Covert URs: evidence from nasalization in Panjabi

INTRODUCTION. Throughout the 20th century, most phonologists assumed the presence of underlying representations (URs). Today, however, a number of theories question the classic generative conception of URs, with some arguing that a UR must occur on the surface and others arguing against the concept of URs entirely[1][2][3]. This paper presents airflow data from two experiments measuring nasalization in Pakistani Panjabi, the results of which cannot be neatly explained without positing the existence of *Covert URs* (URs never realized on the surface). Specifically, pre-N vowels (VN) have phonetically identical nasalization to contrastive nasal vowels (Ṽ), but the two vowels behave differently in their feeding of regressive nasal harmony.

PANJABI PHONOLOGY. Long vowels in Panjabi contrast in nasality in the word-final syllable, but this contrast is neutralized before a nasal consonant (e.g., [tɑɑ] 'warmth' vs. [tɑ̃ɑ̃] 'that' but [tɑ̃ɑ̃n] 'melody' vs. *[tɑɑn])[4]. Additionally, Panjabi has a process of nasal harmony, in which nasal vowels instigate the leftward spread of nasalization, with glides and vowels participating and other consonants acting as blockers (e.g., /tiiʋĩĩ/ → [tĩĩʋ̃ĩĩ] 'wife'). Crucially, it is unclear if both Ṽ and VN instigate nasal harmony in the same manner.

EXPERIMENT 1. Experiment 1 aimed to measure the phonetic realization of Ṽ and VN vowels in Panjabi. 20 native Panjabi speakers from Rawalpindi, Pakistan participated. Stimuli consisted of 67 monosyllabic words from three conditions - oral (CVV(C)), nasal (CṼṼ(C)), and pre-N V (CVVN): e.g., (/ruup/ 'beauty', /rũũ/ 'cotton', /dʒuun/ 'June'). Reading a randomized wordlist, speakers produced each token four times into a dual-chamber mask that measures oral and nasal airflow separately. A preliminary analysis of two speakers was conducted, plotting a Loess curve across 11 equidistant time steps normalized across tokens. Results (fig. 1) show that both Ṽ and VN vowels are overwhelmingly realized with indistinguishable categorical nasality (fig. 2a-b) compared to oral vowels (fig. 2c).

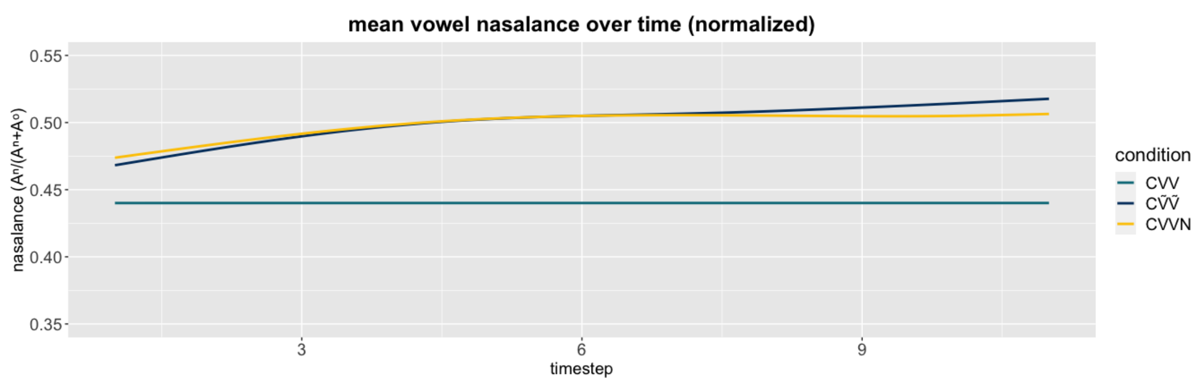
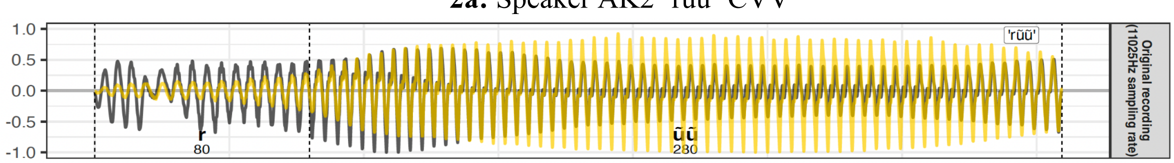
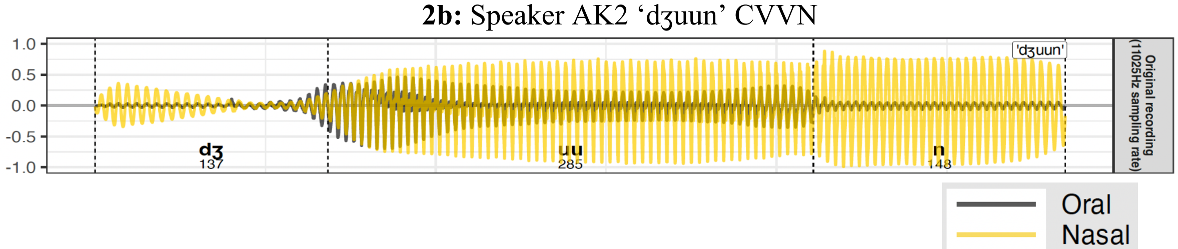


Figure 1: Loess curves separated by condition showing mean vowel nasalance at 11 normalized timesteps for all monosyllabic tokens from experiment 1 for two speakers.

