Effects of auditory perceptual training on the identification of Korean vowels by Mandarin learners of Korean

Na-Young Ryu & Yoonjung Kang

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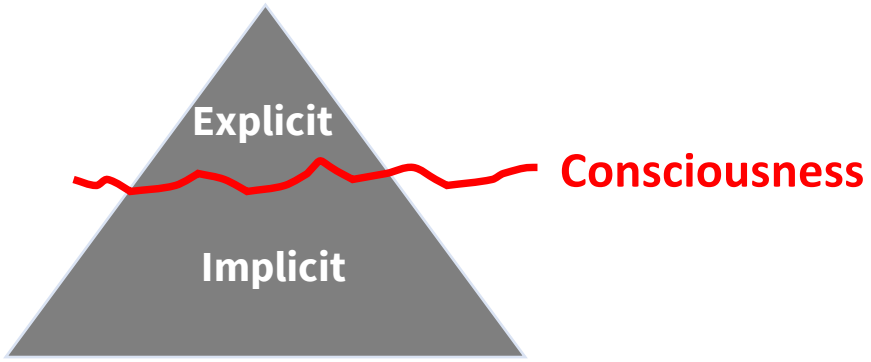
What is explicit vs. implicit learning?

- Is all knowledge acquired by conscious processes, or is some knowledge acquired by unconscious process?



Explicit learning

- **Active process**
- People seek out the structure of any information that is presented to them.

Implicit learning

- **Passive process**
- People acquire knowledge of new information through exposure

Effects of explicit vs. implicit learning on L2 vowel perception

	Explicit training	Implicit training
Stimuli	The same stimuli	
Feedback	The same type of feedback	
Target sounds	Vowels	Non-vowels

Motivation for the current study

- L2 Mandarin learners have more difficulties with Korean vowels /o, u , ʌ / than L2 English learners.
- To date, there are no studies of training on the perception of Korean vowels by L2 learners.

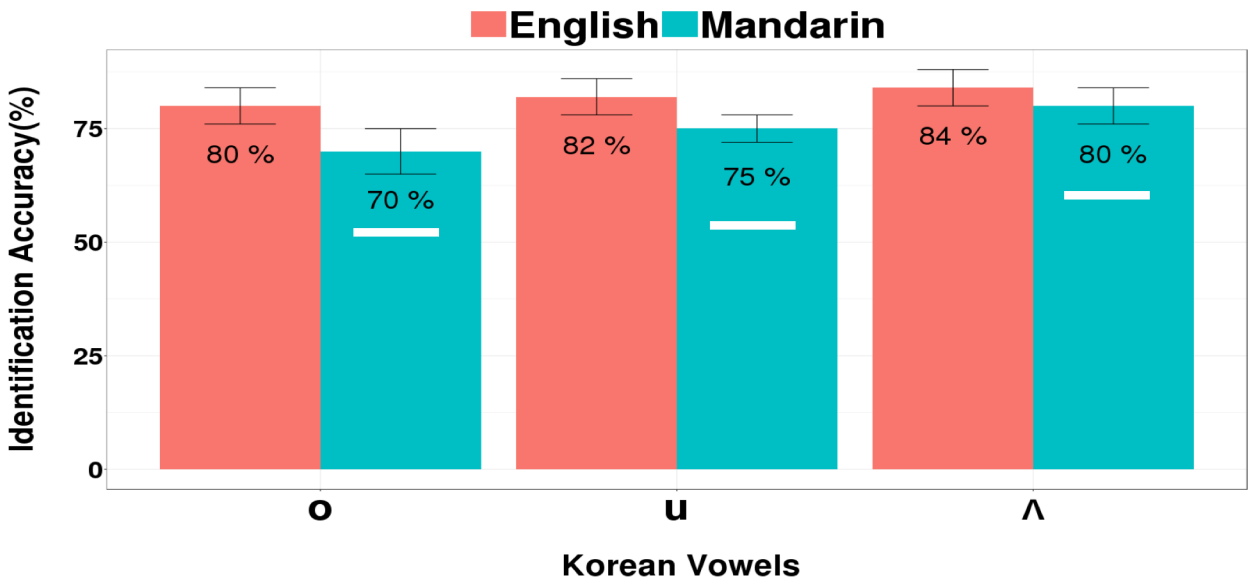


Figure 1. Identification accuracy of Korean vowels /o, u , ʌ / by English and Mandarin listeners (Ryu 2018)

Goals

- To investigate how Mandarin learners of Korean improve the perception of Korean vowels through perceptual training.

(1) Effects of perceptual training
(2) Effects of explicit vs. implicit training
(3) Effects of the generalization test

Research questions

[Effects of perceptual training on L2 vowel perception]

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

[Effects of explicit vs. implicit training on L2 vowel perception]

- **Question 2**: Is ***explicit training*** more effective than ***implicit training*** on L2 vowel perception?
- **Question 3**: Does ***implicit training*** improve performance compared to ***no training***?

