

Introduction

- Mandarin Chinese **alveopalatal** fricatives are fronted to a [s]-like quality in some women's speech in some dialects.
- This fronting is termed the "**feminine accent**".
- It was noticed as early as the mid-1950s in the Beijing dialect of Mandarin Chinese (see Xu 1957 inter alia)
- Recently, fronting was noted in other Northern Mandarin dialects such as the Songyuan dialect (Li 2005, 2008).

Table 1. Lingual place/posture contrast in Mandarin sibilants

WorldBet symbol in figure legend	place	posture
S, tS (IPA [ʃ], [tʃ])	postalveolar	retroflex
c}, tc} (IPA [ç], [tç]) fronted to [s] in feminine accent	alveopalatal	bunched
s, ts	dental	laminal

Goals

- To extend the study of **feminine accent** to word-initial unaspirated affricates, adopting acoustic measures developed by Li (2005, 2008) for the homorganic fricatives.
- To explore temporal patterns that may be related to the realization of gendered speech.

Methods

- Materials: target fricatives and affricates recorded using a picture-prompted word-repetition task as part of a Cross-Linguistic Investigation of Phonological Development.
- Subjects: 20 adult speakers of the Songyuan dialect of Mandarin Chinese (10 men, 10 women).
- Marked off frication interval (Fig. 1 **blue lines**) to calculate duration and to extract spectrum at middle 40ms window for fricatives, middle 20 ms for affricates (Fig. 1 **red lines** on left), to calculate the mean frequency (Fig. 1 **red line** on right).

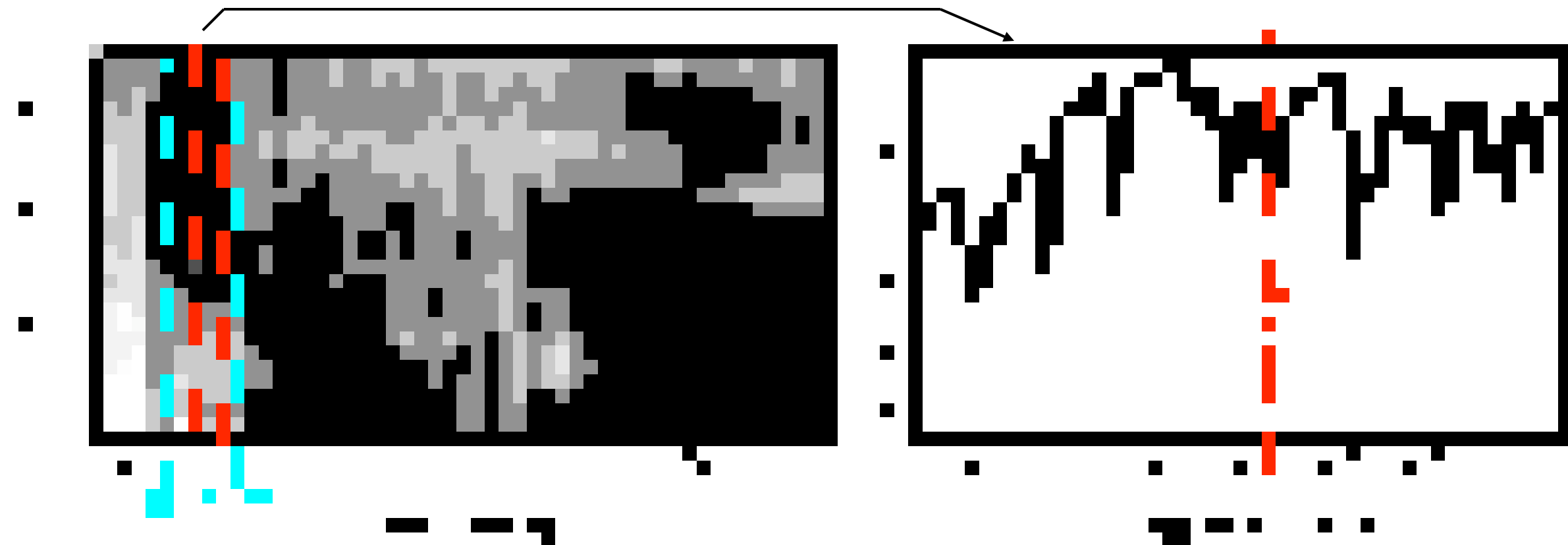


Figure 1. Spectrogram (left panel) of **alveopalatal**-affricate-initial word *jiao3 ya1* 'foot' showing 20-ms window for extracting spectrum (right panel) in order to calculate centroid value (red cursor on right).

Hypotheses:

1. Mean frequency ("centroid") is negatively correlated with the length of the front resonating cavity. This means that the shorter the front cavity, the higher the centroid.
2. Frication interval in affricates is short. Alveopalatals might be lengthened to "make room" to realize both the consonant place/posture contrast and the gender marking.

