

Individual Variation and Linguistic Innovation in the American Pacific Northwest

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The English in the Pacific Northwest research study is a sociophonetic project that has taken a particular interest in what we call low-front-prevelar raising. The vowels in three word classes *bag*, *beg*, *bake*, are in close proximity in acoustic phonetic space. This pattern appears to have several possible historical sources, chiefly, Inland-North and Northeastern settlers to the Pacific Northwest (PNW hereafter). However, it seems the spread of the raising of (e) and (ae) in the PNW is taking a phonetic path different from other North American regions. Clear determination of the path of change is difficult, however, as it is marked by significant individual variability. The research questions taken up in this talk include:

Are the changes in these two word-classes interconnected? Is inter-speaker variability leading to increasing group-wide uniformity? Are there phonetic motivations for (eg)- and (aeg)-raising? If so, can we assert that a phonetic universal has become a sociolinguistic marker?

It appears the two PNW changes arise from several distinct sources coalescing into a regional pattern particular to the PNW. However, Gordon (2001) cautions that sociolinguistic studies sometimes prematurely posit "chain shifts" where the theorized chain appears to account neatly for a set of changes appearing to impact a phonological system. He argues we must find: 1) temporal, 2) structural, and 3) social-geographic relatedness. The PNW changes appear problematic as they upset the symmetry of the vowel system, and show much variability in apparent time. We present these data, and address theoretical problems associated with determining the actuation of raising. We ask what exactly is "systematic" in the sociolinguistic distribution of these patterns.

The History of (ae) and (e) in the Pacific Northwest

The raising of (e)

Although the phonetic realization of (e) is known to be highly variable across American dialects, (cf. involvement in the so-called Northern Cities (NCS) and California Shifts), (e) is typically found to be backing or lowering, thus drastically different from the raising found in the PNW. Only anecdotal evidence exists of nationwide, but lexically isolated, raising of /e/ in *egg* to [ejg]. It is only in the Southern Shift (SS) that we find documentation of (e)-raising (Labov et al., 2006: 248), where /ε/ not only raised but developed an in-glide, [ejə]. Aside from the SS, mentions of (e)-raising are rare, despite Krezschmar's suggestion that standard American varieties may also show raising and gliding (2004: 264). Reed's (1961) survey of PNW English mentions raising of /eg/ to [ejg], although he found these variants to be infrequent. Although the PNW has historic ties to the Inland North, the NCS seems an unlikely source for PNW (e)-raising because the PNW does not participate in the NCS changes (Zeller, 1997; Benson, et al. 2011).

There are two problems in determining when and why raising of (eg) might have started. First, the long-standing lack of serious descriptive surveys in the PNW (apart from Reed's work), make it difficult to trace the roots of regional innovations. In fact, Reed (1961) is the only mention of (eg)-raising until Wassink et al. (2009), and although the PNW project sample includes speakers born between 1900-1950, we still lack the necessary detail and time depth to pinpoint its origin, both temporally and geographically. Second, we cannot rule out phonetic motivations for raising which make it structurally predictable, rather than a change in progress.

The raising of (ae)

In the PNW, we also find (ae) raising to [ej] in prevelar contexts. In the Mid-Atlantic (e.g., cities such as Philadelphia and New York), (ae)-raising occurs in two different environments, one viewed as

tensing, one as raising. Lax [æ] occurs consistently before voiceless stops, /tʃ/ and /l/. The tensed-raised form [æ̃], generally occurs before tautosyllabic front nasals, voiced stops, and voiceless fricatives, as well as in the phonological set *mad, bad, glad*. A small set of morphological factors are also said to condition the tensed-raised form. The lax vowel appears when unstressed (ae) occurs as part of the root morpheme (*dragged DOWN*). By contrast, in the PNW, raised (ae) occurs in all pre-velar environments. Interestingly, pre-velar (ae)-raising similar to that found in the PNW has also been reported in Wisconsin English (cf. Zeller, 1997; Labov, Ash, & Boberg, 2006; Benson, Fox, & Balkman, 2011). This is particularly intriguing because Wisconsin is known to have contributed to migration to the PNW, but differs in its participation in the NCS.

