

The Phonetics and Phonology of Front Vowels in Staten Island English:

*When the traditional descriptions
and the facts do not agree*

Bruce Morén

Center for Advanced Study in Theoretical Linguistics

University of Tromsø

bruce.moren@hum.uit.no

Abstract

According to the 2000 U.S. Census, there are over 8 million people living within the five boroughs of New York City, and the borough of Richmond (a.k.a. Staten Island) has just over 440,000 inhabitants. Until the late 1960s, Staten Island was fairly isolated, with travel to and from the rest of the city possible only by ferry or by crossing a bridge to New Jersey and then a bridge or tunnel to Manhattan. Because of this relative isolation, Staten Island had its own, distinct, dialect. On November 21, 1964, the island's cultural and linguistic identity changed forever as the Verrazano-Narrows Bridge opened a direct route to Brooklyn and the rest of the city. Since that time, the sociolinguistics of the island have become increasingly complex with a number of dialects merging and emerging as people have moved from more urban metropolitan areas (particularly Brooklyn) to the more rural (now suburban/urban) Staten Island. As a result, a unique dialect is slowly being lost as the population becomes more homogenized with the rest of the city.

In this talk, I present the results of a pilot study investigating the front vowel inventory of native speakers of the dialect spoken on the south shore of Staten Island. This dialect is interesting from both a sociolinguistic and phonetics-phonology perspective since it suggests that phonologists working on dialectal variants should be wary of relying too heavily on traditional language descriptions that have not been supported by instrumental data. In addition, it suggests that care is needed not to over-generalize descriptions or analyses across sub-dialects, even for robustly reported sociolinguistic markers. In fact, Staten Island English clearly shows that different dialects can have very similar overall phenomena, and yet differ significantly in the details pertaining to those phenomena.

This talk begins by reviewing the three predominant, and conflicting, phonological analyses regarding the distribution and nature of the two low front vowels found in Metropolitan New York English - a phenomenon usually described as 'æ-tensing'. The first analysis describes both low front vowels as 'short a' and their relationship as purely allophonic (Cohen 1970). The second analysis describes the two vowels as being in a semi-allophonic relationship, where /æ/ is short and lax, while /E/ is long, tense and diphthongized (Labov 1981). In the third analysis, the phonological patterning of the vowels is used to argue that they have distinctive length, which is subject to context-specific neutralization to long. In direct contradiction with the second analysis, it claims that /æ/ is long and /E/ is short (Morén 1999).

The second part of the talk presents the results of an acoustic study undertaken to see which of the conflicting phonological analyses is closest to the phonetic facts. In this study, the relative durations of all the Staten Island front vowels, as well as their relative formant structures, were measured in a variety of phonological contexts. Somewhat surprisingly, the results show that none of the analyses found in the literature provides an accurate or adequate picture of æ-tensing for this dialect. Rather, we are left with the conclusion that the low front vowel that is traditionally described as 'tense' is actually lax, the 'lax' vowel is actually tense, and despite the fact that at least one of the low front vowels is usually described as short, both vowels are actually phonetically and phonologically long.

1. Main Goals

- 1) Present the results of a pilot study investigating the front vowels of the dialect of English spoken in the South Shore region of Staten Island, New York.
- 2) Discuss the phonetics and phonology of the front vowels, and show that none of the traditional analyses of the phenomenon known as “æ-tensing” is correct for this dialect.
- 3) Show that a vowel that is traditionally described as “tense” is actually lax, a “lax” vowel is tense, and despite that fact that at least one of these vowels is usually described as “short”, both vowels are actually long!

2. Staten Island

2.1 Where?

Staten Island is one of the 5 boroughs of New York City and is the southern most tip of New York State.

Until the mid 1960s it was fairly isolated from the rest of the city, and it had its own dialect.

2.2 When?

In 1964, the Verrazano-Narrows Bridge was opened, connecting Staten Island directly to Brooklyn. This caused an increase in migration from other boroughs that is radically changing every aspect of traditional Staten Island life – including language.

2.3 Why?

This dialect is of interest for several reasons:

It is a distinct New York City sub-dialect that is not well studied.

It is a dying dialect that should be documented before it is lost. It does not fit the canonical “æ-tensing” description found in the literature (one of the most studied aspects of New York City English).

A close look at the phonetics and phonology of the front vowels of this dialect has interesting implications for our understanding of vowel inventories and the relationship between phonetics and phonology.

2.4 A Dialect Under Siege

Over the past three decades, the population of Staten Island has changed dramatically. This is reflected in the fact that the population has increased by half and that Staten Island has the highest percent increase in the number of housing units in New York City (see Table 1 and Figure 1).

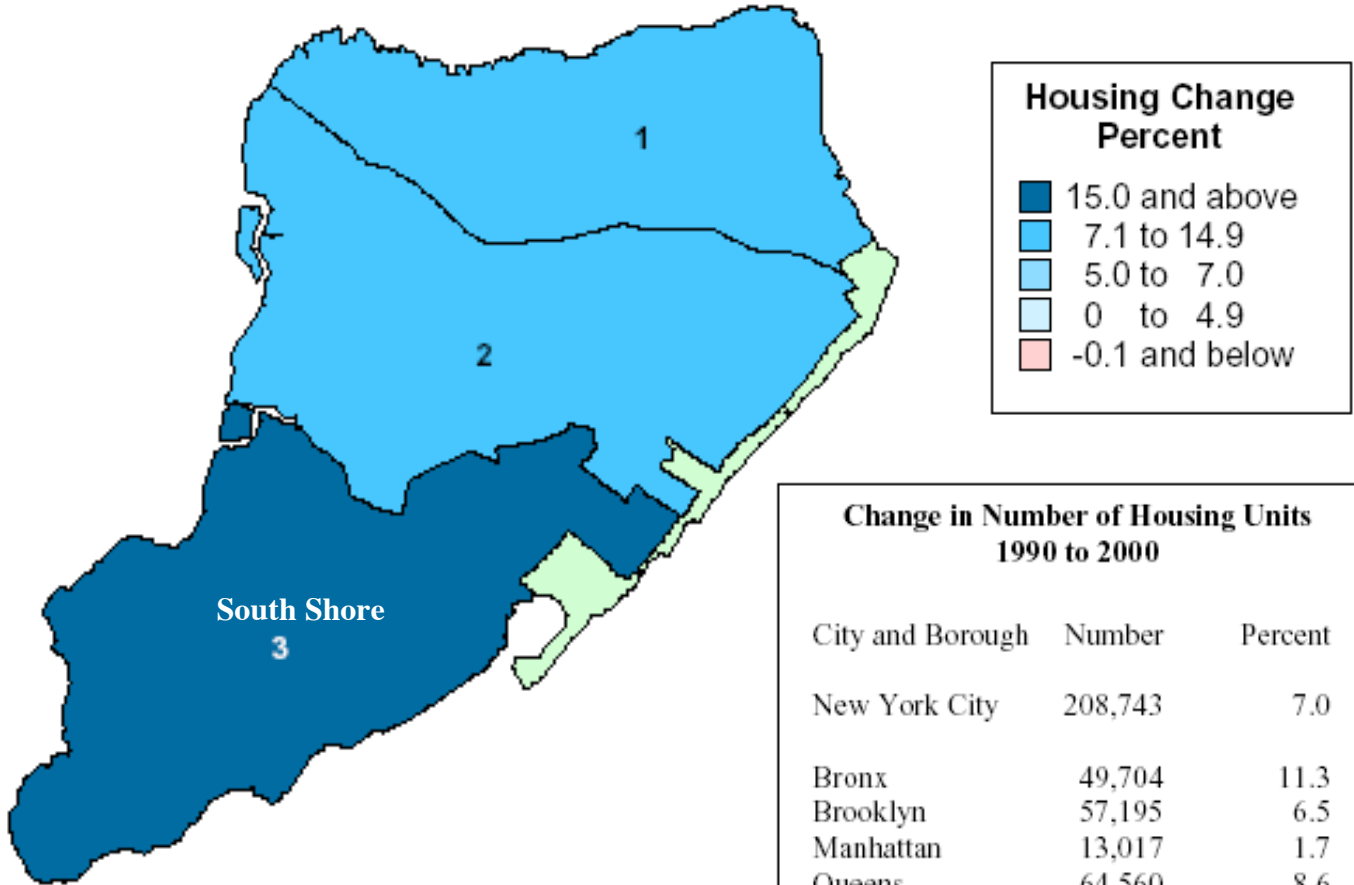
Further, the historically least populated area, South Shore, has seen the greatest increase in both population and housing. The population has more than doubled in the past 30 years.

