Place of Articulation and Lingual Coarticulation of Korean Coronal Obstruents: An Electropalatographic Study

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Place of Articulation of Korean Affricates

- **Phonological patterning**
  - Affricates (/c c’ c’/) pattern as “palatal” or “post-alveolar”.
  - I.e., they interact with high front vowels: “j”-dropping, blocking of umlaut across affricates, affirmation of coronal stops before i/j
- **Articulatory studies**
  - Affricates are produced at the “(denti-)alveolar” place.
  - Static palatography, MRI, EP.
  - Most examined the closure portion only and/or were limited in vowel context or were based on a single speaker, etc.

Goals

- To examine the constriction location at both closure and release portion of the affricates in comparison with coronal stops and fricatives.
- To examine the degree of secondary palatal articulation of coronal obstruents.

Method

- **Participants**
  - 1 male (M1) and 2 female (F1, F2) speakers of Seoul Korean.
- **Materials**
  - A combination of real and nonsense words, maCV:
    - C = affricate /c c’ c’/, stop /t θ τ t/, fricative /s, s’/ (non-palatal) and /i/i/ (palatal).
    - Produced in a carrier phrase “ nueva, no voy”
    - 3 repetitions, 4 rounds = 12 tokens per item.
- **Instrumentation**
  - A WinEPG system (Wrench et al. 2002) with EPG data sampled at 100 Hz, acoustics at 22,050 Hz.
  - Custom-made artificial palates with 62 electrodes (Fig. 1).
- **Data analysis**
  - Contact indices taken at:
    - maximum contact during closure (based on articulation)
    - midpoint of friction interval (based on acoustics).

Fig. 1. A sample EPG palate and phonetic zoning

![EPG palate and phonetic zoning](image)

Primary Constriction (non-palatal V only)

- **Contact Anteriority**
  - Most tokens of affricates show “alveolar” contact.
  - All tokens of stops/fricatives are “alveolar” or “dental”.
- **Contact Posteriority** (Fontdevila, et al. 1994)
  - CP_a5: Weighted sums of activated electrodes in the anterior 5 rows with more weight given to the posterior rows.
  - CP_a5=\[\log\left((-R_1/6) + (R_2/8) - 8(R_3/5) + 9(R_4/3) + 696(R_5/8)) + 1\right] /[\log(95)]
  - Overall, the constriction extends further to the posterior rows for affricates than for stops or fricatives, to a different extent depending on context and speaker.

![Chart showing CP_a5 of closure and friction](image)

Secondary Articulation: palatalization

- **Quotient of Palatal Contact**
  - Q_p3=SUMS of activated electrodes in the posterior 3 rows.
  - Affricates show no more palatal contact than stops/fricatives.
- **Lingual Coarticulation**
  - Palatal contact during the consonant constriction is higher before a palatal vowel for all consonants.
  - Affricates are more resistant to coarticulation (flat line) than stops/fricatives (steep line).

![Chart showing Mean Q_p3 of closure and friction](image)

Summary

- **Primary Constriction**
  - Affricates consistently show “alveolar” constriction, for all 3 speakers during closure, and for 2 speakers during friction.
  - On average, affricates show more post-alveolar contact than stops/fricatives.
- **Secondary Articulation: Palatalization**
  - Affricates show no more palatal contact than stops/fricatives.
  - Affricates are more resistant to palatal coarticulation than stops/fricatives.
- **Implications**
  - Although Korean affricates are not true post-alveolars or palatals in their primary constriction (cf. Anderson et al. 2003, Kim 2001, 2004), among others), they pattern like post-alveolars and palatals in that they are more resistant to lingual coarticulation (cf. Recasens 1999).

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