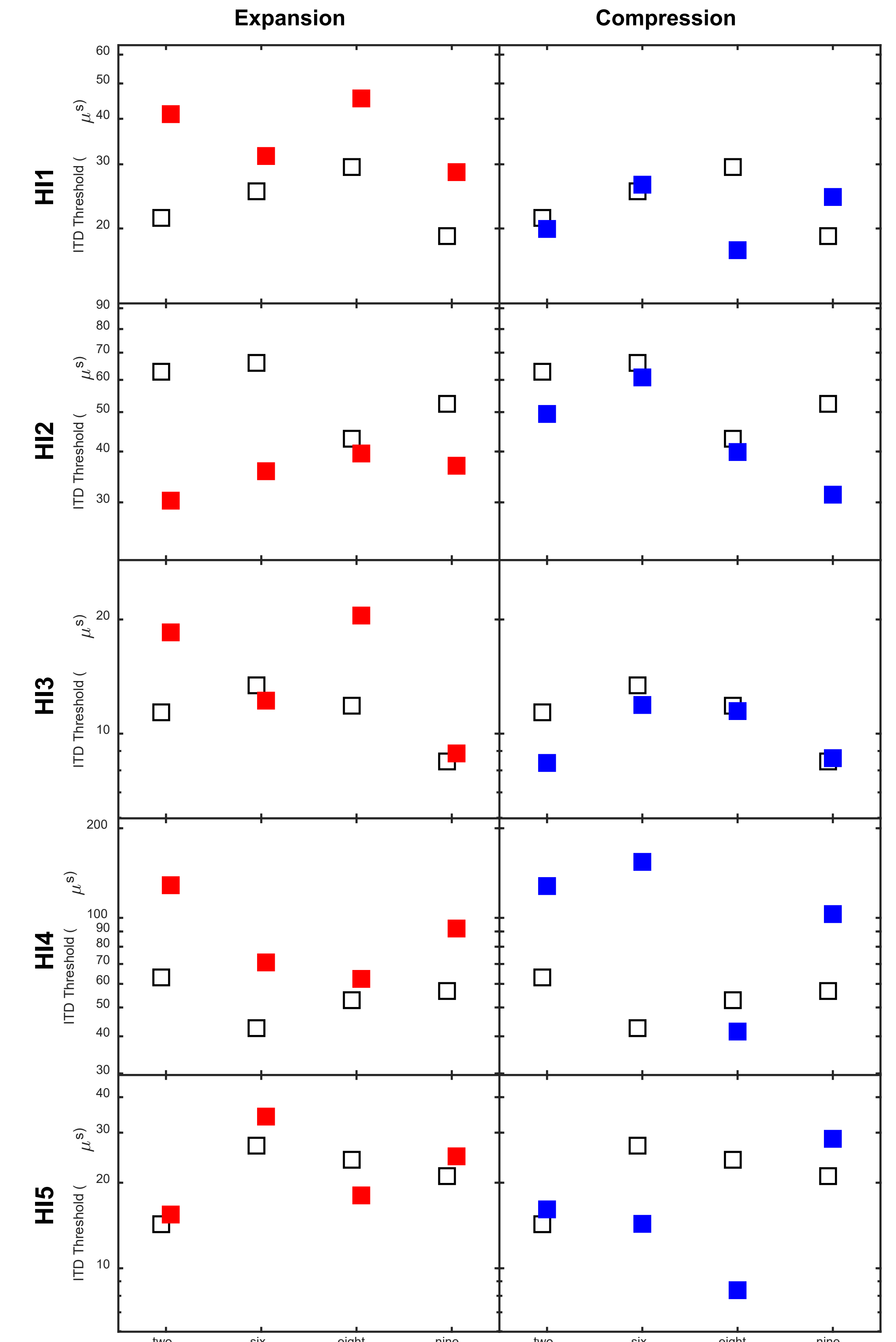
FUTURE WORK

Future work will examine

- reverberant stimuli
- suprathreshold ITD tasks
- multichannel implementations
- a novel hybrid strategy

RESULTS - HI

For listeners with hearing loss we are seeing effects of EE and CE that are very specific to the individual and word token.



REFERENCES & ACKNOWLEDGMENTS

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