Table 1. Staten Island Population Change

(Source: Population Division - New York City Department of City Planning)

			Number <u>increase</u>	Percent <u>increase</u>
S.I. overall	1970-2000	294,675 to 442,588	147,913	50%
South Shore	1970-2000	72,815 to 152,908	80,093	110%

Figure 1. Staten Island change in housing units, 1990 to 2000



Change in Number of Housing Units 1990 to 2000

City and Borough	Number	Percent
New York City	208,743	7.0
Bronx	49,704	11.3
Brooklyn	57,195	6.5
Manhattan	13,017	1.7
Queens	64,560	8.6
Staten Island	24,267	17.4

Source: U.S. Census Bureau, 2000 Census SF1 File and 1990 Census PL File
Population Division - New York City Department of City Planning

3. NYC Vowels - background

3.1 Non-low Front Vowels - /i:, I, e:, ε/

The vowels of NYC have been studied for over a century. The inventory and behavior of the non-low front vowels are fairly uninteresting.

- The tense vowels surface as long with varying degrees of diphthongization depending on the vowel, the context and the speaker.
- The lax vowels surface as short with centralizing off-glides.
- Short lax vowels cannot occur in open monosyllables.

(1) The distribution of non-low vowels (partial)

[bi:t]	<i>beat</i>	[bi:d]	<i>bead</i>	[bi:n]	<i>bean</i>	[bij]	<i>bee</i>
[bIt]	<i>bit</i>	[bId]	<i>bid</i>	[bIn]	<i>bin</i>	*[bI]	---
[bejt]	<i>bait</i>	[bejd]	<i>bade</i>	[be:n]	<i>bane</i>	[bej]	<i>bay</i>
[bεt]	<i>bet</i>	[bεd]	<i>bed</i>	[bεn]	<i>Ben</i>	*[bε]	---

3.2 NYC Low Front Vowels - /æ, E/

The mid-Atlantic region roughly between NYC and Philadelphia has two low front vowels on the surface, one called “lax” ([æ]) and one called “tense” ([E]).

“æ-tensing” is the term usually used to describe the distribution of these low front vowels.

3.2.1 NYC “æ-tensing” - description

The general description of NYC “æ-tensing” claims that the “lax” vowel appears in open syllables and when followed by voiceless stops or voiced fricatives. On the contrary, the “tense” vowel appears when followed by tautosyllabic segments other than voiceless stops and voiced fricatives.

(2) Canonical distribution of low front vowels in the literature

[kæp]	<i>cap</i>	[kæt]	<i>cat</i>		
[kEb]	<i>cab</i>	[kEd]	<i>cad</i>		
[kEf]	<i>calf</i>	[bEs]	<i>bass</i>		
[kæv]	<i>calve</i>	[dʒæz]	<i>jazz</i>		
[dʒEm]	<i>jam</i>	[tEn]	<i>tan</i>		
[kæ.bIn]	<i>cabin</i>	[kæ.ri]	<i>caddy</i>	[mæ.gIt]	<i>maggot</i>

(3) Typical “æ-tensing” rule (Payne 1980)

$$\left. \begin{array}{l} /+low \\ -back/ \end{array} \right\} \rightarrow [+tense] / \left. \begin{array}{l} \text{---} \\ [-wk] \end{array} \right\} \left\{ \begin{array}{l} [+nas] \\ -back \end{array} \right\} \left\{ \begin{array}{l} \# \\ C \end{array} \right\} \left\{ \begin{array}{l} \alpha \text{ voice} \\ -\alpha \text{ cont} \end{array} \right\}$$

3.2.2 NYC “æ-tensing” - problems

The major problem with Payne’s rule (and similar accounts) is that there are a very large number of “exceptions”, including minimal pairs.

(4) **Minimal pairs**

[kæn]	<i>can-verb</i>	[kEn]	<i>can-noun</i>
[hæv]	<i>have</i>	[hEv]	<i>halve</i>
[kæd]	<i>C.A.D.</i>	[kEd]	<i>cad</i>
[ʔæn]	<i>an</i>	[ʔEn]	<i>Ann</i>

The exceptions are so wide spread that Labov (1972) restricted his analysis to monosyllables because they are more regular than disyllables, and then decided in 1981 that these two vowels are actually marginally distinctive.

4. Motivation for the Pilot Phonetic Study

Besides the controversy regarding the phonemic status of the NYC low front vowels, there is also uncertainty regarding the length of the low front vowels:

Some linguists describe them both as “short a” (e.g. Cohen 1970).

Others describe the “lax” vowel as short and the “tense” vowel as long (e.g. Labov 1981).

And still others describe the “tense” vowel as short and the “lax” vowel as long (e.g. Morén 1999).

This pilot acoustic study was undertaken to see which of the three length claims in the literature comes closest to the phonetic (and phonological) facts for Staten Island low front vowels?

5. Staten Island Low Front Vowel Distribution

The distribution of the two low front vowels in Staten Island English clearly supports Labov’s (1981) claim that the low front vowels are contrastive.

