

Diphthong trajectories in Māori

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Index Terms: Māori, sound change, diphthongs

1. Introduction

Sound change over time has been identified in monophthongs in Māori, the language of the indigenous people of NZ [1], with /u u:/ fronting, the mid vowels rising, so that /i~i:~e~e:/ can appear identical, and the quantitative distinctions between long and short monophthongs being reduced apart from /a~a:/ [1], [2]. The five most frequent diphthongs in Māori are /ai ae au ou ao/. Analysis has shown mergers between two pairs of these diphthongs, /ai~ae/ and /au~ou/ [3]. This study argued that only one of these mergers is due to the monophthong movements: we have shown that /e e:/ have risen [3], but the second target of /ae/ is falling. It was suggested that this merger is due to glide weakening of /ai/. The merger of /au/ and /ou/ is probably influenced by the fronting of /u u:/. The major distinction for /au ou/ is in the first target, but the fronting of T1 for both /au/ and /ou/ is highly correlated both to the fronting of T2, and the fronting of /u u:/. Diphthong analysis to date has only offered schematic formant trajectories with arrows from T1 to T2 indicating the movement [2], [3]. Here we present for the first time an analysis of the vowel mergers looking at the entire diphthong trajectories, for T1 and T2 for the male speakers. These plots reveal the course and timing of the diphthong movements.

2. Methodology.

The data comes from three groups of speakers, ten Historical Elders (HE, born ~1880), ten Present Day Elders (PE, born ~1930), and ten Young speakers (born ~1990). The Young speakers are first (YL1) or second (YL2) language Māori speakers. Diphthongs were taken from stressed words in running speech. Up to 30 tokens per diphthong per speaker (total: 3,739 tokens) were analyzed in PRAAT. The F1 and F2 trajectories for the diphthongs were extracted between the first and second vowel targets. Trajectory analysis was carried out in R (<http://www.r-project.org>). For each vowel from each speaker group, the trajectories were time normalized, and averaged.

3. Results

F1/F2 trajectories over time for the diphthongs are shown in Figure 1. There are no changes over time for all vowels in F1. There is a clear centralizing over the entire F2 trajectory by the young speakers for /ai/ and for T1 of /ae/. For /au/ and /ou/ the impact of /u u:/ fronting can be seen over the entire F2 trajectory, which is higher for the Y speakers than the older speakers, although all speaker groups have a similar starting point. /ao/ remains stable over time, reflecting the lack of movement in time of /a a:/ and /o o:/.

4. Conclusion

The merger of /ai~ae/ which could not be explained by other sound changes is probably caused by the centralizing for the young speakers over /ai/ and for T1 of /ae/. For /au~ou/, the fronting of /u/ can be clearly seen to have affected the whole of the diphthong traces for the Y speakers, and is thus confirmed as the cause of the merger.

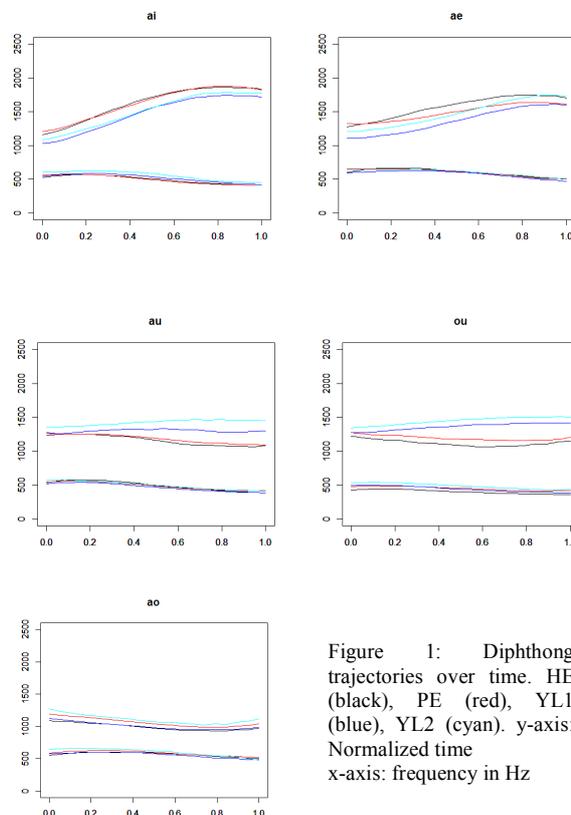


Figure 1: Diphthong trajectories over time. HE (black), PE (red), YL1 (blue), YL2 (cyan). y-axis: Normalized time x-axis: frequency in Hz

5. References

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