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Do I make myself claire? Rethinking the direction of the NEAR/SQUARE merger in New Zealand English

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Do I make myself claire? Rethinking the direction of the NEAR/SQUARE merger in New Zealand English

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Abstract

The near-merger of the front-centering diphthongs NEAR /ɪə/ and SQUARE /eə/ in New Zealand English is a hallmark of ongoing phonological change. Previous studies have largely relied on read-aloud data to track a merger that has conventionally been described as favouring a NEAR realisation, particularly among younger speakers, while older speakers typically maintain a distinction. To explore this phenomenon using more spontaneous speech, this study introduces an interactive sorting task designed to elicit a high density of NEAR/SQUARE tokens in natural discourse, alongside a traditional reading passage and minimal-pair wordlist for comparison. Ten Wellington-based, middle-class Pākehā women were recruited: five categorised as 'Young' (ages 15–23) and five as 'Old' (ages 75–92). Each participant completed three tasks in succession: an interactive card-sorting game, a 50-token reading passage, and a wordlist of 13 minimal pairs, yielding an average of 108 NEAR/SQUARE tokens in under 17 minutes. Auditory coding of spontaneous and read data was complemented by acoustic formant analysis in Praat (F1, F2) of the wordlist items. Contrary to expectations, seven of ten participants exhibited a full merger on SQUARE, with only three maintaining a clear NEAR/SQUARE contrast. Both age groups showed strong tendencies to collapse on SQUARE, though Young speakers merged at a higher rate (four out of five participants) than Old (three out of four). Acoustic measurements confirmed that merger realisations clustered near traditional SQUARE formant values but were overall more open and backed than suggested in earlier studies. These findings challenge the prevailing narrative of a unidirectional merger onto NEAR. The interactive task proved effective at masking linguistic focus while efficiently generating high-volume data, underscoring the value of this semi-spontaneous elicitation method. Implications include the need for updated, large-scale acoustic data collection and expanded sociophonetic variables (e.g., ethnicity, gender, social class, region) to assess whether a directional reversal or an expanded "EAIR" approximation is emerging in New Zealand English.

Keywords

New Zealand English (NZE), NEAR/SQUARE merger, sociophonetics, semi-spontaneous elicitation, Praat formant analysis

1 Introduction

In a yoga class a few years ago, we were on our hands and knees when the teacher instructed us to lift one leg up behind us, "using the inner thigh." As we hovered that leg, balancing on three limbs, she added emphatically, "now lift your inner thigh up *into the ear*!" Seized by a

moment of panic, I glanced about to see how this extraordinary manoeuvre might be performed before my language perception system caught up and identified the miscreant vowel: she had said "into the air".

Variability in pronunciation is one of the defining characteristics of human language (Foulkes & Docherty, 2006). Such variability, often in the form of speaker innovation, leads over time to language change (Holmes & Wilson, 2022, p. 288). One reasonably common type of language change is the phenomenon of the vowel merger (Hazenberg, 2017, p. 189), in which two contrasting phonemes collapse into a single realisation (Hay et al., 2006). In New Zealand English (henceforth NZE), such a merger is in progress between the two front centering diphthongs, NEAR and SQUARE (Hay et al., 2006), as identified by Wells' (1982) lexical set nomenclature. NZE is a non-rhotic variety[1] (Bauer & Warren, 2008), and these two diphthongs are produced with schwa off-glides (Hay et al., 2006).

Although the merger of these two vowels is not unique to New Zealand, the same phenomenon having been observed in a very small number of other varieties of English in the 1960s, 70s and 80s, (Holmes & Bell, 1992), it is nonetheless "one of the most salient characteristics of New Zealand English" (Maclagan & Gordon, 2000, p. 201). In early NZE, the targets for these two diphthongs were distinct, but have been converging over the last few decades (Watson et al., 2000, as cited in Hazenberg, 2017).

According to Labov's definition (Labov, 1994, as cited in Kennedy, 2004), this particular merger is a *near merger*, rather than a *full merger*, the crucial difference being that not all members of the speech community are participating equally. In a full merger, the distinction between the two phonemes in question is neutralized entirely and is presumably unrecoverable (Labov et al., 1972, as cited in Hazenberg, 2017). Further, the NEAR/SQUARE merger is described as a "merger of approximation" as opposed to a "merger of expansion" (Labov, 1994, p. 321), meaning that the two phonemes are collapsing onto a single realisation, rather than expanding across the whole range of pronunciations previously available in the dialect.