However, as Morén (1999) pointed out, there are important gaps in the pattern of “exceptions” that lead to the conclusion that there is neutralization in some environments.

5.1 Overlapping Distribution

(5) Examples of *overlapping* distribution in *monosyllables*

[kEb]	<i>cab</i>	[dEb]	<i>dab</i>	[bEd]	<i>bad</i>	[fEd]	<i>fad</i>
[kEf]	<i>calf</i>	[hEf]	<i>half</i>	[bEs]	<i>bass</i>	[gEs]	<i>gas</i>
[kEv]	<i>calve</i>	[hEv]	<i>halve</i>	[gEsp]	<i>gasp</i>	[ʔEsk]	<i>ask</i>
[kEn]	<i>can-n</i>	[ʔEn]	<i>Ann</i>				

[blæb]	<i>blab</i>	[dæd]	<i>dad</i>	[hæd]	<i>had</i>		
[gæf]	<i>gaff</i>	[tʃæf]	<i>chaff</i>	[læs]	<i>lass</i>	[sæs]	<i>sass</i>
[sæv]	<i>salve</i>	[hæv]	<i>have</i>	[ʔæsp]	<i>asp</i>	[kæsk]	<i>cask</i>
[kæn]	<i>can-v</i>	[ʔæn]	<i>an</i>				

(6) Examples of *overlapping* distribution in *disyllables*

[dɪEgɪn]	<i>dragon</i>	[wEgɪn]	<i>wagon</i>
[bEdʒɪ]	<i>badger</i>	[mEsɪv]	<i>massive</i>
[gɪEnɪ]	<i>granny</i>	[vEnɪʃ]	<i>vanish</i>
[bEskɪt]	<i>basket</i>		

[kæbɪn]	<i>cabin</i>	[dægɪ]	<i>dagger</i>
[mægɪt]	<i>maggot</i>	[gædʒɪt]	<i>gadget</i>
[flænɪ]	<i>flannel</i>	[gæmɪt]	<i>gamut</i>
[ʔæskət]	<i>ascot</i>		

5.2 Unidirectional Neutralization to [æ]

(7) Examples of *neutralization* in *monosyllables*

[kæ]	<i>Caroline</i> -truncated	[dæ]	<i>dad</i> -truncated
[kæp]	<i>cap</i>	[mæp]	<i>map</i>
[bæt]	<i>bat</i>	[næt]	<i>gnat</i>
[bæk]	<i>back</i>	[mæk]	<i>Mack</i>
		[kæt]	<i>cat</i>
		[næk]	<i>knack</i>

*[kE]		*[dE]
*[kEp]	*[mEp]	*[tEp]
*[bEt]	*[nEt]	*[kEt]
*[bEk]	*[mEk]	*[nEk]

(8) Examples of *neutralization* in *disyllables*

[ʔæpɫ]	<i>apple</i>	[ɹæpɪd]	<i>rapid</i>
[gɹæpɫ]	<i>grapple</i>	[kækɫ]	<i>cackle</i>
[dʒækɪt]	<i>jacket</i>	[brækɪt]	<i>bracket</i>

*[ʔEpɫ]	*[ɹEpɪd]
*[gɹEpɫ]	*[kEkɫ]
*[dʒEkɪt]	*[brEkɪt]

Compare with:

[kæbɪn]	<i>cabin</i>	[dægɹ]	<i>dagger</i>
[dɹEgɪn]	<i>dragon</i>	[wEgɪn]	<i>wagon</i>

5.3 Staten Island Low Front Vowel Distribution

The low front vowels [æ] and [ɛ] are distinctive in all environments, except:

In open monosyllables – [æ] only

When followed by voiceless stops regardless of syllable structure – [æ] only

6. Pilot Acoustic Experiment

6.1 Purpose

To determine which phonological description/analysis of the low front vowels matches the phonetic facts, a pilot study was designed to measure the duration of all front vowels in both open and closed monosyllables.

If Broselow, Chen and Huffman (1997) are correct that there is a direct relationship between abstract moraic structure and phonetic duration, then a duration study should confirm or deny the phonological length claims of the competing analyses of “æ-tensing”.

6.2 Methodology

The words in (9) were presented in random order to a 35 y.o. male and a 55 y.o. female native of Prince’s Bay, South Shore, Staten Island.

Each subject repeated each word, carefully, three times in a row.

This process was repeated at several sittings for a total of seven times – 21 tokens per type = 525 tokens per subject = 1050 total tokens.

(9) Elicited data

Coda	i	I	e	ε	æ	E
--	key	--	Kay	--	Ca	--
l	keel	kill	kale	kell	Cal	--
n	keen	kin	cane	Ken	can-v	can-n
d	keyed	kid	Kayed	ked	C.A.D.	cad
t	Pete	kit	Kate	pet	cat	--

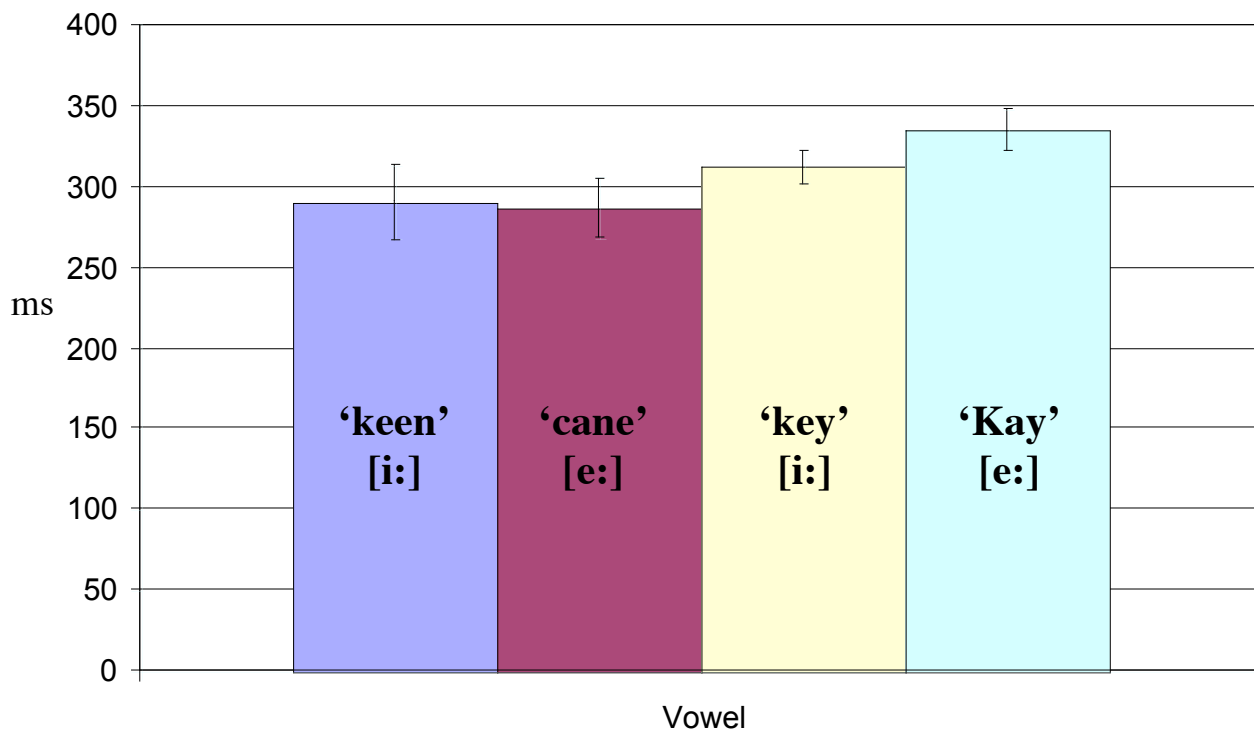
The recordings were made and analyzed using Praat[©].

