Research Article

The perception and production of British English vowels and consonants by Arabic learners of English

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ABSTRACT

This study investigated the perception of British English vowels and consonants by native Saudi Arabic learners of English from a range of proficiency levels. Twenty-six participants completed consonant and vowel identification tasks in quiet and noise. To investigate if predicted difficulties with vowel perception were also present in production, participants also recorded vowels embedded in words and read a short story. The results demonstrated that all learners were better able to identify consonants than vowels in quiet and noise, with more experienced learners outperforming early learners. Although learners were likely able to rely on mapping non-native to native categories when identifying consonants, there was some evidence that they had started to establish new vowel targets. This appeared to start early in learning but even highly experienced learners continued to find vowels with no direct Arabic counterpart difficult. Additionally, there was some evidence for a link between perception and production: vowel perception was better in those who had more accurate production. Overall, the results shed light on problematic phonemic contrasts for Arabic learners, and suggest that though learners may be able to establish new phonetic categories early in learning, other contrasts continue to remain difficult even for highly experienced learners.

1. Introduction

It is well-known that early experience with a first language (L1) influences perception and production of a second-language (L2), such that the acquisition of non-native phonemes in adulthood can be impeded, particularly in cases where one or both target phonemes in the contrast are realised differently or do not occur in the learner's L1 (e.g., Best, 1994; Flege, 1995; Iverson et al., 2003). One possibility is that this is because experience with the L1 alters low-level processing, and that these changes interfere with adult learners' ability to alter existing representations and to form new categories for L2 sounds (see Iverson et al., 2003). For example, Japanese listeners are well-known to have difficulty acquiring the English /r/-/l/ contrast, likely because they are more sensitive to F2, a cue which is irrelevant for /r/-/l/ discrimination but which is associated with the Japanese flap /ɾ/, than to F3 onset

frequency, the cue used by native English speakers (see Hattori & Iverson, 2009; Iverson et al., 2003). Likewise, for vowels, L2 learners who use duration contrastively in their L1 are better at learning vowel contrasts that differ according to duration than those who do not use this cue in their L1 (e.g., Gottfried & Beddor, 1988; McAllister, Flege, & Piske, 2002; Morrison, 2002; though see Bohn, 1995). This is consistent with the idea that language-specific perceptual processing modifies the relative salience of acoustic features, such that L2 features that are not contrastive in an individual's L1 are harder to perceive and produce.

Related to this, previous work has suggested that the relationship between the L1 and L2 phoneme systems affects learning. Flege's Speech Learning Model (SLM; Flege, 1995, 1999, 2002) hypothesizes that the L1 and L2 systems exist in the same phonological space, and that experience with an L1 plays a salient role in the way in which the L1 and L2 phonetic subsystems interact. In particular, L2 segments which are phonetically similar to L1 categories are thought to be assimilated into those L1 categories, but those that are perceptually

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distinct from any L1 category are thought to be easier to learn, since they fall into relatively unoccupied regions in the phonological space (cf. Iverson & Evans, 2009). Similarly, Best's Perceptual Assimilation Model (Best, 1994, 1995) predicts that the difficulty in differentiating non-native phonemic contrasts is predictable from the basis of the relationship between the L1 and L2 phoneme inventories; for naïve perceivers, discrimination will be most difficult if both phonemes are assimilated equally well or poorly to the same L1 category, and best where two non-native phonemes are assimilated into two different L1 categories. For L2 learners in the process of developing an L2 system, assimilation patterns are thought to be determined not just by L1–L2 relationships but also by how contrasting L2 phonemes relate to each other within the emerging L1–L2 phonological space (PAM-L2; Best & Tyler, 2007). This means that discrimination of contrasts in which one phoneme is perceived to be a good exemplar of a given L1 category (i.e., is perceptually assimilated) is predicted to be good and no new category will likely be formed. In cases where both L2 phonemes are perceived as equivalent to the same L1 phoneme but one is perceived to be a better fit than the other, discrimination should also be good, but with new category formation predicted only for the deviant phoneme. In contrast, where both L2 phonemes are assimilated to the same L1 category but are perceived to be equally good or equally poor instances of that category, discrimination of the L2 contrast will be poor initially and learning likely difficult. Lastly, where neither of the L2 phonemes is perceived as belonging to a particular L1 phoneme, i.e., the phonemes are *uncategorized*, then learning may be relatively easy depending on the relationships in the L1–L2 phonological system.