Results (centroid)

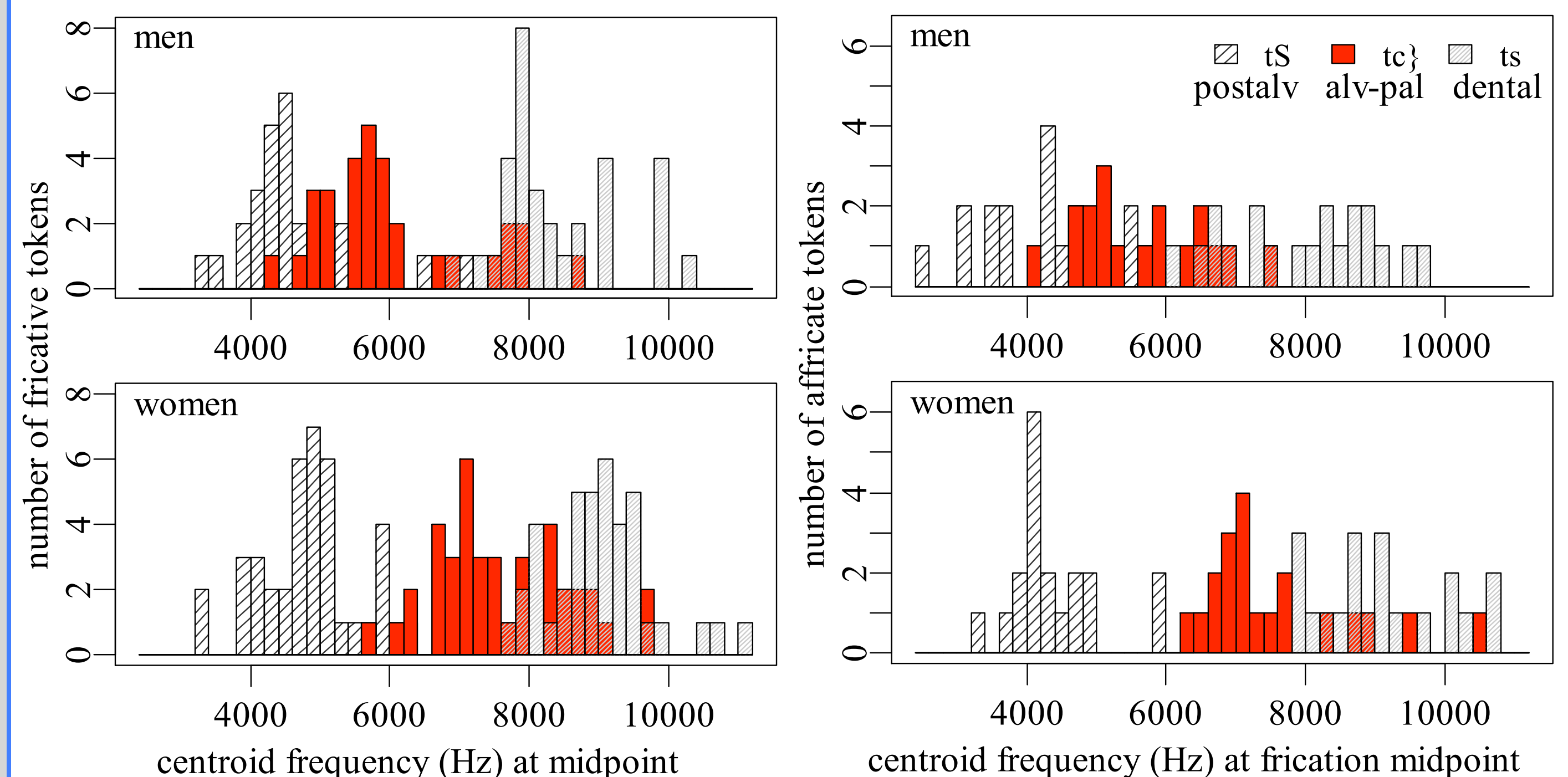


Figure 2. Histograms of centroid values measured in fricatives (left) and affricates (right) produced by 10 men and 10 women speakers of Songyuan Mandarin.

- Figure 2 shows: Centroid values of **alveopalatals** fall between postalveolars (retroflex posture yields sublingual pocket and largest front cavity) and dentals ([+anterior] place yields smallest front cavity), ...
- Centroid values of women's productions higher overall, reflecting their smaller vocal tracts ($F[1,14]=5.7, p<0.05$ fric; $F[1,17]=12.1, p<0.01$ affr).
- Centroid values of women's **alveopalatals** also higher relative to values in postalveolars than expected from patterns in men's productions (interaction effects: $F[2,30]=8.5, p<0.01$ fric; $F[2,35]=7.4, p<0.01$ affr).