Phonetic motivations for raising

Pre-velar raising has an obvious possible phonetic motivation as a phonologization of the language-general phenomenon called ‘velar pinch.’ Indeed many researchers have suggested as much in accounting for the pre-velar raising in the Wisconsin dialect of English (Purnell, 2008; Baker, Mielke, & Archangeli, 2008; Bauer & Parker, 2008). The classic “velar pinch” involves the visible approximation of the second (F2) and third formants (F3) evident in the spectrographic record showing the transition from a vowel such as [a] into a velar stop (oral or nasal). Typically, F2 is raised while F3 lowers, and the two trajectories coincide before the stop closure. This means that if pre-velar raising is phonetically motivated, it could conceivably have arisen independently in both Wisconsin and the Northwest (although it remains to be seen whether there is any evidence for or against this). It would not be necessary to show Wisconsinites played a significant role in the settlement of Washington state. In addition, phonetic effects could help to explain between-region differences in the magnitude of the effect, or in the specific phonetic environments affected. In particular, Baker et al. (2008) note that [ŋ] appears to have a greater tendency to condition velarizing than does [g]. In the case of [ŋ], two articulatory factors mitigate toward velarization, while in the case of [g], there is only one. In both phones, there is raising of the tongue dorsum. In [ŋ], tongue dorsum raising occurs together with the lowering of the velum to open the velopharyngeal port.

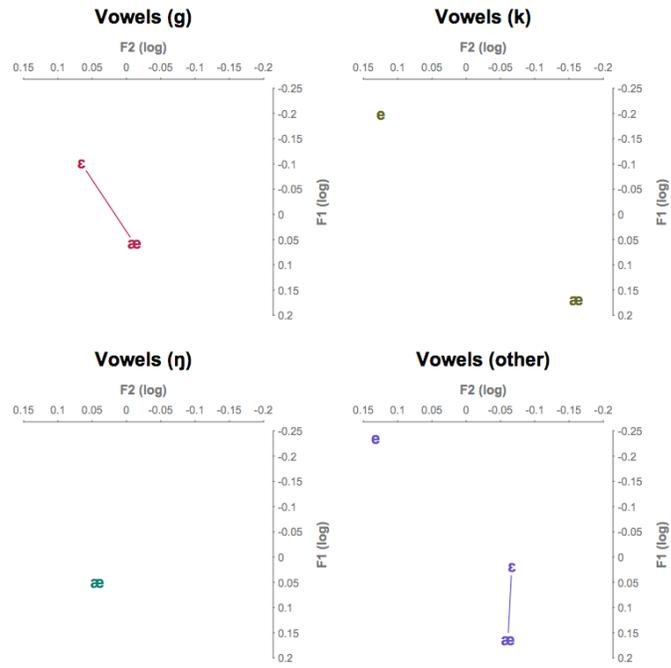
Methods

Three generations of speakers were recorded, representing a wide swath of Seattle history. Speakers range from nearly 100 y.o.a. (representing the 2nd generation of PNW indigenes) to 23 y.o.a. (12 female, 5 male). Data were collected in 5 tasks ranging in formality. We present here data from the word list and reading passage tasks only. All vowels in the system were elicited, plus 5 rhotic classes. However, our particular focus here is on /æ, ε, ej/ in the front periphery. Real words were collected in the carrier frame, “Write __ today.” Following phonetic environment, morphological complexity, and syllable type were varied. Vowels were subjected to multiple point formant measurement (F1-F3 at three temporal locations in the vowel trajectory), as well as euclidean distances and vowel area overlap assessments (Wassink, 2006).