For languages such as Arabic with small vowel inventories (see e.g., Holes, 2004), where there are fewer opportunities to map L1 to L2 categories, it is possible that more L2 phonemes may fall into the uncategorized category (cf. Escudero & Williams, 2011), but that these phonemes may be uncategorized in different ways. Faris, Best, and Tyler (2016) examined the different ways in which native Egyptian Arabic (EA) listeners assimilated Australian English (AusE) vowels (19 vowels) to their L1 vowel categories (10 vowels), finding that there were indeed different observable patterns within uncategorized phonemes, and that these were related to the perceived relationships between the L1 and L2 phonetic and phonological categories. In their data, uncategorized vowels fell into 3 categories; (1) *focalized*, in which the L2 phoneme was perceived to be primarily similar to a single L1 category, but where responses were below their assumed threshold for categorization of 50% (e.g., AusE /iː/ which was primarily assimilated to EA /iː/); (2) *clustered*, in which the L2 phoneme was perceived to be similar to a small set of L1 categories (e.g., AusE /ɪ/ which was split between EA /iː/ and /i/), and (3) *dispersed*, in which a range of L1 phonemes were used as responses because there was no good fit (e.g., AusE /ɜː/). Based on their findings, the authors predict that for dispersed assimilations in which listeners are unable to detect L1 category invariant features, a new L2 category is likely to be formed because there will be no interference from previous L1 attunement. For focalized and clustered responses however, new category formation is predicted to depend on the degree of overlap with other L1 phonemes, such that a new

category is only likely to be formed where the L2 focalized or clustered phoneme doesn't overlap with any other L2 category.

The present study aims to further investigate the acquisition of L2 phonemic contrasts and how this is affected by the relationship between the L1 and L2 by examining the perception and production of English vowels and consonants by Arabic learners of English living and working in London, UK. Although Arabic speakers potentially represent one of the largest groups of L2 English users and in many Arabic countries English is "viewed [. . .] as the language of technology, progress, and the future" (Nickerson & Camiciottoli, 2013, p. 333), little previous research has investigated Arabic speakers' perception and production of English. What work there is has generally focussed on bilingual English-Arabic speakers. For example, Shafiro, Levy, Khamis-Dakwar, and Kharkhurin (2013) tested early Arabic-English bilinguals (from different Arabic dialect backgrounds), and native English speakers of the English dialects spoken in the United Arab Emirates (UAE-English speakers), in their identification of American English vowels (/h/-V-/d/ words), and consonants (three vocalic contexts; /ɑCɑ/, /iCi/, /uCu/). Not surprisingly, participants performed very well. Consonant identification accuracy was 95% for Arabic-English bilinguals and 94% for the UAE-English speakers. Although all listeners found American English vowels that did not have a Modern Standard Arabic (MSA) counterpart (e.g., /ɑ/, /ɔ/, /æ/) more confusable than those that did, overall vowel identification was also high; 70% for the Arabic-English bilinguals and 80% for the UAE-English speakers. Given the much smaller vowel space of Arabic, it is perhaps somewhat surprising that participants performed so well in vowel identification. However, these participants were early bilinguals or native speakers of UAE-English dialects with high proficiency in English. Given previous work on L2 vowel acquisition and the recent findings reviewed above showing that AusE vowels were largely uncategorized by native Egyptian Arabic listeners,[1] with the majority clustered or dispersed uncategorizations (Faris et al., 2016), it is thus highly likely that Arabic adult L2 learners of English (i.e., not early bilinguals) will have difficulties in accurately perceiving and producing English phonemes, in particular English vowels (cf., Best, 1994; Flege, 1995; Harnsberger, 2001; Iverson et al., 2003).

However, predicting exactly what difficulties an Arabic learner might have in terms of acquiring the English vowel and consonant phoneme inventory is not straightforward, as the relationship between an L1 and L2 is somewhat more complicated in Arabic than in other languages. Arabic is a diglossic language, with a high and low variety. The high variety (Classical Arabic or MSA) is used in written forms and in formal settings, while the low variety (i.e., dialectal or colloquial Arabic) is used in daily conversations (Ferguson, 1959; Holes, 2004). Dialectal Arabic differs from classical Arabic in terms of its phonology, syntax, and lexicon. Recently the term Modern Standard Arabic (MSA) has emerged to refer to standard Arabic, a variety that uses the Standard Arabic lexicon, but

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[1] Note that Faris et al. (2016) do not specify whether or not their Arabic participants were naïve or L2 learners of English, or give any details of their proficiency with English