The most extensive study of these two phonemes in NZE was conducted by Gordon and Maclagan (2001). This was a diachronic study, tracking the merger in real time across four Christchurch schools, beginning in 1983 and repeated every five years for a period of 20 years. The researchers interviewed over one hundred 14–15-year-old students for each cycle, collecting read-aloud sentences and wordlist data. Initially there was great variability in realisations of NEAR and SQUARE, but by 1993, the merger was strongly approximating on NEAR.

In 1990, another large production study was undertaken by Holmes and Bell (1992) in Porirua. This study broadened the social factors under consideration with two ethnic groups (Māori and Pākehā), three age groups, and male and female participants. Data was collected by means of a reading passage, wordlists, minimal pairs and through various discussion topics. Holmes and Bell argue for an 'EAIR' vowel, i.e., a realisation somewhere between EAR and AIR. They also noted the merger favoured the SQUARE variant, although some groups favoured the NEAR.

By the 2000s, the direction of the merger was established towards NEAR, especially for younger speakers (Gordon & Maclagan, 2001; Kennedy, 2004; Rae & Warren, 2002; Warren, 2006). Recent acoustic analyses confirm this direction, for example, Gubian et al. (2019), who use a database recorded in 1999–2000 of read-aloud sentences. Some researchers posit an explanation for this direction in terms of phonetic context, suggesting that the merger has

[1] With the notable exception of the Southland dialect, where rhotic forms are produced in the NURSE lexical set (Hay et al., 2006).

progressed through the population by means of a lexical diffusion process (e.g., Maclagan & Gordon, 1996; Warren & Hay, 2006). Certain preceding consonants which exhibit a close, front point of articulation, namely /ʃ/, /ʧ/ and /k/, which Warren (2006) terms coronal consonants, can have the effect of raising the first element of the diphthong. While acknowledging /k/is not generally characterised as a coronal, Warren terms it 'frontish' and considers the close articulation the important aspect in terms of its effect as a preceding consonant. He speculates that words containing these three preceding consonants have potentially led the change towards the approximation on NEAR, with other words in the lexicon following suit over time.

1.1 Social factors

Seeking explanations for phonemic variation between speakers of a dialect calls for an investigation of social factors (Foulkes & Docherty, 2006). Of the many social factors potentially relevant, there is much research indicating that younger speakers tend to merge NEAR and SQUARE where older speakers keep them distinct (e.g., Gordon & Maclagan, 2001; Kennedy 2004, Hay et al., 2006). Maclagan and Gordon's 1996 study found effects for age on the merging of NEAR and SQUARE, with 72.2% of older professionals making a distinction against 30% of younger professionals. Social class was also a factor, with only 1.7% of younger non-professionals (aged 20–30) distinguishing the two vowels, where 30% of younger professionals made the distinction. Batterham (2000) also explored age and social class on the merger, and found similar results.

1.2 Motivation and hypotheses

Bayard asserts that the NEAR/SQUARE diphthongs are 'the most thoroughly studied [variable] in New Zealand English' (Bayard, 1995, p. 67, as cited by Kennedy, 2004). Critically, however, the myriad studies intimated in Bayard's comment utilize very little naturally occurring data. This is because of the low frequency of these phonemes, making it difficult to collect multiple instances of NEAR/SQUARE productions in spontaneous speech. Of the 20 vowels of NZE, these two sit at 17th and 18th (Gimson, 1963, based on a study by Fry, 1947). Admittedly this study is now over 75 years old, however it seems unlikely that this will have changed). A considerable amount of data must therefore be collected in order to elicit a small number of such tokens. While it is generally agreed among linguists that spontaneous speech is preferable to read-aloud data (Hay et al., 2006), this collection difficulty has forced many researchers to utilize read sentences.

To address this issue, I designed an interactive task with the capacity to elicit a large number of semi-spontaneous productions of NEAR and SQUARE tokens in a short period of time. I also included a reading passage and wordlist in the experiment for more ready comparison with data from other studies. My primary motivation in conducting this research was therefore to trial this new experimental approach.

The limited scope of this project allowed for the investigation of only one social factor. I chose age, as a well-established factor in this merger. All participants are Pākehā women. My two groups are classified as 'Young' (aged 15–22), and 'Old' (aged 72–93). I also collected self-reports from participants as to whether they perceive themselves as merging or distinguishing these two vowels.

My hypotheses regarding results are:

1. Age: The Young speakers will predominantly merge their NEAR/SQUARE phonemes; the Old will distinguish.
2. Direction: Those who merge will do so on NEAR.
3. Task: The greatest amount of merging, predominantly by the Young, will be seen in the Interactive Task (representing the most spontaneous speech). Merging will be present perhaps to a lesser extent in the Reading Passage. Wordlist data will display the least merging. In self-reporting, the Old will claim they distinguish NEAR and SQUARE; mixed self-reports will be seen from the Young women.