[Effects of the generalization test]

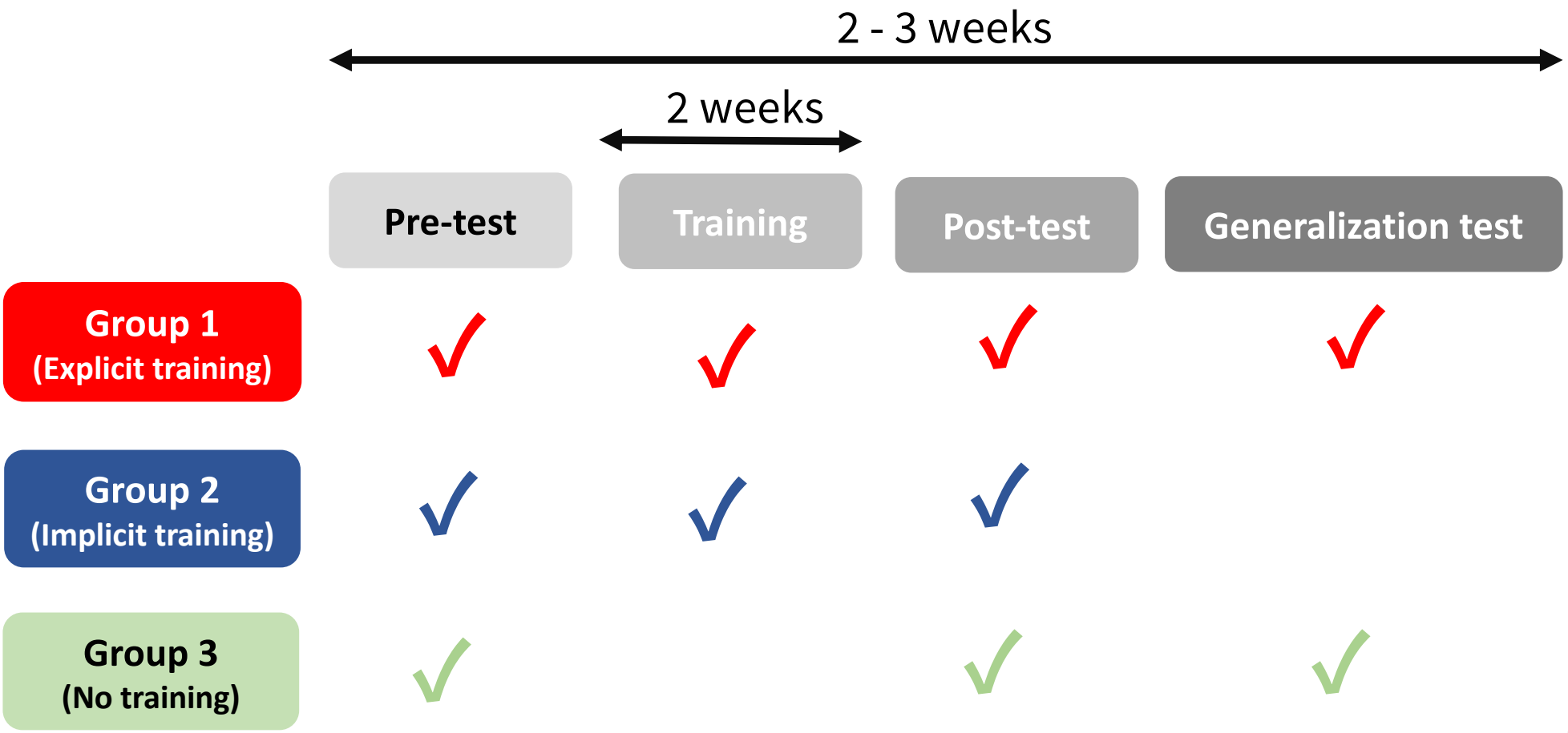
- **Question 4**: Can the training effect be ***transferred*** to sounds in new phonetic contexts?

Participants

- 45 Mandarin learners of Korean
  - Group 1: 15 subjects, Group 2: 15 subjects, Group 3: 15 subjects
- Enrolled in beginner-level Korean courses at universities in Canada

Group 1	Group 2	Group 3
Vowel-focused group: Explicit training	Coda-focused group: Implicit training	No training

Procedure


2 - 3 weeks
2 weeks
Pre-test
Training
Post-test
Generalization test
Group 1
(Explicit training)
Group 2
(Implicit training)
Group 3
(No training)

Auditory stimuli

- 98 monosyllabic Korean words (CVC) naturally produced by 6 native Korean speakers (3 females, 3 males) in their 20s.
  - Trained phonemes: **7 Korean vowels /a, e, i, o, u, ʌ, ɨ/**
  - Pre-test, post-test, and online training: 49 words **/hVC/**
  - Generalization test: 49 words **/kVC/**
- Stimuli were read 5 times in a natural fashion in the phonetics lab.

Pre- test, post-test and generalization test

- Laboratory-based setting
- Identification task using *PsychoPy* (Peirce 2007)
- Talkers: 2 native Korean speakers (1 male, 1 female)
- No feedback

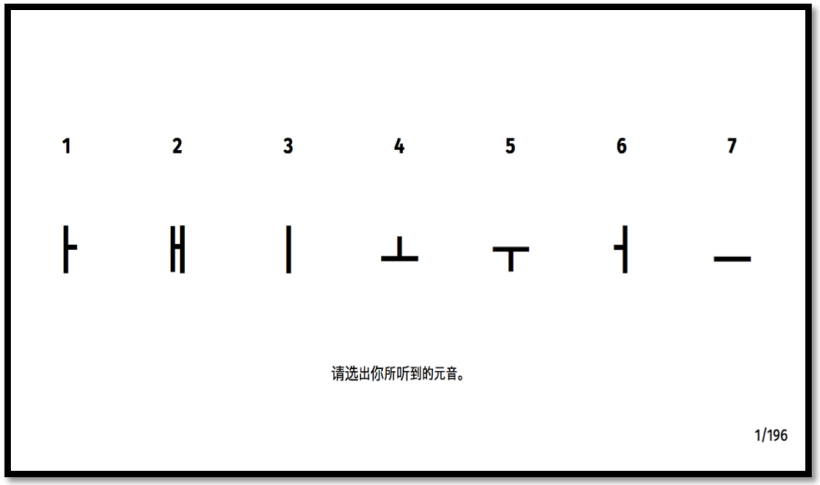
The training system

- Web-based perception training program
  - Self-access & Self-contained
- Identification task
- 8 sessions of high-variability phonetic training
  - 196 tokens: 4 native Korean speakers (2 females, 2 males)
- Immediate feedback

