Overview

Ultrasound data shows that Sūzhōu 苏州 Chinese “front” vowels feature a three-way contrast in constriction location:

- **Dorsal-palatal**, as in conventional front vowels, e.g. [i], [y]
- Two more anterior constriction types typically associated with consonants: lamino-postalveolar, e.g. [ɿ] and apico-alvalveolar, e.g. [ʮ]

Several interesting characteristics of this subset of Sūzhōu Chinese vowels and consonants illustrated here:

- The two more anterior constrictions are, for the most part, implemented with a uniform articulation across the consonants and vowels that employ them.
- In the vowels, non-dorsal place cannot be attributed to coarticulation with non-dorsal consonants alone.
- Canonical frontal vowels ([i], [y]) cannot be [CORONAL] in Sūzhōu Chinese, since there are not one but two types of distinctive [COR] vowel.

About Sūzhōu Chinese

Understudied variety of Wu吴 Chinese, 2–3 million speakers; all Wu varieties in red, below

Other than dorsal-palatal ([i], [y]), two types of vowels are at issue (given in turned-rounded unrounded pairs):

- So-called apical vowels ([ɿ], [ʮ]), transcribed as [i], [u]
  - Apparently apico-alveolar constriction location (Ling, 2009).
  - Occur only after apico-alveolar fricative/affricate onsets (e.g. [ɿ], [ʮ]); construction location could be attributed to assimilation to onset.
  - Also found in Standard Chinese, where they are allophones of /ɿ/; however, Sūzhōu Chinese /ɿ/ is contrastive.

So-called fricated vowels ([ɿ], [ʮ], transcribed as [i], [u]):

- Apparently lamino-postalveolar constriction; Ling (2009) specifically notes acoustics, tongue-palate contact similar to [ɿ]
- Less restricted phonotactic: occur with and without fricative/affricate onsets; construction location cannot be attributed to coarticulation.

Fricated /i/, /y/ and dorso-palatal /ɿ/, /ʮ/ contrast robustly: three-way contrast for the unrounded vowels in a handful of segmented environments:

- [ɿ][ɿ][ɿ] fresh [ɿ][ɿ][ɿ] west [ɿ][ɿ][ɿ] thread
- Only [ɿ] and [ʮ] have a complementary distribution (no *ʮ[ɿ][ɿ]; both allophones of /ɿ/)

Material

Data collection. Lingual ultrasound and synchronized 43, native Sūzhōu Chinese speakers (15M). Stimuli produced in a frame sentence; ultrasound frames selected corresponding to acoustic midpoint of target segments

Target segments /i/, /ɿ/, /ʮ/, /ɿ/ to be compared to segments with known constriction locations: dorso-palatal /ɿ/, lamino-postalveolar /ʮ/, apico-alveolar /ɿ/

Classification of test data

Suggests that most speakers implement [COR] V place similarly to [COR] C place. Fricative vowels /i/, /ɿ/ classify as /ɿ/, even when not preceded by a fricative. Less surprisingly, apical vowels /ʃ/, /ɿ/ tend to classify as /ɿ/.

Fricative vowels /i/, /ɿ/: fricative onset

Classification

Condition

Alv. i, [ɿ](Rc.)
Postalv. ɿ, ʮ (Rc.)
Postalv. ɿ, ʮ (no fric.)
Training (i, ɿ, ʮ)

Clusterin in LD1-LD2 space

Most speakers exhibit a uniform articulatory implementation of place contrasts across Cs and Vs; a handful are non-uniform in their implementation of /ɿ/ and /ʮ/. The rest are in between; full data on request.

Median LD1-LD2: especially uniform speakers

LD1

... and especially non-uniform speakers

LD2

Discussion

Should phonological features for Sūzhōu Chinese vowels directly reflect the articulatory primitives employed to produce them?

- High front vowels (e.g. /i/, /ɿ/) have been called [COR] in an abstract sense due to parallels with [COR] consonants (Hume, 1996)

Same tongue postures used in [COR] consonant and [COR] vowels in Sūzhōu Chinese; suggests a more direct parallel.

- [COR] already has an [ant] contrast.
- High front vowels such as /ɿ/ must be [DOR] in contrast to [COR]:

Vowels of the sort described here may be more common than currently understood: reported throughout dialectal Chinese (Zhu, 2004; Zhao, 2007) and further afield, notably in Swedish (Aoi, 2012; Westerberg, 2016).

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References


