

Patterns of Heritage Speakers' Perception of Arabic Consonants

Heritage speakers' early exposure to a language has been associated with native-like performance in perception (Oh et al. 2003) and better performance than second language learners in phonetic aspects of production (e.g. Montrul, Foote, and Perpiñán 2008), though their productions sometimes differ from native speakers (Au et al. 2002). However, there are only a small number of perception studies comparing heritage speakers to native speakers and L2 speakers, and none of them have investigated perception for nonce words across phonetic environments, to separate phonological knowledge from lexical knowledge.

This study examines the patterns of phonological perception among heritage speakers of Arabic as compared to native speakers and L2 speakers, for stimuli presented in masking noise. Overall, heritage listeners tended to identify sounds with accuracy intermediate between native and non-native listeners, but different aspects of their responses aligned with native listeners, L2 listeners, or were distinct from both other groups.

In this experiment, listeners who were native speakers ($n = 9$), L2 speakers ($n = 16$), and heritage speakers of Arabic (currently, $n = 5$) listened to Arabic nonce words and real words played in masking noise and identified them from an array of forms written in Arabic orthography. Each block included consonants in onsets or codas, next to /a/, /i/, or /u/.

Heritage listeners were significantly less accurate than native listeners for some sounds, and significantly more accurate than L2 listeners for others: discriminability for a selection of sounds is given below.

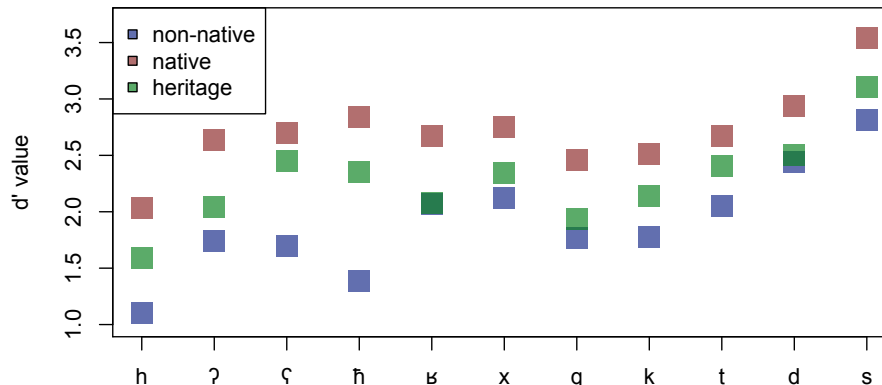


Figure 1: D-prime Values by Segment and Listener Group, Pooled Across All Environments

Heritage listeners exhibited less symmetrical confusions than either native or L2 listeners did, and had a shorter mean response time, which may indicate that they were less prone to reconsidering their answers and hyper-correcting than listeners in other groups. Furthermore, heritage listeners' accuracy did not increase during this task, in contrast to both other groups; this suggests a lack of acclimation to new speakers or to the masking noise.

Like L2 listeners, heritage listeners exhibited a large variability in accuracy across listeners for most guttural and uvularized consonants, with high correlations in accuracy across segments for each listener. However, all individual heritage listeners had consistently different

patterns of responses for /h/ stimuli and /h/ stimuli, whereas few of the L2 listeners did; neither group consistently had different patterns of responses for uvularized vs. non-uvularized consonants. While heritage listeners are aware of some contrasts which are perceptually challenging for native speakers of English, other contrasts seem to be less salient.

Including only sounds with no analogs in English, heritage listeners' accuracy of identifying sounds was highly correlated with their type frequency within Arabic ($R = 0.46$, $p = 0.21$); the correlation was small among native listeners and L2 listeners. The correlation among heritage listeners was much smaller if all sounds were included. These results suggest that heritage listeners' ability to perceive Arabic phonemes is dependent on how frequently they have been exposed to those phonemes across a range of environments.

There was also a high correlation between token frequency in English and accuracy among heritage listeners ($R = 0.55$, $p = 0.011$), higher than both among native listeners ($R = 0.40$, $p = 0.083$) and non-native listeners ($R = 0.45$, $p = 0.049$); omitting consonants with a frequency of 0 in English, the correlation is eliminated among L2 listeners. This suggests that their familiarity with the distribution of consonants in English shapes listeners' expectations.

Heritage listeners, like L2 listeners, had significantly higher accuracy for identifications of real-word stimuli than nonce-word stimuli; however, this was only attributable to significantly higher frequency of real-word responses among L2 listeners.

The varied patterns among heritage listeners suggest that phonological knowledge is not scalar and that the process by which heritage speakers learn a language is different both from the process of native language acquisition and L2 learning.

Many heritage speakers' lack of formal education in Arabic may influence phonological perception, as a result of limited orthographic exposure. There was a high correlation between phoneme identification accuracy and accuracy in a test of familiarity with the diacritics that mark vowels ($R = 0.91$, $p = 0.033$); the correlation was also significant for L2 speakers.

Heritage listeners seem to be more influenced by frequency of exposure to Arabic sounds than native or L2 listeners, exhibiting strong effects of the frequency of phonemes within Arabic and English as well as lexical effects. As their higher accuracy with real words is not the result of preferential selection of these forms, this result suggests that greater exposure to these combinations of phonemes increases heritage listeners' ability to perceive them, particularly as most of the real words present in the stimuli are common words.

The results from heritage speakers in this study can help to elucidate another facet of heritage listeners' linguistic status, which contributes to our understanding of how age and context of acquisition can influence phonological development.

References

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- [3] Oh, Janet, Sun-Ah Jun, Leah Knightly, and Terry Au. "Holding on to Childhood Language Memory." *Cognition* 86.3 (2003): B53-B64.