San Francisco English and the California Vowel Shift

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ABSTRACT

San Francisco English has been previously identified as distinct from Californian English, based on its maintenance of a low back vowel distinction [13]. Subsequent work has shown participation in the low back merger and other Californian sound changes [15]. We present an analysis of the front and central vowels involved in the California Vowel Shift: KIT, DRESS, TRAP, and STRUT. Previous work in San Francisco [8] found raised DRESS after velars, and raised KIT, DRESS, and TRAP before nasals. Elsewhere in California [11], KIT and DRESS are lowering; TRAP is raising before nasals and backing before orals ('the nasal split').

We examine vowels produced in read speech by 24 speakers stratified by age, gender, and ethnicity. Results show apparent time evidence of DRESS lowering/backing and the TRAP 'nasal split'. Effects of style and gender raise further questions. The results point to San Francisco English converging on broader regional patterns.

Keywords: sociophonetics, vowels, sound change, regional variation, US English

1. INTRODUCTION

The California Shift has been characterized by a lowering of the front vowels, a backing of the back vowels, a merger of the low back vowels, the fronting of the STRUT vowel, and a 'nasal split' whereby TRAP before nasals (BAN) raises. While a few studies provide an overview of all features simultaneously [2, 8], the most in-depth examination has considered different vowels with data from different sets of participants in different areas of the US state of California. The lowering of KIT, DRESS, and TRAP is documented by [11] based on a sample of 13 speakers from a wide range of Californian locations. The nasal split for TRAP is evidenced by [3] based on an ethnically diverse sample of 20 preadolescents in Northern California. The fronting of GOOSE is among the best-evidenced changes, appearing, for example, in [4], a study of 32 Latinos from Los Angeles. [15] examines GOOSE and GOAT fronting and the TRAP nasal split with respect to intraspeaker variation and social meaning in the speech of one Vietnamese American from Orange County. The fronting of the STRUT vowel has not been evidenced by any published quantitative data, although it is mentioned as a feature by [4] and [11].

Oddly, while San Francisco English has been identified as distinct from other Californian varieties based on its maintenance of the low back vowel merger [13], it is precisely San Francisco where most of the studies of low back merger have taken place [5, 14]. Work in San Francisco has also shown robust fronting of GOOSE [5, 6] and GOAT [5], in line with other Californian (and Western US) evidence. Taken as a whole, San Francisco's participation in the California Vowel Shift is still up for debate; the role of speaker ethnicity, for example, is particularly complex, with some changes showing a significant difference between San Franciscans of Chinese (specifically Cantonese) heritage and those of non-Hispanic European heritage (White) [6, 7]. What is needed is an analysis of the front vowel system, which has not been made since the 1980s [8]. The present investigation is a first step towards that end. Overall, the results show that San Francisco English does show some evidence for the California Vowel Shift, but only for certain vowels and certain vowel qualities. Other vowels show patterns of variation that are not predicted by the age of the speaker, and so are not interpreted as changes in progress. In both cases, the variability does not always correlate in the expected ways with all of the social variables.

2. METHODS

A speaker sample balanced for age, binary gender and race/ethnic heritage was obtained to provide an acoustic analysis of the front vowels in San Francisco English. Vowels were elicited using a word list and reading passage [9]. A statistical analysis of the results was performed through the use of linear mixed-effects models on normalized first and second formant measurements [10].

2.1. Participants

A sample of 24 (near-)native San Franciscans were taken from a wider study [5] for the present analysis (Table 1). The read speech data analyzed here are taken from longer sociolinguistic interviews conducted by the first author in San Francisco in 2008 and 2009.