2a: Speaker AK2 'rũũ' CṼṼ



2b: Speaker AK2 'dʒuun' CVVN



2c: Speaker AK2 ‘ruup’ CVV

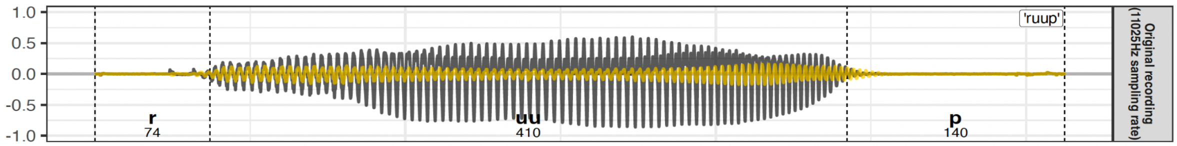


Figure 2: Representatives of normalized nasal (yellow) and oral (grey) waveforms overlayed on each other for the Ṽ (2a), VN (2b), and V conditions from experiment 1.

<u>EXPERIMENT 2</u>. Experiment 2 investigated whether or not both Ṽ and VN instigate nasal harmony. 16 additional native Panjabi speakers participated. 28 di/trisyllabic words from three conditions were chosen, all with similar shapes for the final two syllables: CVV.GVV (oral), CVV.GṼṼ (nasal), CVV.GVVN (pre-N). Importantly, VVN sequences from the pre-N condition never straddle a morpheme boundary, so speakers have no experience with alternations revealing the status of the pre-N vowels when not followed by a nasal consonant. Phonologically [+nasal] vowels are expected to instigate nasal harmony through the onset glide (G) of the final syllable and through the penultimate vowel. The same elicitation procedure from experiment 1 was followed. A preliminary analysis of four speakers was conducted, plotting a Loess curve through 33 equidistant time steps across the VVGVV sequence; duration was normalized for all tokens. As shown in Figure 3, results suggest that Ṽ instigates regressive nasal harmony at a much higher rate than VN. Word-final Ṽ and VN are realized with a high degree of nasalance relative to oral vowels, but only Ṽ triggers a significantly distinct degree of nasalance across the entire VVGVV sequence. Nasalance emanating from VN decreases rapidly at the transition into the preceding glide, with nasalance eventually mirroring that of completely oral tokens on the pre-glide vowel.

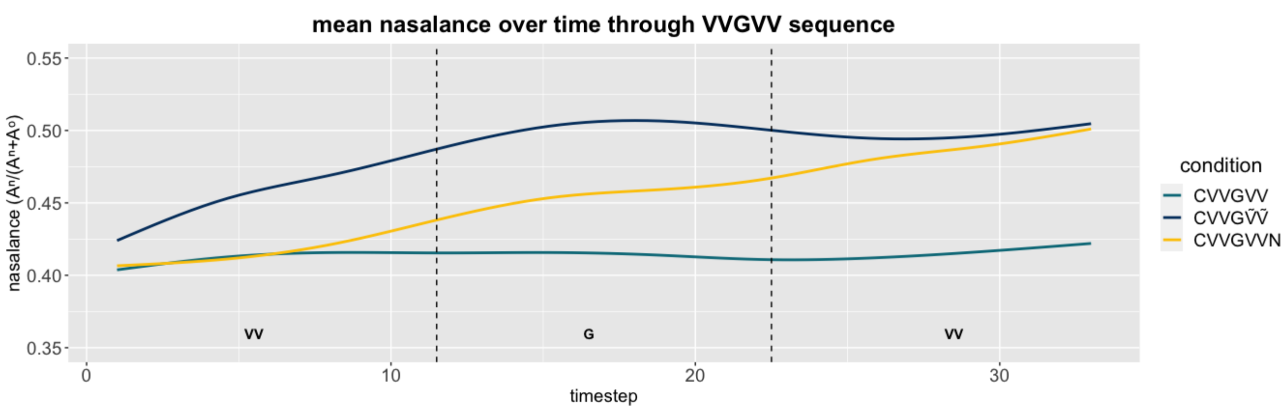


Figure 3: Loess curves separated by condition showing mean nasalance at 33 normalized timesteps across the three segments of the VVGVV sequence from all experiment 2 tokens.

<u>CONCLUSION</u>. Due to the indistinguishable realizations of Ṽ and VN (exp.1), coupled with the fact that the pre-N forms in this experiment have no alternations in which they are not followed by a nasal consonant, phonological theories that either reject URs altogether or require URs to be realized in at least some surface forms have difficulty explaining why the two vowels instigate harmony at different rates (exp. 2). However, a simple analysis exists if we assume [CVVGṼṼN] has a Covert UR: /CVVGVVN/, with speakers perceptually attributing nasality on pre-N vowels to the following consonant. NOTE: The final paper will include an in-depth quantitative analysis of airflow data from all speakers.

<u>References</u>: [1] Hyman, L. (2018). Why URs?. *J. Linguistics* **54.** [2] Albright, A. (2002). *Identification of Bases in Morphological Paradigms*. MIT Dissertation. [3] Burzio, L. (1996). Surface constraints vs. URs. *Current trends in Phonology.* 118-136. Salford, U. of Salford [4] Bashir E. & Conners T. (2019). *Grammar of Hindko, Panjabi, and, Saraiki*. De Gruyter Mouton.