F0 as a Word Boundary Cue for Segmenting New Zealand English Ethnolects

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1. Introduction

It has been shown that English speakers (from non-New Zealand backgrounds) use initial stress as a word boundary cue in the segmentation of continuous speech [1]. Research has also shown that Maori English is significantly more syllable-timed than Pakeha English [2]. New Zealanders have exposure to both Maori and Pakeha English. We ask whether they use different segmentation strategies when they are listening to speakers with different dialect features. More precisely, we question whether a) New Zealand English speakers use the same segmentation strategies as speakers of other varieties of English, and b) whether New Zealanders segment words in continuous speech in these ethnolects differently. To answer these questions, an artificial language learning paradigm was used, based on [1].

2. Methodology

An artificial language was designed, consisting of nine nonsense words, randomly concatenated to form 'continuous speech'. In total, four versions of the language were made, to which participants were randomly assigned. In this 2×2 factorial design, one factor was ethnolect (Maori or Pakeha speaker), and the other was boundary cue position (left or right edge of the word). As the amplitude and length of each syllable within the words were normalised, fundamental frequency change over the syllable was the sole cue to word boundaries. The fundamental frequency of the first or last syllable of the words (in the left vs. right edge condition, respectively) was resynthesized to have a contour tone. The pitch of the remaining syllables was flattened (see Figure 1).

In the introduction phase of the experiment, participants were auditorily and visually primed with the target ethnolect to encourage ethnolect-based segmentation strategies. Following that, participants were exposed to the language for about 14 minutes, then presented with 27 randomised and counterbalanced test pairs. Each pair consisted of one attested word from the language they were trained on and one non-word. Participants were asked to identify the attested word.

3. Results

Binomial mixed effects models were used to analyze participants' accuracy in the task. In the pilot study, the 22 Pakeha participants who completed the task:

- were significantly more accurate with the Maori English voice (61%) than the Pakeha English voice (54%).
- showed a significant interaction between the position of the correct word in the test pair and the stress-alignment; participants were significantly more accurate when the real word was the first member of the presented pair.
- when the first member of the presented pair was the real word, participants were significantly more accurate in the right edge condition (74%) than in the left edge condition (61%).
- participants performed at chance when the real word appeared second, regardless of the stress alignment.

4. Discussion

The pilot results suggest that (i) segmentation strategies used by New Zealand English speakers may differ from strategies used by speakers of previously studied varieties, and that (ii) the strategies used may be mediated by dialectal features of the speaker.

The full study is currently underway and includes a larger sample of Pakeha participants, and additional pitch cue conditions. Results from this phase will be presented and discussed in the poster.

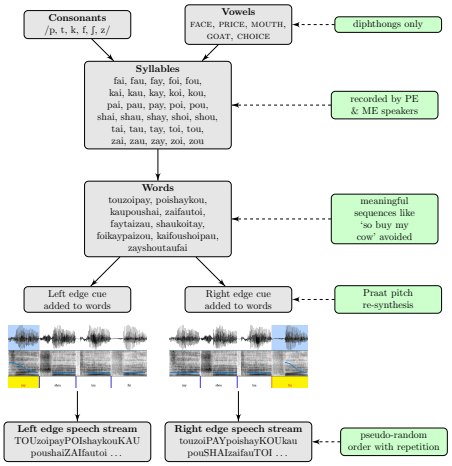

Figure 1: *Stimulus in the experiment.*

5. References

[1] Tyler, M. D. and Cutler, A. (2009). Cross-language differences in cue use for speech segmentation. *The Journal of the Acoustical Society of America*, 126, 367–376.

[2] Szakay, A. (2006). Rhythm and pitch as markers of ethnicity in New Zealand English. In *Proceedings of the 11th Australasian International Conference on Speech Science & Technology*, University of Auckland (pp. 421–426).

[3] Szakay, Anita. (2007). *Identifying Māori English and Pākehā English from suprasegmental cues: A study based on speech resynthesis*. University of Canterbury MA thesis, Canterbury, New Zealand.