LOT/THOUGHT in a TRAP? Low vowel correlations in North American English
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Martinet (1955:80f.) proposes that sound change disfavors *cases vides* (“holes in the pattern”) in sound systems. Gordon (2005:347) and Bigham (2009) hypothesize that merger of LOT/THOUGHT creates a “hole” in the short vowel subsystem that actuates or accelerates TRAP-retraction (i.e., as part of a pull chain); these authors cite the presence of TRAP-retraction in distant regions (e.g., California, Canada, and southern Illinois) which are all experiencing low back merger. We evaluate this claim for the whole of North America using token-level data from the *Atlas of North American English* (Labov et al. 2006). This requires us to control for the reality that observations from neighboring regions are not statistically independent. For instance, either (a) a single actuation with subsequent diffusion or (b) multiple actuation events could cause TRAP-retraction in speakers from nearby regions. We find that the correlation between LOT/THOUGHT merger and TRAP-retraction is much reduced after controlling for spatial autocorrelation.

Linear models (controlling for manner and voicing of the following segment) are used to measure the per-speaker low vowel *case vide* with the F2 of LOT and degree of merger as measured by the LOT/THOUGHT Pillai score (Hay et al. 2006). The backness of TRAP is only weakly correlated with the F2 of LOT ($R^2 = 0.037$) and Pillai score ($R^2 = 0.097$). A linear regression combining these predictors estimates that a fully merged speaker will realize TRAP 140 Hz more back than a fully unmerged speaker ($p = 7.2 \times 10^{-11}$), a very robust effect (LOT F2 is non-significant). However, this model is confounded by spatial autocorrelation (Moran’s I, $p = 7.9 \times 10^{-27}$). When spatial autocorrelation is controlled for using a mixed effects regression model per-region with random intercepts and slopes, the effect of full merger on TRAP-retraction is reduced by more than half and is non-significant ($p = 0.083$) as is the F2 of LOT. While the LOT/THOUGHT merger is positive correlated with TRAP-retraction in some regions (particularly the Mid-Atlantic and North), they are negatively correlated in other regions (such as Eastern New England and the Southeast). We conclude that *cases vides* explanation of TRAP-retraction does not generalize to North America.