Table 1: Speaker sample and demographics

Ethnicity	*N*	Gender	*N*	Age Range	YOB
Chinese	12	F	6	Oldest	1932
				Youngest	1991
		M	6	Oldest	1922
				Youngest	1991
White	12	F	6	Oldest	1942
				Youngest	1991
		M	6	Oldest	1941
				Youngest	1990

2.2. Materials

Speakers were asked to read a word list and reading passage after having completed an ethnographic interview about their identity, social practices, and experiences in San Francisco. The present paper focuses on the word list and reading passage data, in line with the many sociolinguistic studies that use these two forms of read speech to model a stylistic contrast and to elicit tokens of the key vowels in particular phonological environments. Given standard representations of these styles in the literature, our default assumption is that word list speech will result in relatively more conservative pronunciations than in the reading passage speech.

Each word list consisted of pairs of words that were minimal (*sat~set*), semi-minimal (*dang~darn*), or homonymic (*two~too*). All occurrences of the vowels under analysis here come from minimal pairs, with the exception of the TRAP (BAN) vowel in '*dang*'. Of the eighty pairs of words, 10 were KIT, 14 were DRESS, 26 were TRAP (10 of those BAN), and 5 were STRUT. The reading passage data consisted of a version of the 'Comma Gets a Cure' passage [9], modified to include more tokens relevant to the California Vowel Shift. Some of the word lists and reading passages also contain bits of unscripted conversation preceding and following the read portion of the text, and those are included here.

2.3. Measurement, Normalization, and Modeling

In contrast to all previous studies of San Francisco English, which used hand-aligned data and much smaller datasets, in the present study vowel measurements were obtained based on automatic alignment and extraction using FAVE [16]. Because of errors in the vowel dynamic representation (taken five times between 20%–80% of the vowel duration), analysis here is based only on the single-point FAVE defaults for f1 and f2. For KIT, DRESS, TRAP, and STRUT, these measurements are all taken at 1/3 of the vowel duration.

The initial dataset (including all possible vowel classes) was trimmed to remove cases of possible noise. All tokens immediately preceded by (N=336) or followed by (N=391) a vowel were deleted. All tokens without primary lexical stress (N=1000) were deleted. All tokens immediately preceded by (N=25) or followed by (N=38) a noise (e.g., a cough) were also deleted. The final dataset contains 8975 vowels, 3450 of which under analysis here (Table 2). In what follows, pre-nasal TRAP is treated as a distinct lexical set, which we call BAN.

Table 2: Number of tokens per vowel (and relevant environmental subset) across all speakers

Lexical Set		*N*
KIT	688	
	KIT before a nasal	*96*
DRESS	1017	
	DRESS after a velar	*32*
	DRESS before a nasal	*161*
TRAP	1330	
	TRAP before a nasal (BAN)	*498*
STRUT	415	

FAVE default f1 and f2 measurements were normalized in R using the Lobanov method in the `vowels.R` package [10].

Linear mixed-effects models provide a statistical analysis of the data. Normalized f1 and f2 values are the dependent variable for models of every lexical set. The linguistic constraints included in each initial model are PRECEDING and FOLLOWING phonological environment, coded as a single factor encompassing both manner and place features, where relevant. The social constraints included STYLE (reading passage, word list), YOB (speaker year of birth), BINARY GENDER (male, female), and ETHNICITY (Chinese, White). Random effects included SPEAKER and WORD. All models were built using the `step()` function in the `lmerTest` package [12]. Model comparisons using `anova()` were performed on the predictors and resulting *p*-values are reported.

3. RESULTS

The significant correlations with linguistic and social factors differ for each lexical set.

Both the preceding and following phonological environments significantly predicted variation in KIT f2, DRESS f2, BAN f1, and STRUT f1. Preceding environment was also a main effect for DRESS f1, BAN f2, and TRAP f2. Neither predicted variation in KIT f1, TRAP f1, or STRUT f2. All significant predictors achieved at least $p < 0.02$ in the model comparisons.

