

Eccentric C-V timing across speakers of diaspora Tibetan with and without lexical tone contrasts

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Background

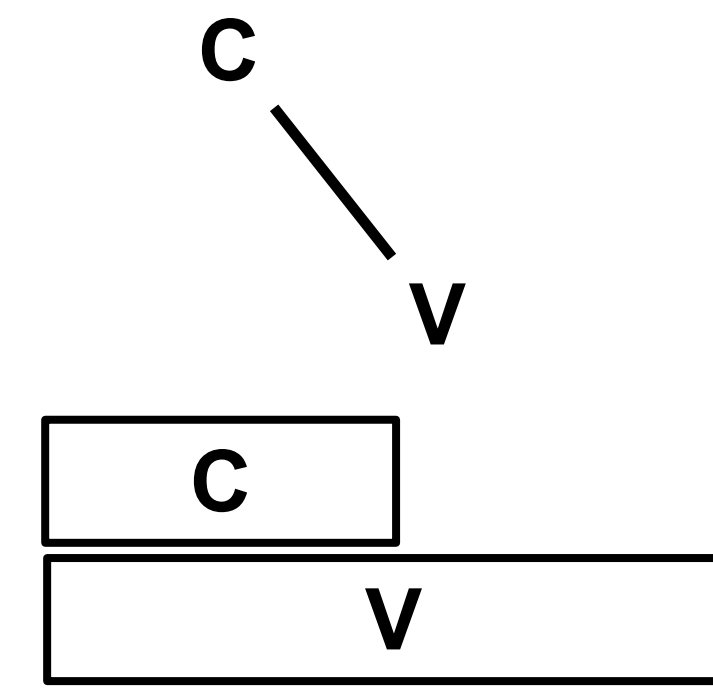
- Articulatory timing is language-specific
- Temporal coordination of *gestures* is used to capture timing in Articulatory Phonology
- Some coordination relations (*in-phase* and *anti-phase coupling*) are hypothesized to be intrinsically stable (Saltzman & Byrd 2000)
- Language-specific timing patterns are derived from the interaction of coordination relations, e.g. *competitive coupling* (see right). May include consonant, vowel, and tone gestures
- **Research Question: Does the presence or absence of a tone gesture affect articulatory timing?**

Hypothesis

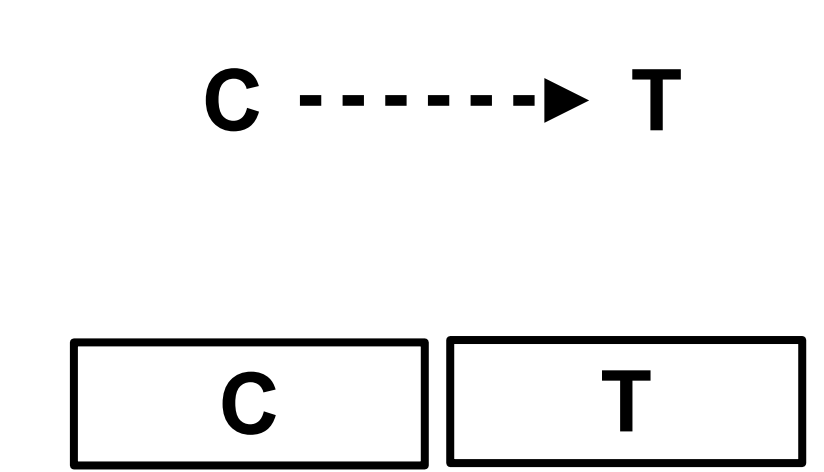
- Past work shows differences in C-V timing...
 - ... across tonal and non-tonal languages (Gao 2008, Katsika et al. 2014, Karlin 2018)
 - ... across tonal and non-tonal syllables within a language (Zhang et al. 2019)
- **In this study, we investigate C-V timing across speakers of diaspora Tibetan, comparing speakers who maintain a lexical tone contrast with those who do not**
 - raised in dialectically-diverse Tibetan-speaking enclaves in India/Nepal, living in USA
- Tonal speakers are predicted to have competitive coupling among C, V, and tone gestures
- Non-tonal speakers, lacking tone gesture, are predicted to have in-phase or eccentric timing
- **In-phase coupling predicts ~0ms C-V lag**
- **Competitive & eccentric timing predict >0ms lag and pos. correlation C-V lag ~ C duration**