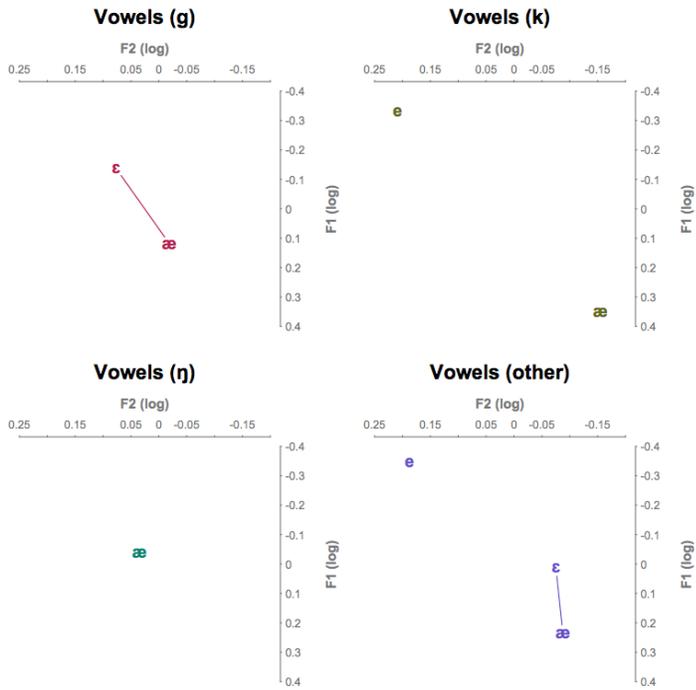
Findings to date

Across the three generations studied, speakers show a clear tendency to raise *bag* class vowels (e.g., [tɛ:g] and [bɛ:g]), and *legs* and *peg* surface as [lɛ:gz] and [pɛ:g]. (We see no raising in words such as *dead*). Though a pattern seems suggested, an age-stratified view of the spread of raising does not offer a nice, neat apparent-time picture. Some speakers raise /æ/ to [e:], others to [ɛ]. Furthermore, interestingly, raising in non-prevelar environments does not presuppose pre-velar raising (e.g., evident in Older Male speakers, below). Data for three generations of speakers (older, middle and younger), partitioned by

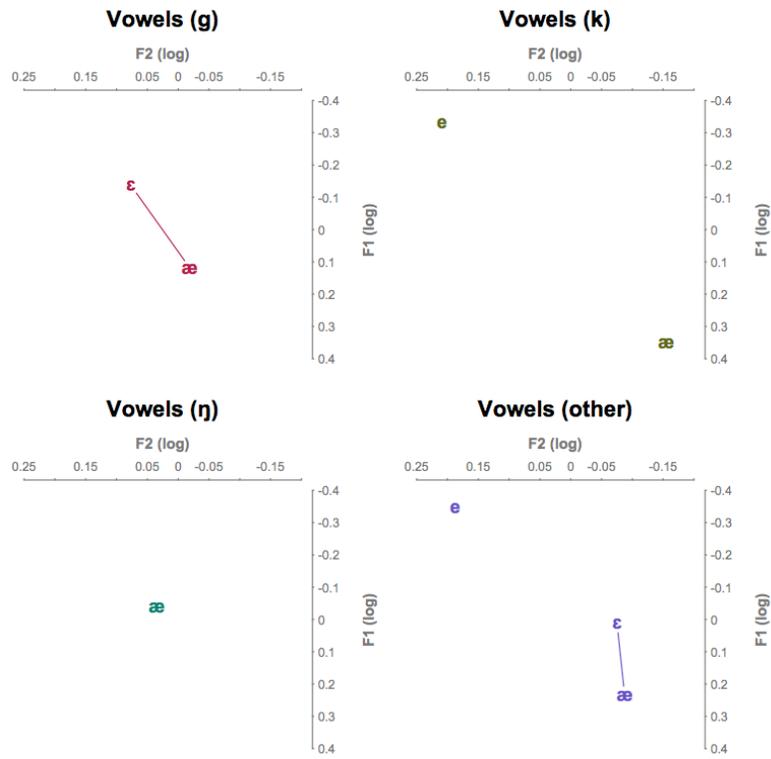
gender, are shown in Figures 1-3.



