From Latin to Romance

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<th>Latin</th>
<th>Italian</th>
<th>Portuguese</th>
<th>Spanish</th>
<th>Catalan</th>
<th>French</th>
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<td>CABALLUS</td>
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- Why did these stops spirantize? Some proposals in the literature:
  i. Push-chain effect caused initially by degemination of /sp/, /fr/, and /hk/, which lead to voicing of /p/, /f/, and /h/ (e.g. Martinez 1952)
  ii. Voiced stops were deleted in all intervocalic positions then restored in word-initial position to avoid confusion (Weinreich 1958 cited in Cravens 2000)
  iii. Drag-chain caused by a drive to weaken articulation of all consonants (degrades weaker = stronger in duration) and a drive to match the same number of phonological contrasts in the system (Baker 2006)
  iv. “Segmental replacements resulting from a decrease in duration and in constriction degree” (Recasens 2002)

What mechanism underlies the change of voiced stops to spirants? That is, how does synchronic phonetic variation lead to diachronic sound change?

How sounds change: a possible path

- Hypothesis: Some sound change is listener driven, caused by listeners misinterpreting articulatory patterns that create the acoustic signal (Ohala 1981). Listeners try to faithfully recreate the sound patterns they hear, including productions that are reduced from their original targets (Chen 2003).

Variation in production of stops (shorter duration, incomplete closure)

- Listeners imitate PRODUCED constriction, rather than intended constriction target
- Reduced production becomes phonologized, leading to a new gestural target for stops

- No need for active speaker implementation of lenition (cf. Kingston 2008, Kirchner 1998)
- Avoids needing to posit that listeners try to maintain contrasts in the phonological system

Further questions

- Can this approach explain retention of /b, d, g/ after consonants/ different results of lenition based on vowel differences?
- In principle, yes. Initial position closer to target after consonants or high vowels may result in full closure, which would not lead to gestural target reinterpretation. Further modeling will provide a more detailed account.
- Why does /b/ never delete? Why does /b/ merge with /w/?
- Frication caused by undershoot may lead to merger with /w/.
- No existing coronal or velar voiced fricative.
- Role of visual (multi-modal) input?
- What role, if any, do undershoot and reinterpretation play in processes of degemination (e.g. Latin /tr/ — Romance /t/) and voicing (e.g. Latin /dr/ — Romance /r/)?

Spirantization in Spanish: articulatory data on reduction

- EMG data from 2 speakers of peninsular Spanish (Parrell submitted)
- /b/ and /p/ produced in phrase-internal position
- /v/ produced in phrase-final position
- /b/ and /p/ produced after voiceless consonants or high vowels may result in full closure, which would not lead to gestural target reinterpretation. Further investigation is needed.

Modeling interactions of duration and target

Hypothesis: Learners will interpret reduced constriction degree (caused by shortened duration) as the speaker’s gestural goal

- Intervocalic /b/ modelled in TaDA (Nam et al. 2004), a computational model that generates both articulatory trajectories and corresponding acoustic signals (using HLSyn, Hanson & Stevens 2002)
  • Duration and intended constriction degree (CD) manipulated
  • Target CD: 0.5 to 2.0 mm, 0.1 mm steps
- Look for areas with similar acoustic and articulatory productions despite different articulatory control
- Differences due to normal duration fluctuations in running speech (e.g. speech rate)
- Possible sources of learner mishearing

CONCLUSIONS

- Lenition of voiced stops to approximants (and subsequent deletion) starts with sporadic undershoot of full stop closure due to decreased duration
  • Can be seen in non-spirantizing languages such as English and French
  • Same variation in duration does not cause spirantization of voiceless stops due to their inherently longer duration

- Multiple combinations of intended consonant duration and constriction degree result in similar acoustic and articulatory consequences
  • Produced lip aperture, acoustic intensity, and the presence of a burst or frication
  • This many-to-one mapping could create confusion in perception of the intended speech gesture by language learners

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