

# The diphthongization of FLEECE and GOOSE in Auckland

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## 1. Introduction

We present acoustic data looking at the diphthongization of FLEECE and GOOSE for New Zealand English (NZE) speakers in Auckland. In NZE these vowels are distinctly diphthongized through the raising of F1 and lowering of F2 during the vowel onset. Until recently NZE research indicated that this diphthongization was increasing over time [1].

However, Auckland, New Zealand's largest city, has seen dramatic demographic change over the past 30 years. In 2018 over 40% of Aucklanders were born overseas [2], and with these migrants has come a diverse range of language and dialect backgrounds. We know that with increased linguistic diversity often comes new linguistic change [3]. For example, recent phonetic research shows young NZE speakers in Auckland are *lowering* their DRESS, TRAP, and NURSE vowels [4]. This is notable as the *raising* of these vowels has been the centerpiece of NZE research for decades. Given this, we look at FLEECE and GOOSE and consider whether there is evidence of these vowels also undergoing change amongst young Aucklanders. We are especially interested in FLEECE which some work suggests has been linked to DRESS raising and is implicated in NZE's 'Short Front Vowel Shift' [5].

## 2. Methods

Data is taken from the Auckland Voices Project corpus. We analyzed 67 NZE speakers from Auckland, stratified by age (<25, 40+) and gender; all either NZ born or arrived in NZ under age seven. 10 minutes of speech per speaker was extracted from larger sociolinguistic style interviews.

Transcribed recordings were passed through WebMAUS forced aligner [7]. Formant tracks were calculated with the EMUR [8] package in R [<https://www.r-project.org/>]. Further processing including hand checking phonetic boundaries and formant correction was then undertaken using the EMU-webApp [8]. Vowel targets were labelled for vowels with phrase stress and these tokens were extracted for in R using EMUR. Tokens in an approximant (/j, r, w, l/) or vowel environment were removed from the analysis. We looked at two measures, first, a static measurement at the vowel target (onglide). This is given as a normalized to a value between 0 and 1. For a diphthongized FLEECE and GOOSE, we expect an onglide value of more than 0.5 indicating the vowel reaches its target after the midpoint. Second, we present a visual analysis via formant trajectory plots of F1 and F2 where the formant tracks are linear interpolated and time normalized.

## 3. Results

The results of the visual analysis indicate that the under-25 Auckland speakers are using less diphthongized variants of

FLEECE and GOOSE than their 40+ counterparts. For FLEECE the onglide measure supports the findings of the visual analysis. The 40+ men and women have a more delayed target (0.6 and 0.59 respectively), than the under-25 speakers (men 0.54, women 0.53). The onglide measure, however, fails for the GOOSE vowel. We know from the formant plots that the older groups have a distinct onglide for GOOSE, but our delayed target measure indicated no groups with a value greater than 0.5. After further investigation we establish that this is likely due to the target labelling guidelines for NZE GOOSE which we can show don't work for an onglided GOOSE vowel.

## 4. Discussion

Our analysis suggests that for our under-25 Aucklanders, FLEECE and GOOSE are more monophthongal than their 40+ counterparts. This is notable as it might indicate the potential loss of two longstanding NZE features. Furthermore, FLEECE is often said to be implicated in the NZE 'short front vowel shift'. It is worth considering whether there is a link between this finding and DRESS lowering. We should also consider potential links to research with Australian English speakers in Sydney which also found reduced diphthongization of FLEECE [8]. Finally, while this study is limited to Auckland based NZE speakers, a preliminary analysis of speakers from a smaller NZ centre (Nelson) indicates this change might be being starting to be adopted by young speakers elsewhere in New Zealand.

## 5. References

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