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Intrusive Vowels in Cruceño Spanish

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Background

Intrusive vowels are short vowels that intrude between two consonants in a cluster
- Example: [kreyando] -> [kᵊreyando]

Intrusive Vowels are generally considered to be different from true epenthetic vowels:
- Shorter length
- Don't create new syllables or affect stress placement

Previous descriptions and claims:
- Quality of Intrusive Vowel is similar to the following Nucleic Vowel [1][2][3]
- Intrusive vowel is most likely to be present after a dental consonant [3]
- Intrusive Vowels are longer before high vowels [2]
- Intrusive vowels are longer after velars [4][5]
- Intrusive vowels are longer after voiced consonants [3][4]
- Intrusive vowels are longer word-initially and in stressed syllables [5]

Research Questions

- What are the characteristics of the Intrusive Vowel in terms of length and quality?
- Do the factors of quality of the preceding consonant, quality of the following nucleic vowel, position in word, stress, or type of cluster affect the likelihood that an Intrusive Vowel will be present?
- Do any of these factors affect the length of an Intrusive Vowel?

Methods

Subjects:
- 6 males, chosen at random from a corpus of 30+ speakers
- Native speakers of Spanish residing in Santa Cruz, Bolivia
- Ages 20-66, various educational backgrounds

Data collection:
- Subjects recorded in free conversations lasting 30-45 minutes
- 70-90 words containing /Cr/ clusters selected from a random portion of each speaker's recording

Data Analysis:
- Each token was segmented using Praat, identifying the duration of Intrusive V, /r/, and Nucleic Vowel, and formant values for Intrusive and Nucleic Vowels
- For each token, ANOVAs were run on both absolute length of intrusive vowels and on ratio of absolute intrusive vowel length to absolute length of the following nucleic vowel (to control for rate of speech) ($p < .05$)
- For each speaker, tokens with vowel lengths that varied more than 2SD from the mean were discarded (3.5%)
- Chi Square tests were used to determine if vowel height, vowel backness, consonant voicing, consonant place of articulation, stress, type of cluster, or position in word affected presence/absence of an intrusive vowel
- Tokens analyzed
  - 144 without intrusive vowel
  - 340 with intrusive vowel

Conclusions and Implications

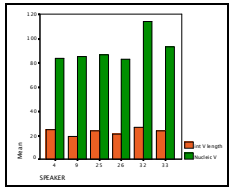
- The Intrusive Vowel is similar to the following Nucleic Vowel, but shows a clearly reduced vowel space
- No factors that we considered clearly predict if an Intrusive Vowel will appear
- Factors that predict the length of an Intrusive Vowel vary by speaker, and results are inconsistent for different measures of length (absolute vs. ratio), which brings into question the validity of generalizations regarding intrusive vowels based only on absolute length measurements
- More empirical studies of this phenomenon are necessary
  - in order to generalize previous or current results to a larger population
  - to validate theoretical analyses based on assumptions about Intrusive Vowels

Selected References

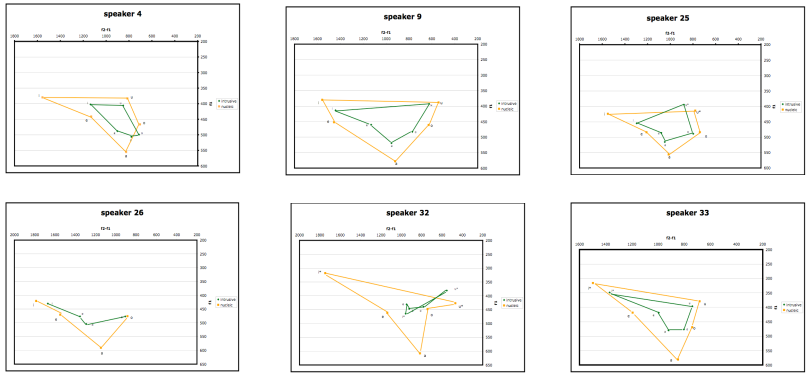
[1]Quilis, Antonio. 1993. Tratado de fonología y fonética españolas. Madrid: Editorial Gredos.
[2] Ramirez, Carlos. 2002. Characterization of the epenthetic vowel between the clusters formed by stop/fricatives + flap in Spanish. Toronto Working Papers in Linguistics 19.67-74.
[3] Ramirez, Carlos. In progress. A description of the Svarabatic vowel in clusters formed by stop or fricative plus flap or lateral in Spanish. University of Toronto, ms.
[4] Schmeiser, Benjamin. 2004. On the durational variability of svarabhakti vowels in Spanish complex onsets. Paper presented at the Western Conference on Linguistics, Los Angeles.
[5] Bradley, Travis, and Benjamin Schmeiser. 2003. On the phonetic reality of /r/ in Spanish complex onsets. Selected Proceedings of The Sixth Hispanic Linguistics Symposium, ed. by Paula M. Kempchinsky and Carlos-Eduardo Piñeros. 1-20. Somerville: Cascadilla Press.

