Training Mandarin Listeners to Improve Their Production and Perception of Korean Vowels: The Role of Explicit and Implicit Instruction

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Aug 2, 2018
Identification accuracy of Korean vowels by L2 learners

- L2 Mandarin learners have more difficulties with Korean vowels /o, u, ʌ/ than L2 English learners

Figure 1. Identification accuracy of Korean vowels /o, u, ʌ/ by English and Mandarin listeners (Ryu 2018)
• L2 learners’ difficulties with non-native sounds can be partly overcome by perceptual training
Goals

- Investigate the benefits of perceptual training on perception and production of Korean vowels by Mandarin L2 learners

(1) Effects of perceptual training on L2 acquisition
(2) Effects of instruction in L2 acquisition
(3) Effects of generalization
Research questions and hypotheses
(1) Effects of perceptual training on L2 acquisition

- **Question 1:** Does perceptual training enhance Mandarin L2 learners’ perception and production of Korean vowels?

- **Hypothesis 1:** After a sufficient amount of perceptual training, Mandarin L2 learners’ identification and production accuracy of Korean sounds will significantly increase.
(2) Effects of instruction in L2 acquisition

• Question 2: Is explicit instruction more effective than implicit instruction in L2 acquisition?

• Hypothesis 2: If there is an effect of explicit training, better identification is expected if L2 learners are instructed to focus on the target sounds during training.

• Question 3: Does implicit training improve performance compared to no training?

• Hypothesis 3: Mandarin L2 learners who are trained on Korean vowels with Implicit instruction show greater accuracy in perception and production of Korean vowels than L2 learners who receive no training at all.
(3) Generalization effects

• **Question 4**: Can the training effect be transferred to sounds in new phonetic contexts?

• **Hypothesis 4**: Mandarin L2 learners’ will be able to generalize the knowledge acquired through training to novel items.
Effects of Perceptual Training on L2 Vowel Perception
Participants

- 30 adult native Mandarin speakers (25 females, 5 males; mean: 20.5 years old)
- Enrolled in beginner-level Korean courses at universities in Canada
- Randomly assigned to the experimental groups (Group 1 & Group 2) and the control group (Group 3)

Group 1 (11 subjects)
Training with explicit instruction

Group 2 (11 subjects)
Training with non-explicit instruction

Group 3 (8 subjects)
No training
Auditory stimuli

• 98 monosyllabic Korean words (CVC)
  • Trained phonemes: 7 Korean vowels [a, e, i, o, u, ɨ, ʌ]
  • Pre-, post-test and online training: 49 words /hVC/
  • Generalization test: 49 words /kVC/

• Recorded by 6 native Korean speakers (3 females, 3 males) in their 20s

• Stimuli were read 5 times in a natural fashion in the phonetics lab
Three phases

All participants

Pre-test
  - Perception
  - Production

Group 1 & 2
  - Online training
    - Perception (8 sessions)

All participants

Post-test
  - Perception
  - Production
  - Generalization
Web-based perceptual training

• All groups were asked to identify a sound they heard and press a corresponding button on the keyboard.
• Group 1 and Group 2 were exposed to the same stimuli, but focused on different target segments.
• Feedback was provided in the online training.

Group 1 (Vowel-focused group)

Group 2 (Non-vowel focused group)
Analysis of vowel perception performance

• A mixed-effects logistic model in R (Baayen 2008; R CoreTeam 2012)
  • The package lme4 (Bates et al 2011)
  • Dependent variable: Response (correct:1, incorrect:0)
  • Fixed effects: Test (pre-test, post-test, generalization test), group (G1, G2, G3), vowels and their interactions
  • Random effects: Speakers, items
Effects of perceptual training on L2 perception

- Perceptual training had significantly affected learners’ identification ability positively.
- Group 1 with explicit instruction: **13% increase**
- Group 2 with implicit instruction: **4% increase**

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Figure 1. Accuracy of Korean vowel perception at pre- and post-test by group
Effects of instruction on L2 vowel perception

- Only in Group 1 with explicit instruction showed improvement in perception of Korean vowels /e, o, ʌ/.

Figure 2. Accuracy in perception of Korean vowels at pre-and post-test by experimental groups.
Individual development of L2 vowel perception

• Gradually increase perceptual knowledge of Korean vowels over eight training sessions

Figure 3. Individual learners’ perceptual development of Korean vowels during eight training sessions (Group 1)
Generalization effects

- Generalization effects to new words were found in Group 1

![Graph showing generalization effects by group](image)

Figure 4. Generalization effects by group
Effects of perceptual training on L2 vowel production
Participants

- The same participants who took part in perception tasks completed the production task

- Included only female participants for acoustic analysis
  
  - 25 female native Mandarin speakers

  - 3 female native Korean speakers (control group)
Stimuli

• Read words containing target vowels presented in Korean on a computer screen using PsycoPy (Pierce 2007).

• Disyllabic Korean words /hVda/ including 7 Korean vowels (Yang 1996)

• Each set of words appeared five times in isolation
Acoustic analysis

• F1 and F2 values in Praat (Boersma and Weenink 2011)
• 1846 tokens were acoustically analyzed
  • pre-test: 866 tokens
  • post-test: 875 tokens
  • native Korean: 105 tokens
Production accuracy of Korean vowels

Figure 5. Production accuracy of Korean vowels at pre- and post-test by groups
Statistical analysis

- Linear mixed-effects regression in R (Baayen 2008; R CoreTeam 2012)
  - The package lme4 (Bates et al 2011)
  - Dependent variable: **Euclidean distance** from the native target
  - Fixed effect: **Test** (pre-test, post-test), **group** (G1, G2, G3), **vowels**
  - Random effect: Speakers, items

- Euclidean distance between non-native productions and target native productions was used to assess L2 production accuracy.

- A shorter euclidean distance indicates more native-like production.
Effects of perceptual training on L2 production

- Perceptual training was successful in improving the production of Korean vowels.
- Post-test performance for articulation of Korean vowels was significantly greater in Group 1.

Figure 6. Effects of training on production accuracy for Korean vowels by group
Effect of instruction on L2 vowel production

- In Group 1 with explicit instruction, production accuracy of /a, u, i/ increased

Figure 7. Production accuracy of Korean vowels after explicit training (Group 1)
Conclusions

- Perceptual training is effective in improving L2 perception and production
- Asymmetry in production and perception abilities for Korean vowels

### Effects of training in L2 vowel perception

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<td>/e, ʌ, o/ accurately perceived</td>
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- Explicit instruction is more beneficial than implicit instruction
Acknowledgements

• Special thanks to Dr. Kang, Dr. Dr. Monahan and Dr. Schertz.
• Dr. Ko and Dr. Choi for their help recruiting participants.
• Hyoung Seok Kwon for technical support.
• Research assistant Min Ji Heo for running the experiments.
• Mandarin, Canadian and Korean subjects who participated in the experiments.
• This work was supported by the Academy of Korean Studies for research funding.
Selected References