Coupling Relations

In-Phase

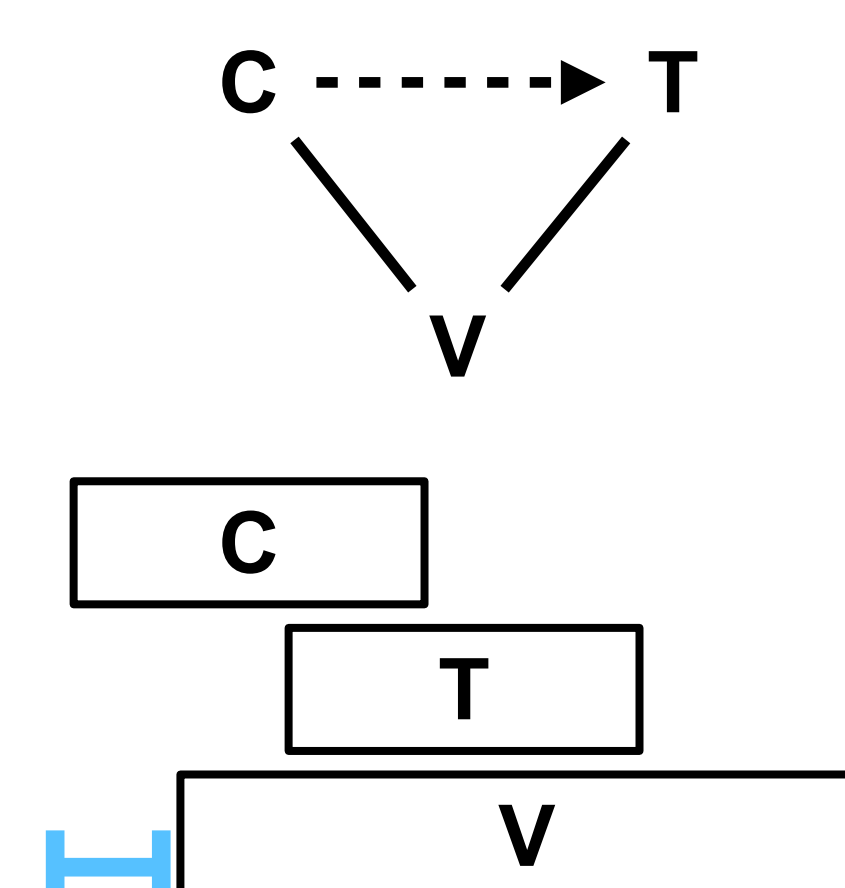


Anti-Phase

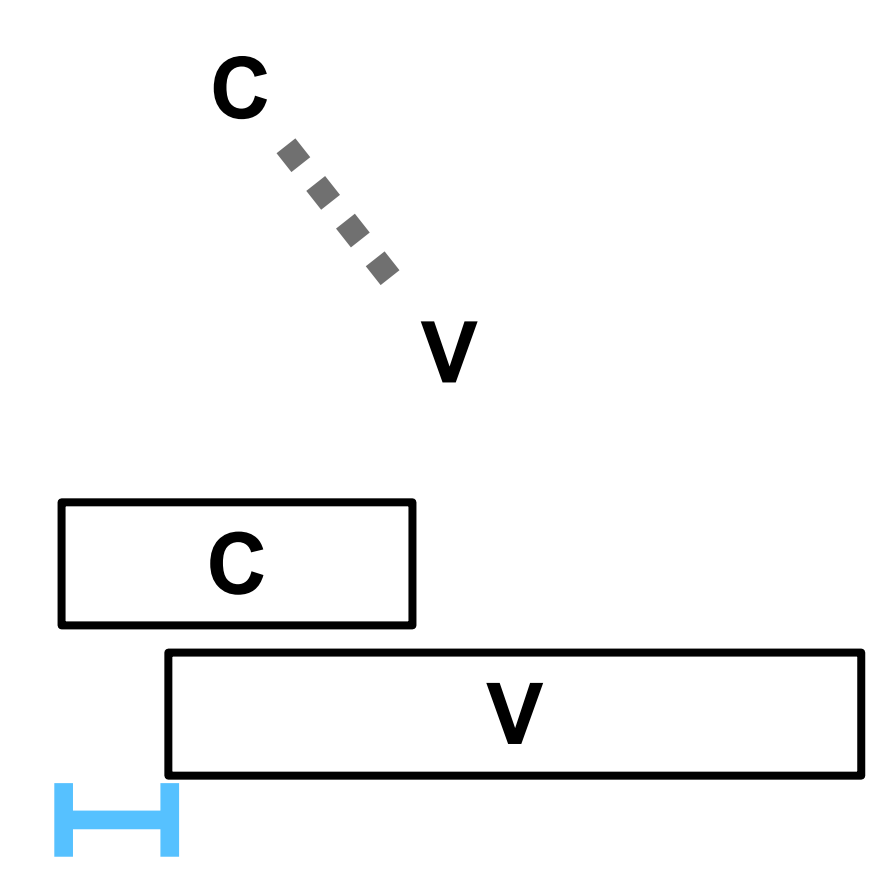


- *In-phase coupling* (synchronous) and *Anti-phase coupling* (sequential) are most stable
- *Competitive coupling*: combination of in-phase and anti-phase coupling relations
- *Eccentric coupling*: one coupling relation, just not intrinsically stable

