

Developing epenthetic vowels in consonant clusters in heritage Spanish

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Spanish heritage speakers (HSs henceforth) in the United States are early bilinguals that acquire Spanish in the home environment and English as a majority language (Valdés, 2014). While studies on HSs phonetics-phonology have found evidence of non-canonical speech productions (see Rao, 2019 for a review), it is still unclear whether these deviations result from early grammar interaction in childhood or attrition during adulthood (Montrul, 2018). To examine this question, we analyze the production of Spanish consonant clusters containing a tap (e.g., /r.C/ ‘árbol’ and /Cr/ ‘tronco’). Crucially, these sequences optionally surface with a vocalic element between the two consonants (Blecua, 2001; Colantoni & Steele, 2006, 2007; Malmberg, 1965) (e.g., /rə.C/ or /Cər/). Such intrusive vocoids (IV henceforth) indicate a low consonant-to-consonant overlap and a high degree of intergestural timing, which, moreover, has been found to be modulated by voicing (Gibson et al., 2019). Unlike in Spanish, consonant clusters containing /ɹ/ in English (e.g., crow [kɹo]) do not demonstrate vocalic epenthesis (Colantoni & Steele, 2006). We predict that the probabilistic nature of IVs along with the higher gestural overlap in English will likely result in lower rates of IVs in Spanish HSs when compared to Spanish speakers raised in monolingual environments.

/Cr/ and /r.C/ sequences were elicited using the pictureless book *Frog, where are you* (Mayer, 1969) from 50 HSs (30 children: 8;11 1 ± 1 ; 9 years old, 20 adults: mean age = 20.7), and 52 SpanMonoSs (32 children 8;7 ± 1 ; 11 years old, 20 adults mean age = 20.87). A trained research assistant coded taps as true tap (i.e., TT), approximant tap (i.e., AT), perceptual tap (i.e., PT), or other and segmented epenthetic vowels when the speech signal showed (nearly) periodic waves. Only TTs and ATs were included in the analysis. The rate of IV in the preliminary data (653 tokens, 30 speakers) was analyzed with a mixed-effects logistic regression. The model included the variables AGE GROUP (i.e., children, adults), TYPE OF SPEAKER (i.e., SpanMonoSs, HSs) and their interaction, TYPE OF PHONETIC CONTEXT (i.e., /Cr/, /r.C/), TYPE OF TAP (i.e., true tap, approximant tap), and VOICING (i.e., voiced, voiceless) as fixed effects, and the variables PARTICIPANT and WORD as random effects. Our model showed a main effect of AGE GROUP, indicating that children produced fewer IVs than adults ($\beta = -1.22$, $SE = 0.57$, $z = -1.97$, $p = 0.04$), but no main effect of TYPE OF SPEAKER nor interaction between AGE GROUP and TYPE OF SPEAKER were found. In terms of language-internal factors, we found that IVs surfaced more frequently in true taps than in approximant taps ($\beta = 1.05$, $SE = 0.25$, $z = 4.19$, $p < 0.001$), and when the neighboring consonant was voiced compared to voiceless ($\beta = -0.86$, $SE = 0.36$, $z = -2.39$, $p = 0.01$).

Our preliminary results suggest that Spanish-acquiring children at ~ 8 years of age are still developing adult-like coarticulatory patterns in /Cr/, /r.C/ clusters, which contributes to the

¹ While there are no specific studies on the acquisition of consonant clusters in Spanish, research on the acquisition of coarticulatory patterns in English shows that children are still acquiring coarticulation patterns during late childhood (Nitttrouer, 1993; Singh & Singh, 2008).

literature showing that gestural patterns between segments are still maturing at ~ 7-8 y.o. (Nitttrouer, 1993; Singh & Singh, 2008). Contrary to our predictions, no significant differences were found between the SpanMonoSs and the HSs, suggesting that, at least in Spanish, HSs develop language-specific coarticulatory patterns. Our findings showing that taps with strong constrictions are more likely to show IVs than taps with weaker ones (i.e., indicating that the former may require longer intergestural timing than the latter), support an articulatory account of IV production. Lastly, similar to Gibson, Sotiropoulou, Tobin, and Gafos (2019), we found that voicing affects the degree of overlap in consonant clusters.

References

- Blecua, B. (2001). *Las vibrantes del español: manifestaciones acústicas y procesos fonéticos*. Universitat Autònoma de Barcelona.
- Colantoni, L., & Steele, J. (2006). Native-Like Attainment in the L2 Acquisition of Spanish Stop-Liquid Clusters. *Selected Proceedings of the 7th Conference on the Acquisition of Spanish and Portuguese as First and Second Languages*, 59–73.
- Colantoni, L., & Steele, J. (2007). Voicing-dependent cluster simplification asymmetries in Spanish and French (pp. 109–129). <https://doi.org/10.1075/cilt.282.09col>
- Gibson, M., Sotiropoulou, S., Tobin, S., & Gafos, A. I. (2019). Temporal Aspects of Word Initial Single Consonants and Consonants in Clusters in Spanish. *Phonetica*, 76(6). <https://doi.org/10.1159/000501508>
- Malmberg, B. (1965). *Estudios de fonética hispánica*.
- Mayer, M. (1969). *Frog Where Are You?* Dial Press.
- Montrul, S. (2018). Heritage language development: Connecting the dots. *International Journal of Bilingualism*, 22(5), 530–546. <https://doi.org/10.1177/1367006916654368>
- Nitttrouer, S. (1993). The emergence of mature gestural patterns is not uniform: Evidence from an acoustic study. *Journal of Speech and Hearing Research*, 36(5), 959–972. <https://doi.org/10.1044/jshr.3605.959>
- Rao, R. (2019). The phonological system of adult heritage speakers of Spanish in the United States. In F. Martínez Gil & S. Colina (Eds.), *The Routledge Handbook of Spanish Phonology* (pp. 439–451). Routledge. <https://doi.org/10.4324/9781315228112-24>
- Singh, L., & Singh, N. C. (2008). The development of articulatory signatures in children. *Developmental Science*, 11(4), 467–473.
- Valdés, G. (2014). Heritage language students: Profiles and possibilities. In T. G. Wiley, J. K. Peyton, S. C. K. Moore, D. Christian, & N. Liu (Eds.), *Handbook of Heritage, Community, and Native American Languages in the United States: Research, Policy, and Educational Practice* (pp. 41–49). Routledge. <https://doi.org/10.4324/9780203122419>