Web-based perceptual training

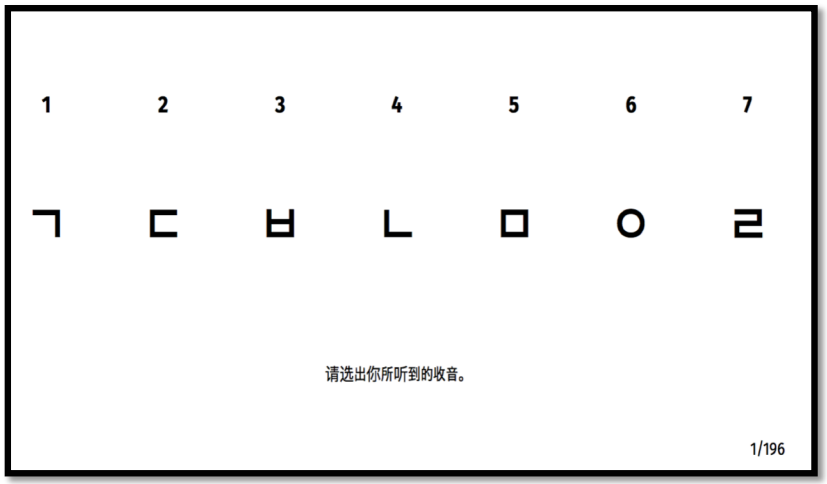
- All groups were asked to identify a sound they heard and press a corresponding button on the keyboard.
- Group 1 and Group 2 were exposed to the same stimuli, but focused on different target segments.

Group 1 (Explicit training)



Korean vowels

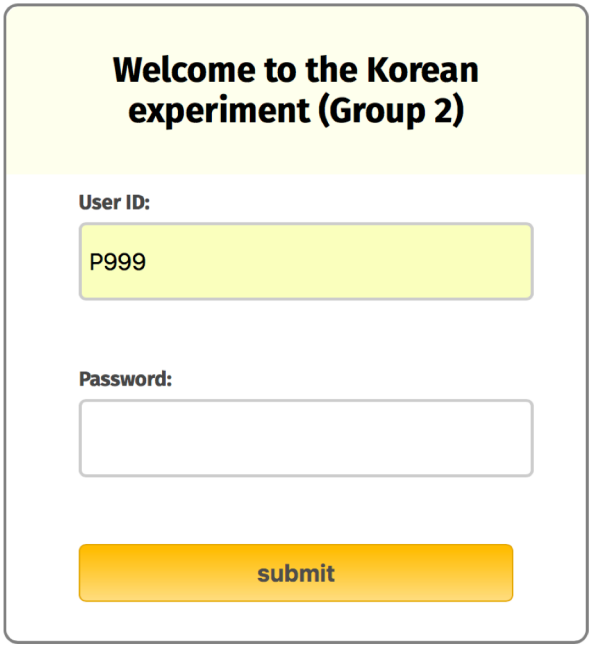
Group 2 (Implicit training)



Korean codas

Web-based perceptual training

- ID and PW were provided.
- No more than one training session per day.



Analysis of Korean 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), and their interactions
  - Random effects: Speakers, items

Perception accuracy at pre-test

Pre-test: No significant difference across three groups.