The forms were segmented using a combination of waveform, intensity and spectrographic cues.

The durations were normalized for each word type to control for speech rate.

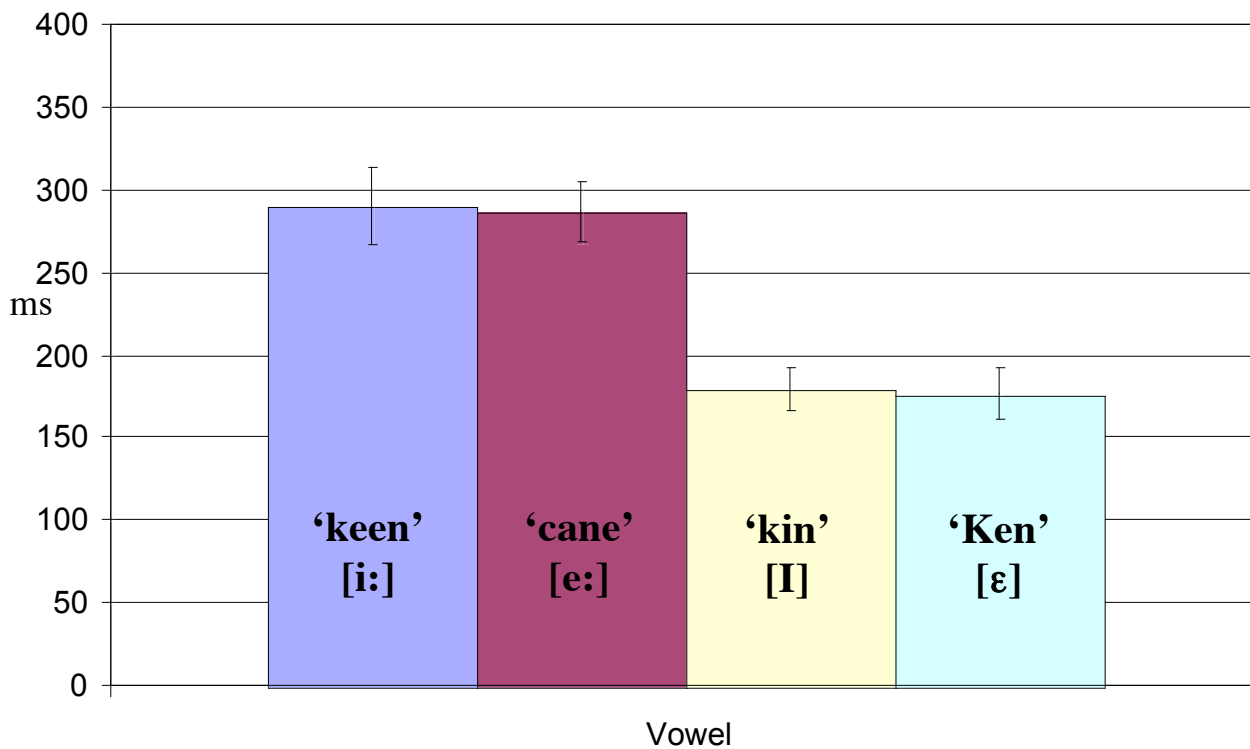
6.3 Duration Results - Non-low Vowels

Figure 2. Average non-low long vowel duration in open syllables and those closed by [n]



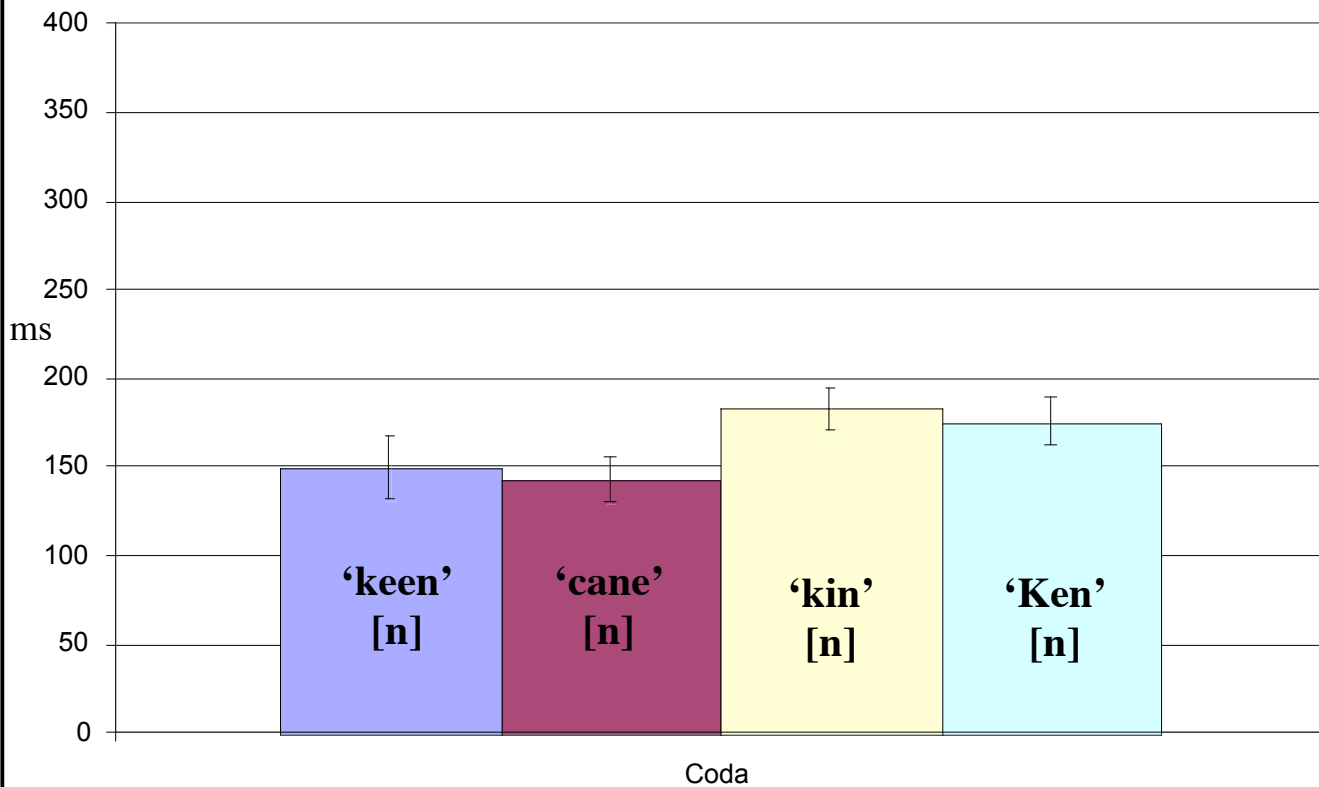
The vowels in open syllables are significantly longer than those in closed syllables.