2 Methodology

2.1 Participants

Ten participants were recorded for this study, all Wellington-based native NZE speakers. In order to investigate the effect of age as a social factor, five young participants were selected (aged 15–23) and five old (75–92), controlling as much as possible for other social factors: all were Pākehā, all were women, and all were roughly middle-class. As indicated through a background questionnaire, education levels were high among the 'Old', with all five university-educated, four to postgraduate level. Among the 'Young', only one was currently studying at university, and education levels among their parents varied. I cannot rule out the potential discrepancy in social class as an influential factor in the results, however the difference between the two groups in this regard is difficult to measure and potentially negligible. By contrast, the groups were conclusively separated by age with a good 50 years between them, making age a clearly defined variable.

All participants received Whittakers chocolate for their time.

2.2 Materials

A three-task structure was devised for this experiment: an Interactive Task, a Reading Passage, then lastly a Wordlist. The progression through the tasks is intended to elicit the most spontaneous, informal speech initially, through to the most formal, controlled speech typical of a wordlist. The first task also offers the researcher the most covert observation of the phonemes produced, through to the most overt, speaker-aware productions in the last.

Task 1 (the experimental aspect of this study): An interactive sorting task designed with a level of cognitive load hopefully sufficient to distract participants from monitoring their speech, without being *too* great a load that might result in long pauses for thinking. It is also hoped that this cognitive load will help disguise the phonetic features under observation. Fillers were included to aid this purpose. Under an A3 sheet of paper I arranged 40 small yellow cards, a noun written onto each one. Five included small sketches for clarification of items I thought the young participants might be unfamiliar with (e.g., *ouzo, snare, Blackbeard*). Around the perimeter I placed sorting boxes with the following labels, which I asked participants to read aloud: *Land, Sea, Air, Food & Drink, People*, *House, Dangerous*. Participants were then instructed to place the yellow cards in whatever category they saw fit, with no right or wrong answers. The one caveat was that they could not touch the cards but rather had to give me verbal instructions to move them. The phrase "Put the ____ in the ____ (box)" was written at the bottom of the A3 page, with instructions to use this phrasing as much as possible. I didn't insist on this as doing so was shown in pre-tests of the materials to disrupt

the natural flow of language. '*Banana*' was given as a demonstration card, and then the covering was removed. Participants were asked to point in order to help me find the items quickly.

The 40 items in the task are comprised of 26 NEAR/SQUARE words, 13 NEAR and 13 SQUARE (see Table 1). Another 14 vowel-initial words were included as distractors, doubling as items for a potential investigation of /ði/ and /ðə/ before a vowel (altogether there are 19 vowel-initial words, supplying 18/20 of the NZE vowels–see Appendix A). Some of the NEAR/SQUARE targets are within compound words (e.g., *nightmare, reindeer*) or exist as part of two words (e.g. *grizzly bear*). This is intended to further obscure the NEAR/SQUARE focus of the task, as well as allowing nouns to be created out of verbs and adjectives (e.g., *scarecrow, spare tyre*). However, it should be noted that the stress patterns on these compound words, particularly where the stress is weak on the NEAR/SQUARE token, will probably have influenced results.

Table 1. Breakdown of NEAR/SQUARE words in Task 1

NEAR words	SQUARE words
pier	pear
steers	stairs
beer	grizzly bear
spear	spare tyre
meerkat	nightmare
reindeer	daredevil
earring	airship
earwig	airgun
cheerleader	chair
clearfile	éclair
blackbeard	snare
sports gear	scarecrow
chandelier	arctic hare

The first two lines display the only minimal pairs in the word set (i.e., *pier/pear* and *steers/stairs*). The next eight lines show words that contain within them a NEAR/SQUARE pair (e.g., *beer* and *grizzly bear*). The last three lines have no NEAR/SQUARE partner in the set. (See Appendix A. for a breakdown of the vowel-initial word set.)

Participants were then asked to hazard a guess at the language focus of the study (see Appendix E. for exact wording of questions to participants.)

Task 2: Participants were then given the Reading Passage and instructed to read it aloud 'at a natural pace' (see Appendix B for the full Reading Passage.) The style mimics that of a

children's novel, and the passage contains 50 NEAR/SQUARE words altogether, out of a total of 520 vowels in the passage (i.e., 9.6% of the vowels in the passage are NEAR/SQUARE vowels). This includes 23 NEAR and 27 SQUARE tokens, with several compound words once again *(blackbeard, meerkats, nightmare, airship)* and varying parts of speech *(e.g., appeared, weirdly, daring).* (See Appendix C for the breakdown of NEAR/SQUARE words in the Reading Passage).