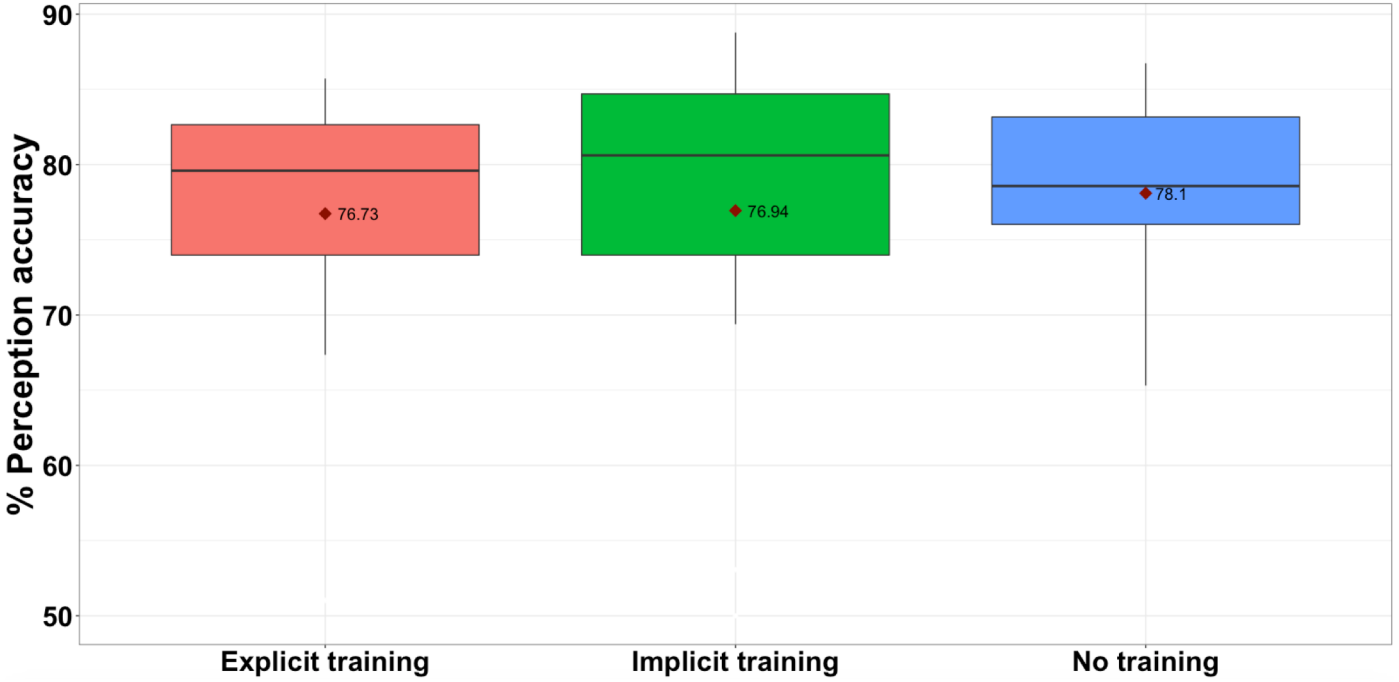


Figure 2. Perception accuracy of Korean vowels at pre-test by group

Effects of explicit vs. implicit training

- Strongly significant improvement is found after explicit training (12 % increase)
- Significant improvement is also found after implicit training (3% increase)

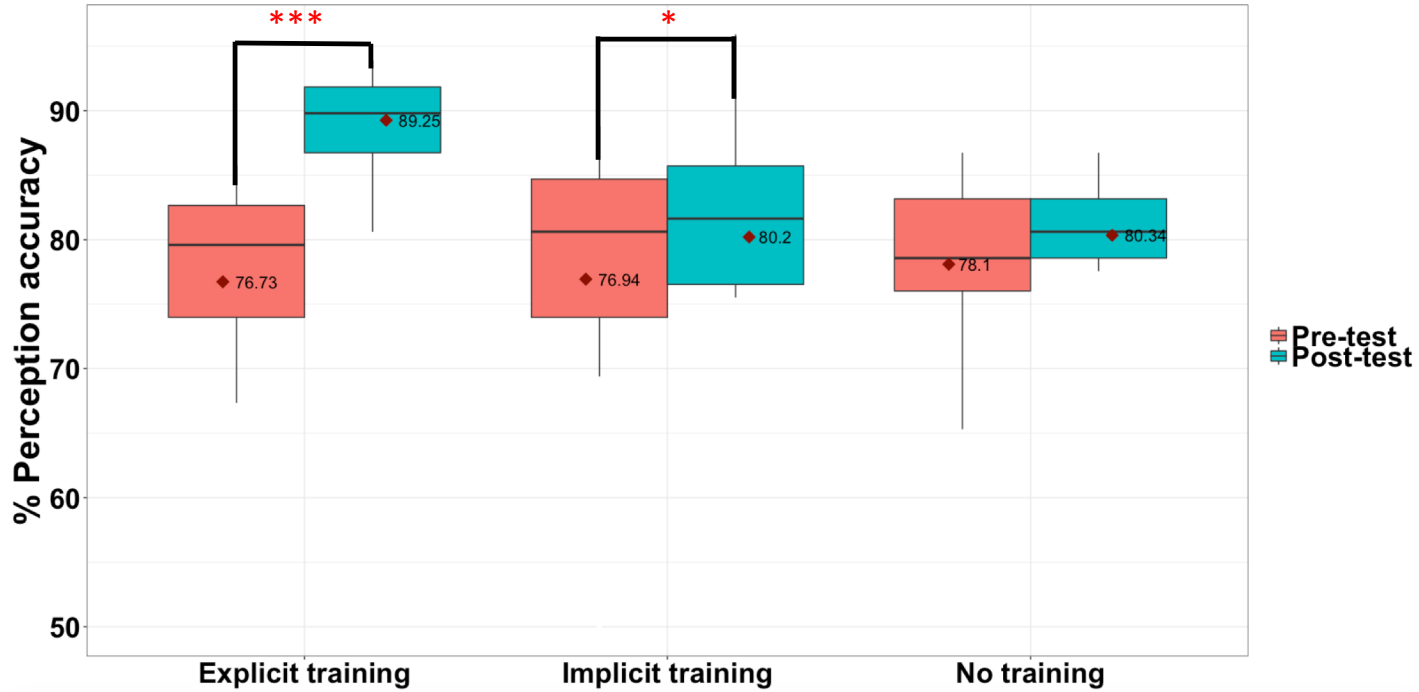


Figure 3. Perception accuracy of Korean vowels at pre-and post-test by group

Individual learners' perception improvement

There is some variation in the level of improvement in both the implicit training and no training group.

