

# An incremental cue-weighting approach to extended lexical tone training

Yanyu Li, Laurence White & Ghada Khattab

Newcastle University

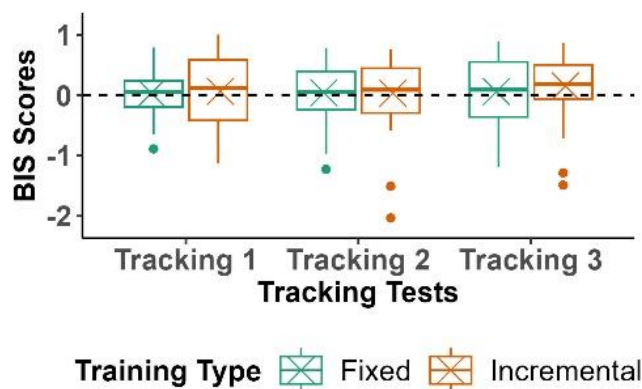
[y.li218@newcastle.ac.uk](mailto:y.li218@newcastle.ac.uk), [laurence.white@newcastle.ac.uk](mailto:laurence.white@newcastle.ac.uk), [ghada.khattab@newcastle.ac.uk](mailto:ghada.khattab@newcastle.ac.uk)

First language (L1) experience can affect perceptual weighting of acoustic cues relevant to meaningful second language (L2) contrasts [1]. For example, functional discrimination of Mandarin lexical tones requires attention to both *F0 direction* and *F0 height*, but, relative to L1 Mandarin listeners, *F0 direction* is underweighted by L1 English listeners [2].

Incremental cue training aims to enhance sensitivity to previously less-attended cues: the phonetic salience of the cue is initially exaggerated, with the magnitude of exaggeration incrementally reduced as training proceeds. So far, the technique has only been applied for training segmental contrasts [3]. Here we test the efficacy of exaggeration of tonal slope, incrementally reduced over three sessions, for training tone perception in L1 English listeners.

Two groups (N=30) were trained and tested on pairwise comparisons of nine CV syllables uttered with four pseudo tones (*high level*, *fall*, *rise*, *fall-rise*) contrasting on *F0 direction*, with pseudo-random variation of *F0 height*. Training sessions 1 to 3 were completed at 24-48hr intervals. For the Incremental training group (N=15), tonal slopes were exaggerated at training outset and reduced by session, whilst the Fixed group (N=15) was trained with the same tonal contrasts, but unexaggerated throughout. After each training session, all participants completed a tracking test on a subset of unexaggerated (baseline) stimuli, whilst pre- and post-training tests used the full sets of baseline stimuli. Each test or training trial used an ABX task (“Does syllable X sound more like syllable A or syllable B?”), with feedback (“correct”/“incorrect”) only in training sessions.

Accuracy was comparable between training groups in training and pre-/post-tests, whilst in tracking tests, the Fixed group outperformed the Incremental group until the last session, where the two training groups were comparable. However, a combined accuracy-RT measure (Balanced Integration Score: BIS) showed the Incremental group outperforming the Fixed group in Training Session 1, indicating a temporary perceptual boost due to cue exaggeration. The Incremental group also performed better on the BIS measure in the final tracking-test (*Fig. 1*), providing some evidence of a sustained boost to perceptual sensitivity. In line with established theories of perceptual learning, we suggest that the modest benefits of incremental cue exaggeration evidenced here might be more robust when the range of cue exaggeration varies between training trials, rather than just between sessions, thus requiring the listener to make categorical generalisations at an early stage.



**Fig. 1:**  
Combined  
accuracy-RT  
measure (BIS)  
in tracking  
tests.

## References

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- [3] M.V. Kondaurova and A.L. Francis. (2010). The role of selective attention in the acquisition of English tense and lax vowels by native Spanish listeners: Comparison of three training methods. *J Phon*, 38, 569-587.