Figure 3. Average non-low vowel duration in syllables closed by [n]



Tense vowels are significantly longer than lax vowels in closed syllables.

Figure 4. Average coda [n] duration following non-low vowels



Codas following long tense vowels are significantly shorter than those following short lax vowels.

Moraicity in Staten Island rimes containing non-low vowel using the criteria of Broselow, Chen and Huffman (1997):

long vowels are bimoraic,
 short vowels are monomoraic,
 codas following short vowels are monomoraic, and
 codas following long vowels share the mora with the preceding vowel.

(10) For example, *Kay* vs. *cane* vs. *Ken*

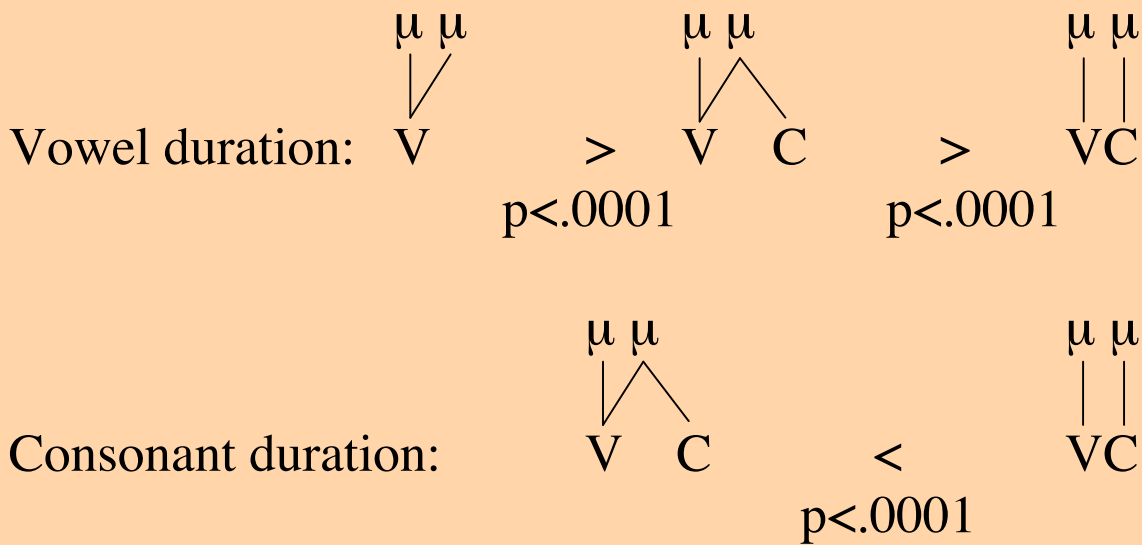
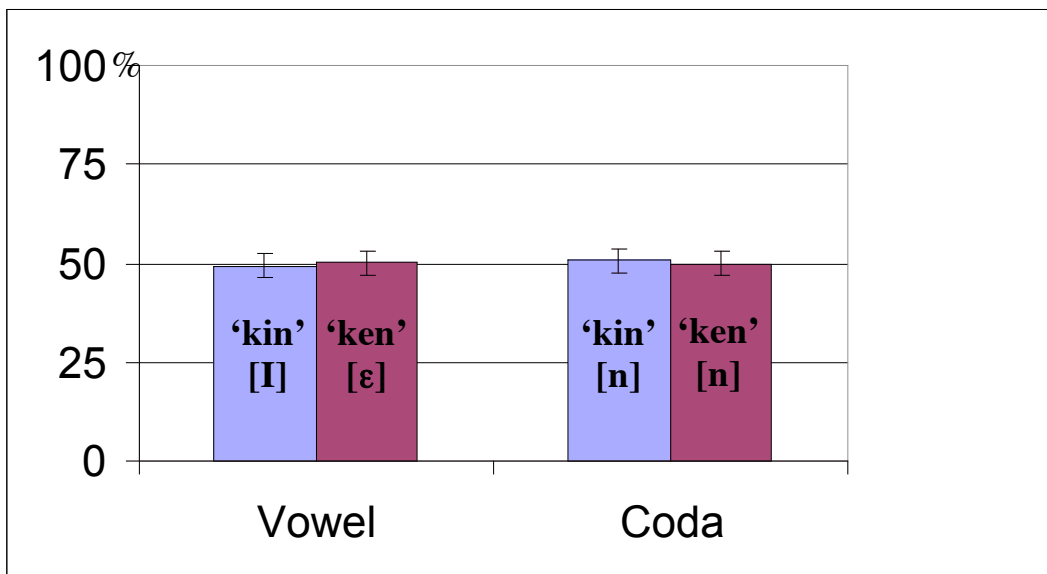
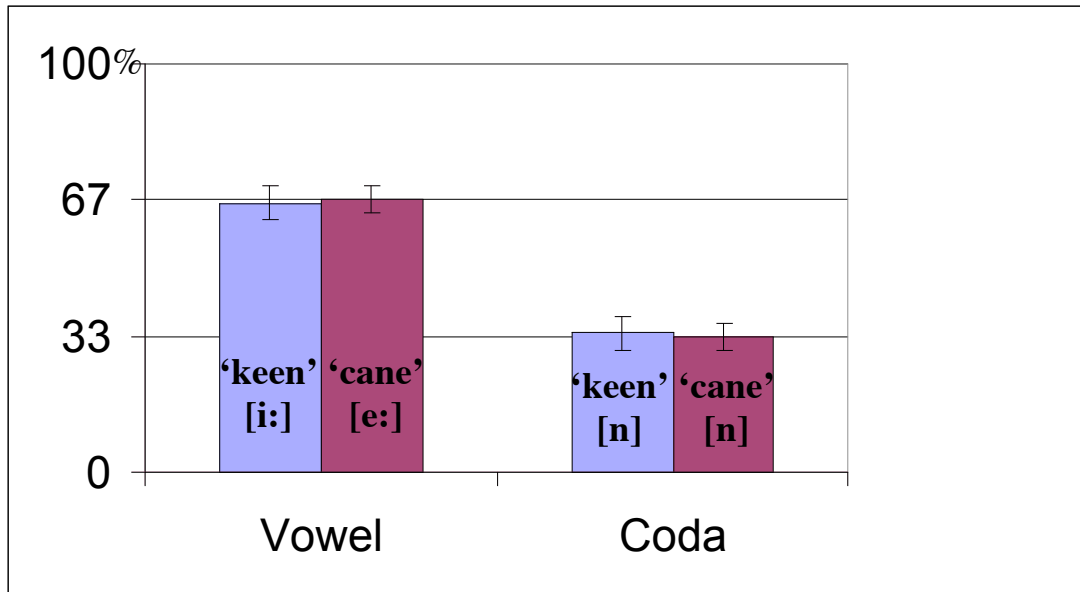


Figure 5. Average percent of rime of short non-low front vowels and coda [n].