Results (duration)

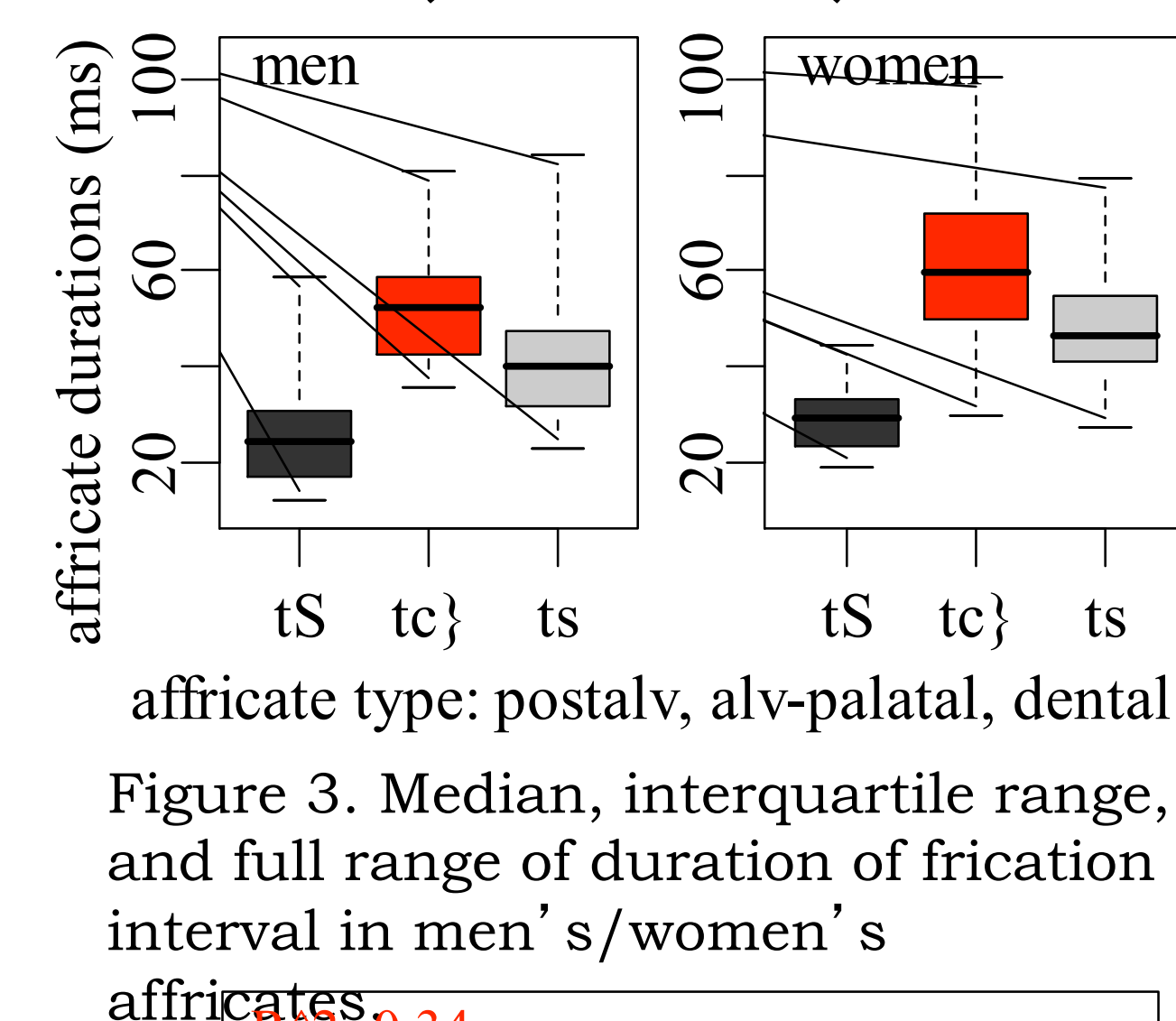


Figure 3. Median, interquartile range, and full range of duration of frication interval in men's/women's affricates

