Production of Japanese geminates by native English speakers: Durational accuracy and native speaker evaluation

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Background

• Native English speakers learning Japanese have problems producing Japanese consonant length (C) and vowel length (V) distinctions.

  – /kako/ ‘past’ versus /kak:o/ ‘parenthesis’

  – /kake/ ‘gambling’ versus /kakeː/ ‘family accounting’

• For C production,

  – Beginning learners improve in the first year (Masuda and Hayes-Harb, 2005).

  – Beginning learners improve more readily in V than C production (Toda, 1997).

  – Advanced learners did not reach the native-speaker level in C production, even after a year or more living in Japan (Han, 1992).
Questions

1. Focus on intermediate learners: Improve or not?

   To what extent does their ability to produce length distinctions improve over the first several months in Japan? Do they improve without focused production training?

2. Types of length distinctions?

   Do intermediate learners improve less in C distinction than in V distinction at the intermediate level, following the beginning learners’ trend in Toda (1997)?

→ Analysis of produced duration measures
   (Compare with native speaker data; Hirata, 2004; Hirata & Whiton, 2005)

→ Analysis of accuracy and degree of foreign accent evaluated by native Japanese (NJ) listeners
Method

Participants

- Seven students (ages: 19-21) who were native speakers of American English and had taken two years of Japanese language classes, totaling 300 hours, at Colgate University.

- All students participated in a study abroad program in Japan for four months.

- None of them received special production or perception training on length distinctions during this longitudinal experiment.
Method

Stimuli

- C-pair: /kako/ ‘past’ (2 moras) vs /kakːo/ ‘parenthesis’ (3 moras)

- V-pair: /rika/ ‘science’ (2 moras) vs /rikaː/ ‘liquor’ (3 moras)

- Participants read these words (among others) in a carrier sentence /soko wa ___ to jomimasu/ at three speaking rates, each repeated three times.

- Identical materials were recorded before and after their study in Japan.
Results

Duration of contrasting vowels and consonants
Learners’ results
Vowel duration in rika(ː) pair

- The Quantity x Time interaction was marginally significant (p = 0.057).
- A greater durational difference between the short and long vowels at post-Japan.

Long/short ratios
NJs: 2.22 (Hirata, 2004)
Learners: Pre-Japan 1.81 → Post-Japan 2.24
→ Improvement found for V-pair
Learners’ results
Consonant duration in kak(ː)o pair

- No significant Quantity x Time interaction

→ No improvement for C-pair

Geminate/single ratios

NJJs: 3.06-3.18 (Hirata & Whiton, 2005)
Learners: Pre-Japan 1.97 → Post-Japan 2.11
Vowel-to-word ratio & consonant-to-word ratio
Vowel-to-Word (V/W) ratio by NJs

SLOW SPEECH

SLOW SPEECH

FAST SPEECH

FAST SPEECH
V/W ratio by NJ (Hirata, 2004)

Long vowels

Short vowels

0.38 with 94% accuracy
Learners’ results
V/W ratio in rika(:)

- Classification accuracy
  Pre-Japan: 66% → Post-Japan: 85%
- A significant Quantity x Time interaction, indicating improvement in V/W ratio at post-Japan
Consonant-to-Word (C/W) ratio by NJs in kak(:)o pair

(Hirata & Whiton, 2005)
- Classification accuracy
  Pre-Japan: 73% → Post-Japan: 74%
- No significant Quantity x Time interaction, indicating their distinction did not change over time.
How learners’ production was perceived by native Japanese (NJ) speakers
Method

Listeners
  - 13 & 16 monolingual NJ speakers for Accuracy Test and Accent Rating Test, respectively.

Stimuli
  - All learners’ production were presented to each listener in a randomized order.

Procedure
  - For Accuracy Test, listeners chose one of six response alternatives, e.g.,
    *kako, kaako, kakoo, kaakoo, kakko, kakkoo*
  - For Accentedness Test, listeners marked the degree of foreign accent in each stimulus in a 1-7 scale.
A significant Contrast type x Time interaction: The amount of improvement was greater for V-pair than C-pair.

V-pair: 16.5%
C-pair: 8.9%
Production accuracy by rate

- A significant Contrast type x Time x Speaking rate interaction
Production accuracy by speaker

- A significant Contrast type x Time x Speaker interaction
NJ’ accent rating on learners’ production

- 7 = Native level; 1 = Not at all native-like
- Significant main effects of Time and Rate; No effect of Contrast type
Summary

1. Improve or not?
   → YES, participants with two years of Japanese language study in their home country continued to improve without intensive training.

2. Types of length distinctions?
   Consonant length pair
   → NO improvement in any acoustic measures
   → A small but significant improvement in perceived accuracy and accent rating
   → Perceived accuracy improved less for C-pair than V-pair.
   → Accent rating improved similarly between C-Pair and V-pair.

   Vowel length pair
   → Significant improvement in all acoustic measures, perceived accuracy, and accent rating.
   → Greatest accuracy improvement at the fastest rate.
Summary

3. Worth noting…

- Speaking rate of production was a significant factor.
- Large room for further improvement on C-pair
  (post-test accuracy mean: 42%; range: 3%-85%).
- Large individual variation.
- Very small amount of accent improvement.
- The accuracy difference between C-pair and V-pair does not appear to affect the overall accent rating.
Conclusions

• Intermediate learners are not yet fixed in their ability to produce vowel length distinction (Toda, 1997), but about to reach a plateau for consonant length (Han, 1992).

• Focused training on consonant length distinction may be necessary for a notable amount of improvement for intermediate learners.

• However, the amount and type of improvement depend greatly on individual learners.

• Methodological: Native speaker durational measures were useful in characterizing production learning.

But some discrepancy was observed between durational measures and NJ auditory judgments for the consonant length pair.
Discussion

Further research is necessary...

• To investigate why learners improved more on vowel length than on consonant length distinctions.
  - Generalize to other vowels and consonants?
  - Infants’ first language acquisition
  - Sonority of segments
  - Similarities and differences across languages
References


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