Nasalization Change over Time in Michigan English

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This paper examines articulatory variation for a subphonemic representation, nasalization, in Michigan English. Research on sound change has primarily focused on changes to the phonetic implementation of individual phonemes, or to more phonological properties like allophonic conditioning. More research on community-level change to non-segmental features is needed to deepen our understanding of how such features change over time. Michigan English has been claimed to have the presence of nasal peaks and anti-formants in non-nasal environments (Plichta 2004), but this has not been tested in real or apparent time. Prior work on Philadelphia English (Zellou and Tamminga 2014), however, confirmed that coarticulatory vowel nasalization can be targeted for change. The present study therefore tests whether degree and duration of vowel nasalization across different age groups in two distinct phonological contexts (pre-oral [CVC] and pre-nasal [CVN]) in Michigan English exhibit change in apparent time.

We analyzed self-recorded audio dairies in the state of Michigan (Sneller et al. 2022). A total of 22 hours of recordings from 54 native speakers of Michigan English (aged 18-74, 20 male, 32 female and 2 other) was analyzed. The degree of nasalization was measured with the acoustic value A_1-P_0 (the amplitude of the first harmonic peak F_1 minus the amplitude of the lowest nasal peak) (Chen 1997) in four target vowels – THOUGHT, LOT, FACE and GOAT. The formant extraction was automated using a modified Praat script designed to measure nasality in acoustic data (Styler 2017). Measurements were taken at ten timepoints during the vowel in three different phonological environments, the baseline [SVS], pre-oral [CVC] and pre-nasal [CVN] contexts. The duration of nasalization was calculated as the significant divergent timepoint between the nasal trajectories in pre-nasal and pre-oral contexts and the baseline. The results were analyzed in R (R Core Team 2021) with linear regression models.

The results confirm Plichta's (2004) observation of nasality even in pre-oral contexts and show that as birth year increases, the degree of nasalization decreases (Figure 1) but the variability in the degree of vowel nasalization increases (Figure 2). This pattern is present across all contexts for all four vowels. The results for the duration of nasalization find that birth year does not have an effect on the duration of nasalization across all vowels and contexts in comparison with the baseline. Further examination shows participants, unsurprisingly, fully nasalize in pre-nasal context but exhibit a bimodal distribution in pre-oral context – they are either fully nasalizing their pre-oral vowels or not nasalizing at all.

To summarize, younger speakers of Michigan English exhibit less nasality, in the degree of nasalization but not the duration, than older speakers. Additionally, young people's production of nasalization has a higher degree of variability. This could be an indication that nasalization in Michigan English could be undergoing generational change, as increased interspeaker variability is expected for the early stages of certain types of phonological change (Fruehwald 2013; Sneller 2018). This paper underscores that language change in subphonemic representations may be fruitfully studied in apparent time. (494 words)

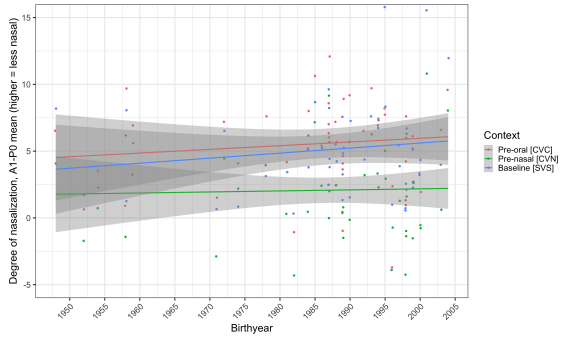

Figure 1: Average degree of nasalization (mean A_1-P_0, averaged cross ten time points) in three phonological contexts, aggregated across all four vowels. Each point represents an averaged value of one speaker.

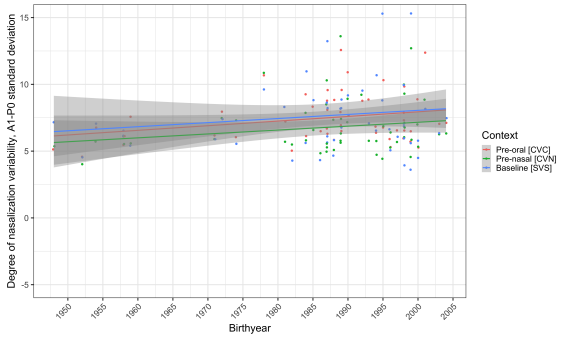

Figure 2: Average degree of nasalization variability (A_1-P_0 standard deviation) in three phonological contexts, aggregated across all four vowels. Each point represents an averaged value of one speaker.

Table 1: Results of the linear regression model for the average degree of nasalization.

	Estimate	t value	Pr(>|t|)
(Intercept)	-56.66	-2.03	0.04^{*}
BirthYear	0.03	2.30	0.02^{*}
THOUGHT	0.54	0.93	0.35
FACE	-0.60	-1.06	0.29
GOAT	0.31	0.55	0.58
ContextCVC	-1.93	-3.90	0.0001^{***}
ContextCVN	-5.34	-10.78	0.00^{***}

Table 2: Results of the linear regression model for the standard deviation of the degree of nasalization.

	Estimate	t value	Pr(>|t|)
(Intercept)	-53.40	-2.75	0.01^{**}
BirthYear	0.03	3.13	0.002^{**}
THOUGHT	-0.26	-0.63	0.53
FACE	-0.41	-1.04	0.30
GOAT	0.21	0.54	0.59
ContextCVN	-1.13	-3.71	0.0002^{***}
ContextSVS	-1.04	-2.87	0.004^{**}

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