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Diphthong trajectories in Māori

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Raureti Te Huia, Ngāti Maniapoto, 1885-1952

Background

Monophthongs

Sound change over time has been identified in Māori monophthongs [1] (Figure 1):

- /u u:/ fronting,
- mid front vowels rising, so that /i~i:~e~e:/ can appear identical,
- quantitative distinctions between long and short monophthongs reduced, except for /a~a:/ [1, 2].

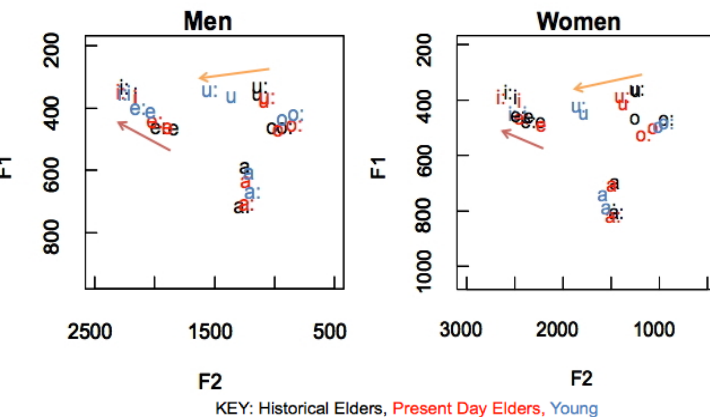


Figure 1: F1/F2 monophthong vowel space (in Hz)

Diphthongs

Five most frequent diphthongs in Māori are /ai ae au ou ao/.

- Mergers between /ai~ae/ and /au~ou/ [3] (Figure 2).
- Only one of these mergers is due to monophthong movements:
 - Merger of /au/ and /ou/ is probably influenced by fronting of /u u:/
- Suggestion that the /ai~ae/ merger is due to glide weakening of /ai/.

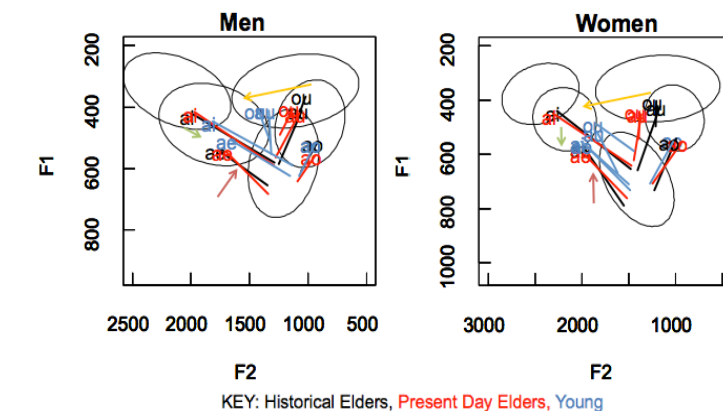


Figure 2: F1/F2 diphthong vowel space (in Hz) showing T1 and T2 trajectories and monophthong ellipses

Dynamic analysis

Here we present for the first time an analysis of the vowel mergers looking at the entire diphthong trajectories, for F1 and F2 across the whole diphthong (T1-T2) for the male speakers. The plots in Figure 3 reveal the course and timing of the diphthong movements.