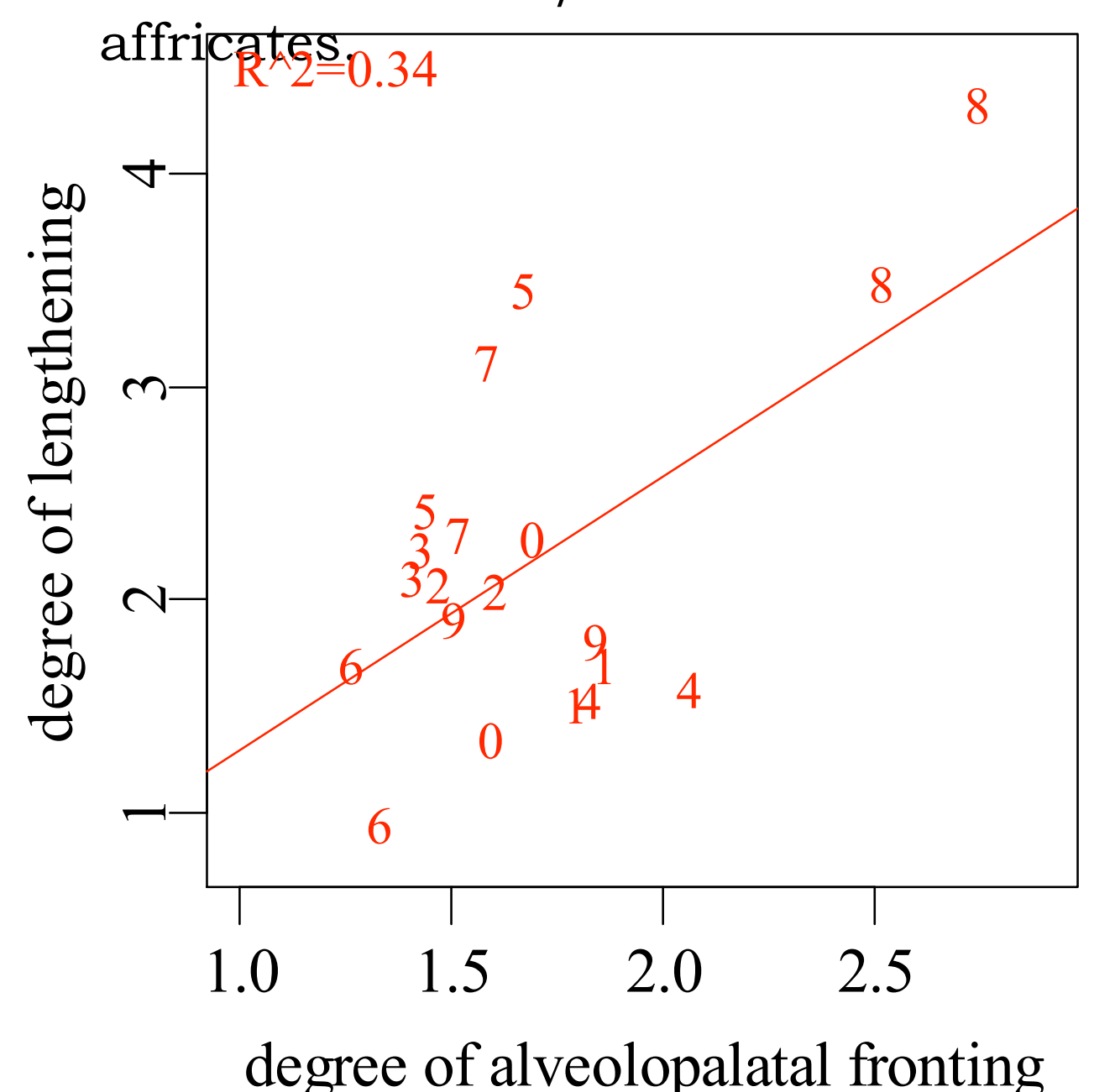


Figure 4. Frication length in **alveopalatal** as function of centroid (both relative to postalveolar) in women's affricate productions.

- Figure 3 shows: durations of frication interval in affricates much shorter than duration of homorganic fricatives (which are typically > 100 ms), but among affricates
- the **alveopalatals** produced by women are longest, and
- also more variable than the women's [tS] and [ts].
- Figure 4 shows: Calculated "degree of fronting" by dividing centroids of each woman's **alveopalatal** affricates by median centroid for her postalveolar affricate.
- Calculated analogous relative measure for "degree of lengthening" of each woman's **alveopalatal** affricates.
- The frontier the alveopalatal, the higher the centroid, and the longer the duration.
- Degree of fronting accounts for 34% of variability in lengthening.

Conclusions

- Applied Li's (2005) measure (centroid) to show that some women speakers of the Songyuan dialect of Mandarin front their **alveopalatal** fricatives, producing the "feminine accent" variant of the Beijing dialect.
- This acoustic measure also shows fronting of the **alveopalatal** affricates.
- Women who show more extreme fronting lengthen the durations of their **alveopalatal** affricates, as if to "make room" to realize the gender marking.

Acknowledgments:

This project is funded by an Ohio State University Department of Linguistics Targeted Investment in Excellence fellowship to Fangfang Li and Eunjong Kong. It is part of a larger project funded by NIDCD grant R01 DC02932 to Jan Edwards of University of Wisconsin.