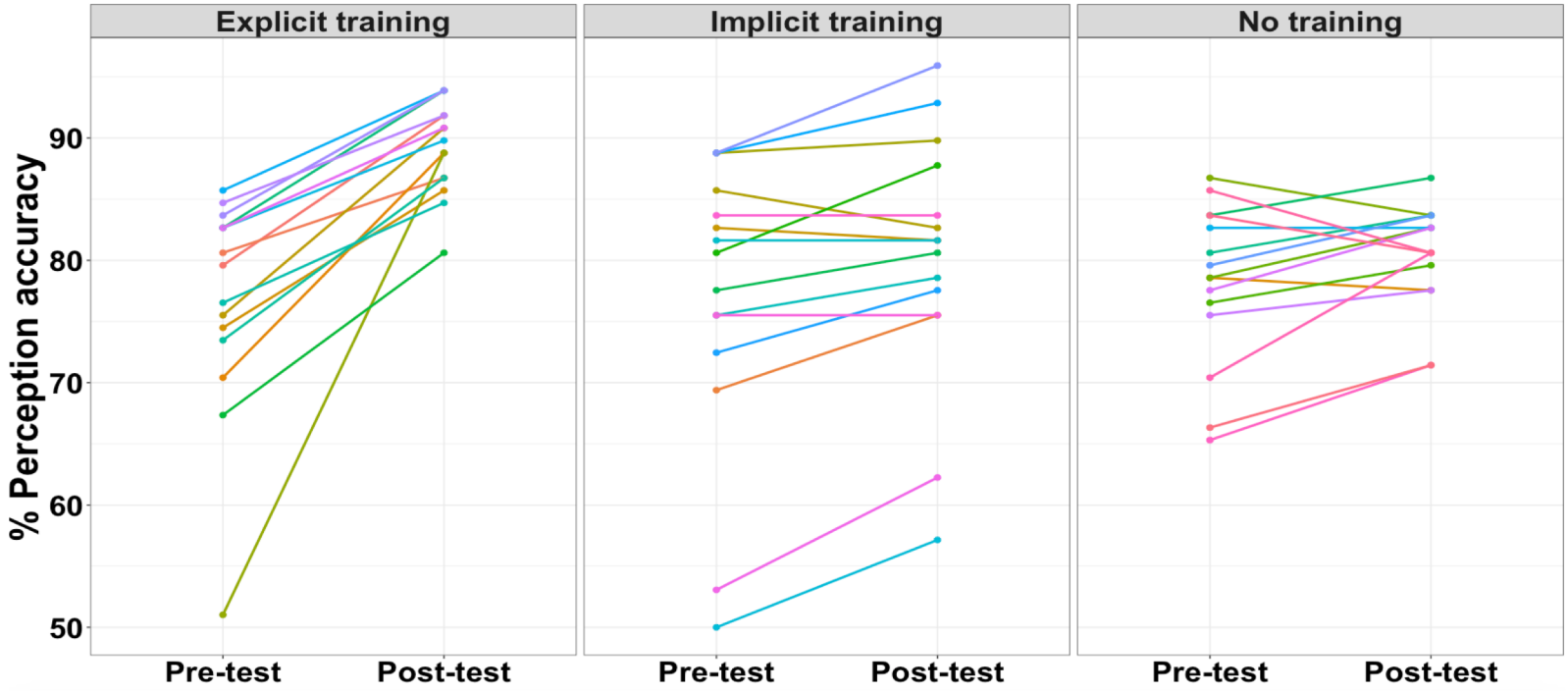


Figure 4. Individual learners' perception improvement of Korean vowels from pre-to post-test

G1: Development of L2 vowel perception during training

Overall, there was a gradual increase across the sessions during online training.