Participants were then asked again if the focus of the study was any clearer.

Task 3: Participants read aloud a wordlist containing 13 minimal pairs of NEAR and SQUARE words (see Appendix D). The order of the vowels in question was randomized for each minimal pair to avoid any patterning. All participants received the wordlist pairs in the order given in Appendix D. Finally, for the self-reporting question, participants were asked, "Do you pronounce these pairs of words the same or differently?"

These three tasks elicited a minimum of 103 tokens of NEAR/SQUARE per participant (49 of NEAR and 54 of SQUARE).

2.3 Method of analysis

Participants were recorded on Voice Recorder on a Samsung Galaxy mobile phone; as a result, recording quality was somewhat variable. An auditory analysis was made for all three tasks (the Interactive Task, the Reading Passage, and the Wordlist), in which tokens were coded as NEAR or SQUARE by the researcher, a NZE speaker who distinguishes these two phonemes. Admittedly, the nature of my own distinction as the researcher will very likely have influenced my categorisaton of the tokens; similarly, my knowledge of which word the speaker is saying in any one instance will also have influenced my judgements. To go some way towards addressing this, an acoustic analysis of the F1 and F2 formants was performed using the phonetics freeware programme, Praat (Boersma & Weenink, 2022). However, due to time constraints, only the Wordlist data was analysed acoustically. The first target of each NEAR or SQUARE diphthong was analysed, at a point 25% into the duration of the diphthong as isolated on a spectrogram. Given the second target of the diphthong centres to schwa (Kennedy, 2004), this aspect of the vowel was not included in the analysis. All results were analysed in R studio using Core R (R Core Team, 2021) and ggplot2 (Wickham, 2016).

3 Results

3.1 Auditory analysis (across all three tasks)

This experiment produced an average of 108 NEAR/SQUARE tokens per participant in a time period of 8–17 minutes. The total number of NEAR tokens collected across all participants and all three tasks was 502, and the total number of SQUARE tokens was 584. Results of the auditory analysis collated across all three tasks indicate that seven out of the ten participants in this study fully merge their NEAR and SQUARE vowels, and surprisingly, those who merge do so on SQUARE. No participants were found to merge on NEAR. Unexpected results were also seen for the age factor, with three out of five participants in the Old group merging, and four out of five participants amongst the Young.

The means are given here for proportions of tokens, first over all participants, and then by age (Tables 2 and 3).

Table 2. Means for pronunciations of NEAR and SQUARE diphthongs across all participants

Vowel	Pronounced as NEAR	Pronounced as SQUARE
NEAR	46.7%	53.3%
SQUARE	4.7%	95.3%

Table 3. Means for pronunciations of NEAR and SQUARE diphthongs by Age

	OLD			**YOUNG**	
Vowel	Pronounced as NEAR	Pronounced as SQUARE	Vowel	Pronounced as NEAR	Pronounced as SQUARE
NEAR	60.2%	39.8%	NEAR	33.2%	67.8%
SQUARE	6.7%	93.3%	SQUARE	2.7%	97.3%

3.2 Auditory analysis by Task

I was also interested in the effect of Task on merging. For clarity, the total numbers of NEAR/SQUARE tokens collected in each task across all participants were as follows (Table 4):

Table 4. Number of NEAR/SQUARE tokens by Task

Task	Number of NEAR/SQUARE tokens
Interactive Task (T1)	326
Reading Passage (T2)	500
Wordlist (T3)	260

Assuming the Interactive Task produced the most spontaneous, unmonitored speech and the Wordlist the most controlled, with the Reading Passage somewhere in between, I predicted more merging to be seen in the first task than in the last (Table 5), particularly among the Young speakers, while I predicted the Old to distinguish across all three tasks.

Table 5. Means for pronunciations of NEAR and SQUARE by Task

Interactive Task (T1)			**Reading Passage (T2)**			**Wordlist (T3)**		
Vowel	Pron. as NEAR	Pron. as SQUARE	Vowel	Pron. as NEAR	Pron. as SQUARE	Vowel	Pron. as NEAR	Pron. as SQUARE
NEAR	50.3%	49.7%	NEAR	46.8%	53.2%	NEAR	43.1%	56.9%
SQUARE	5.4%	94.6%	SQUARE	3.5%	96.5%	SQUARE	5.4%	94.6%

Results here contradicted my prediction. There is a modest *increase* in the proportion of NEAR words pronounced as SQUARE as we go from T1 to T3 (from 49.7% to 56.9%), i.e., a *greater* degree of merging as participants went from most spontaneous to most controlled task. SQUARE words pronounced as NEAR remain very low across all three tasks (3.5–5.4%).