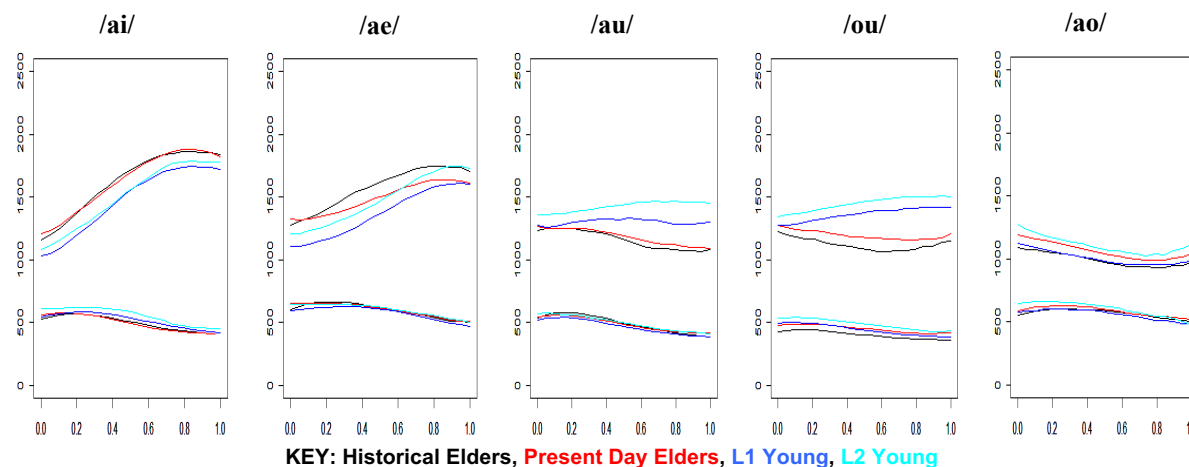


Figure 3: F1 and F2 trajectories of five most common Māori diphthongs over time, y-axis: Normalized time, x-axis: frequency in Hz

Findings

- F1: no changes over time for all vowels.
- /ai/: clear centralizing of F2 over the entire T1-T2 trajectory by the Young speakers.
- /ae/: clear centralizing of F2 for T1 by the Young speakers.
- For /au/ and /ou/ the impact of /u u:/ fronting can be seen over the entire F2 trajectory.
- /ao/ remains stable over time, reflecting the lack of movement in time of /a a:/ and /o o:/.

Conclusion

The merger of /ai~ae/ which could not be explained by other sound changes is probably caused by the centralizing by the Young speakers for F2 for the whole of /ai/ and for F2 in 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 Young speakers, and is thus confirmed as the cause of the merger.

Merger implications

Diphthong merger does not cause confusion for speakers because minimal pairs are usually easily disambiguated in context.

- *Tae* (to arrive) vs. *tai* (tide)
- *Pou* (a post) vs *pau* (to be all used up)

The data

The MAONZE (Māori and NZ English) project investigates sound change over time in the Māori language, the language of the indigenous people of NZ, using three groups of male and female speakers:

- 10 Historical speakers born 1880s
 - 10 Present day elders born 1920-1944
 - 10 Young speakers born 1969-1992
- Young speakers are first (L1) or second (L2) language Māori speakers

- Diphthongs taken from stressed words in running speech.
- Up to 30 tokens per diphthong per speaker (total: 3,739 tokens)
- Analyzed in PRAAT.
- F1 and F2 trajectories extracted between the first and second vowel targets (T1 & T2).
- Trajectory analysis carried out in R (<http://www.r-project.org>).
- For each vowel from each speaker group, the trajectories were time normalized, and averaged.

Māori phonology

- 10 monophthongs, 5 long short pairs:
 - /i: e: a: o: u:/
 - /i e a o u/
- 10 consonants:
 - /p, t, k, m, n, ŋ, f, h, r, w/
- Diphthongs: at least within morphemes, all sequences of a lower and higher vowel, e.g. /au/, /ou/, /ao/, /ae/, /ai/, also /oe/, etc.

References

- [1] Harlow R., Keegan, P., King J., Maclagan, M., and Watson C., "The changing sound of the Māori language", in J. Stanford and D. Preston [Eds], An anthology on quantitative sociolinguistic studies of indigenous minority languages, 129-152, John Benjamins, 2009.
- [2] Maclagan, M., Harlow, R., King, J., Keegan, P. and Watson, C.I., "The role of women in Māori sound change." In Y. Elhindi and T. McGarry [Eds], Gender-linked variation across languages, 5-21, Common Ground, 2013.
- [3] Watson, C.I., Maclagan, M., King, J., Harlow, R. and Keegan, P., "Sound change in Māori and the influence of New Zealand English", J. of the International Phonetics Association, in press.