Learning the pronunciation of an endangered language:
Spanish speakers' acquisition of Salvadoran Nawat vowel glottalization

Nawat, also known as Pipil, is the only indigenous language still spoken in El Salvador (Campbell 1985). Despite its critical level of endangerment—most sources report less than 200 living speakers (Lemus 2009)—, the last two decades have seen the emergence of an important language revitalization movement (Lemus 2018). As a result, hundreds of L1 Salvadoran Spanish speakers are learning Nawat as an L2 in classrooms all over the country. Although the prospects for language maintenance have improved, no studies assessing how these learners are acquiring Nawat have been produced to date.

In my presentation, I assess the L2 acquisition of Nawat utterance-final vowel glottalization by L1 Salvadoran Spanish speakers. In Nawat, vowels occurring at the end of utterances show glottalization, which surfaces as either an epenthetic glottal stop after the utterance-final vowel or as creaky voice in the utterance-final vowel (King 2014, 350, f.n. 19). In contrast, utterance-final vowels in Spanish are frequently articulated with breathy voice or different degrees of devoicing (Dabkowski 2018; Delforge 2008). From my experience as an L2 Nawat learner and teacher, I notice that Nawat learners frequently produce Nawat utterance-final vowels as in Spanish, which heavily affects intelligibility with L1 Nawat speakers. For these reason, assessing whether L2 Nawat learners become more proficient in their production of utterance-final vowel glottalization as their experience with the language increases is important to language revitalization.

Sixteen L1 Salvadoran Spanish learners of Nawat participate in this study, distributed in two groups according to their years of Nawat instruction: 12 learners with less than two years and four learners with more than six years. L1 Salvadoran Spanish speakers completed a sentence reading task in Nawat from which all utterance-final vowels (971 total) and a set of utterance-medial vowels (724) were extracted. For comparative purposes, a similar set of vowels were extracted from open-ended interviews in Nawat with three L1 Nawat speakers (156 utterance-final and 146 utterance-medial). Two types of analyses were performed. The difference in amplitude between the first and second harmonics (H1-H2), measured at three points in the vowels, is used as an acoustic correlate of glottal constriction in vowels—a lower H1-H2 in utterance-final vowels compared to utterance-medial vowels is indicative of a more glottalized production of the former, while a higher H1-H2 in utterance-final vowels reflects a breathier articulation (Garellek 2019). In addition, utterance-final vowels were classified into one of five categories according to their acoustic properties: devoiced, breathy, produced with creaky voice, produced with creaky voice followed by breathy voice, and followed by a glottal stop.

The effects of the following factors on H1-H2 were assessed using mixed-effects linear regression models: 'group' (Learners less than 2 years, Learners more than 6 six years, L1 Nawat speakers), 'vowel position' (utterance-final, utterance-medial), 'vowel', 'manner of articulation of previous consonant', 'age of speaker', and 'degree of exposure to native speaker input' (more than once a week, once a week, less than once a week). The interactions between 'group'/'vowel position', 'gender'/'vowel position', 'vowel'/'vowel position' were explored. The results show that the H1-H2 of utterance-medial and utterance-final vowels produced by both groups of

Nawat learners is not statistically significant, which means that they are not producing utterance-final vowels with more glottalization. In contrast, all three L1 Nawat speakers produce utterance-final vowels with statistically lower H1-H2 than utterance-medial vowels, which is indicative of glottalization of the former. Moreover, the classification analysis reveals that almost all productions of utterance-final vowels by L1 Nawat speakers are followed by a glottal stop (102/156) or produced with creaky voice (41/156). On the other hand, utterance-final vowels by both groups of Nawat students are mostly classified as breathy voice (447/971), creaky voice followed by breathy voice (223/971), or devoiced (145/971).

The results are evidence that L1 Salvadoran Spanish learners of Nawat, even the most advanced ones, have yet to acquire Nawat utterance-final vowel glottalization. However, the productions by some students of utterance-final vowels with creaky voice followed by breathy voice are an indication that at least some of them may be in the process of acquiring it. These findings have repercussions for the Nawat revitalization movement, highlighting the need for explicit instruction of Nawat phonological processes and increased exposure of L2 Nawat learners to input from L1 speakers. The results are also of value to the literature on L2 phonological acquisition, which has traditionally focused on the acquisition of L2 phonemes and allophones (e.g., Flege 1987; Bradlow et al. 1997), while giving far less attention to the acquisition of the L2 prosody.

References

Bradlow, Ann R., David B. Pisoni, Reiko Akahane-Yamada, and Yoh'ichi Tohkura. 1997. "Training Japanese Listeners to Identify English /**r** / and /**l** /: IV. Some Effects of Perceptual Learning on Speech Production." *The Journal of the Acoustical Society of America* 101 (4): 2299–2310.

Campbell, Lyle. 1985. *The Pipil Language of El Salvador*. Berlin/New York/Amsterdam: Mouton Publishers.

Flege, James Emil. 1987. "The Production of 'New' and 'Similar' Phones in a Foreign Language: Evidence for the Effect of Equivalence Classification." *Journal of Phonetics* 15 (1): 47–65.

Garellek, Marc. 2019. "The Phonetics of Voice." In *The Routledge Handbook of Phonetics*, edited by William F. Katz and Peter F. Assmann, 1st ed., 75–106. New York, NY: Routledge.

King, Alan R. 2014. *Curso de gramática náhuat. Basado en el texto del* Yankwik Sentaketzat. Ne Bibliaj Tik Nawat.

Lemus, Jorge E. 2009. "Definiendo al indígena salvadoreño." *Wani* 62: 48–61.

———. 2018. "Revitalizing Pipil." In *The Routledge Handbook of Language Revitalization*, edited by Leanne Hinton, Leena Huss, and Gerald Roche, 395–405. New York, NY: Routledge.