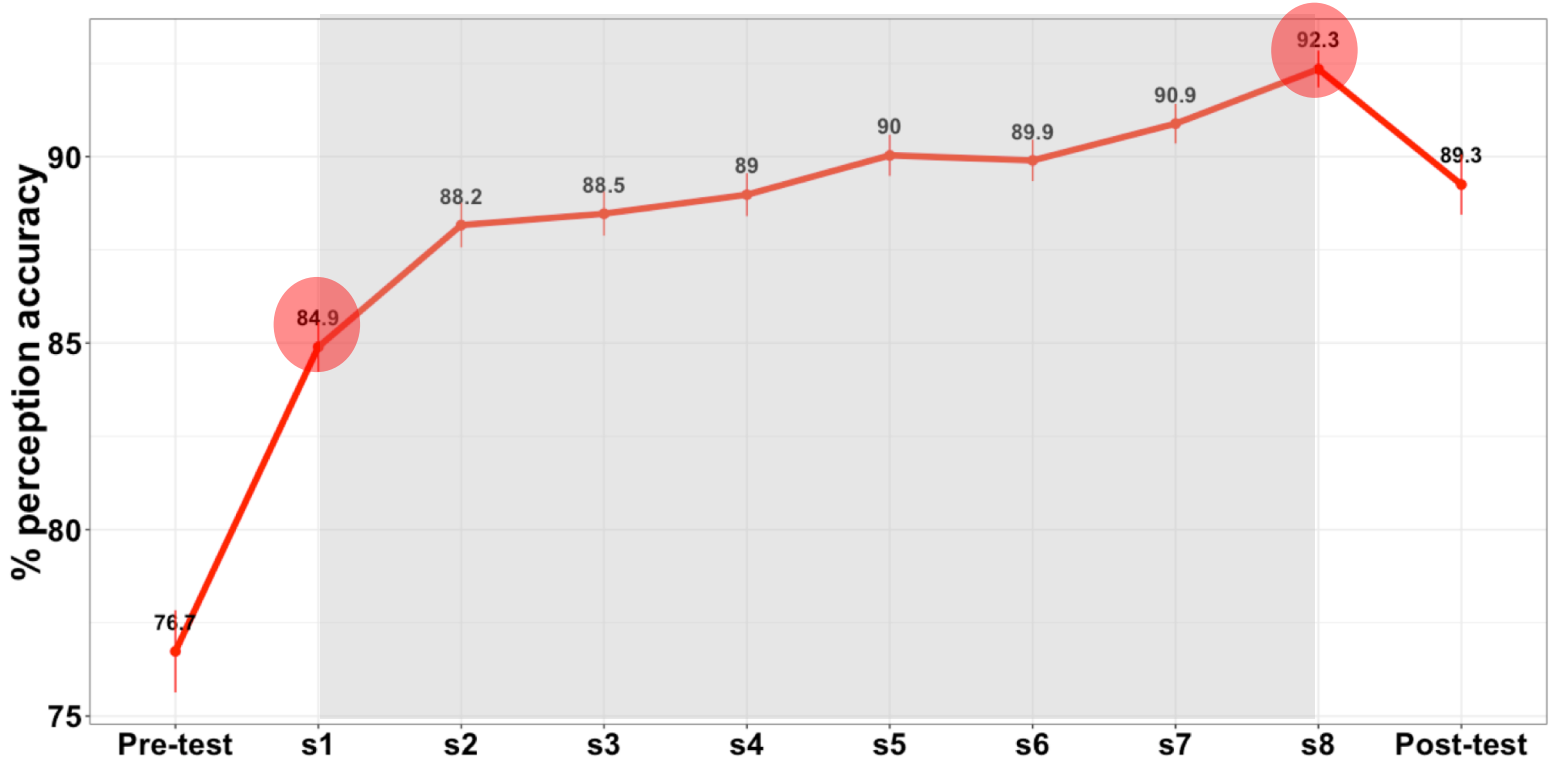


Figure 5. Improvement on perception accuracy of Korean vowels in Group 1 during online training

Generalization effects of training

- Explicit training vs. No training: Generalization effects to new words found in explicit training

Figure 6. Effects of generalization test by group

Perception accuracy of individual Korean vowels

- The hierarchy of accurate perception at pre- test**: / i > ɨ > ɑ > e > u > ʌ > o /**
- Perception accuracy of Korean vowels /e, o, u, ʌ / significantly improved at post-test.

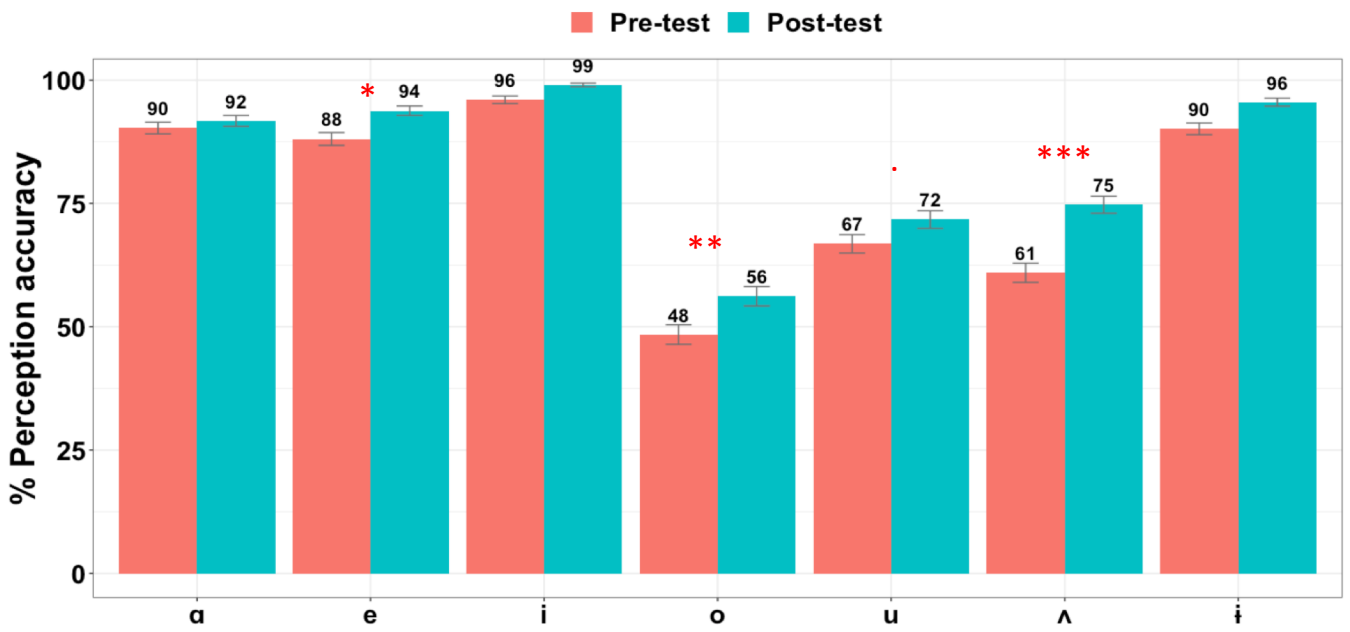


Figure 7. Perception accuracy of each Korean vowels at pre- and post-test

Perception accuracy of individual Korean vowels by group

- Korean vowels /e, o, u, ʌ/ are significantly improved after explicit training.

