Uyghur speakers' knowledge of vowel and vowel-consonant harmony

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A major puzzle in laboratory phonology is what is part of speakers' phonological grammar. One proposal is that phonological naturalness plays a role. What naturalness refers to is theory-dependent: Functionalists argue that natural structures are those that are easily articulated or perceived (substance bias), while formalists argue that natural structures are the typologically frequent ones because cognitive biases facilitate learning them. Empirical evidence is mixed: some studies indicate that only natural phonological constraints can become part of grammar (e.g., Moreton, 2008), while others indicate grammatical encoding also for unnatural constraints (e.g., Hayes & Londe, 2006). To add to the debate, we tested speakers' productive knowledge of phonological structures that show similar phonetic precursor robustness but differ in typology.

We focused on Uyghur, a Turkic language, where suffixes alternate phonologically based on more, or less, natural non-local harmony rules (Hahn, 1991). A natural one is VV harmony, where the backness of a stem vowel determines the backness of suffix vowels (both typologically frequent and phonetically motivated, e.g. Moreton, 2008; Ohala, 1994). Less natural is VC harmony with the backness of a stem vowel (front/back) determining the quality of a suffix dorsal (velar/uvular, resp.). From a phonetic substance perspective, it is natural, as back vowels and dorsals are can be subject to articulatory correlations (MacNeilage et al., 2000) and harmony rules (Walker & Rose, 2011). However, typologically, non-local backness-dorsal harmony is extremely rare. This raises the question of whether both harmony rules are part of phonological grammar. While cognitive bias predicts that VV but not VC harmony is productive, substance bias predicts that both are.

Methods. Native speakers of Uyghur (so far 10N of 25N) were tested in a wug experiment. In each trial, a CVC nonword stem was introduced in a narrative context. At test, participants completed (1) a two-alternative forced choice task and (2) a rating task. In (1), participants chose between two verb suffixes to append to the non-words. In (2), participants rated their choice on a 7-point Likert scale. There were 3 conditions: In a VV harmony condition, the backness of the suffix vowel agreed with the stem vowel (or not), while the consonant was the same (e.g., /tæn-i/+/dæ/ or /dɑ/). In a VC+VV harmony condition, either both suffix consonant and vowel harmonized with the stem vowel, or neither (e.g., /tæn-i/+/gæ/ or /ʁa/). Finally, a pure VC harmony condition paired (non-)harmonizing dorsals with neutral vowels (e.g., /tæn-i/+/gili/ or /ʁili/). 12 C_C stem forms combined with 6 vowels (3 front, 3 back), totaling 72 stems. The experiment was hosted on the online platform IbexFarm using the PennController (Zehr & Schwarz, 2018).

Results. Linear mixed-effects models tested if suffix choice depended on condition (VV, VC+VV, VC) and stem vowel (front/back). Tests against chance per condition indicate near-significant preferences for harmonic suffixes after front (p=.05) but not back stem vowels in the VV condition, whereas with VC+VV and VC, harmonic choices only reached significance with back stem vowels (both ps < .001). A global model (see Figure 1) revealed interactions of condition and stem vowel (VV vs. CV+V contrast: p<.01; VC+V vs. VC-V contrast: p<.05). Ratings showed only a main effect of trial order, suggesting that participants became more confident over time (p<.001).

Discussion. Preliminary results suggest that, as expected, Uyghur speakers tend to use VV harmony productively, particularly with front vowels (and possibly back vowels with total N). However, VC harmony does not seem to be productive. Note that in the VC+VV condition, any VV harmony appears superseded by a bias for uvulars. This bias is even stronger with transparent suffix vowels, and corpus analyses should show whether it is frequency-related. In any case, results suggest that Uyghur speakers do not internalize VV and VC harmony in the same way. This supports a role for cognitive biases in determining what enters speakers' phonological grammar.

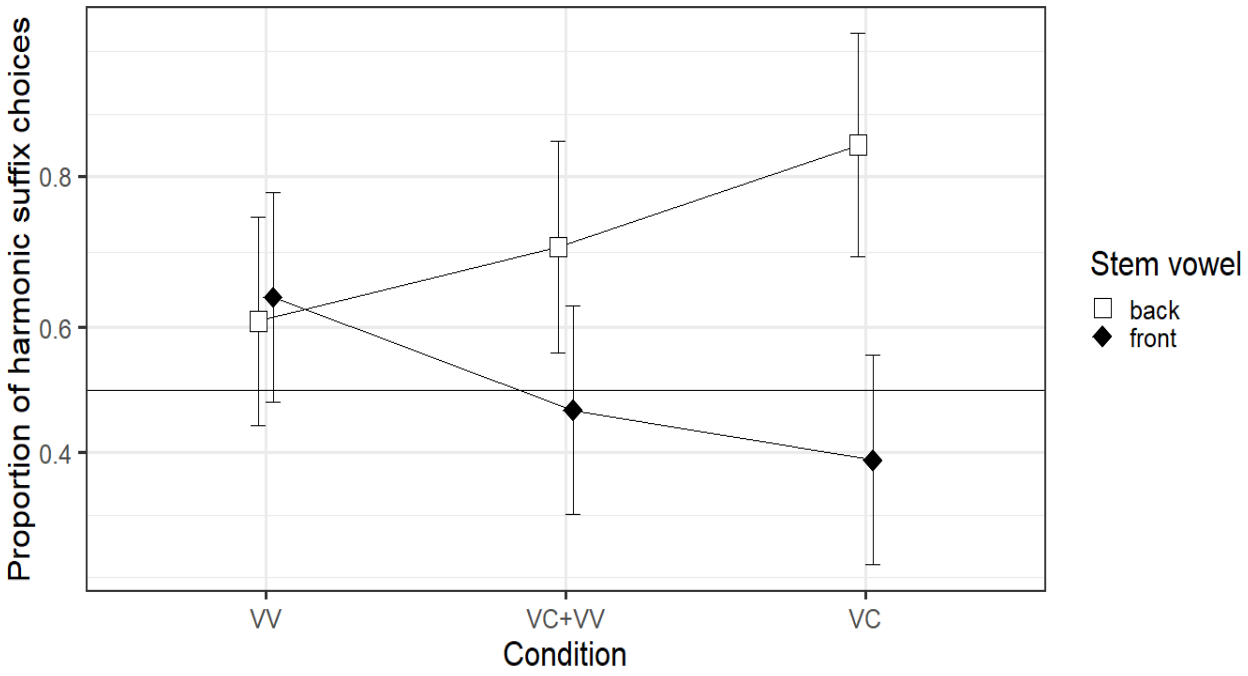

Figure 1: Plot of the generalized linear mixed-effects model with the proportion of participants' choices of suffixes with harmonic segments on the y-axis (scale adjusted for logit space) split by condition (VV = Vowel harmony; VC+VV = Vowel-Consonant harmony with Vowel harmony; VC = Vowel-Consonant harmony with transparent vowel) on the x-axis, separated for stems with back (white square) vs. front vowels (black diamond).

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