



A45. Effects of Vowel Perception Training: The Information Learned and Maintained After Training

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Introduction

Our recent study with native Japanese learners of English has shown that second language (L2) vowel perception can be improved by short-term training (Nishi & Kewley-Port, 2005). However, it is not known what acoustic cues were learned during training. Specifically, did identification improve because trainees learned to use acoustic cues (e.g., spectral or duration) in a similar manner to native listeners? Answers to this question were sought by performing multidimensional scaling analysis on similarity rating data that was collected as a part of pre-, post- and maintenance tests.

Method

Participants

- 6 native J listeners participated in a vowel training study in Nishi & Kewley-Port (2005) were grouped based on training results.
 - 4 with higher post- and maintenance test scores (J-High)
 - 2 with lower post- and maintenance test scores (J-Low)
- 4 native AE listeners (2male, 2 female).

Materials

9 nonsense /bVpə/disyllables containing one of the 9 AE vowels /i, I, ε, æ, α, λ, ɔ, u, u/; 3 tokens each.

Procedures

- Rate dissimilarity of 36 pairs of /bVpə/ words on a 9-point scale (1 = almost same); task given as a part of pre-, post-, and maintenance (3 months later) tests.
 - 36 pairs x 2 presentation orders x 6 blocks = 432 trials
- #### Analysis
- Acoustic analysis of stimuli for F1, F2, F3 and vowel duration.
 - Multidimensional scaling technique (ALSCAL) to construct perceptual vowel spaces for AE listeners and J listeners for 3 tests.

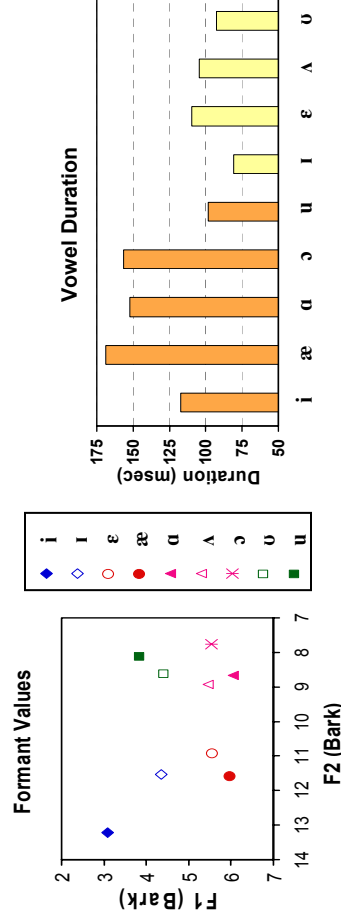
Best solution was 3-dimensional for all.

- 2 Correlation analyses:

- (1) Between acoustic measurements and dimensional loadings for each of the 9 vowels to determine which acoustic cues are used by listeners
- (2) Between inter-vowel perceptual distances (n = 36, Euclidean) for pre-, post- and maintenance tests for 2 J groups to examine if reorganization of perceptual vowel space occurred after training.

Results & Discussion

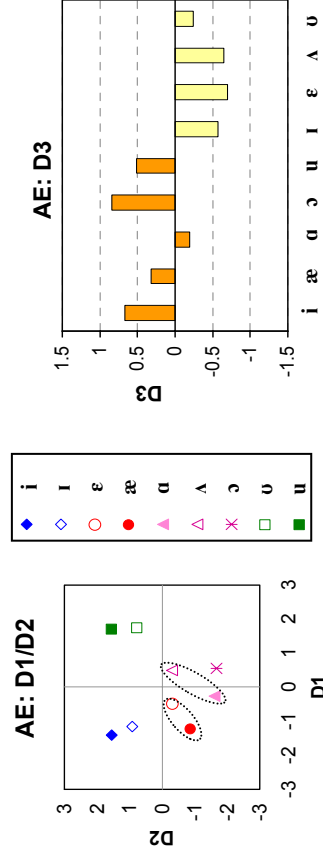
Acoustic Properties of AE Stimuli (3 tokens)



Perceptual Vowel Spaces

(A) Native AE Listeners (N = 4)

ID score: Pretest = 83%



(1) Correlation with acoustic measures:

