

The structural antagonism and apparent-time change of the Northern Cities Shift and the Low Back Vowel Merger in northwestern Wisconsin English

The Low Back Vowel Merger (LBVM) and Northern Cities Shift (NCS) are two phonological changes believed to be structurally antagonistic (Labov, 1994) due to mutual involvement of the *BOY* and *BOUGHT* vowel classes. However, resistance to the LBVM is weakening in communities in Upstate New York (Dinkin, 2011), a long-standing NCS region (Labov et al., 2006). Moreover, northwestern Wisconsin, where differential /æ/-raising before voiced velars but not voiceless velars is also well established (Bauer & Parker, 2008; Purnell, 2008), exhibits both NCS and LBVM patterns in one community (Benson et al., 2011), ostensibly making this region a fringe NCS zone. Dinkin (2011) shows that backing of *BOY* occurs in areas of New York with full Inland North NCS systems (core) and partial NCS systems (fringe) (Labov et al., 2006). He posits this as a consequence of proximity to established LBVM communities bringing about diffusion of merger, strongly suggesting that *BOY*-fronting or even full-blown NCS is not sufficient to prevent the diffusion of the LBVM. Northwestern Wisconsin is another area in which the LBVM and NCS regions are geographically proximate (Labov et al., 2006, p. 182), making it well situated for the investigation of the relationship between the LBVM, NCS, and *BAG*-raising.

The internal progression of the NCS in the Inland North is associated with larger cities, such that the bigger they are the more advanced each stage of the change (Labov et al., 2006, pp. 187–215). More generally the gravity model (Trudgill, 1974) predicts that the LBVM and NCS will diffuse to larger cities first, followed by geographically contiguous suburban and rural communities. Taken together this leads to the following predictions: (1) both changes will be more advanced in the denser urban area relative to the others, and (2) *BOY*-backing will occur due to LBVM proximity. However, whether or not *BOY*-backing brings about retraction of other stages of the NCS in reverse sequence, or leads to a coexistence of NCS features with the LBVM is an open question.

The vowel systems of 134 participants (75 Female, 59 Male, Birth year: 1929-1992) from three geographically contiguous cities in Northwestern Wisconsin (Urban, Rural, and Suburban) were measured from force-aligned (Yuan & Liberman, 2008) reading materials (Tokens=69,074). Lobanov (1971) normalized measurements were submitted to sets of mixed-effects regressions with speaker and task as nested random-intercepts, and a random-slope-by-speaker for $\log(\text{duration})$.

The LBVM is making inroads into the region, with substantial phonetic overlap starting in the 1980s. While it appears that *BET* and *BOUGHT* are stable across apparent-time, with *BET* often backer than *BAD*, the first two stages of the NCS are found to be reversing with *BOY* backing and *BAD* lowering and backing, across apparent-time. A city*year of birth interaction shows the second largest city reversing *BAD* fastest. *BOY* is reversing in all communities, ending up in the same phonetic space, but each community had reached a different level of fronting before LBVM diffusion brought about reversal. Lastly, the different communities show different trajectories of change for both *BAG* and *BAN*.

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