

LABIAL MOVEMENTS, ARTICULATION AND VOCAL QUALITY DURING SPOKEN AND SUNG VOWELS IN *CANTU IN PAGHJELLA*

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Corsican tradition includes many types of polyphonic songs, including the *Cantu in Paghjella*, a traditional singing polyphony of the UNESCO List of Intangible Cultural Heritage in Need of Urgent Safeguarding, sung by three men voices: 1) the *secunda*, the tenor lead voice who starts singing the melody; 2) the *bassu* or bass voice accompanying the *secunda*, and 3) the *terza*, the more high-pitched voice singing ornamentations.

What are the labial movements and the acoustic characteristics of spoken and sung vowels in the *Cantu in Paghjella*, depending on the singer and the vowel? The labial movements of the *bassu* and the *secunda* were measured with two multi-sensor headsets developed within the European project *iTreasures* (Chawah *et al.*, 2014), containing an electrostatic cardioid headset microphone (model C520L, brand AKG) used to record the acoustic signal, and a video camera (model DFM 22BUC03-ML USBmono CMOS), in front of each subject's lips, to acquire the lips movements. Measurements were carried out on spoken and sung versions of the secular song *Vuleria chì la mio pelle*. Internal labial opening and stretching (MATLAB interface), formant values (Praat software) were measured from each spoken and paired sung vowels /ɔ, o, u, i, e, ε, a/ at 25%, 50% and 75% of 120 occurrences for the *bassu*, and 114 occurrences for the *secunda*.

Our result show from speech to singing, a significative increase of i) first formant (F1) and internal labial opening, mostly for the *secunda* for all vowels, except /e, ε/ et /a/ for the *bassu*; ii) F2 of posterior vowels; iii) Unexpectedly, a significative increase of internal labial stretching, mostly for /u/ and /o/ of the *bassu*, and except for /a/ of this singer. There is no significative trend for F3 of the *secunda*. It increases for /u, o, ɔ/ with a focus near 2800Hz for the *bassu* (decrease for /i/ and increase for other vowels). Internal labial opening and stretching are positively correlated in speech and singing for the *bassu* and the *secunda* ($r_{57}=0.84$ for speech, $r_{57}=0.88$ for singing, $p<0.01$), but are not correlated to the fundamental frequency.

According to Garnier *et al.* (2010, among others), there is a greater labial opening and rounding in classical singing than speech. However, our results and the examination of the obtained images show mainly a labial horizontal expansion, associated with a labial vertical expansion and a protrusion, an association considered as a rare labial setting by Laver (1980). This particular articulation allows the singers, especially the *bassu*, to increase the clarity of their voice, as evidenced by the significant increase of the Singing Power Ratio (Omori *et al.*, 1996) from -25dB to -19dB for the *bassu*, and -35dB to -24dB for the *secunda*. During the conference, we will present additional results including another group of singers singing the same song and more songs. These data allow us to enrich the description of the Intangible Cultural Heritage, thanks to new technologies to contribute to the transmission of the *Cantu in Paghjella*.

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