

## Can menstrual hormonal changes affect global as well as local laryngeal phenomena?

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The present study aims to contribute to our understanding of whether there are links between global and local phonatory phenomena, and what the nature of these links is. The following questions are asked: 1. Is global phonation/voice quality affected by menstrual hormonal changes? 2. Are the voicing characteristics of phonologically voiced obstruents affected by menstrual hormonal changes? 3. If so, is the magnitude of these effects larger for voice quality as opposed to subsegmental phonatory phenomena that may be controlled more strictly by cognitive (phonological) processes? These questions are motivated by studies of PMS and female vocal attraction, which suggest that hormonal changes associated with different phases of the menstrual cycle can affect voice quality and that these changes can make the female voice breathier and more attractive (see e.g. Abitbol et al. 1999: 434-5; Pipitone & Gallup 2008; Raj et al. 2008).

The author conducted a case study of 1 female (F) who met the criteria of a suitable subject: 1. F is a healthily (but somewhat irregularly) menstruating female (29yrs in 2017); 2. F has never been on contraceptives; 3. F has never smoked; 4. F does not drink alcohol. 5. F was not aware of the number and the characteristics of the phases during participation. F was recorded on a daily basis for 9 months, producing a. phonologically short vowels of Czech (F's mother tongue) twice during each recording session ([a], [ɛ], [ɪ], [o~ɔ~ɒ], [u]); b. phonologically long vowels of Czech sustained for as long as comfortable ([a:], [ɛ:], [i:], [o~ɔ~ɒ:], [u:]); c. phonologically long vowels of Czech sustained for 5s; d. the sentence *Řekni, řekni, Řehoři, že v řece plují úhoři*. The sentence contains 6 instances of /ř/, a rhotic fricative, which has a voiced and a voiceless allophone in Czech (e.g. Isačenko 2013). The sentence also contains 1 instance of /z/, and 1 instance of /h/, both of which are considered phonologically voiced, although devoicing of /z/ has been reported (Machač 2008) and /h/ does not contrast with \*/h/ in Czech. The data was obtained with H5 Zoom recorder in conjunction with a head-mounted AKG C520 microphone. The recording did not take place when F suffered from a cold, could not participate, or forgot. This yielded a corpus of 2606 short vowels, 1283 sustained long vowels, 1293 long vowels sustained for 5s, 1564 productions of /ř/, 260 cases of /z/, 517 cases of /h/, and 260 instances of /ʔ/.

Noisiness (quantified via CPP measurements) of the vowels is affected by the individual vowel phoneme category (a segmental factor) but also by the menstrual phase. However, the effects of vowel phoneme are bigger than those of the menstrual phase. Visual results suggest that the ovulatory phase is associated with noisier voice quality than the follicular and the luteal phases; nonetheless, the statistical analysis confirms the effect of ovarian phase *only* for the third third of the vocalic interval. Voicing of /ř/ (quantified as a voicing proportion of the /ř/ interval) is shortest within the ovulatory phase, in contrast to the follicular and luteal phases. This does not apply to /z/ and /h/, nor the realisation of /ʔ/. We therefore observe similar effects of menstrual phase on global voice quality, on glottal quality associated with specific vowel phoneme, and on /ř/, the last of which does not contrast for [voice] and does not show the traditional voicing allophony in F. The magnitude of the phase effects is somewhat surprisingly much larger for /ř/ than is the case for global phonation. Further analyses and methodological issues will be discussed.