

The Short-a Nasal System: how does it get so tense?

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Background

Short-a is (phonologically) a low front vowel but made with a pharyngeal constriction (Wood 1979). It undergoes positional “tensing” (decrease in F1 and increase in F2) in many dialects of English before +N(asal) consonant (Labov, Ash, & Boberg 2010).

Cross-linguistically, co-articulation between vowel and following nasal consonant can induce lowering of F1 due to increase in nasality (Krakow et al. 1988).

If short-a tensing is from nasal co-articulation, then:

1. nasality (A1-P0 (Chen 1997, Chen et al. 2007) higher in +N environment compared to *elsewhere*.
2. (a) Nasality and (b) concomitant effect on F1 intensify preceding the nasal consonant (Cohn 1993).

Methodology

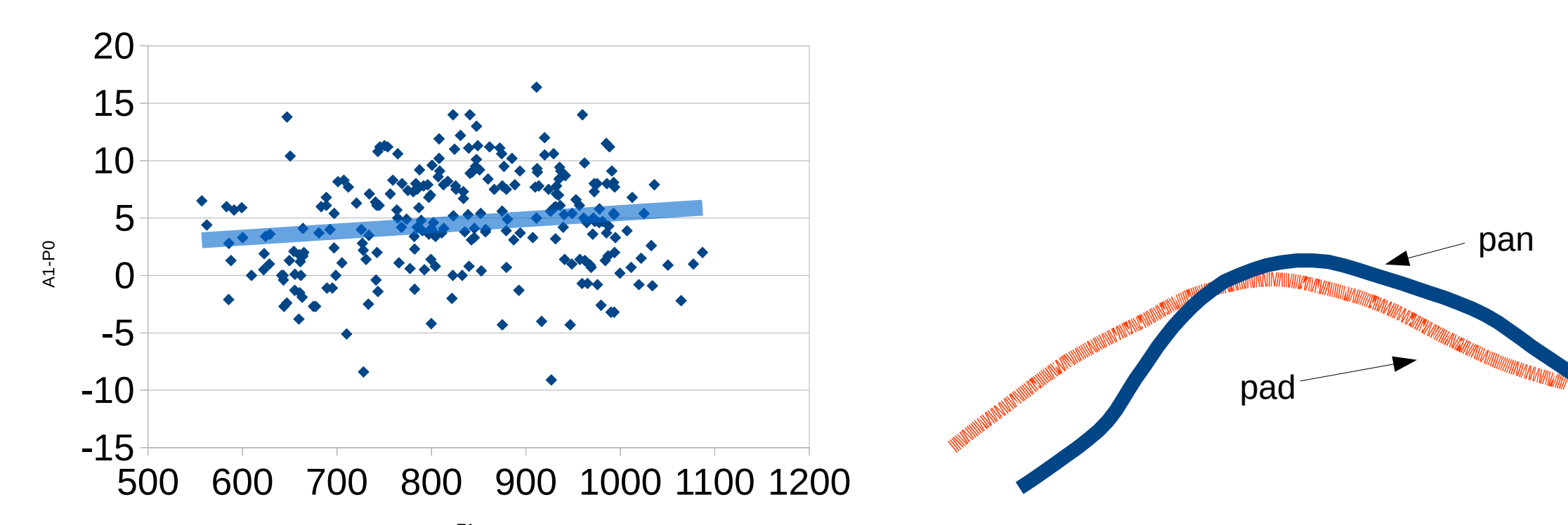
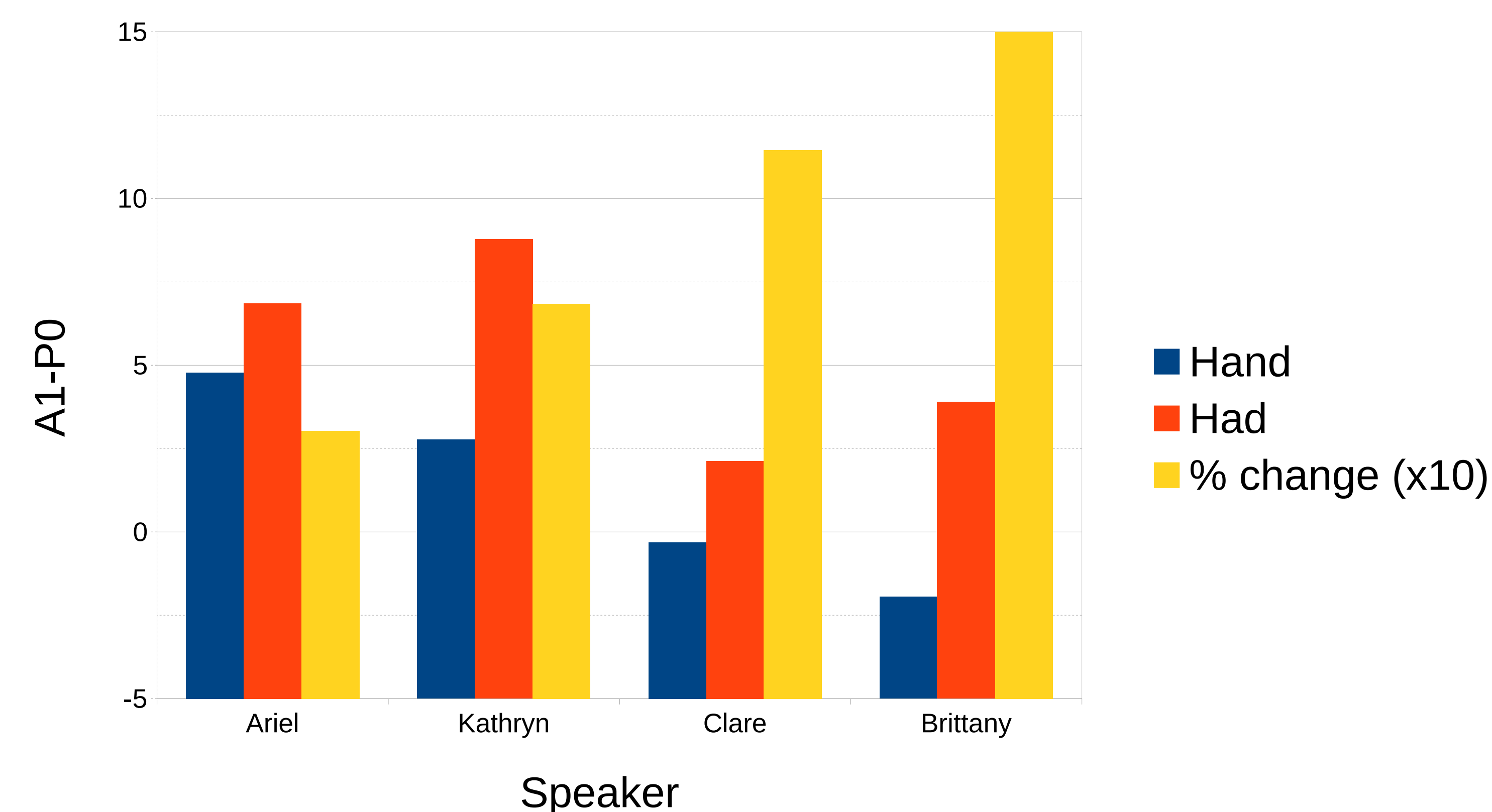
Speakers in early 20's, life-long residents of the province of Newfoundland.