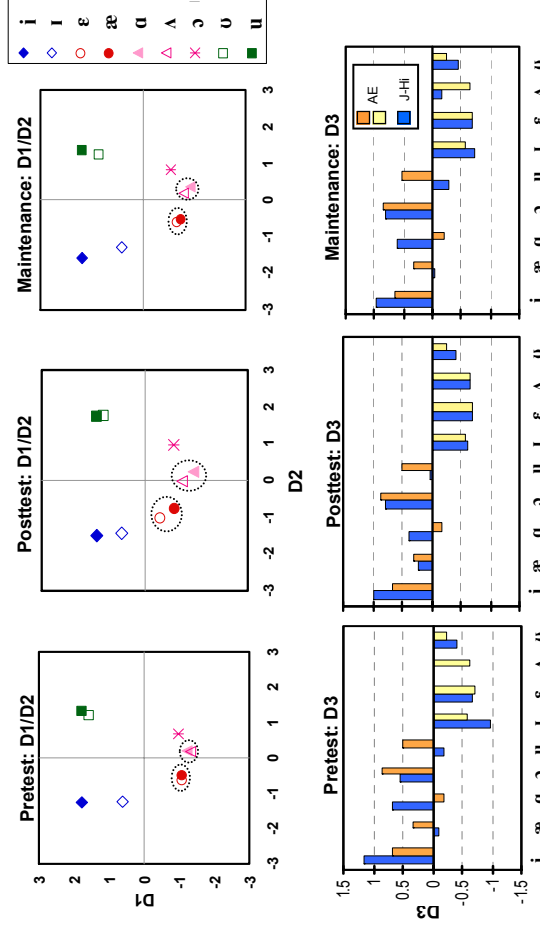
- F1, F2, and duration ($p < 0.05$ for all)
- Vowels separated in D1/D2 space in a typical pattern.

Results & Discussion (Continued)

Perceptual Vowel Spaces (Continued)

(B) J-High Learners (N = 4)

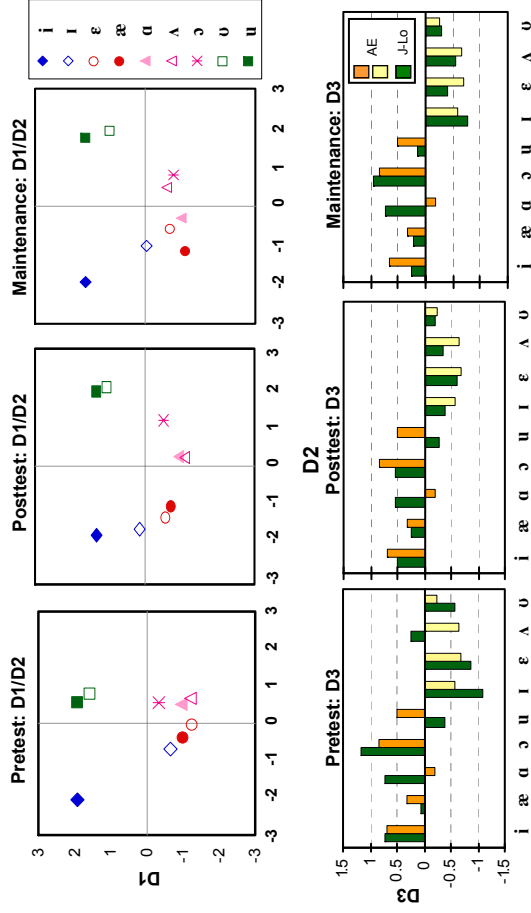
ID scores: Pretest = 56%, Posttest = 89%, Maintenance = 86%



- (1) Correlation with acoustic measures:
 - F1, F2, and F3 for all 3 tests ($p < 0.05$).
 - Posttest was different from other 2 tests ($p < 0.05$)
 - (Note the changes in distances for /æ-e/ and /a-ʌ/ pairs in D1/D2 space)
- ★ **Mainly focused attention on the spectral cues.**
- ★ **J-High learners focused their attention on spectral cues even without overt instruction.**
- ★ **Use of duration cue for some pairs (ex. /u-u/) were not appropriate — need to learn duration cue.**
- ★ **Because spectral cues separate AE vowels, J-High group's strategy yielded greater improvement.**

(C) J-Low Learners (N=2)

ID score criteria: Posttest = 73%, Maintenance = 67%



- (1) Correlation with acoustic measures:
 - Pretest: F1, F2 and duration ($p < 0.05$)
 - But D1/D2 space looked distorted.
 - Post- & maintenance: F1, F2, F3 and duration ($p < 0.05$)
- (2) Inter-vowel distance comparison among 3 tests:
 - No difference was observed among the 3 tests.

★ **Using duration may not be an effective strategy.**

Conclusions

- (1) **Without specific instruction, L2 learners developed different learning strategies during training— one more effective and the other less effective.**
- (2) **Learners with more effective strategy focused their attention on the spectral cues.**
- (3) **Learners with less effective strategy focused more attention on the duration cue. This might have prevented them from learning the spectral cues that are more important in AE vowels.**
- (4) **In order to maximize training effectiveness, future AE vowel training protocols may need to hold vowel duration constant and guide learners' attention to spectral cues at least in initial stages and introduce duration training at later stages.**

References

Nishi, K., & Kewley-Port, D. (2005). Training Japanese listeners to identify American English vowels. *J. of Acoustical Society of America*, 117 (4), 2401.

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