Most of the effects are straightforwardly interpretable with respect to known coarticulatory

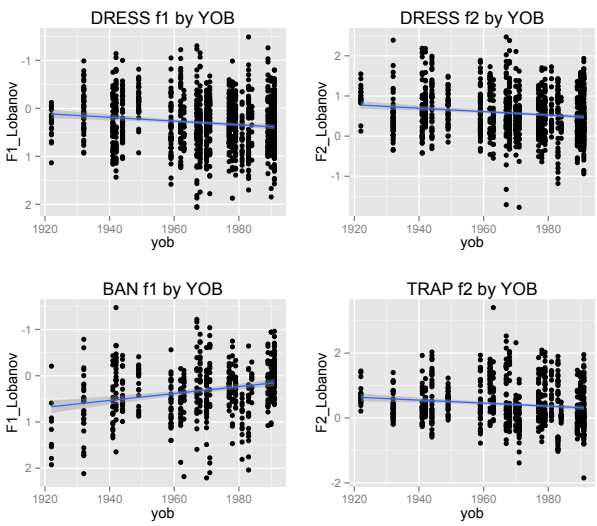
effects between adjacent consonants and vowels. Here, we focus only on those effects for variables that will be seen in the next section to be changes in progress (Figure 1). As found in [8], DRESS is higher and fronter when preceded by a velar. Here, we also find that DRESS is higher and fronter when preceded by an apical nasal or a pause, but in contrast to [8], DRESS does not significantly raise (or front) before nasals. BAN is most raised following a velar onset or preceding an apical (nasal) coda. TRAP is realized furthest back following a liquid.

As for the social constraints, speaker ethnicity never achieves significance as a main or interacting effect, for any of the vowels. The other social constraints on variation are discussed in turn below.

3.1 Change in Apparent Time: Speaker Year of Birth

Speaker year of birth (YOB) did not correlate with variation in either KIT or STRUT; while these might be identifiable components of the California Shift elsewhere, they do not seem to be active in the read speech of this subset of San Franciscans. In contrast, YOB is a significant predictor of variation for DRESS f1, DRESS f2, BAN f1, and TRAP f2. This suggests that San Franciscans are matching other Californians in terms of the DRESS vowel lowering in apparent time, and in terms of the TRAP nasal split progressing in apparent time (raising before nasals, backing before orals). Figure 1 plots YOB from 1922 to 1991 on the *x*-axis and normalized formant values on the *y*-axes for DRESS f1 and BAN f1 (reversed so that a lower *y*-value indicates a lower vowel, as on typical vowel plots) and DRESS f2 and TRAP f2 (not reversed; a lower value on the *y*-axis indicates a backer vowel).

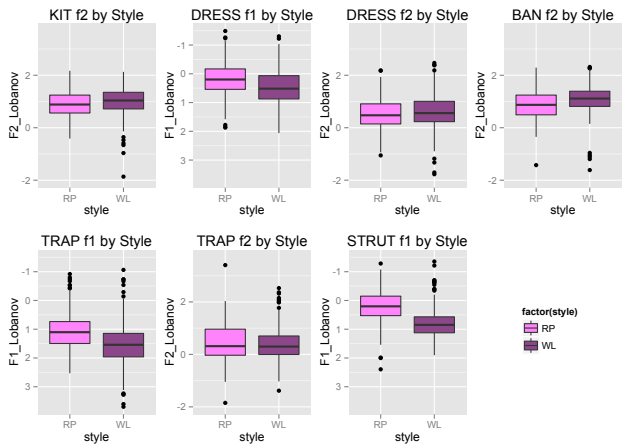
Figure 1: Significant Year-of-Birth correlations



3.2 Style Differences: Reading Passage vs. Word List

The contrast between reading passage (RP) speech and word list (WL) speech is a significant predictor for KIT f2, DRESS f1 and f2, BAN f2, TRAP f1 and f2, and STRUT f1 (Figure 2). For those dimensions corresponding to sound changes, the more advanced form (lower/backer DRESS, backer TRAP) appears in the word list speech, not the reading passage speech. This is surprising in the sense that word list speech is generally expected to elicit more conservative productions than reading passage speech.

