

# Intelligibility of speech improves after perceptual vowel training in L2 learners of English

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## Abstract

Previous research (Giannakopoulou et al., 2013) has shown that perceptual training intervention helps L2 English adult learners to perceptually shift their attention to primary cues to correctly identify vowels in L2. This study investigates whether the production of L2 speech by L2 adult learners was affected by high-variability training. Ratings of accuracy and clarity were tested from production samples of a previous study (Giannakopoulou, 2012). In the present study, twenty native English listeners transcribed the production samples and rated them for accuracy and clarity. It was found that the intelligibility of L2 learners' speech samples as indexed by higher accuracy in transcription were rated to be higher after the high-variability training than before. Implications of the findings are discussed in terms of theories concerning the link between speech perception and production, and the Speech Learning Model by Flege (1995).

## Background

It has been shown that perception training of L1 Japanese speakers that resulted in the enhanced identification of English /r/-/l/ also led to the enhanced production of English /r/-/l/ after completing the perception training, such that production samples were more intelligible than before training (Bradlow et al., 1997). Previous research indicated that L2 speakers' pronunciation accuracy could affect the overall intelligibility of L2 speech in native English listeners (Purcell and Suter 1980; Varonis and Gass 1982). Thus, undergoing perceptual learning can help L2 speakers acquire a non-native perceptual contrast. It is therefore clear that there can be a transfer of L2 speakers' perceptual learning onto L2 speech production. This can suggest that L2 speakers' acquisition of non-native phonetic contrasts could affect their control over how that contrast is produced (e.g. Bradlow et al., 1997).

## Objective

- To investigate if perceptual training improves production of L2 speech sounds by L2 learners of English, as assessed by native English listeners in an orthographic transcription task, and in a perceptual goodness rating task.

## Hypothesis

- Speech produced by the L1 Greek adult trainees will be more intelligible and clearer after perceptual training than before.

## Methodology

### Speakers

- Eight female native Greek learners of L2 English between 20-30 years (mean age 27.4 yrs) participated in the speech recording task.

- Native speakers' samples were taken from two female monolingual native English speakers (mean age 20 yrs).

### Listeners

- 20 native speakers of English (16 female, 4 male) (mean age 19 yrs) were recruited to rate the native and non-native speech samples.

### Speech stimuli

- The native Greek learners of L2 English read out aloud in a clear voice the list of words and sentences prior to participating in the pre-test and HVPT sessions. The same procedure was repeated after participants had completed all training sessions and the post-test as reported in Giannakopoulou et al. (2013).
- The monolingual English speakers read out aloud in a clear voice the same list of words and sentences as the Greek speakers.

### Procedure

- In the orthographic transcription task the native English listeners carefully listened to each word stimulus and then typed out on the keyboard what they heard in the space provided on the screen. They indicated on a Likert scale from 0-6 how confident they were in the accuracy of their transcription (0=very confident; 6=not very confident at all).
- In the perceptual goodness rating native English listeners viewed each word stimulus on the screen for 300 milliseconds and after another 300 milliseconds, they listened carefully to the viewed words. They then rated the word stimulus for how typical the word sounds are in the English language on a Likert scale from 0-6 (0 =very typical, 6 = not typical at all).

## Results

• A three-way within-subjects ANOVA (time, speaker, item) was used to analyze the transcription of the words and sentences (see supplementary materials for full list of words and sentences) that were produced before and after the perceptual training by native Greek speakers as learners of L2 English. The transcription task did not accept any word candidates by native speakers that incompletely matched the word in the stimulus utterance but only transcribed words that were identified completely correctly.

- There was higher accuracy in transcription of samples produced at word level ( $F(1, 19) = 11.081$ ;  $p < .05$ ;  $\eta^2 p = .368$ ; see Figure 1) and sentence level ( $F(1, 19) = 12.679$ ;  $p < .05$ ;  $\eta^2 p = .400$ ) after training compared to baseline accuracy.
- There was higher clarity in speech production before training than after training ( $F(1, 19) = 4.775$ ;  $p < .05$ ;  $\eta^2 p = .201$ )

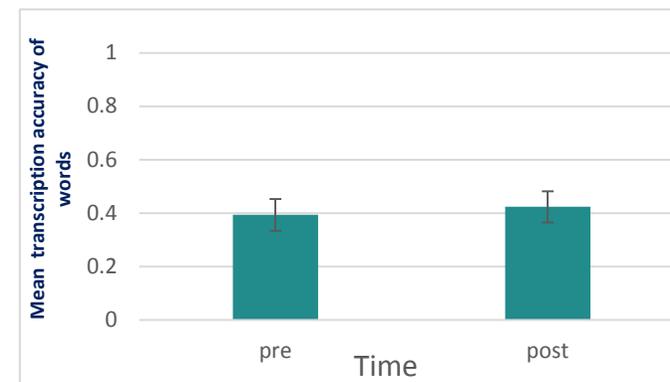


Figure 1. Transcription accuracy of Greek-speakers' speech samples by native speakers at word level. Error bars show +/- 1 standard error from the mean.

## Discussion

- Data indicate that intelligibility improved after high-variability phonetic training.
- Higher clarity in speech production before than after training was in the opposite direction to what was expected.

## Implications and future research

- High-variability phonetic training where particular cues are removed and attention is forced on relevant cues could possibly help L2 learners perceptually rearrange cues that were initially perceived as secondary into primary cues, and turn their perceptual benefit of enhancing their identification and discrimination of non-native speech contrasts into a tangible benefit when producing L2 speech.
- Future research could carry out accent ratings to evaluate the strength of L2 learners' accents before and after undergoing high-variability training.

## References

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