Characteristics of Intrusive Vowels

- Intrusive V length ranges from 5.7 ms to 67.7 ms
- Ratio of Intrusive V length to Nucleic V length ranges from .05 to .66
- The vowel space of Intrusive Vowels is reduced in comparison to the vowel space of Nucleic Vowels



Mean length by speaker of Intrusive and Nucleic Vowels



Comparison of Intrusive and Nucleic vowel space for each speaker

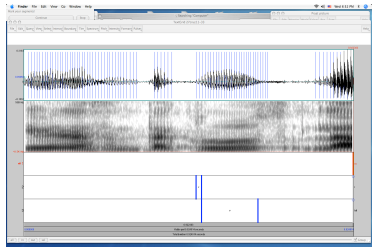
* Based on a single token

Variables affecting the presence of Intrusive vowels

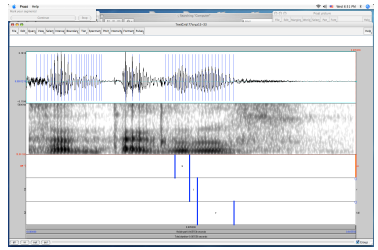
Previous claims	Current results
Int V in ~50% of tokens [2]	Int V in 70.2% of tokens for group; varies by speaker
Int V most likely before dental [2]	not significant
Int V is most likely with /a/ [2]	not significant

Speaker	Tokens with Intrusive Vowel
Speaker 4	93%
Speaker 9	96%
Speaker 25	75%
Speaker 26	76%
Speaker 32	39%
Speaker 33	45%

- Stress, position of cluster, and type of cluster do not predict whether or not an Intrusive Vowel will appear
- Previous claims regarding correlation of vowel height and consonant place of articulation to presence of an Intrusive Vowel are not supported

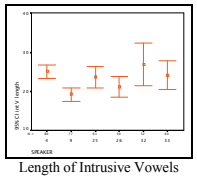


Speaker 33 'cruz' **without** intrusive vowel

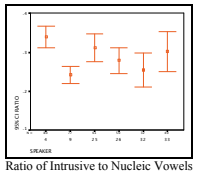


Speaker 33 'cruz' **with** intrusive vowel

Variables affecting the length of Intrusive Vowels

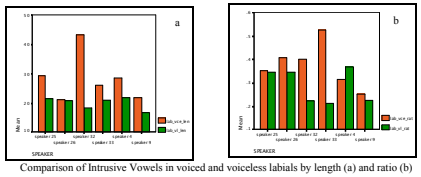


Length of Intrusive Vowels

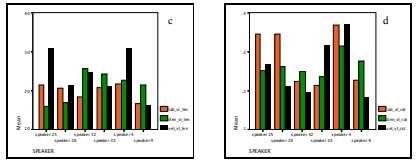


Ratio of Intrusive to Nucleic Vowels

Previous claims	Current results	
	length	ratio
Intrusive V longer in *stressed* syllable [5]	significant for 2 speakers	not significant for any speakers
Intrusive V longer if cluster is word-*initial* [5]	significant for 1 speaker	not significant for any speakers
Place of Articulation of consonant affects duration of Intrusive V [4][5]	Place significant for 2 speakers	Place significant for 2 (different) speakers
Intrusive V longer before *high* nucleic V [2]	significant for 1 speaker	significant for 1 (different) speaker
Intrusive V longer with *voiced* consonants [3][4]	significant for 5 speakers	significant for 1 speaker



Comparison of Intrusive Vowels in voiced and voiceless labials by length (a) and ratio (b)



Comparison of Intrusive Vowels in voiced stops by place for length (c) and ratio (d)