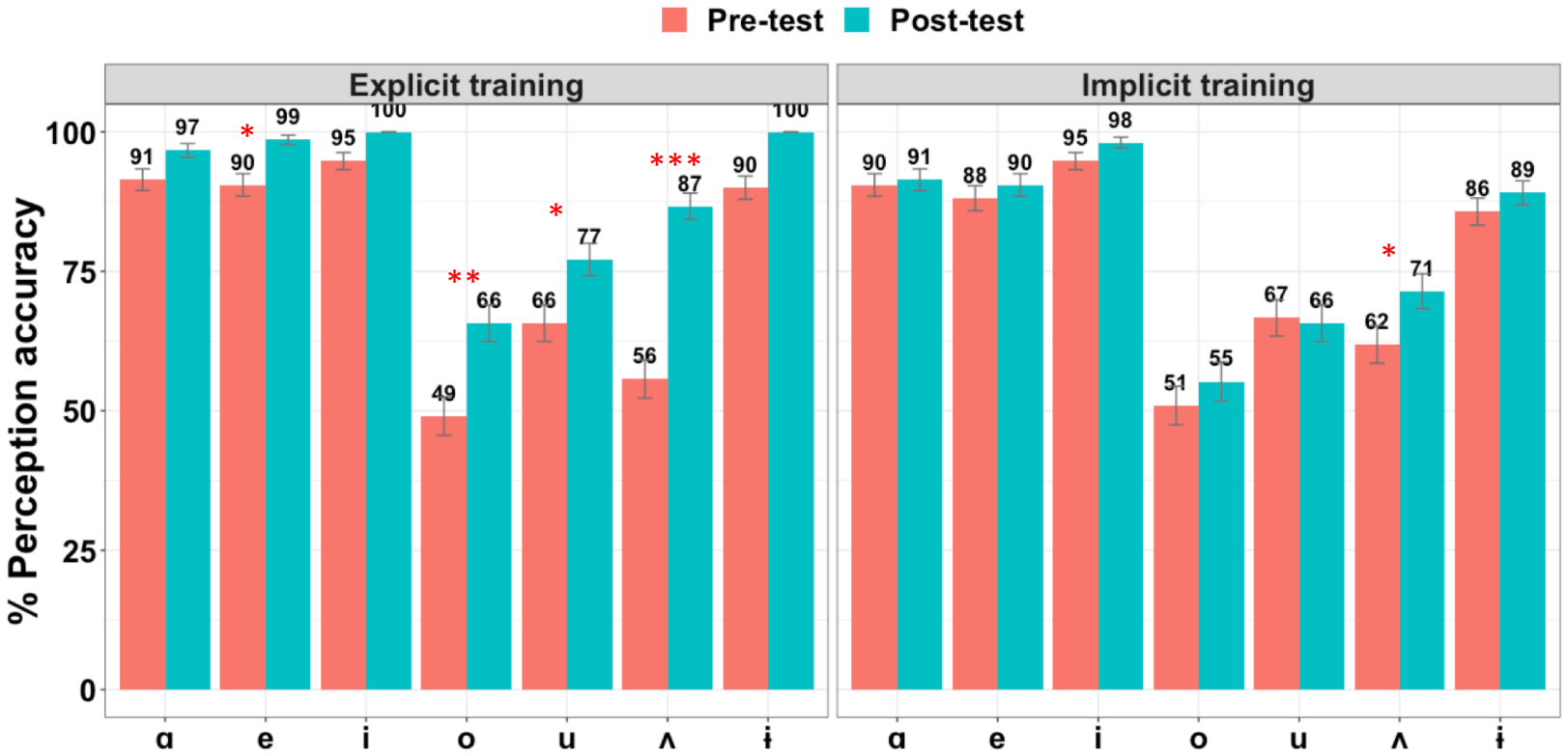


Figure 8. Perception accuracy of individual vowels by group

Improvement of perception accuracy of individual Korean vowels

- Perception accuracy of all vowels in explicit training improved.

