Acoustic variation in two types of gemination in Egyptian Arabic

While previous research on gemination in most varieties of Arabic has tended to focus on intervocalic gemination (Blevins 2008), the most common variety of gemination cross-linguistically, rarer word-final gemination has been neglected. Similarly, gemination research has tended to focus on true or phonemic geminates which exist underlyingly and contrast meaningfully with singleton consonants. Fake geminates, which result from phonological processes like morphological concatenation (i.e. the addition of an affix), assimilation of one consonant to another, or the presence of identical consonants across a word boundary, are under-studied, though some research, including Oh & Redford (2012), has suggested that fake geminates may differ acoustically from true geminates.

In the Arabic linguistics literature, phonological descriptions of word-final gemination in Arabic have tended to assume that degemination occurs word-finally, with no acoustic distinction between word-final singletons and geminates (Farwaneh 2009). However, acoustic studies have demonstrated that word-final true (i.e. underlyingly long) geminates in Urban Jordanian Arabic (UJA) are acoustically distinct from their singleton counterparts, with durations 1.5 times longer than singletons and shorter preceding vowels (Al-Tamimi et al. 2010). Research on word-final fake (morphologically concatenated) gemination in Egyptian Arabic (EA), on the other hand, has revealed that word-final fake geminates in EA are 1.3 times as long as singleton consonants, with no preceding vowel length differences (Author 2016). How do EA word-final true geminates compare to those in UJA and to word-final fake geminates in EA?

In this paper, I compare acoustic data on word-final true and fake gemination in EA, measuring the stop closure durations and preceding vowel lengths of word-final coronal singletons and geminates, /t, d, tˤ, dˤ, tt, dd, tˤtˤ, dˤdˤ/, collected in a reading task. Four male speakers of EA and four female speakers of EA read the following in the EA frame ([ʔu:lu ____, ʔu:lu ____ ʔu:lu ____ "Say ____, say ____, say _____") for a total of three repetitions per word:

1) Fifteen verbs ending in singleton /t, d, tˤ, dˤ/, e.g.
   [ˈsɪkɪt]
   quiet.PAST.3SG
   'he was quiet'

2) Fifteen verbs ending in fake geminate /tt, tˤtˤ/, e.g.
   [sɪˈkɪt-t]
   quiet.PAST-1SG
   'I was quiet'

3) Fifteen nouns and verbs ending in true geminate /tt, dd, tˤtˤ, dˤdˤ/, e.g.
   [sɪtt]
   'lady'

I argue that each variety of gemination is acoustically distinct, with word-final true gemination characterized by shorter preceding vowels in a kind of "temporal compensation" relationship similar to UJA (Al-Tamimi et al. 2010, 121). The shorter preceding vowel creates the perception of a longer stop closure duration, ultimately distinguishing word-final true geminates from word-final fake geminates in EA and enhancing the important phonemic distinction between singleton consonants and true geminates. Typologically, this work adds to our growing understanding of the parameters of variation in spoken varieties of Arabic.