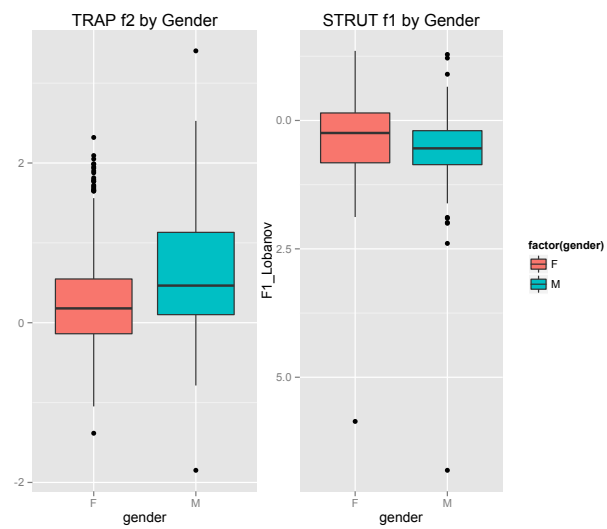
Figure 2: Significant Style correlations



3.3 Change in Apparent Time: Speaker Gender

The results show a significant difference between women and men for only two dimensions studied here: TRAP f2 and STRUT f1. The variation in TRAP, a change in progress, shows women leading the change with a backer variant. The variation in STRUT, which is not an apparent time change, shows men producing a lower STRUT vowel than women.

Figure 3: Significant effects by Speaker Gender



3.6 Summary

Table 3 summarizes the significant social effects obtained in this analysis of read speech produced by 24 San Franciscans in 2008-2009.

Table 3: Summary of social effects

Lexical Set	YOB	Style	Gender
KIT f1	×	×	×
KIT f2	×	<0.02	×
DRESS f1	<0.02	<0.02	×
DRESS f2	<0.01	<0.02	×
BAN f1	<0.01	×	×
BAN f2	×	<0.01	×
TRAP f1	×	<0.01	×
TRAP f2	<0.02	<0.01	<0.01
STRUT f1	×	<0.0001	<0.02
STRUT f2	×	×	×

4. DISCUSSION

The results shown here support previous evidence that San Francisco natives are participating in the California Vowel Shift, despite other reports that suggest that San Francisco English might be better considered a dialect island. However, we found that each vowel examined in the present study correlated with a different set of social predictors. In this section we consider what each pattern adds to the overall picture of sound change in San Francisco.

If we accept the concept of apparent time as a measure of change in progress, then the results suggest that DRESS is lowering and backing, pre-nasal TRAP (BAN) is raising, and pre-oral TRAP is backing. These all match previously described aspects of the California Vowel Shift. Note that two secondary dimensions – BAN *fronting* and TRAP *lowering* – are not correlated with speaker year of birth. One reason might be that BAN is already very front, and TRAP is already very low, so the range of variance itself might be too small to reflect change.

However, both BAN fronting and TRAP lowering do vary by speech style, and DRESS lowering/ backing and TRAP backing vary by style as well (but not BAN raising). As noted above, this effect appears to go in the 'opposite' direction of the sound changes, with more innovative or nonstandard, variants realized in word list speech, and more conservative forms in the reading passage speech. Given that vowels with longer durations are known to be lower, one source of this pattern might be any durational differences between the two speech styles. However, a full account of this issue is left for future study, particularly since the applicability of a duration-based account is less clear for variation in the f2 dimension.

Despite previous evidence of KIT lowering and discussion of STRUT fronting in California English, neither of these changes appear in these data. What we find instead are significant correlations of KIT anteriority and STRUT height with speech style and, for the latter, with speaker gender. Possible explanations for these unexpected results must also be left for future study.

Given previous work on San Francisco English, we might expect these variables to show social patterning in line with other documented elements of the California Vowel Shift, such as the fronting of GOOSE [5, 6] and GOAT [5]. In such cases we might expect to see women leading the change, unless the change is near completion, in which case we would expect no gender difference [6]. However, in only one case – TRAP f2 – do we see evidence of a classic sociolinguistic change in progress: a significant correlation with speaker year of birth paired with a significant correlation with speaker gender, such that women are leading the change. Based on the present sample we claim that San Francisco English is participating in the retraction of pre-oral TRAP over time, with women leading the change. The data are too sparse to make any further conjectures about why the other apparent time correlations show no gender patterning.

