The Nasal Invasion: Predicting systemic change in dialect contact

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The traditional complex Philadelphia Short-a System (PHL), described in (1), is being rapidly replaced by the simpler Nasal system (NAS), described in (2) (Labov et al, forthcoming). In this paper, we suggest that the mechanisms of language acquisition guarantee the emergence of NAS at the expense of PHL when the linguistic environment introduces a surprisingly low level of NAS as input (due to e.g, contact).

(1) æ → tense / __{m, n, f, θ , s}]$_{\sigma}$]$_{stem}$ (2) æ → tense / __{m, n, ŋ }

If NAS is to take hold in an environment which the input is generated by PHL, it must be able to withstand exceptions--e.g., tense /æ/ in *fast, mad* --that are inconsistent with NAS. The Tolerance Principle is a precise model of productivity: A productive rule applicable to *N* lexical items cannot tolerate more than N/lnN exceptions; see Yang (2016) for extensive empirical case studies and Schular, Yang, & Newport (2016) for confirmation from artificial language learning. We coded N=2,729 word types from the CHILDES database that are relevant for the PHL distribution (Labov 1989). The NAS grammar, whose formal simplicity may be favored by learners, is compatible with a majority of the data (76%) but falls short of the productivity threshold, whether the analysis consists of all /æ/ words or only the most frequent words. Our acquisition analysis therefore coincides with the theoretical prediction (Bermudez-Otero, 2007) that the NAS grammar cannot spontaneously emerge within, and subsequently replace, PHL.

What, then, is the cause of the rapid change from PHL to NAS in Philadelphia? We propose that this replacement is the result of a contact situation with NAS speakers weakening the input to Philadelphian language learners (Payne 1980). Recent work (Labov, Ash, and Boberg, 2006; Labov et al., forthcoming) has found NAS speakers in the geographic area surrounding Philadelphia. We test the vulnerability of PHL in contact with NAS in the following way. We introduce a contact parameter (*m*) that represents the proportion of the NAS-generated word types. We then randomly generate a mixed lexicon according to *m,* which is then subjected to Tolerance analysis to see if NAS reaches productivity. The results are averaged over 1000 trials for each value of *m* (from .1 to .9, in steps of .01) to quantify the vulnerability of PHL in competition with NAS (Fig 1). Notably, PHL is more likely to lose to NAS when the environment consists of just over 40% of NAS input. This is strongly consistent with Payne's classic finding that Philadelphian-born children without PHL-speaking parents were unable to successfully acquire the full PHL system.

Our results suggest the internal mechanisms of language transmission react to perturbations in the external linguistic environment, resulting in structural language change. Furthermore, this process can be rigorously formulated through the study of language acquisition. The precise quantitative predictions from such a formulation in turn invite additional empirical and sharply focused investigation into the social factors of language change.

Word Count: 492

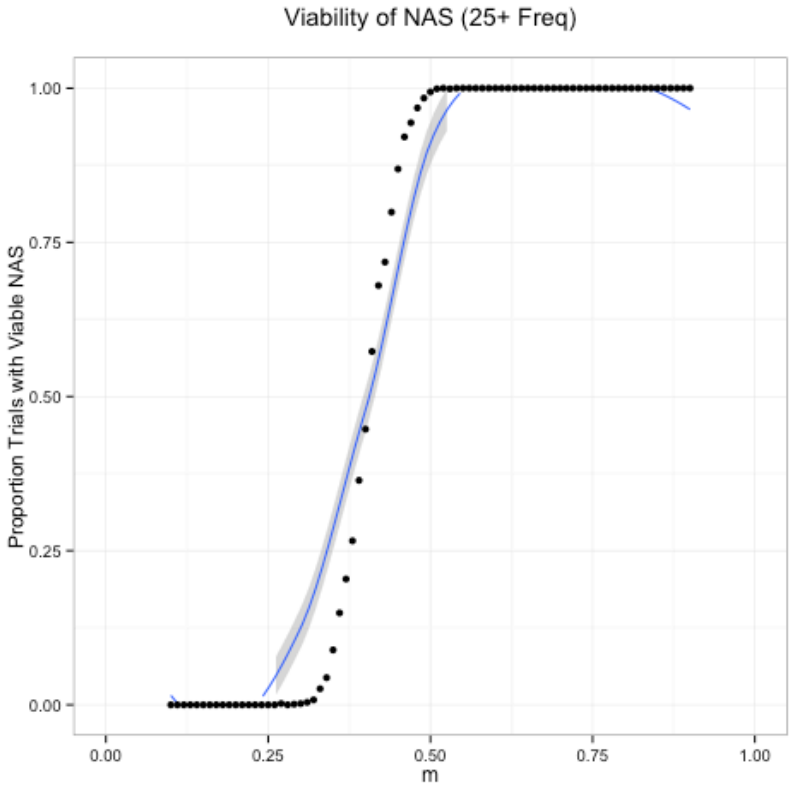

Figure 1: Proportion of 1000 trials that produced a viable NAS lexicon for values of *m* from .1 to .9

Selected References

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