Short vowels are exactly 1/2 the rime.

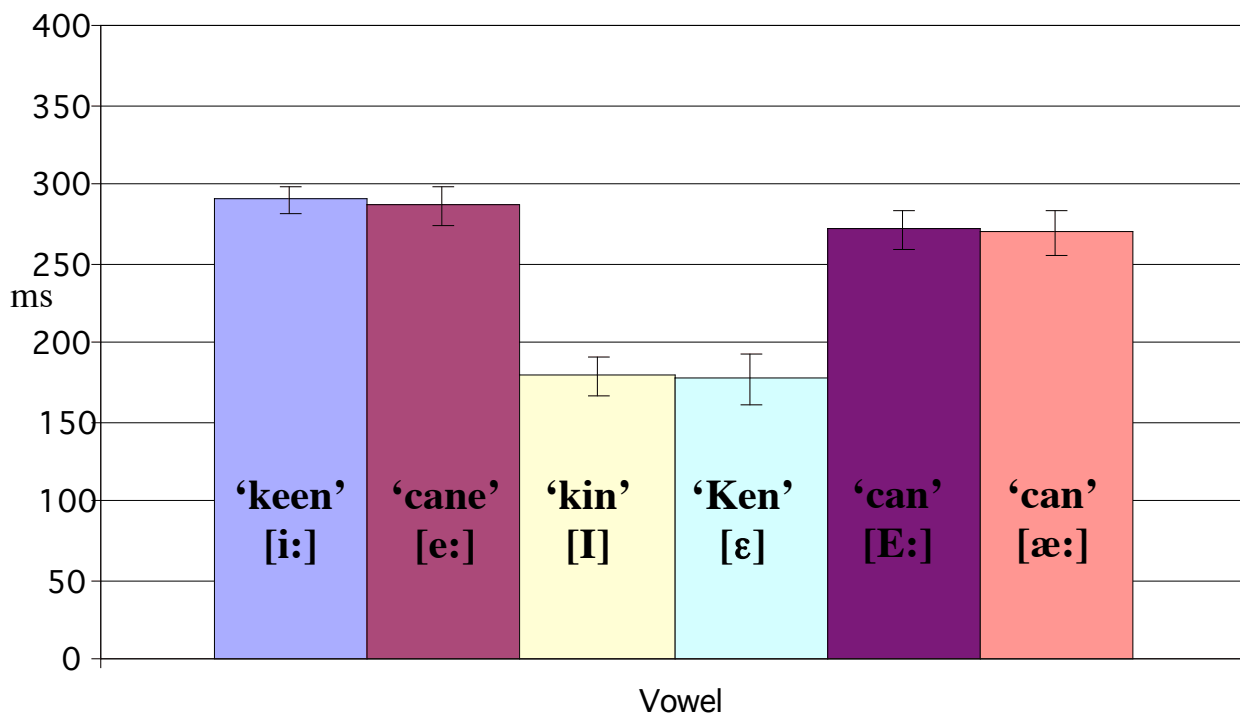
Figure 6. Average percent of rime of long non-low front vowels and coda [n].



Long vowels are exactly 2/3 the rime.

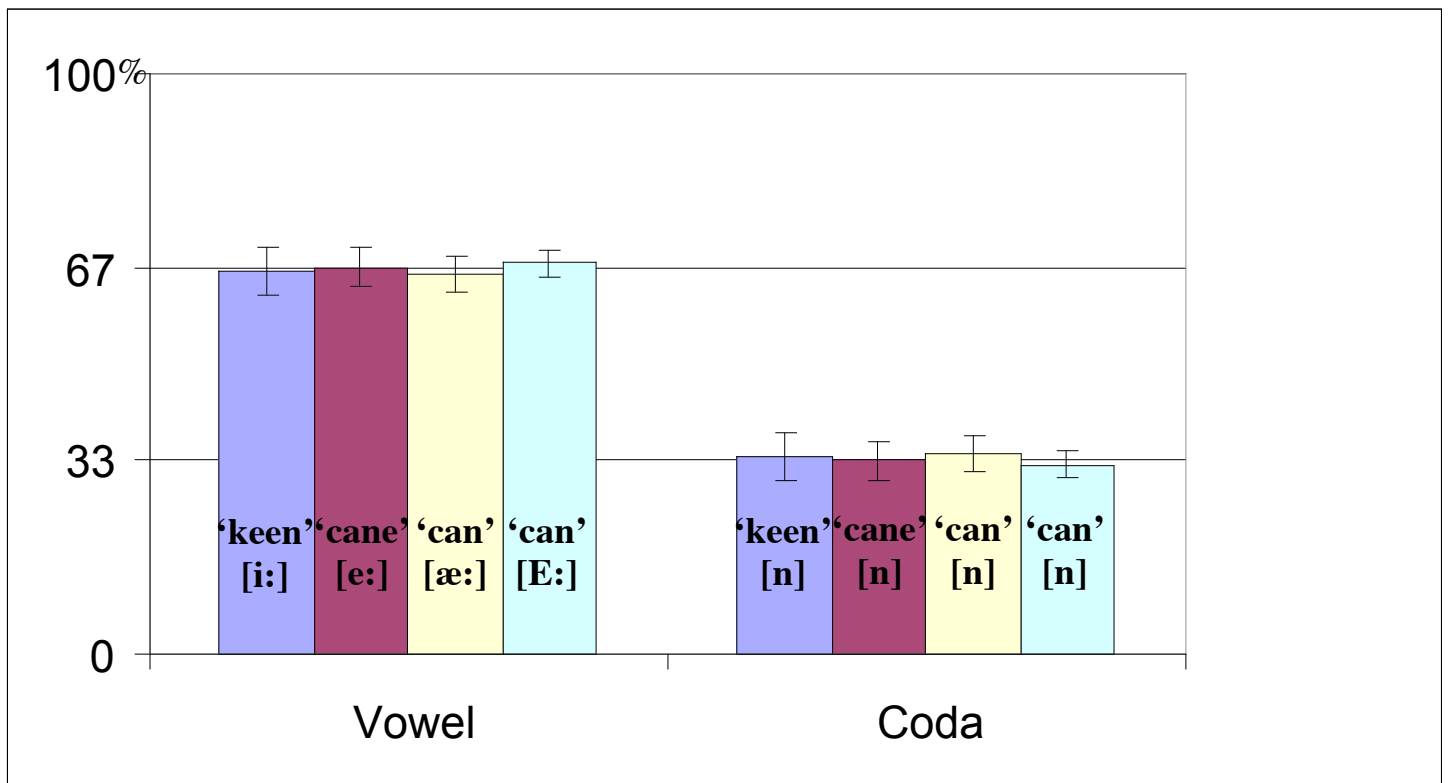
6.4 Duration Results - Low Vowels

Figure 7. Average front vowel duration in syllables closed by [n]