3.3 Acoustic analysis (of Wordlist, Task 3)

Locating the midpoint of the target vowel in the spectrogram analysis was done largely by eye: I isolated the start and end of the diphthong, then took a measurement approximately 25% into the isolated segment, to record the F1 and F2 of the target vowel. It is worth noting the limitations of this method and its inherent inaccuracies, in both the difficulty in identifying the vowel boundaries, and in the estimate by eye of 25% into the duration of the vowel. This was particularly the case for vowels following /ɹ/ and /l/, and to a lesser extent, /m/ and /n/.

The graphs below (Figures 1–4) display four individual participants' distributions of the target vowels for NEAR and SQUARE diphthongs extracted from the Wordlist task: two participants are mergers, and two are 'distinguishers' (one Old and one Young of each, each selected as one of the most extreme examples of merging or distinguishing their age group). Plotted against these distributions (in black) are the mean Hertz values of formants for NEAR and SQUARE targets for Old and Young participants from an external data source recorded in 2002 (P. Warren, personal communication, 2022). Note that Warren's data come from read sentences, where mine are derived from a Wordlist reading, which would be expected to be more conservative. Although not a perfect match for comparison, both, evidently, are read-aloud data.

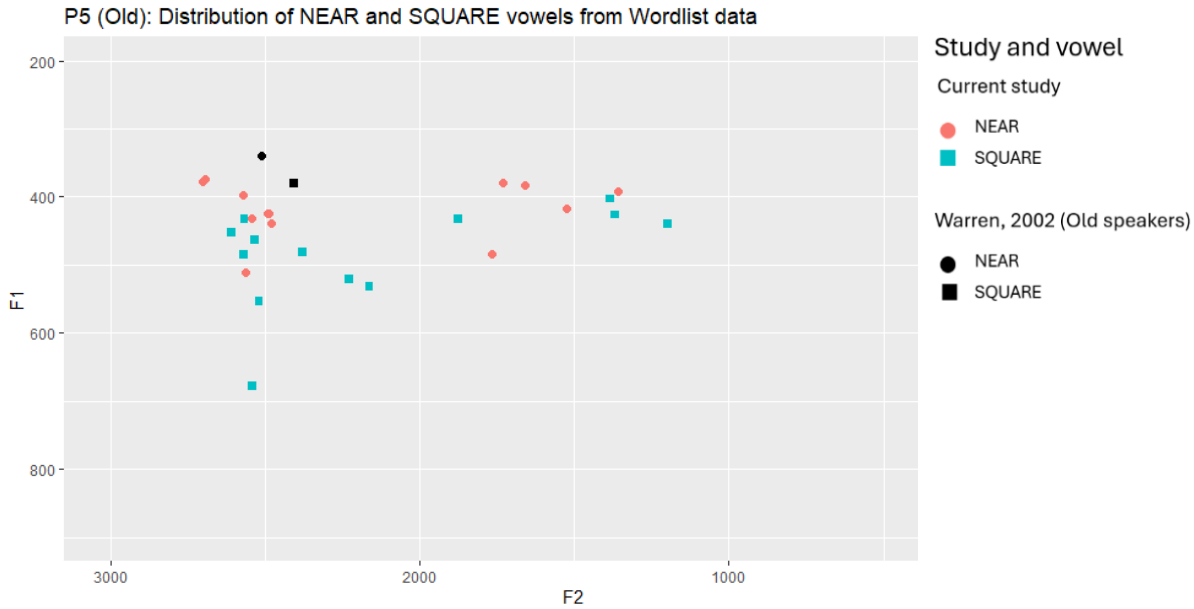

Figure 1. Merger (Old). Vowel formants (in Hz) of target for near and square vowels from Wordlist

