

Phonetic and Phonological Patterns of Nasality in Lakota Vowels

Coarticulation has held an important place in discussions of phonetic universals since SPE (Chomsky and Halle 1968), where coarticulation was described as a completely physiologically determined, and therefore universal, phenomenon resulting from the necessary transitions between adjacent articulations. Subsequent research (e.g., Keating & Cohn 1988; Manuel 1990; Beddor, Harnsberger & Lindemann 2002), however, has demonstrated language-specific patterns in the realization of coarticulation, suggesting that at least some aspects of coarticulation are part of the phonetic grammar. Furthermore, coarticulation has figured prominently in discussions of the role of communicative constraints in language. It has been argued that coarticulation is detrimental to segmental contrast, so there may be perceptually determined limits on coarticulation based on the system of contrast in a given language (Manuel 1990). Despite these language-specific differences in coarticulation, though, the existence of coarticulation, whatever the details, seems to be ubiquitous cross-linguistically. It is only careful description of coarticulatory patterns across languages that can reveal which aspects of coarticulatory patterning may be universal. This paper describes nasal coarticulation in Lakota, a Siouan language spoken in the northern plains of North America.

Lakota is of particular interest with respect to nasal coarticulation because it has contrastive vowel nasality, which might be hypothesized to interfere with coarticulatory nasality. Lakota has five oral vowels, /i, e, a, o, u/, and three nasal vowels, /i, a, u/. All of these vowels can occur preceding or following a nasal consonant (/n, m, ŋ/), with the caveat that VN sequences are always heterosyllabic. The current study examines CV, NV, and VN sequences with both oral and nasal /a/. In total, there were 26 words, with 4 to 6 words exemplifying each category. Two female native speakers of Lakota recorded three repetitions of each, yielding 156 tokens. Degree of nasality was measured acoustically as A1-P0 (Chen 1996) at the beginning, midpoint, and end of each test vowel. Oral – nasal vowel pairs were matched as closely as possible for stress and phonetic context.

As expected, the data show that underlyingly nasal vowels are more nasal than underlyingly oral vowels. Nasal vowels start essentially oral (with the same degree of nasality as oral vowels), with a steady increase in nasality through the end of the vowel. The data also reveal there is nasal coarticulation in both oral and nasal vowels; in other words, vowels are more nasal in NV and VN words than in CV words, regardless of their underlying nasality. Overall, the degree of carryover coarticulation (in NV words) is greater than the degree of anticipatory coarticulation (in VN words). One between speaker difference deserves mention: while one speaker shows the greatest coarticulatory nasality in the part of the vowel adjacent to the nasal consonant (as expected articulatorily), the other speaker consistently shows the greatest coarticulatory nasality at the end of the vowel (just as in contrastively nasal vowels).

The data indicate first that nasal coarticulation is not restricted in Lakota, despite the contrastive role of nasality (cf., Manuel 1990): carryover coarticulatory nasality is comparable in degree to the nasality in nasal vowels. The existence of coarticulation in nasal vowels further suggests that nasal coarticulation in Lakota is not fully articulatorily motivated (cf., Chomsky and Halle 1968): since velum lowering already occurs in nasal vowels, there is no need for additional coarticulatory velum lowering to facilitate the VN or NV transition. Despite these seeming arguments against universal conditioning of coarticulation, the data are similar to findings for French (Cohn 1990), another language with contrastive vowel nasality, which also exhibits nasal coarticulation, though this coarticulation is more limited in French nasal vowels.

References

- Beddor, S.P., Harnsberger, J.D. & Lindemann, S. (2002) Language-specific patterns of vowel-to-vowel coarticulation: acoustic structures and their perceptual correlates. *Journal of Phonetics*, 30, 591-627.
- Chen, M. Y. (1996) *Acoustic Correlates of Nasality in Speech*, Ph.D. dissertation, Massachusetts Institute of Technology.
- Chomsky, N. & Halle, M. (1968) *The Sound Pattern of English*. New York: Harper & Row.
- Cohn, A. C. (1990) *Phonetic and Phonological Rules of Nasalization*, Ph.D. dissertation, UCLA.
- Keating, P. & Cohn, A. (1988) Cross-language effects of vowels on consonant onsets," *Journal of the Acoustical Society of America*, 84, S84.
- Manuel, S. (1990) The role of contrast in limiting vowel-to-vowel coarticulation in different languages. *Journal of the Acoustical Society of America*, 88, 1286-1298.