Competitive



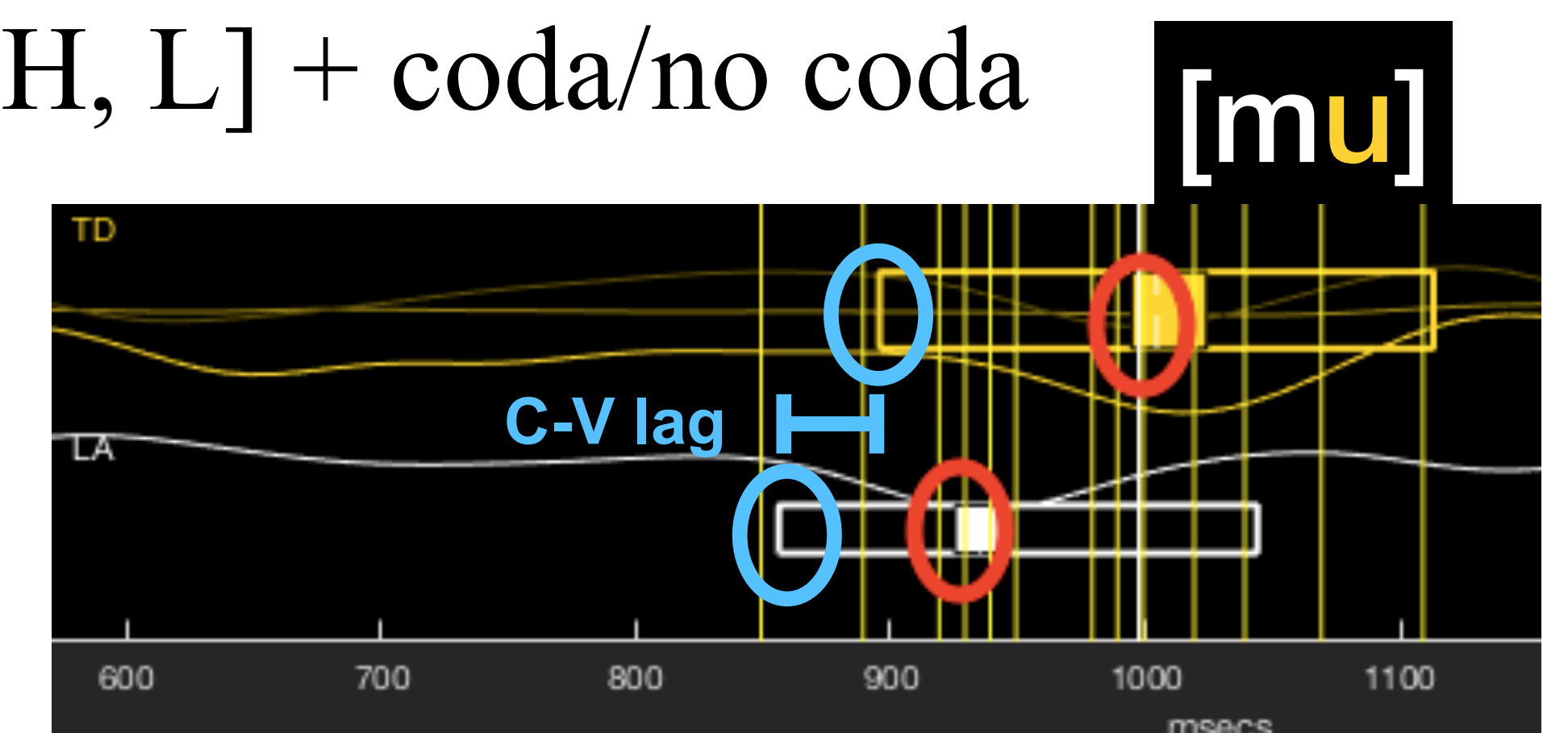
Eccentric



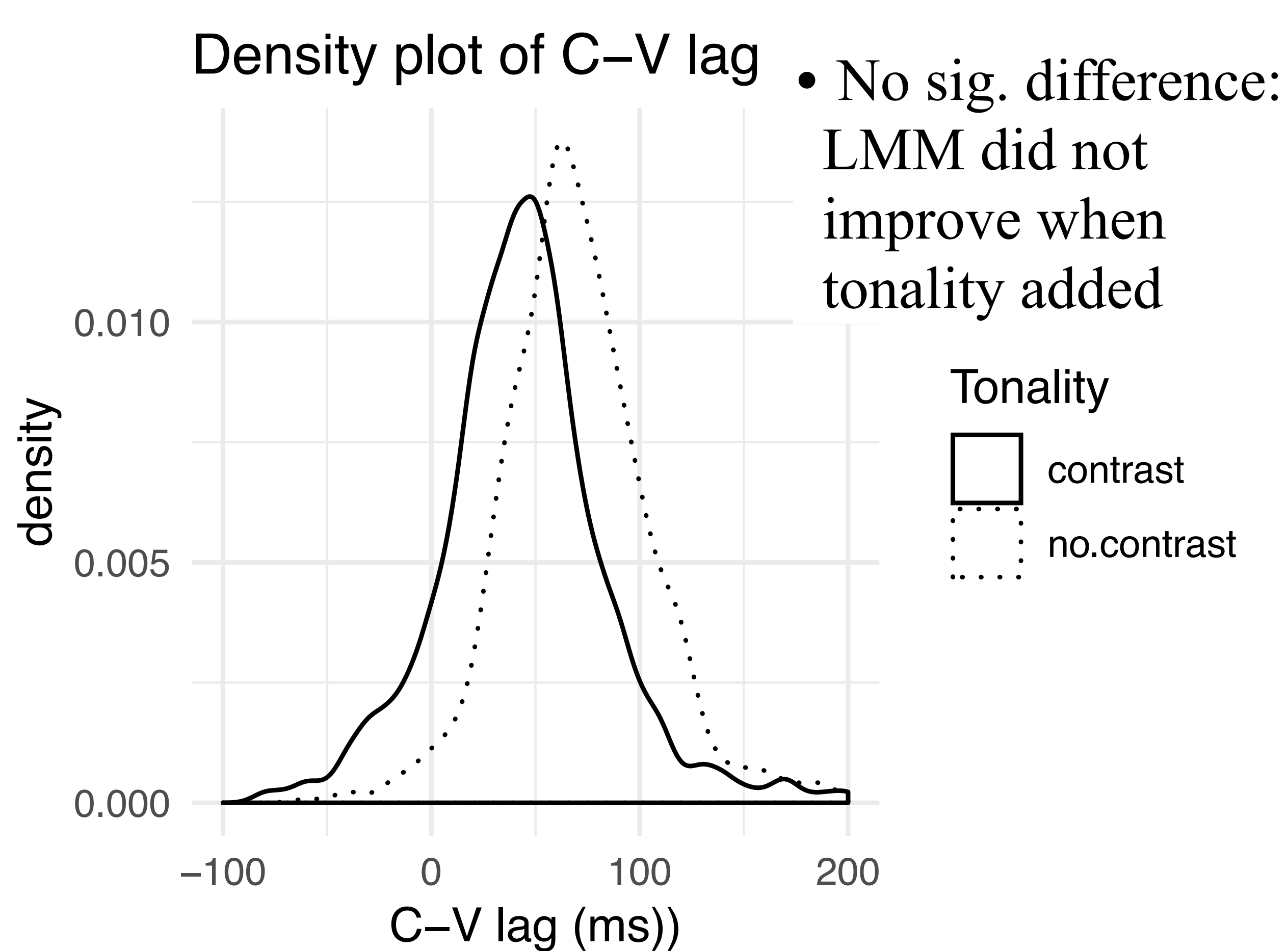
- Identical C-V timing can result from different coupling

Methods

- Participants: 6 speakers of diaspora Tibetan, four who maintain a lexical tone contrast and two who do not
- Electromagnetic articulography (EMA): NDI Wave
 - Start / end of gesture: 20% velocity threshold
- Stimuli presented in Tibetan orthography:
 - [p p^h m] + [a o u] + [H, L] + coda/no coda
 - 1&2 syll. words
- C-V lag between:
 - C: lip aperture
 - V: tongue dorsum

