

Production of English vowels by Portuguese learners: effect of perceptual training

Anabela Rato

University of Toronto

anabela.rato@utoronto.ca

It is widely acknowledged that second language (L2) speech learning poses a challenge for adult learners, whose difficulties include perceptually categorizing and producing non-native sounds that do not exist or are not phonologically distinctive in their native language (L1) [1, 2]. Previous research on L2 speech learning suggest that both segmental and suprasegmental deviations derive from perceptual inaccuracy (*accented* perception [3]) rather than from production difficulties. Hence, several studies have provided encouraging findings concerning the plasticity of L2 learners' perceptual systems by showing the effectiveness of perceptual training in improving adult learners' ability to perceive and produce L2 sound contrasts [4, 5, 6]. However, some studies have reported no carryover effect of perceptual learning to production [7, 8], and few have used combined empirical techniques to assess L2 speech production [7, 9, 10]. Therefore, the main objective of this study was to investigate the effects of a high variability perceptual training on the production of three American English (AmE) vowel contrasts (/i/-/ɪ/, /ɛ/-/æ/, /u/-/ʊ/) by Portuguese adult learners of English as a foreign language (EFL). The set of English vowel contrasts was selected due to the reported difficulties native European Portuguese [EP] speakers have in distinguishing between the two vowel sounds of each pair [11]. English /ɪ/, /æ/, /and /ʊ/ tend to be assimilated to the Portuguese vowel sounds /i/, /ɛ/, and /u/ respectively. Thirty-four adult learners (mean age=23 years, SD=6.8) of EFL (English as a Foreign Language) participated. They had started learning English at the age of 10 (mean=9.7 years, SD=0.9) and had been exposed mostly through formal instruction for 8 years (SD=1.7). The group of raters included 12 native AmE speakers who had never lived in a Portuguese-speaking country and had no knowledge of Portuguese. The perceptual training comprised five sessions divided into two blocks that included both discrimination and identification tasks followed by immediate feedback with natural stimuli produced by multiple native talkers in different phonetic contexts. Vowel production data were collected three times, before training (pretest), immediately after (posttest), and two months later (delayed posttest) with a sentence-reading task. Two empirical techniques were used to examine L2 vowel production, namely quantitative acoustic analyses of vowel quality and quantity, and perceptual assimilation and category goodness-of-fit ratings [12]. Both duration and the first two vowel formants (F1 and F2) were measured to calculate the Euclidian distance (Hz) and duration ratios (ms) between the vowels of the target contrasts, and L2 vowel productions of 34 Portuguese EFL learners were aurally presented to 12 native AmE listeners who categorized and rated the phonetic realizations in terms of category goodness in a seven-point Likert scale. The acoustic analyses revealed that perceptual training had a significant effect on pronunciation accuracy of the target vowels, specifically in terms of vowel quality, and long term gains were observed two months after training was over. The preliminary results of the native listeners' ratings also showed a positive effect of training on the learning of the three AmE vowel contrasts. However, the goodness ratings showed that L2 vowels were perceived less consistently as single native categories than L1 vowels. These findings imply that pronunciation learning can occur in a formal foreign language learning setting within a short period of time and support the claim that perceptual training can positively modify L2 vowel production.

1. Flege, J. (1995). Second Language Speech Learning: Theory, Findings and Problems. In Strange, W. (Ed), *Speech Perception and Linguistic Experience: Issues in Cross Language Research* (pp. 233-277). Timonium, MD: New York Press.
2. Best, C. & Tyler, M. (2007). Nonnative and second-language speech perception: Commonalities and complementarities. In Bohn, O. & Munro, M. (Eds), *Language Experience in Second Language Speech Learning – In Honor of James Emil Flege* (pp. 13-34). Amsterdam/Philadelphia: John Benjamins Publishing Company.
3. Strange, W. (1995). Cross language studies of speech perception - a historical review. In Strange, W. (Ed), *Speech Perception and Linguistic Experience: Issues in Cross Language Research* (pp. 3-45). Timonium, MD: New York Press.
4. Bradlow, A. R., Pisoni, D. B., Yamada, R. A., & Tohkura, Y. (1997). Training Japanese listeners to identify English /r/ and /l/: IV. Some effects of perceptual learning on speech production. *Journal of the Acoustical Society of America*, 101(4), 2299-2310.
5. Hazan, V., Sennema, A., Iba, M., & Faulkner, A. (2005). Effect of audiovisual perceptual training on the perception and production of consonants by Japanese learners of English. *Speech Communication*, 47, 360-378.
6. Rato, A., & Rauber, A. (2015). The effects of perceptual training on the production of English vowel contrasts by Portuguese learners. In The Scottish Consortium for ICPhS 2015 (Ed.), *Proceedings of the 18th International Congress of Phonetic Sciences*. Glasgow, UK: The University of Glasgow. Retrieved from: <http://www.icphs2015.info/pdfs/Papers/ICPHS0656.pdf>
7. Wang, X. (2008). *Perceptual Training for Learning English Vowels – Perception, Production, and Long-Term Retention*. Saarbrücken: VDM Verlag Dr. Müller.
8. Aliaga-Garcia, C., & Mora, J. C. (2007). Assessing the effects of phonetic training on L2 sound perception and production. In A. Rauber, M. Watkins, & B. Baptista (Eds.), *New Sounds 2007: Proceedings of the Fifth International Symposium on the Acquisition of Second Language Speech* (pp. 25-28).
9. Lambacher, S. G., Martens, W. L., Kakehi, K., Marasinghe, C. A., & Molholt, G. (2005). The effects of identification training on the identification and production of American English vowels by native speakers of Japanese. *Applied Psycholinguistics*, 26, 227-247. doi: 10.1017/S0142716405050150
10. Pereira, Y. (2014). *Perception and production of English vowels by Chilean learners of English: effect of auditory and visual modalities on phonetic training* (Doctoral dissertation). University College London, London, UK. Retrieved from: <http://discovery.ucl.ac.uk/1417190/>
11. Rato, A., Rauber, A., Soares, L., Lucas, L. 2014. Challenges in the perception and production of English front vowels by native speakers of European Portuguese. *Diacrítica - série ciências da linguagem* 28(1), 137-155.
12. Strange, W. 2007. Cross-language phonetic similarity of vowels: Theoretical and methodological issues. In: Bohn, O.-S., Munro, M. (eds), *Language Experience in Second Language Speech Learning – In honor of James Emil Flege*. Amsterdam/Philadelphia: John Benjamins, 35-55.