

The effect of experience on vowel production: the case of heritage speakers of Arabic

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Due to exposure/experience in the target language, adult learners are able to produce vowels that resemble or differ from target values (Munro et al., 2008). Specifically, do we expect the phonetic acquisition of vowels of experienced heritage speakers (EHSs) to more closely resemble native speakers of Arabic (NSs) than inexperienced heritage speakers (IHSs)? Prior work shows that experienced bilinguals produce vowels that are closer to NSs' values than the ones produced by inexperienced bilinguals (Bohn and Flege, 1992). Based on this, the current study hypothesizes that age of first exposure to native-produced target sounds helps establish the phonetic categories (Munro et al., 1996), as in the case of HSs, regardless of amount of experience in the target language. Another competing hypothesis is that IHSs will not be able to produce target-like phonetic categories despite their early language exposure. To test the extent of experience on phonetic attainment, EHSs (6 subjects) and IHSs (6 subjects) in the language classroom are tested. In addition, they are compared to English second language (L2) learners of Arabic, who also differ in the amount of exposure to the target language, i.e., beginner (BL2) learners (6 subjects) and advanced (AL2) learners (6 subjects). All groups have balanced number of males and females. Subjects were assigned to groups based on their language level in the Arabic program at a Midwestern American university as well as on their oral proficiency scores translating 'the Swadesh list' (Polinsky, 2007). Subjects produced all six Arabic vowels /i i: u u: a a:/ in carrier phrases, occurring word-medially in monosyllabic words and surrounded by a balanced set of stops and fricatives in onset and coda positions. Formant values of 6840 vowel tokens (114 words x 2 repetitions x 30 subjects) were measured at vowel midpoint using the Praat burg algorithm.

Two-way ANOVAs testing F1 and F2 (dependent variables) and the effect of language group (5-level factor: IHSs, EHSs, BL2, AL2, and NSs), and vowel (6-level factor) on language group were performed. The results show highly significant effects of language group on F1 [$F(4, 6810) = 53.639, p < 0.001$] and F2 [$F(4, 6810) = 19.096, p < 0.001$], as well as highly significant effects of vowel on F1 [$F(25, 6810) = 967.040, p < 0.001$] and F2 [$F(25, 6810) = 1270, p < 0.001$]. Tukey HSD post-hoc show F1 differences between all language groups except AL2 and EHSs, and between NSs and EHSs. For F2, there are significant differences between groups except BL2 and AL2, IHSs and AL2, BL2 and IHSs, and NSs and EHSs. For vowel, post-hoc tests do not show a consistent pattern for the effect of vowels as produced by different language groups on F1 and F2 measures. These results support the hypothesis that early childhood exposure affects later phonetic attainment. More interestingly, it provides evidence that with extensive contact/exposure to the target language, adult learners are able to acquire native-like phonetic categories and are able to compensate for the phonetic/phonemic disadvantages of a late start.

Overall, this study shows that EHSs have acquired native-like vowels whereas HSs and L2 learners with less exposure to Arabic have not attained target-like values. Hence, more experience in the target language is reflected through significant improve in vowel production as shown by HSs and L2 learners.