The duration of both low front vowels is identical, very similar to non-low long vowels, and very different from non-low short vowels.

Figure 8. Average percent of rime in syllables closed by [n]



Both low front vowels take up exactly 2/3 of the rime - just like the non-low long vowels.

6.5 Duration Summary

The duration evidence is unambiguous; *both low front vowels are long*. Not only do they have approximately the same duration as the long non-low vowels, but they also take up exactly the same percentage of the rime - 2/3.

None of the phonological analyses of “æ-tensing” makes the correct duration predictions!

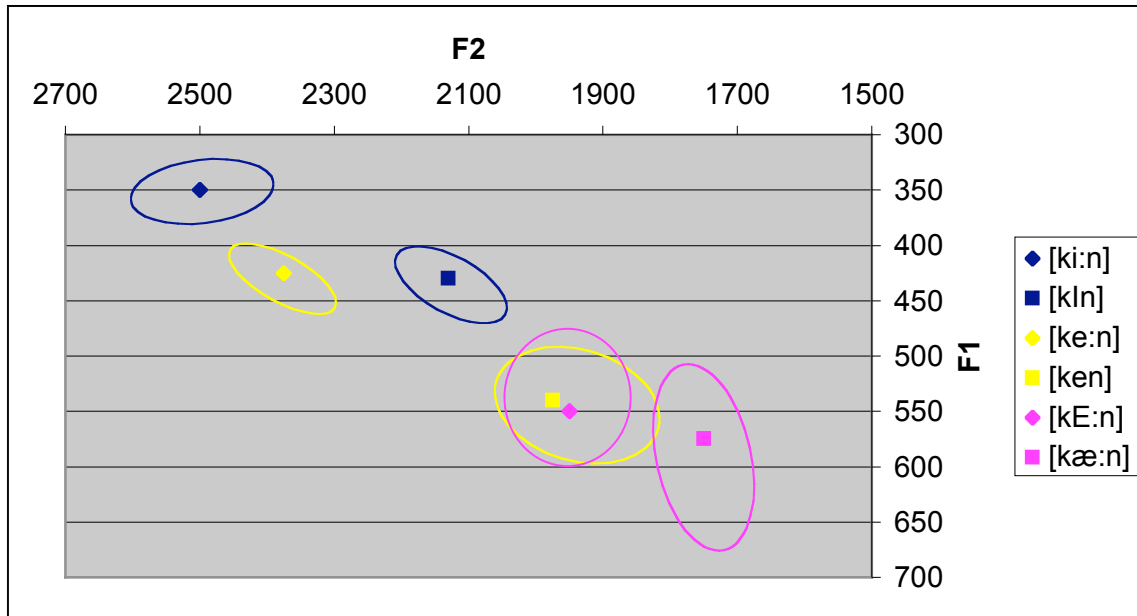
Non-low vowels come in long and short pairs, where the phonological duration is mirrored perfectly in both the duration and the proportion of rime facts.

Low front vowels are always long.

7. Formant Comparisons

If both low front vowels are long, then they must be differentiated via quality/formant structure.

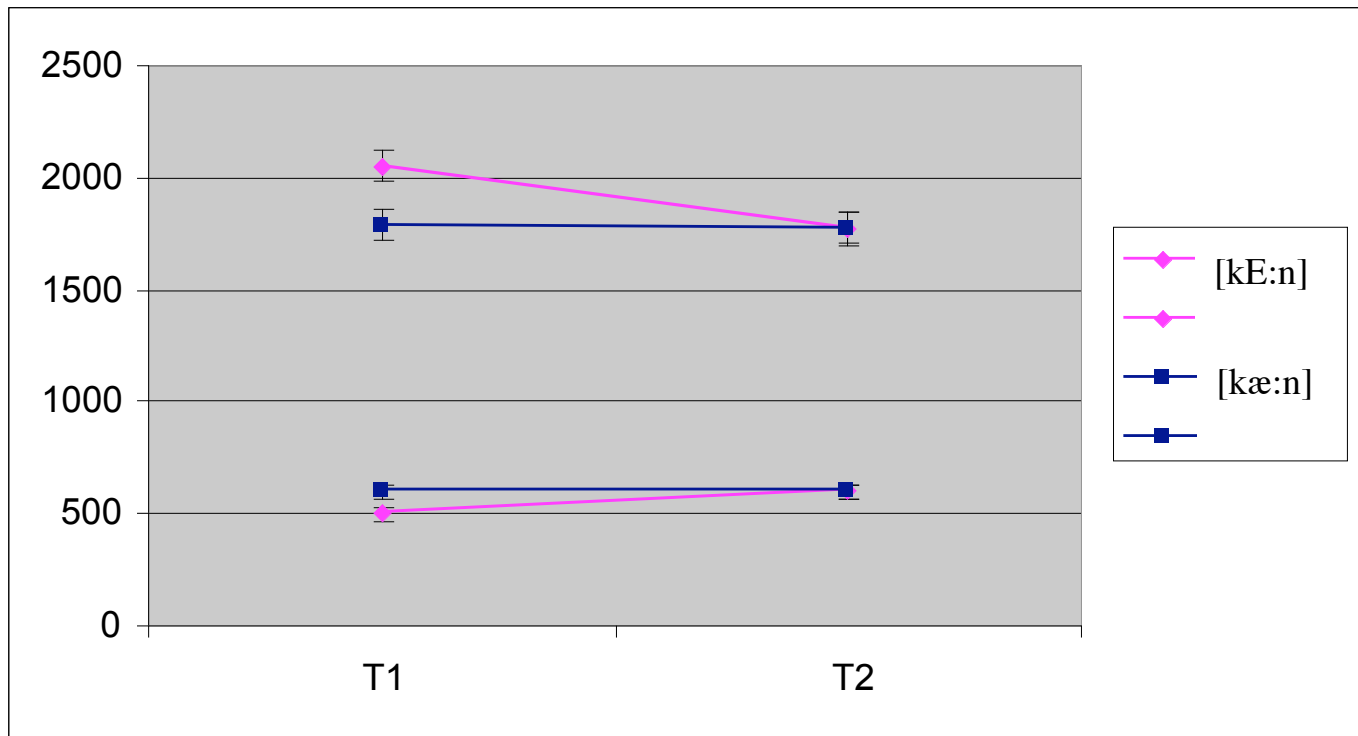
Figure 9. Plot of average front vowel formants in syllables closed by [n] for male subject



The average *formant values of the low “tense”* vowel are *almost identical to those of the mid lax* vowel - both of which are quite different from the low “lax” vowel.

