Feature economy in vowel variation

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The aim of this paper is to account for variation in the number and dispersion of oral and nasal vowels in vowel inventories. Existing phonetic and phonological theories cannot separately account for this issue. If phonology chooses from what phonetics has to offer, then combining a phonetic theory, such as a dispersion theory (Liljencrants and Lindblom 1972, Lindblom 1986), and a phonological theory, such as feature economy (Clements 2003), can shed light on how vowel inventories are constrained. Steriade (to appear) notices that dispersion and feature economy conflict: "more economic alphabets have less well separated members, because fewer features distinguish them." She also notices that an unconstrained conflict between dispersion and economy would predict impossible, non-existent inventories of sounds.

Flemming's (2004) dispersion theory of contrast is based on the claim that the selection of phonological contrasts has three functional goals: maximize the distinctiveness of contrasts, minimize articulatory effort and maximize the number of contrasts. Steriade's (to appear) suggestion is that a revised formalization of Flemming's dispersion theory of contrast should retain evaluating MAXCONTRAST on individual feature dimensions, but it should also take into account a violable constraint requiring feature economy.

This paper proposes a method of formalizing feature economy within the dispersion theory of contrast (Flemming 2004) and tests how the explanation of a vowel inventory benefits from including a violable feature economy constraint. Evaluated are the following vowel systems (cf. Greenberg 2005, Croft 2002, de Boer 2000, Donegan 1985): a system consisting of five oral and five nasal vowels, a system consisting of five oral but only three nasal vowels, a system consisting of five oral vowels but only one nasal vowel, a system consisting of seven oral and seven nasal vowels. Two constraints are used after Flemming (2004): MINDIST (Minimal Distance) and MAXIMIZE CONTRAST. The following constraint is introduced to formalize the effects of feature economy on vowel inventories: ECONOMY: NASAL. One more constraint is introduced to enable vowel systems to have fewer nasal than oral vowels: MINDISTNAS (Minimal Distance within the nasal vowel series).

As Steriade (to appear) predicts, introducing the feature economy constraint allows us to explain why languages seem to prefer systems with equal number of oral and nasal vowels. Because of the emergence of the unmarked (McCarthy and Prince 1994) it also explains why languages will never allow a system with more nasal than oral vowels. To account for systems with fewer nasal than oral vowels a constraint MINDISTNAS requiring more distance between less perceptible nasal vowel has been postulated. Constraints combining functional requirements of a language system to have well dispersed vowels and to have a number of contrasts between the vowels with feature economy, i.e. a phonological tendency of a symmetry in the system achieved by fully crossing its contrasts, seem to be successful in accounting for different combinations of oral and nasal vowels in language systems.