The case of dental obstruents in Bissa (Eastern Mande)

Nathan Severance (University of Oregon)
Valeriia Tretiak (University of Oregon)

Contrasts between dental and alveolar obstruents are well documented in Indic languages (among others) (Ladefoged and Maddieson 1996) but are not often described in West African language phonologies. Some dental sounds sounds have been posited for proto languages of families found in this region (e.g. Vydrin 2004 for Proto-mande), but relatively few written grammars claim that such phones or phonemes exist in Mande consonant inventories. Recent investigation (in the context of a University of Oregon Field Methods class) into one Mande language (Bissa) indicates that such consonant sounds may be present, though it is not yet certain whether dental and alveolar sounds contrast or are in an allophonic relationship. A contrast between dental and alveolar sounds has not been described in prior phonological descriptions of Bissa. However, one description treats all seemingly coronal stops as dental (Vanhoudt 1999) and another claims them to be alveolar (Prost 1968). Our work suggests that sounds occur at both places of articulation. This was initially proposed based on impressions of investigators and a native speaker‘s ability to disntinguish seemingly alveolar obstruents sounds from potentially dental ones, based on self-reports of the position of the apical portion of the tongue when pronouncing Bissa vocablary.

To verify whether such impressionistic judgments are correct, we undertook acoustic investigation of Bissa voiceless coronal plosives. Building on methodologies in previous literature (Ladefoged and Maddieson 1996, Fosla et al 2015, Ijaz and Anwar 2003, Stevens 1999, and Jongman, Blumstein, and Lahiri 1985), we conducted a pilot study to investigate the existing of distinct pronunciations in terms of F2 transitions for word initial [t] and [t̪]. We found that F2 transitions (as measured by the F2 start point minus the F2 midpoint on the following vowel, averaged across five tokens for each word) created two measurement groups whose F2 transition measurement distributions did not overlap.

Our results indicate that one group of voiceless stops shows an average F2 difference of roughly 350 Hz while the other shows an average difference of less than 100 Hz, for a small word list (thirteen words). In our data, this difference remains consistent irrespective of the vowel quality of the following vowel. Interestingly, our consultant’s intuitions about which words contain which sounds do not always match our results (which suggests a possible allophonic relationship). However, the distinction seems to be acoustically clear, as Fosla et al (2015) and Stevens, Keyser, and Kawasaki (1986) (cited in Fosla et al 2015) show that dental stops have a sharper F2 transition into following vowels. We suspect our two groups follow this pattern.

We plan to conduct similar acoustic investigations of other obstruents (and possibly sonorants) to establish whether or not dental versus alveolar pronunciations exist for other Bissa coronal sounds. As the existing literature on West African languages does not discuss acosutic parameters for dental versus alveolar sounds, we also plan investigate other acoustic phenmoena known to distinguish consonants, such as amplitude differences and centers of gravity. The phonological impication of the results and our speaker‘s intuitions will also be explored.

References

Fasola, A.C., Paillán, H.P., Lee, J.S., and Perkins, J. (2015). Acoustic properties of the dental vs. alveolar contrast in Mapudungun. *International Congress on Phoneic Sciences Proceedings*.

Ijaz, A., Anwar A.M. (2003). Acoustic differences between dental and alveolar stops of Urdu. *CRULP Annual Student Report.* Retreived from http://www.cle.org.pk/Publication/Crulp_report/CR03_02E.pdf

Jongman, A., Blumstein, S., and Lahiri, A. (1985). Acoustic properties for dental and alveolar stop consonants: A cross-language study. *Journal of Phonetics* 13, 235-251.

Ladefoged, P. And Maddieson, I. (1996). *The Sounds of the World's Languages*. Wiley-Blackwell: Oxford, UK.

Pickett, J.M. (1999). *The acoustics of speech communication*. Allyn and Bacon: Boston, MA.

Prost, A. (1968). La langue bisa: grammaire et dictionnaire. *Études voltaïques*. Gregg Press: Farnborough Hants, UK.

Stevens, K. N. (1998). *Acoustic Phonetics*. MIT Press: Cambridge, MA.

Vanhoudt, B. (1999). Lexique bisa-français. *Mandekan* 34.

Vydrine, V. (2004). Areal and genetic features in West Mande and South Mande phonology: in what sense did Mande languages evolve? *Journal of West African Linguistics* 32(2), 113-125.