Finally, in contrast to previous studies of the San Francisco back vowels [5, 7], none of the variation examined here is significantly correlated with speaker ethnicity as a main or interacting effect with any other social variables.

5. CONCLUSION

The present paper provides the first study of the front vowel system of San Francisco English since the 1980s. In considering whether or not San Franciscans are participating in a wider sound change known as the California Vowel Shift, the results presented here suggest that the answer depends on the vowel and the quality contrast being modeled. Significant correlations with speaker year of birth suggest that some changes are indeed operating in San Francisco English, while others are not. We see one case of women leading men in one of the changes in progress, but for other vowels significant gender differences are either absent or the explanation is unclear. The strongest finding is that most of these vocalic variables correlate with speech style, but with the more advanced variants occurring in word list speech rather than reading passage speech. Overall, the findings provide a useful contribution to the dialectological literature, but also raise new questions that call for further investigation.

7. REFERENCES

[1] DeCamp, D. 1958–59. The Pronunciation of English in San Francisco. *Orbis* 7: 372–91; 8: 54–77

[2] Eckert, P. 2004. *Vowel Shifts in Northern California and the Detroit Suburbs: Northern California Vowels.* http://web.stanford.edu/~eckert/vowels.html

[3] Eckert, P. 2008. Where do ethnolects stop? *International Journal of Bilingualism* 12(1&2), 25–42.

[4] Fought, Carmen. 1999. A Majority Sound Change in A Minority Community: /u/-Fronting in Chicano English. *Journal of Sociolinguistics*, 3(1), 5–23.

[5] Hall-Lew, L. 2009. *Ethnicity and Phonetic Variation in a San Francisco Neighborhood.* Ph.D. diss., Stanford University.

[6] Hall-Lew, L. 2011. The Completion of a Sound Change in California English. *Publication of the 17th International Conference of the Phonetic Sciences (ICPhS XVII)*. Hong Kong.

[7] Hall-Lew, Lauren. 2013. 'Flip-flop' and mergers-in-progress. *English Language and Linguistics*,17(2), 359–90.

[8] Hinton, L., Moonwomon, B., Bremner, S., Luthin, H., Van Clay, M., Lerner, J., Corcoran, H. 1987. It's Not Just the Valley Girls: A Study of California English. *Proceedings of the Thirteenth Annual Meeting of the Berkeley Linguistics Society* 13, 117–28.

[9] Honorof, D., McCullough, J., Somerville, B. 2000. *Comma gets a cure: A diagnostic passage for accent study*. http://web.ku.edu/idea/readings/comma.htm.

[10] Kendall, T., Thomas., E. R. 2009-2014. *Vowels: Vowel Manipulation, Normalization, and Plotting in R.* R Package. Version 1.2-1.

[11] Kennedy, R., Grama, J. 2012. Chain Shifting and Centralization in California Vowels: an acoustic analysis. *American Speech* 87, 39–56.

[12] Kuznetsova, A., Bruun, B. P., Christensen, R. H. B. 2014. Package *lmerTest.* CRAN, http://cran.rproject.org/web/packages/lmerTest/

[13] Labov, W., Ash, S., Boberg, C. 2006. *The atlas of North American English: phonetics, phonology, and sound change: a multimedia reference tool*. Berlin: Mouton.

[14] Moonwomon, B. 1991. *Sound change in San Francisco English*. PhD dissertation, University of California, Berkeley.

[15] Podesva, R. J. 2011. The California Vowel Shift and Gay Identity. *American Speech*, 86(1), 32–51.

[16] Rosenfelder, I., Fruehwald, J., Evanini, K., Seyfarth, S., Gorman, K., Prichard, H., Yuan, J. 2014. *FAVE 1.1.3.* ZENODO. doi:10.5281/zenodo.9846.