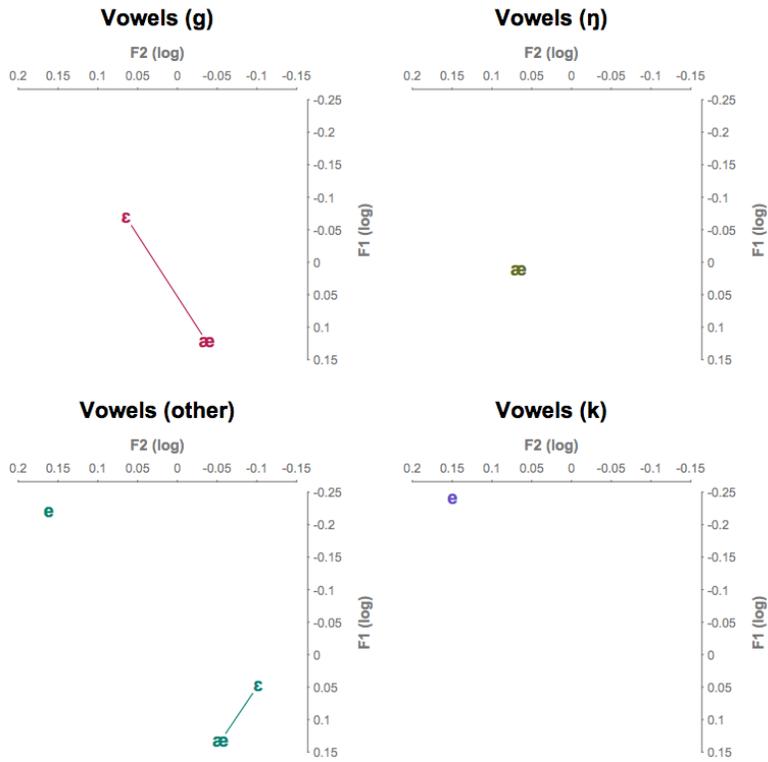
(1a) Older Females



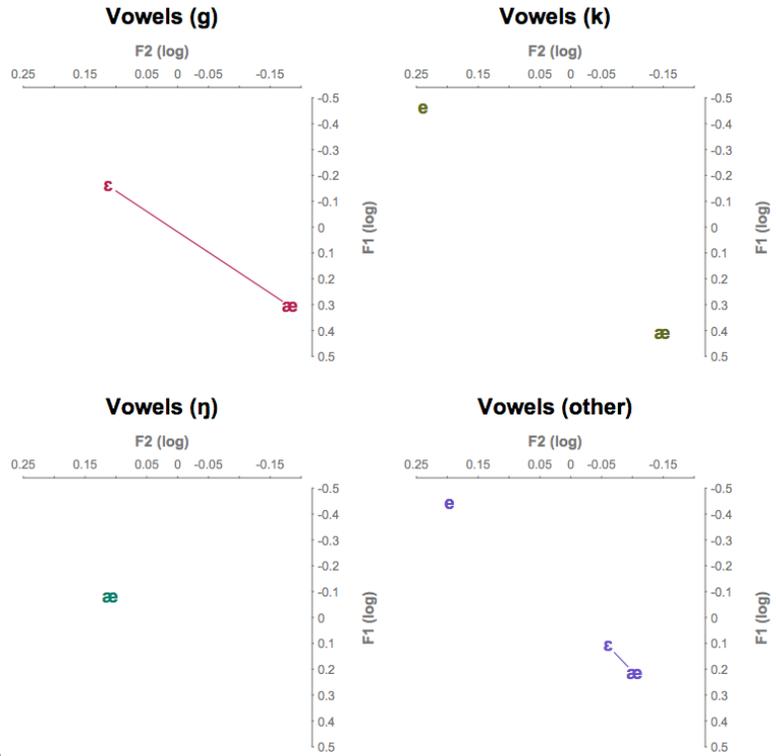
(1b) Older Males



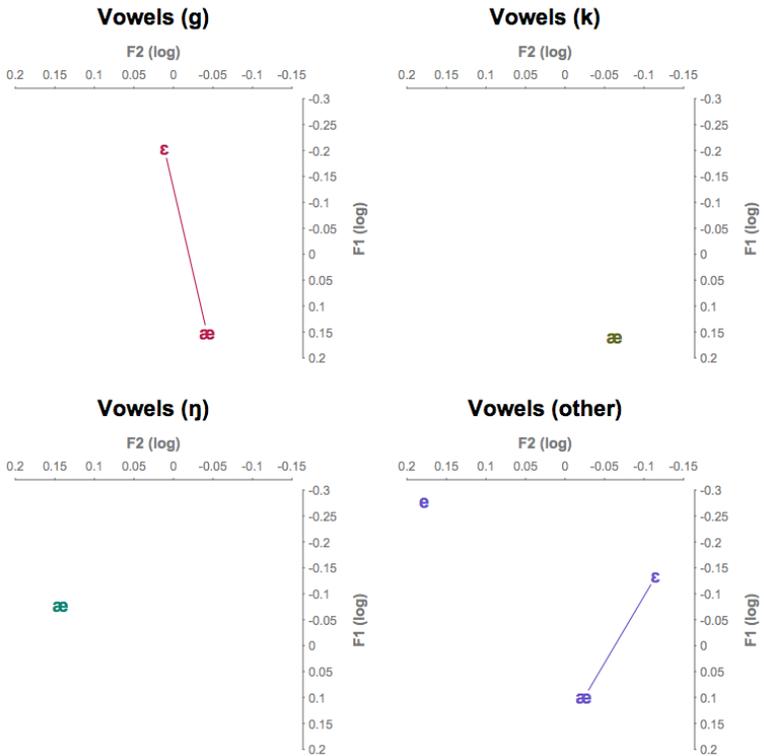
(2a) Middle Females



(2b) Middle Males



(3a) Younger Females



(3b) Younger Males

Figures 1-3. Front vowels /æ,ɛ,ej/ for three generations of Seattle speakers. Each graph presents vowels partitioned by following environment. Following environment (4-levels): /g, k, ŋ/ vs. “other” non-prevelar environments.

Results suggest that raising in the Seattle sample behaves somewhat differently from what one might expect if it were truly phonetically conditioned. First, pre-velar raising occurs only before one oral velar stop, /g/, and not /k/. This may be due in part to the lengthening effect of following voiced consonants. Second, pre-velar raising occurs even in words like *leggings*, where the /g/ is not tautosyllabic. On the other hand, we also see a clear tendency for [ŋ] contexts to raise more than [g] ones, supporting the articulatory account articulated by Baker et al. (2008).

Absence of the "velar-pinch" phonetic pattern is of interest, as it evades prediction. Individual variability both points to some lack of robustness of this phonetic "universal", as well as defiance of the historical linguistic axiom of the import of maintenance of phonetic distinctions.

Systemic motivations for raising

One of the reasons this phenomenon is of interest relates to the disruption it signifies with respect to distinctions along the front periphery of vowel space. Functionalist theories of phonology have held that a key principal governing the balance of vowel systems, and helping to account for internally-motivated vowel shifts remains the importance of maintaining phonetic distinctions (Martinet 1952; Labov, 2001). Loss of distinction, and changes in the functional economy of the system, would be the clear result, if /æ/, /ɛ/ both approximate the space occupied by /ej/. However, there are several reasons to believe that this word class is an unusual one, perhaps more susceptible to being "crowded" by members