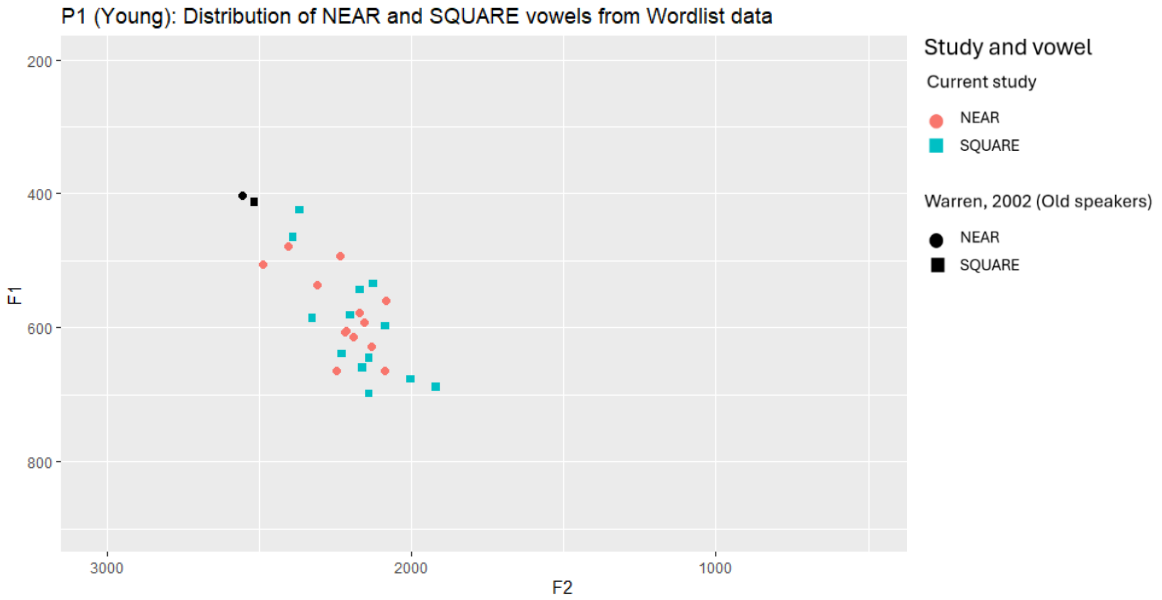

Figure 2. Merger (Young). Vowel formants (in Hz) of target for NEAR and SQUARE vowels from Wordlist

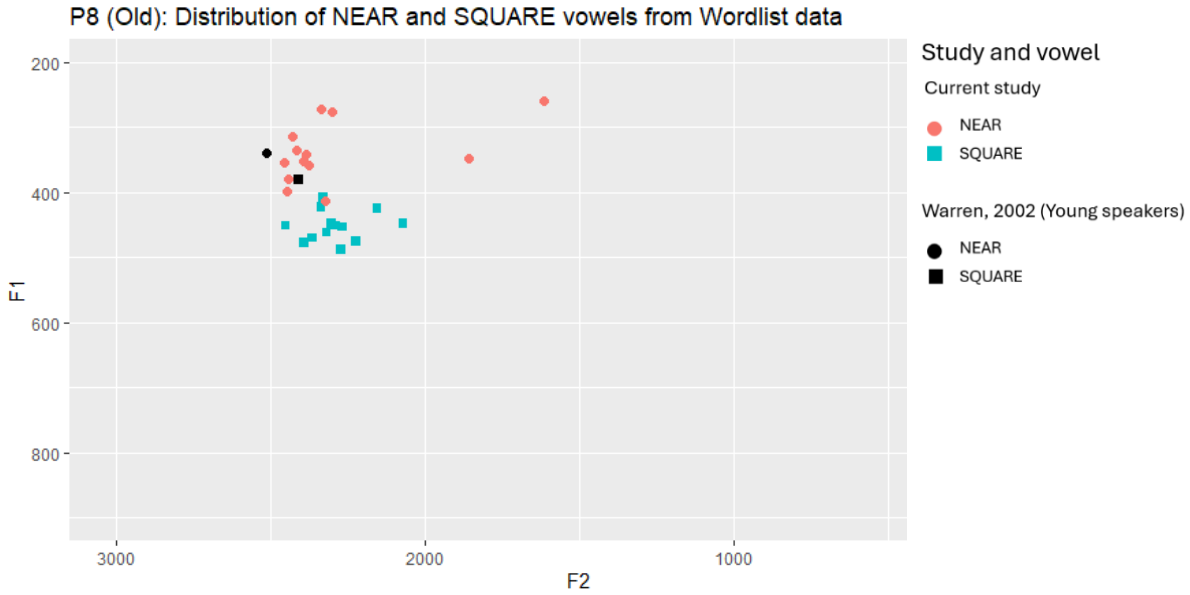

Figure 3. Distinguisher (Old). Vowel formants (in Hz) of target for near and square vowels from Wordlist