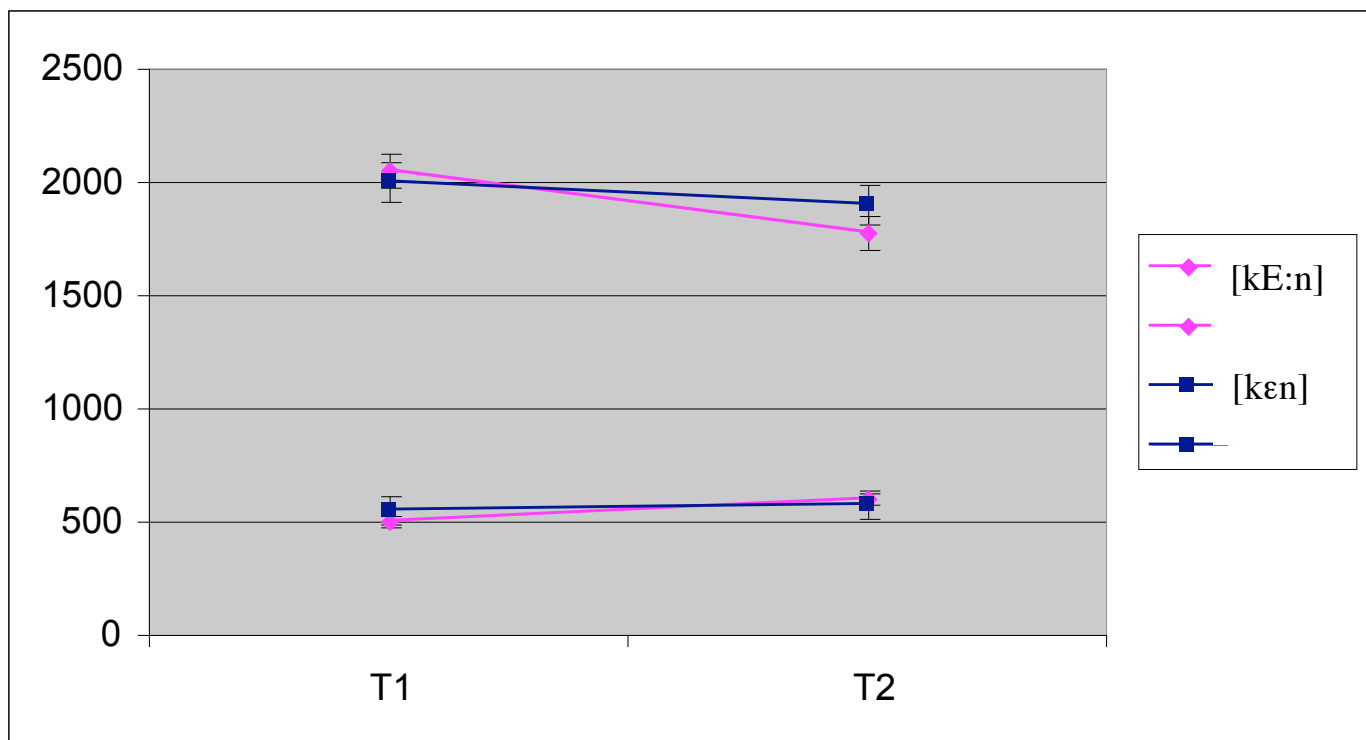
Another difference between the two low front vowels is in the overall formant structure. The “*lax*” vowel formants are fairly *steady state*, while the “*tense*” vowel has a *centralizing off-glide*, as shown in Figure 10.

Figure 10. Plot of the interpolation of the average F1&F2 values at post- and pre-transition points for the two low front vowels



Interestingly, the *short mid vowel* and the “*tense*” *low vowel seem to differ only in length*, and they have almost identical formant structure - both with a centralizing off-glide.

Figure 11. Plot of the interpolation of the average F1&F2 values at post- and pre-transition points for [ɛ:] and [ɛ]



8. Conclusions

None of the phonological analyses of the distribution of low front vowels in NYC English is adequate for the South Shore dialect of Staten Island English:

Despite claims to the contrary, both low front vowels are phonetically and phonologically long.

[E:] is lax since it has the same formant structure as the other front lax vowels, and it patterns like the other lax vowels (e.g. cannot occur in open monosyllables).

[æ:] is tense since it only differs from [E:] in quality, and it patterns like other tense vowels (e.g. can occur in open monosyllables).

Some of the restrictions on the distribution of the short front vowels must be due to quality, not quantity, since those same restrictions hold for the *long* lax vowel.

9. Phonological implications:

One of the debates in the literature on American English vowels is whether they contrast in length or tense/lax. Given that Staten Island low front vowels are of equal length, this dialect must have a tense/lax distinction.

A standard analysis of the distributional restrictions on the short lax vowels in American English (e.g. they cannot appear in open monosyllables) is that there is a minimal word requirement (i.e. there must be two moras). Given that long [E:] cannot appear in open monosyllables, the restriction must be against lax vowels in that environment (regardless of length) in this dialect.

10. Future Research

Include more speakers in the study.

Look at phrase-medial contexts.

Provide a phonological analysis of the neutralization of all low vowels to long in all environments.

Provide a phonological analysis of the neutralization of the low front vowels to [æ:] in open monosyllables and when followed by voiceless stops.

Take-home Message

Staten Island English is a dying dialect in which:

What has been described as a “tense” low front vowel is actually lax.

What has been described as a “lax” low front vowel is actually tense.

Both vowels surface as phonetically and phonologically long!

References

- Broselow, E., S. Chen and M. Huffman. 1997. “Syllable Weight: Convergence of Phonology and Phonetics.” *Phonology* 14: 47-82.
- Cohen, P. 1970. The Tensing and Raising of Short *a* in the Metropolitan Area of New York City. Master’s essay, Columbia University.
- Labov, W. 1972. *Language in the Inner City*. University of Pennsylvania Press, Philadelphia.
- Labov, W. 1981. “Resolving the Neogrammarian Controversy.” *Language* 57:267-308.
- Morén, B. 1999. *Distinctiveness, Coercion and Sonority: A Unified Theory of Weight*. Ph.D. dissertation, University of Maryland. Published by Routledge (2001).