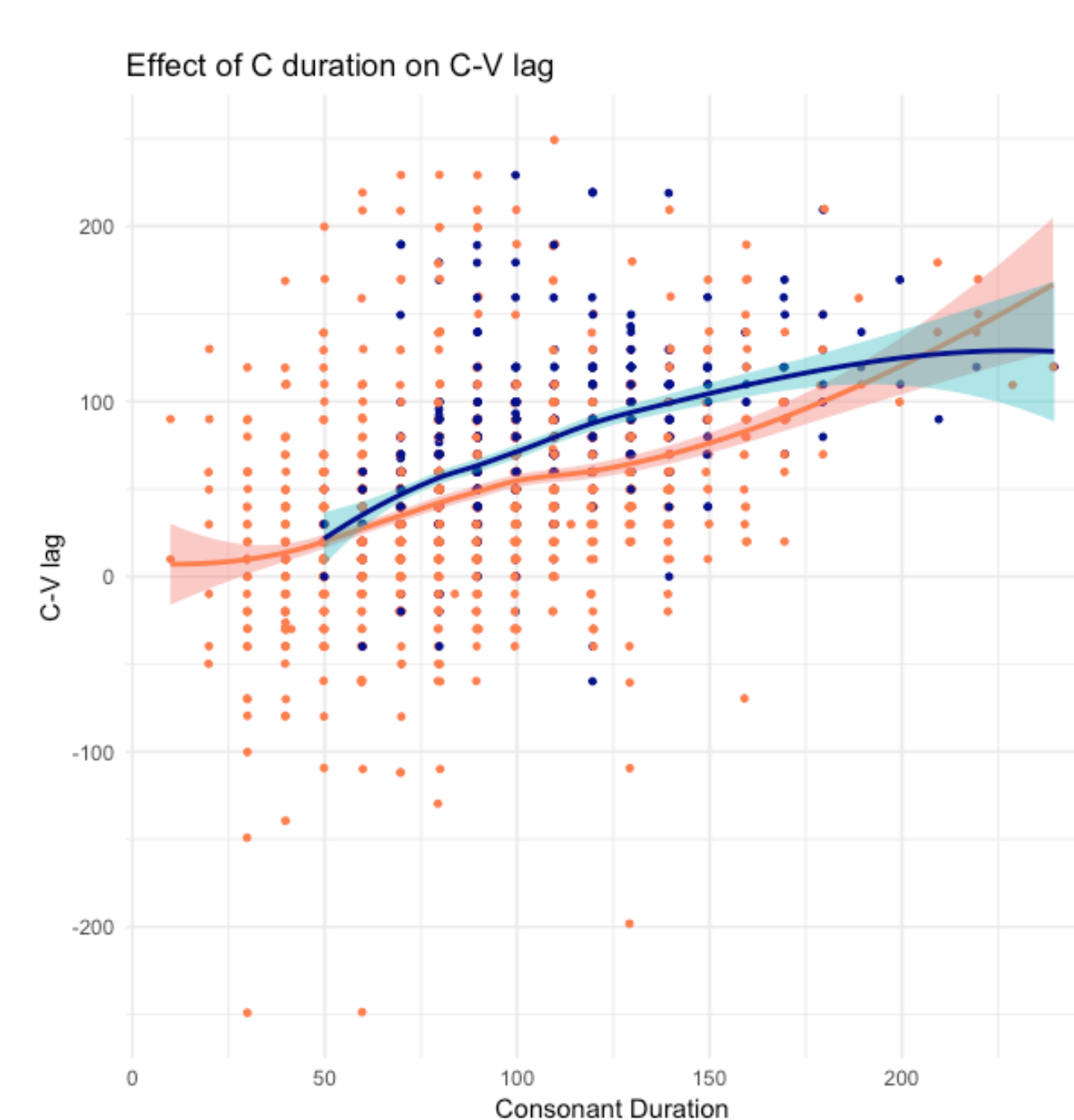


C-V lag Results and Interpretation



- **~50 ms C-V lag is consistent with both competitive and eccentric coupling**
- Predicted for tonal speakers, but not for non-tonal speakers

C-V lag covaries with C gesture duration



- Covariation is consistent with competitive or eccentric coupling

- Competitive coupling unlikely for non-tonal speakers in absence of tone gesture

Conclusion:

- evidence for eccentric coupling, at least in non-tonal speakers
- Tone gesture may affect timing, but there is only so much
- apparent persistence of tonal-type timing after tone loss