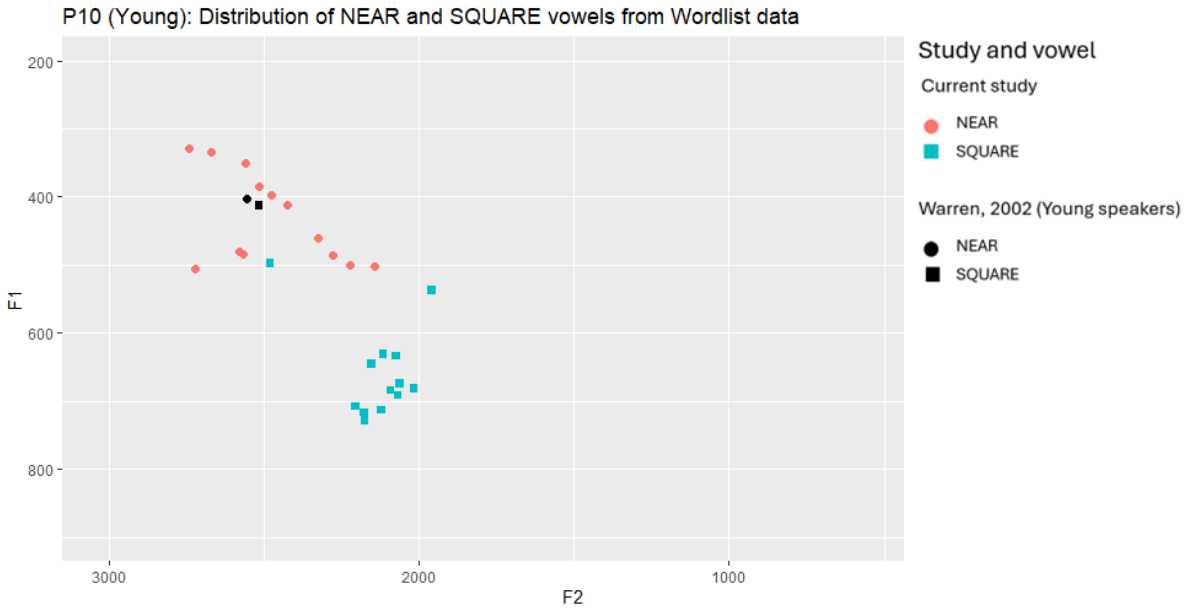

Figure 4. Distinguisher (Young). Vowel formants (in Hz) of target for NEAR and SQUARE vowels from Wordlist for Young participant who distinguishes

The formant means (in Hz) and standard deviations across all participants in the Young vs. Old age groups are as follows (Table 6).

Table 6. Wordlist data: Means and standard deviations from acoustic analysis of formants

Age	Vowel	Mean F1 (Hz)	SD F1	Mean F2 (Hz)	SD F2
Old	NEAR	384.8	39.1	2159.7	203.8
Old	SQUARE	438.3	30.7	2195.8	203.7
Young	NEAR	499.4	53.8	2340.2	101.5
Young	SQUARE	564.2	68.2	2234.5	98.8

Warren (2019) undertook a similar acoustic analysis of the target of NEAR and SQUARE diphthongs from the New Zealand Spoken English Database (NZSED) (Warren, 2002); a summary of his findings is reproduced in Table 7 (P. Warren, personal communication, 2022).

Table 7. Warren's 2002 data from the NZSED

Age	Vowel	meanF1	SDF1	meanF2	SDF2
Old	NEAR	340.0	46.2	2513.4	192.5
Old	SQUARE	380.0	54.7	2408.0	222.2
MidAge	NEAR	377.4	59.8	2588.3	209.2
MidAge	SQUARE	403.0	55.9	2509.6	209.0
Young	NEAR	403.4	58.1	2557.0	196.4
Young	SQUARE	412.9	60.3	2516.0	194.3

The mean values from both tables can be usefully visualized in a scatterplot for ease of comparison:

