

Phonetic Investigation of six diphthongs in Punjabi-Urdu

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The limited literature on Urdu phonology disagrees on the number of vowels, but authors agree that phonologically Urdu does not have diphthongs. However, phonetically, diphthongal sequences are created by the deletion of intervocalic /ʔ/, /j/ and /v/. According to Waqar and Waqar (2002) these diphthongs are rising and the on-glide is shorter than the off-glide, which is unlike the diphthongs in other languages, such as English (e.g. Lindau et al. 1990). The present study investigated six vocalic sequences that could be diphthongal [ɑɪ ɔɪ ʌʊ ɪə eə ʊə] placed in minimal or near minimal pairs of CV structure and embedded in (i) a standard carrier phrase (/mɛ ɪsɛ ɔɑɪ kəhõ ɡɪ/ “I will say *hoof once*”) and (ii) a longer, more natural sentence. Native Punjabi speakers (11M, 11F) between 19 and 55 years of age read 5 semi-randomised sets of the sentences presented on screen for a total of 1320 tokens.

F1 and F2 were measured at two positions, 20% and 80% of each sequence. In addition, F1 and F2 frequencies were measured at seven equidistant points within this interval, 20% 30% 40% 50% 60% 70% and 80%, to examine diphthong trajectories, F1 and F2 movement, and vowel inherent spectral change (cf. Mayr and Davies, 2011). Mean formant frequencies from each participant were submitted to repeated-measures mixed-plot ANOVAs (6 diphthongs × 2 carrier phrases × 2 genders), run separately for each start and end point of F1 and F2 using R (R Core Team, 2013). The results suggest that the vowel quality at the end of /ɪə/, /eə/, and /ʊə/ was closer to /ɑ:/ than /ʌ/ or /ə/, while that of /ʌʊ/ was closer to /ɔ:/ than /ʊ/. The results also show that the onset of /ɪə/ was different from monophthongal /ɪ/ with regard to F1 ($p < 0.001$) and suggested that /ɪ/ in /ɪə/ was higher and more fronted than /ɪ/. The lower F2 at the onset of /eə/ suggested that this onset was lower and more retracted than /e:/. The higher F2 at the onset of /ʌʊ/ suggested that it was more fronted than /ɑ:/, while lower F2 at the onset of /ɑɪ/ suggested that it was more retracted than /ɑ:/. As expected, durations were significantly longer in the speech of female participants and in natural sentences.

In addition, the percentage of duration spent in the F2 transition phase and duration of onset and offset was calculated. These percentages suggest that the transition occupies barely 30% of the total duration of each diphthong; this is markedly different from English where transition duration can be very high, e.g., 60% for /ɑɪ/, and 73% for /ʌʊ/ (Lindau et al. 1990). Contrary to Waqar & Waqar (2002), on-glide is not always shorter than off-glide for all six diphthongs. The almost equal duration at onset and offset and the short transition reflect the non-phonological nature of these sequences that are produced more as distinct vowels than true diphthongs.

References

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