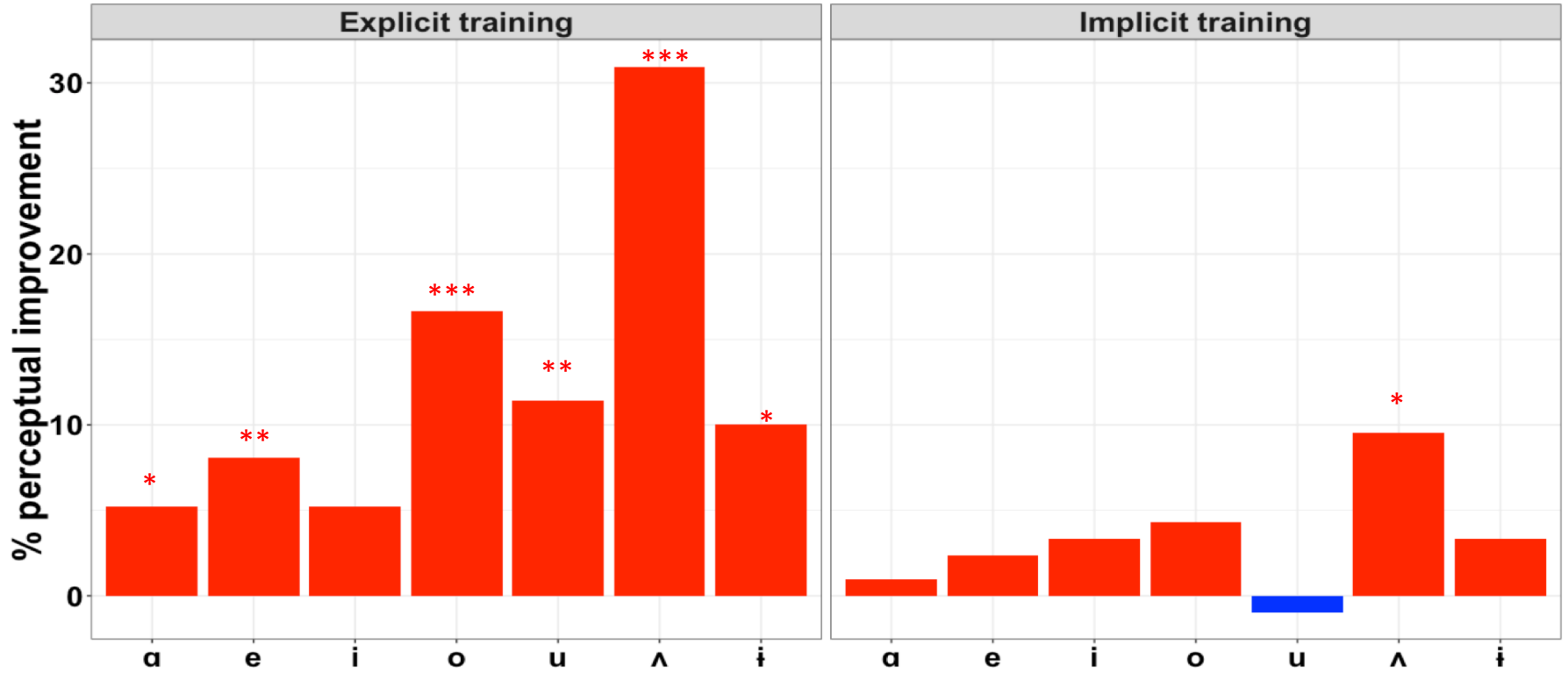


Figure 9. Perception improvement of individual vowels by group

Response patterns of Korean vowels

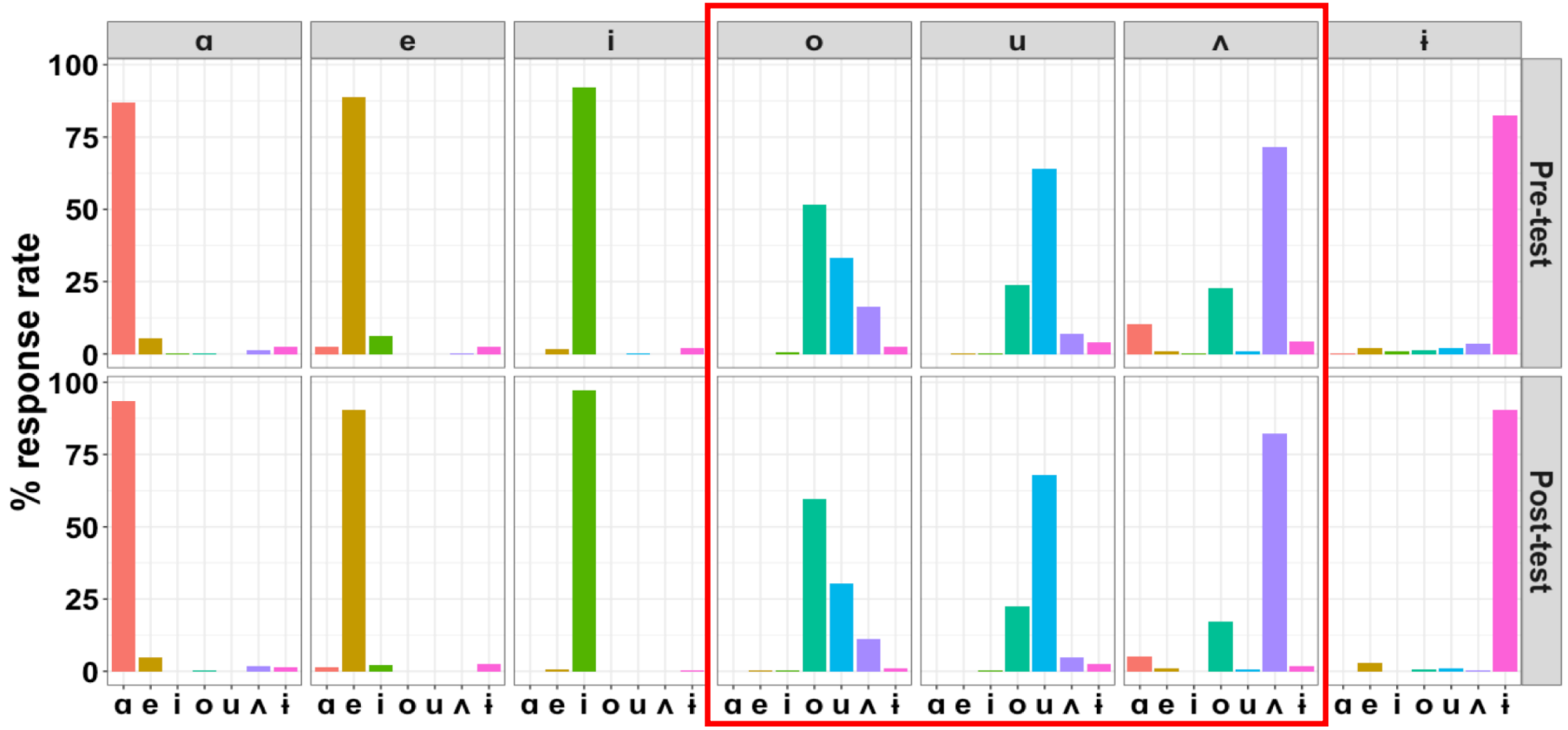


Figure 10. Response patterns of Korean vowels at pre- and post-test

Summary of Results

Effects	Results
Effects of perceptual training on L2 vowel perception	**Improvement from pre-test to post-test** **Explicit training & Implicit training: Significant improvement** ✓ **No training: No improvement** ✗
Effects of explicit vs. implicit training on L2 vowel perception	Group * test interaction **Explicit training** > Implicit training , no training No difference between implicit training and no training
Effects of generalization tests	**Explicit training** – Generalization effects ✓ No training – No effects ✗

Conclusion and future direction

- High variability phonetic training increases accuracy of Mandarin speakers' perception of Korean vowels.

- Explicit training is more beneficial for improving the most difficult Korean vowels /e, o, u, ʌ / than implicit training.

- Future plans:
  - Investigating effects of perceptual training on production of Korean vowels in order to examine the relationship between perception and production in L2 acquisition.

  - Investigating the long-term effects of perceptual training.

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