

On the Learnability of Prefix-Controlled Consonant Harmony and the Role of the L1

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Among the world's languages, vowel and consonant harmonies demonstrate a striking dispreference for one particular type of harmony process – prefix-controlled harmonies. Prefix-controlled vowel harmonies are vanishingly rare, and prefix-controlled consonant harmonies have not been documented at all [1, 2]. The underlying cause of this typological gap has not been established, but one potential explanation is that prefix-controlled harmonies suffer a fatal deficit of learnability. The present study utilizes artificial grammar learning (AGL) to investigate whether the typological lack of prefix-controlled consonant harmony can be attributed to a lack of learnability.

To evaluate the learnability of prefix-controlled consonant harmony, 102 English speakers (42 male, 60 female) and 101 Spanish speakers (43 male; 57 female; 1 gender not reported) completed an artificial grammar learning task in which they learned an artificial language featuring a [s~ʃ] sibilant harmony pattern in one of four types (Regressive Stem Control, Regressive Affix Control, Progressive Stem Control, or Progressive Affix Control). After a passive training phase in which they heard 24 stems and their affixed forms, randomized and repeated four times each, subjects completed a 96-trial two-alternative forced-choice task with corrective feedback in which they chose between harmonic and disharmonic forms, such as [sulosu, suloʃu] or [gatepasesu, gatepaʃesu], as better belonging to the artificial language they had learned. In addition to the analysis of harmony type, stimuli varied in the number of transparent syllables separating target and trigger segments to determine what role target-trigger distance plays in the acquisition of consonant harmony. (Distances tested varied from 0 to 3 intervening syllables.) This variable is of particular interest since consonant harmony processes in natural language frequently operate over relatively large target-trigger distances. Data analysis was conducted using mixed-effects logistic regression.

Contrary to its typological distribution, prefix-controlled harmony did not suffer any disadvantage in learnability in the AGL task when compared to stem-controlled and suffix-controlled harmonies, as illustrated by the lack of a statistically significant difference between groups (see Fig. 1). (Although, for Spanish speakers, prefix-controlled harmony surprisingly proved more learnable than progressive stem-controlled harmony.) These AGL results provide strong evidence that learnability is not the only or even the most important determining factor in the typological distribution of harmony: historical and phonological factors likely play key roles.

With regard to target-trigger distance, performance decreased strongly with increased target-trigger distance for English speakers, but no effect was found for Spanish-speaking subjects. We attribute this disparity to the effect of multilingualism, as the English-speaking participants were functionally monolingual, but the Spanish-speaking subjects all possessed some level of competence in a second or even third language. While the bilingual advantage in L3 learning typically manifests in the area of vocabulary [3, 4], some advantage can also be found in the area of phonetic learning [5]. Thus, the increased experience of the multilingual Spanish-speaking participants in acquiring unfamiliar phonetic and phonological systems likely contributed to their steady performance across both short and long target-trigger distances.

In summary, in seeking a reason for the typological lack of prefix-controlled consonant harmony, this study presents evidence that this typological gap is not caused by a lack of learnability, as illustrated by the lack of statistical effect between groups. This result is reproduced with subjects from two distinct L1 backgrounds, and it differs notably from the finding in [6] for vowel harmony, which unlike prefix-controlled consonant harmony did suffer a lack of learnability. In our discussion, we seek to explain this difference in behavior across consonant and vowel harmonies by appealing to differences in their underlying mechanisms; we explore the differences in communicative advantage offered by regressive and progressive harmony and how they could give rise to distinct biases relating to prefix control; and we examine the impact of L1 background on subjects' performance, including the effect of multilingualism and language-specific biases related to specific L1 characteristics.

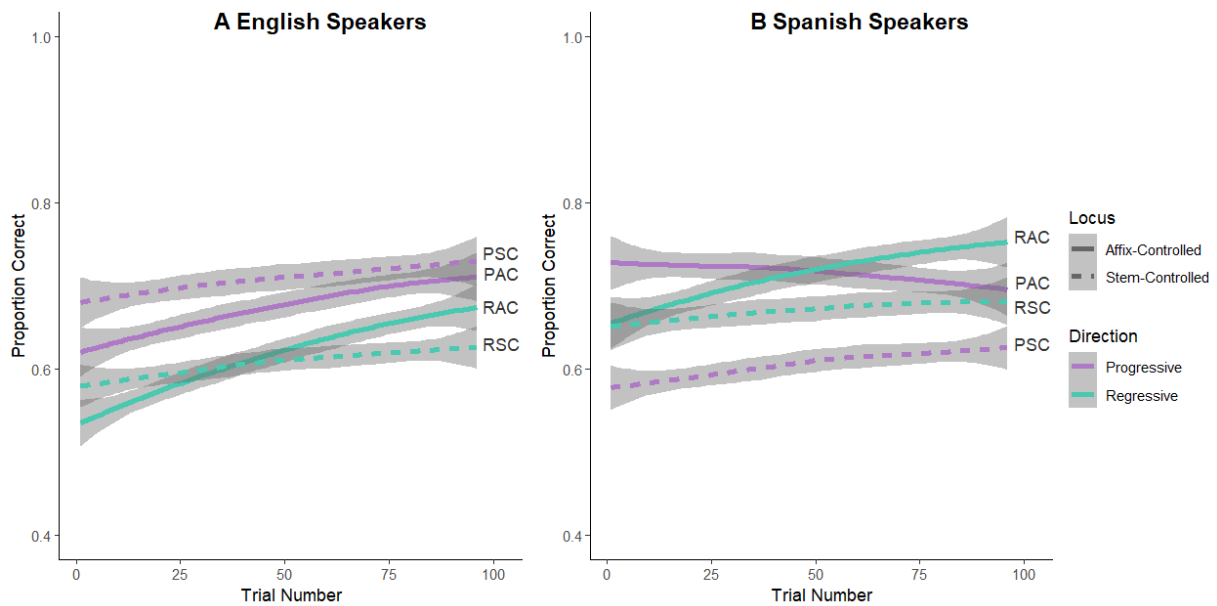


Fig. 1. Performance of English and Spanish speakers on 2AFC task over time by group (smoothed model-predicted values)

References

- [1] Hansson, G. Ó. (2010). *Consonant harmony: Long-distance interaction in phonology*. University of California Press.
- [2] McCollum, A. G., & Essegbey, J. (2020). Initial prominence and progressive vowel harmony in Tutrugbu. *Phonological Data and Analysis*, 2(3), 1–37. <https://doi.org/10.3765/pda.v2art3.14>
- [3] Keshavarz, M. H., & Astaneh, H. (2004). The Impact of Bilinguality on the Learning of English Vocabulary as a Foreign Language (L3). *International Journal of Bilingual Education and Bilingualism*, 7(4), 295–302. <https://doi.org/10.1080/13670050408667814>
- [4] Salomé, F., Casalis, S., & Commissaire, E. (2022). Bilingual advantage in L3 vocabulary acquisition: Evidence of a generalized learning benefit among classroom-immersion children. *Bilingualism: Language and Cognition*, 25(2), 242–255. <https://doi.org/10.1017/S1366728921000687>
- [5] Antoniou, M., Liang, E., Ettliger, M., & Wong, P. C. M. (2015). The bilingual advantage in phonetic learning. *Bilingualism: Language and Cognition*, 18(4), 683–695. <https://doi.org/10.1017/S1366728914000777>
- [6] Finley, S., & Badecker, W. (2009). Right-to-left biases for vowel harmony: Evidence from artificial grammar. *Proceedings of the 38th North East Linguistic Society Annual Meeting*, 1, 269–282.