Gemination in normal and whistled speech

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Gemination is a salient property of the linguistic system of Tashlhiyt Berber, where each single consonant has a geminate counterpart. In this talk I will first present a short tutorial, sketching basic facts about the phonological and phonetic characteristics of Berber geminates. Then I will present a recent study on how gemination is rendered in whistled speech. The study address a core linguistic issue - the status of covarying features relative to primary gestures in the production of lexical contrasts - by drawing parallels between spoken and whistled languages. Whistling is one of the multiple modes of expression for some languages, which has the advantage to increase the audible range of speech and to enable dialogues when speakers are far from each. An example of a whistled Berber word is given in Figure 1.

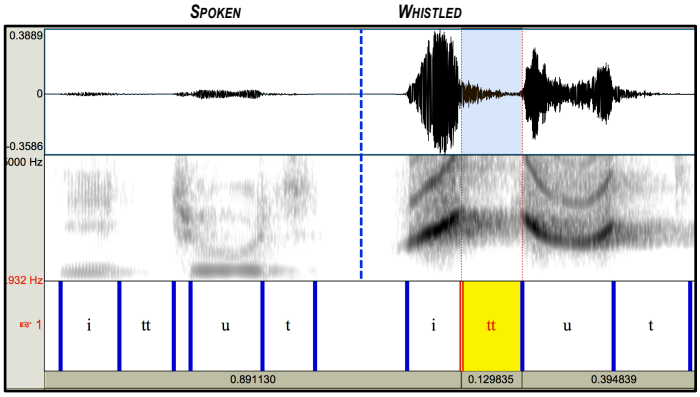

Figure 1. *Waveform and spectrogram of the spoken and whistled form [ittut] 'he forgot him'.*

The status of covarying features is a long-standing issue in speech: are they deliberately controlled by the speakers or are they contingent automatic effects required by the primary gesture? Although there are clear examples of secondary features that cannot be considered as biomechanical effects of the primary gesture (e.g. lip-rounding usually added to /ʃ/ in English, increasing its auditory difference from /s/), the view that most of the properties that covary with the defining attributes are actively controlled has not been unambiguously demonstrated for other contrasts (e.g. intrinsic F0 differences in vowel height and voicing)**.** The biomechanical and/or aerodynamic constraints of the speech mechanism that may result in covarying features may not be at play in whistled speech. Moreover, the technique of whistling imposes severe constraints and restrictions on speech articulation. During this procedure, certain phonetic details that are present in standard speech are lost. As a result whistled speech is expected to oversimplify the phonetic implementation of phonological contrasts, and thus implement only those attributes that are actively controlled by the speaker. In this talk, I examine how the difference between whistled singletons vs. geminates is acoustically implemented in different prosodic positions, and test whether whistling also gives rise to secondary attributes. Results are discussed in relation to what we know about the implementation of gemination contrast in normal speech.