Restrictions on palatalized consonants

The production of PalCons: a primary articulation with simultaneous raising and fronting of the tongue body, which can overlap with adjacent vowels (Kochetov 2002, 2004). This can cause misperception of the following [u] as [i].

The C\text{u} vs. Ci contrast is hard to maintain.

Misperception is less likely when the following V is long [u] (Kochetov 2004).

Long duration of the steady formants serves as a perceptual cue to the identity of [u] (Kochetov 2004).

The C\text{u} vs. Ci: contrast is less hard to maintain.

2. A contrast-based account of *S\text{u}: and *S\text{su}:

Japanese /s/u/ is realized as alveopalatal [çu]. I.e. palatal gesture is primary articulation as opposed to secondary.

Sibilant fricatives contain acoustic information of their following vowels, especially the F2 (Soi 1981).

This additional perceptual cue helps identify the following vowel.

The S\text{u}:(;) vs. Si:(;) contrast is relatively easy to maintain.

3. A contrast-based account of *B\text{u} and *B\text{u}:

Cross-linguistically, palatalization on labials tends to be realized as a palatal off-glide (Bhat 1978): e.g. [pa\text{u}].

Delayed palatalization: perceptual enhancement (Kochetov 2004).

The acoustic effects of the tongue movement are masked when a palatal gesture is articulated simultaneously with a labial.

Palatalization is thus delayed to enhance the contrast between a plain and a palatalized labial: e.g. /pa/ [pa\text{u}] vs. /pa/ [pa\text{a}]

But this brings about another risk of neutralization.

Delayed palatalization yields further F2 raising and shortening of the steady state of the following vowel.

Identification of [u] is hard even when the vowel is long [u:].

The B\text{u}:(;) vs. Bi:(;) contrast is especially hard to maintain.

Possible inventories and perceptual distinctiveness:

3-way contrast

B\text{u} vs. B\text{u}: enhanced

2-way, elimination of B\text{u}:

Contrast weak

Contrast strong

Experiment: a gating task

45 English speakers participated in a gating experiment.

Auditorily presented with 15 gates of (mostly nonce) Japanese words: /C\text{u}:/ and /Ci:/ forms with 12 different consonants. e.g. /s/u:/ [çu] \( \sim /s/i:/ [\text{ci}] /k\text{u}:/ /k\text{i}/ /b\text{u}/ /b/.

Only the consonant part (150ms at the first gate); then, additional 15ms of the vowel portion at each gate.

J udged whether the vowel sounds like English i or u at each gate.

Predictions for identification of /C\text{u}/:

In general, more i-responses (\text{correct}) at earlier gates and more u-responses (\text{correct}) at later gates.

More u-responses (\text{correct}) in identification of /S\text{u}:/.

More i-responses (\text{incorrect}) in identification of /b\text{u}/.

Results

Figure 1: Average rate of u-response in identification of /C\text{u}/:

Figure 2: Average isolation points for /C\text{u}/:

Results (cont.)

The vowel in /B\text{u}:/ was identified as i for longer gates than in other contexts. => /B\text{u}:/ vs. /Bi:/ is a weak contrast.

No effects of the perceptual advantages of sib. fricatives found.

Figure 3: Average isolation points for /Ci:/

Discussion and conclusion

The results (partially) supported the hypotheses.

/\text{Ci}/ vs. /\text{Ci}/ is weaker than /\text{Ci}/ vs. /\text{Ci}/.

/\text{B\text{u}}:/ vs. /\text{Bi}/ is weaker than other /\text{Ci}/ vs. /\text{Ci}/ contrasts.

But no effects of strong perceptual cues in sibilant fricatives.

Ceiling effects? General vowel mismapping by English speakers?

Conducting discrimination tasks and testing speakers of other languages (e.g. Japanese) may settle the issues.

The study nonetheless provides another instance of distributional restrictions grounded on the perceptual distinctiveness of contrasts.

Selected references