moving from other classes. First, /ejg/-words themselves are rather rare, so rare, in fact, that it's possible to provide a nearly exhaustive list of them right here: "bagel", "vague", "plague", "pagan". What's more, these words appear to be somewhat unstable, with some speakers in the Seattle area apparently alternating between [ɛg] or [æg], showing that for them, word-class affiliation for such forms is unclear (e.g., [plæg] for "plague"). /ejg/-words are also unusual within the English front vowel system, in that there are almost no system-internal minimal pairs. Indeed, there is only one true minimal pair that we are aware of: "beagle"/"bagel", which contrasts /ijg, ejg/, and one pseudo-minimal pair "big 'ol"/"bagel", contrasting /ig, ejg/. As for /æg, ɛg/, there are no minimal pairs whatsoever distinguishing either of them from /ejg/. (Which is one reason the graphs shown above show "gaps" for certain following places of articulation.)

It is not hard to imagine, then, that the lack of a functional opposition between /æg, ɛg/ and /ejg/ helps to account for the observed tendencies to merge. In fact, a merger would create no homophones whatsoever (although there are also no homographs). On the other hand, there are many minimal pairs for /æg/~ɛg/ (e.g. "bag"/"beg", "lag"/"leg", "mag"/"meg"), so despite some spectral overlap in this region, it might be more theoretically sound to propose that /æg/→/ɛg/ represents only a mid-range target, or intermediate stage, for the change.

Of course, we must often allow that some linguistic changes may be the result of conflation (separate effects converging on a similar outcome). Thus, it need not be the case that pre-velar raising in the Northwest is due to one factor alone. The rarity of /ejg/-words and the concomitantly low functional load of the pairs could act in concert with the aforementioned articulatory factors to produce the merger. In a sense then, low functional load opens the door for the phonologization of the velar pinch, which acts to raise the vowels involved.

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