Ejectivity in Omani Mehri: A gradual shift to dorsopharyngealization?

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Ejective stops exhibit acoustic characteristics that considerably vary both cross-linguistically and within a given language (e.g., Lindau, 1984; Kingston, 1985; Warner, 1996). This variability is often considered a consequence of the complex articulatory strategies involved in the production of ejective consonants (i.e., double glottal and oral closure with simultaneous larynx raising). In this study we consider language contact as yet another possible source of variability. We provide acoustic data from Mehri, a minority language in Oman, showing that ejectives are susceptible to cross-language influence. Omani Mehri belongs to the Modern South Arabian languages, a subgroup of the Semitic branch of the Afroasiatic family. Spoken by an estimated 50.800 speakers, it is considered by the UNESCO as *definitely endangered*, particularly threatened by the prestigious status of Arabic, the only official and national language of Oman. The variety of Mehri investigated in this study is spoken in Salalah, in the province of Dhofar. It is claimed to have plain [t, k] and their ejective counterparts [t', k'], alongside with a series of plain and ejective fricatives not considered here.
A large amount of variability has been reported in the realization of Mehri ejectives (Johnstone, 1975; Lonnet and Simeone-Senelle, 1997; Watson, 2012). This variability inevitably raised some debate as to whether the description of these segments as ejectives was, in fact, correct, and led some researchers to argue for a gradual sound change which switches from a contrast of ejectivity to a contrast of dorsopharyngealization (Lonnet, 1993; Watson and Bellem, 2010). Most of the reports on Mehri ejectives were limited to dialects spoken in Yemen. They also relied mostly on perception-based segmental transcription to capture the native speakers' productions.
For our study we recorded 7 male native Omani Mehri speakers. All the speakers were bilingual in Mehri and dialectal Arabic, as is common for native Mehri speakers; and they all learnt Standard Arabic at school. The data recorded consisted of 12 items contrasting ejective and pulmonic alveolar and velar stops in word-initial (/#—/), word-medial (V—V) and word-final (V—#) positions, yielding a total of 420 tokens (12 items×7 speakers×5 repetitions). Different durational and non-durational measurements that signal either ejectivity or dorsopharyngealization (or both) were examined. Non-durational measurements included relative intensity of the stop release, F0 of the following vowel, center of gravity of the burst, formant structure of the adjacent vowels, and the rise time of the following vowel. Temporal measurements included closure duration, VOT, and adjacent vowel duration. In addition, we also looked at phonation differences and measured H1-H2 (relative amplitude of the first two harmonics). The cues for the ejective/pulmonic distinction were defined as the set of parameters that showed a significant difference between the two categories. The relative importance of these cues was quantified by the calculation of D-prime values for each cue (Clayards, 2008), normalized to percent.
We find differences for some parameters when comparing Mehri plain and ejective consonants. These differences vary depending on place of articulation (alveolar vs velar) as well as on word position. Table 1 shows the acoustic parameters relevant for the t/t' distinction in intervocalic position, their means, the overall variance (sigma) and the cue weighting results with d-prime values and the relative weights (w_{rel}) in percent. The most prominent difference is reflected in formant structure of the following vowels: a substantial lowering of F2 and raising of F1 were observed in the context of ejectives. This is typical of the effect induced by dorsopharyngealizations in Arabic dialects (Yeou, 2001). Interestingly, while the effects on F1 and F2 of the following vowels were systematic and significant for alveolars in all word positions, they vary for velars (e.g., no significant difference in F2 for velars in word-medial position) (Fig. 1). Temporal parameters also allowed to distinguish the two series of stops, for example release duration was significantly shorter for ejectives. But again, this difference was observed for alveolars only (Fig. 2). Regarding the non-temporal cues, results show longer rise time (for velar ejectives in /—#/), higher center of gravity (for alveolar ejectives in /V—V/) and higher preceding vowel intensity (for velar ejectives in V—#). Significant differences in phonation were also found, with vowels following ejectives displaying lower H1-H2 value, suggesting a more creaky phonation. This difference was significant for velars but only in word final position. None of the cues measured displayed differences between plain and ejective alveolars in word-final position. The poor acoustic cues to

ejectivity are a diagnostic either of the sound change that is currently in progress (unlike velars, alveolars are becoming dorsopharyngealized in word-initial and -medial positions), or of the ongoing neutralization of this laryngeal contrast (loss of the contrast for alveolars in word-final position).

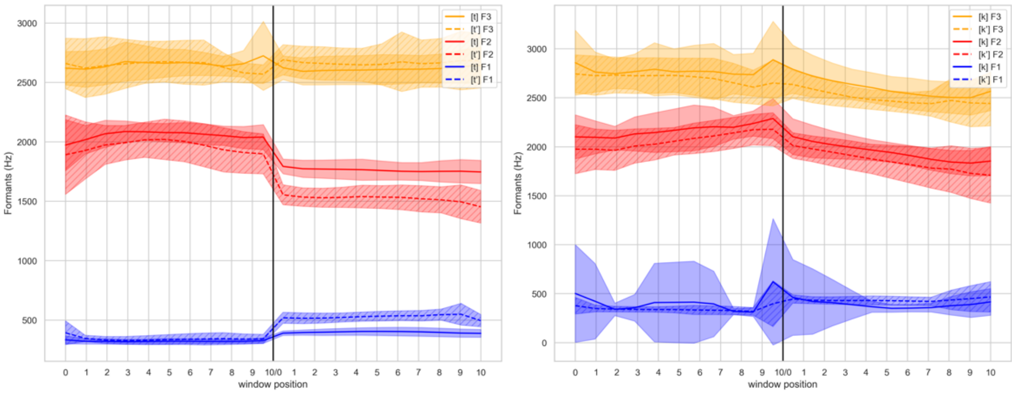

Figure 1. Formant structure of t/t’ (left) and k/k’ (right) in intervocalic position.

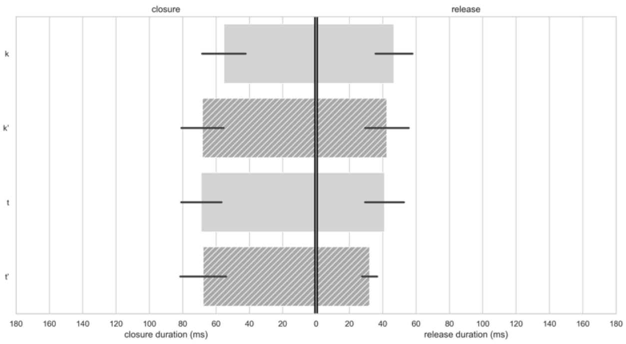

Figure 2. Closure and release duration differences between plain and ejective alveolar and velar stops.

Table 1. Cue weighting for t/t’ contrast in /V_V/ context.

parameter	mean (plain)	mean (ejective)	sigma	d’	w_{rel}
release duration	41	32	10	0.87	13
COG release offset	478	871.0	333	1.18	18
F2 preceding vowel offset	2040	1899	154.0	0.92	14
F1 following vowel onset	390	519	72.0	1.78	27
F2 following vowel onset	1794	1555	139.0	1.72	27

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