Wordlist elicitation, included 5 tokens of *hand* and *had*.

Analysis of F1, F2 and harmonic spectrum (focussed on amplitude of F1 and H1) using Praat.

Two-tailed, paired t tests in R compared acoustic properties across two lexical conditions; significant results ($p \leq .05$) are reported here.

Results



Findings

Nasal vs. Elsewhere:(fig1)

- lower mean A1-P0 in nasal environment for all speakers.
- lower mean f1 and higher mean f2 in nasal environment for all speakers.

Nasalization could be behind tensing but...

- **no significant increase in nasality** closer to nasal consonant (figs2-5)
- **significant backing** (lower F2) over the duration of the vowel, closer to +N
- **significant lowering** (higher F1) over the duration of the vowel
- **weak positive correlation** between nasalization and F1 ($r = 0.1509$) (fig6)

Conclusion

Short-a in +N environment is more nasalized than *elsewhere* but co-articulatory nasalization examined here seems to apply categorically, not gradually (cf: Cohn 1993) as A1-P0, F1 and F2 do not pattern as expected closer to the +N consonant. Therefore, results not entirely consistent with tensing via co-articulatory nasalization.

So, how does short-a get so tense?

- not solely through nasalization
- different lingual articulations in /_+N (De Decker and Nycz 2012); preliminary analysis of ultrasound tongue imaging data is consistent with this. (fig7)