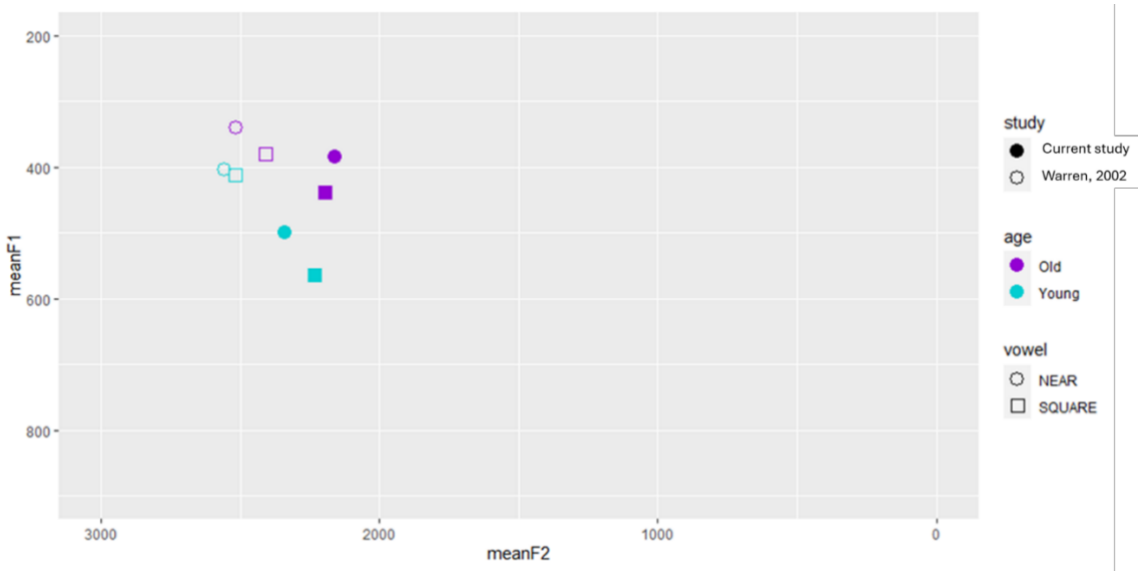

Figure 5. Formant means (in Hz) for targets of NEAR and SQUARE diphthongs for Old vs Young from Wordlist data: a comparison of my data vs. Paul Warren's (recordings from 2002)

3.4 Linguistic factors

3.4.1 Brief exploration of phonetic context

Warren (2006) reported that SQUARE vowels more frequently exhibit a raised target vowel, producing a more NEAR-like realisation, when preceded by a coronal consonant (i.e., /ʃ/, /ʧ/ and /k/). In order to test for this effect, I extracted the SQUARE tokens with a preceding coronal consonant across all three tasks. In Task 1 these are *chair* and *scarecrow*; in Task 2, *scare,* and in Task 3 *chair*. Tokens with preceding coronal consonants total 4 out of approximately 58 SQUARE tokens collected on average per participant (6.8%). Total number of SQUARE tokens collected across all participants and all tasks was 584; of these, 41 contained preceding coronals, 543 did not.

Percentages were calculated across all tasks and all participants, using the auditory analysis only, to allow a comparison between SQUARE words that feature preceding coronal consonants against those that do not (Table 8).

Table 8. Investigation of preceding coronal consonants on pronunciations

	Tokens *without* preceding coronal consonants	Tokens *with* preceding coronal consonants
SQUARE words pronounced as NEAR	4% (22/543)	7.3% (3/41)
SQUARE words pronounced as SQUARE	96% (521/543)	92.7% (38/41)

This analysis shows a moderate increase in the number of SQUARE words pronounced as NEAR when the diphthong is preceded by a coronal consonant (4% vs 7.3%).

3.4.2 Brief exploration of orthographical effects: *-ier*

In their investigation into the NEAR/SQUARE merger in 2006, Hay, Warren and Drager (Hay et al., 2006) avoided *-ear* spellings in their experiment for words in the SQUARE lexical set, citing earlier work that had shown these spellings to be frequently interpreted as belonging to the NEAR set (Hay & Maclagan, 2002). In considering the effect of various spellings on realisation of NEAR and SQUARE diphthongs, *-ear* is arguably the most salient variation, as this spelling presents an ambiguity in a conservative system: it can be said either as NEAR, (e.g., *hear*), or SQUARE, (e.g., *pear*).

For this analysis however, the vowel set in which the most variation occurs is NEAR, with SQUARE pronunciations occurring 54% of the time (see Table 9). After completing the auditory analysis, I sensed that the *-ier* orthography, a relatively uncommon spelling of the NEAR vowel, may be influencing the pronunciation of NEAR words to a more conservative, NEAR-like variation (see Table 9). This spelling features in three words across the experiment: *pier*, *piercing*, and *chandelier.* Total number of NEAR tokens collected across all participants and all tasks was 502; of these, 43 contained *-ier* orthography, 459 did not.

Table 9. Investigation of *-ier* spelling on pronunciations of NEAR words

	NEAR words pronounced as NEAR	NEAR words pronounced as SQUARE
Spelling: *-ier*	54% (23/43)	46.5% (20/43)
Other spelling	23% (106/459)	77% (353/459)

These results point towards a considerable impact of *-ier* spelling on NEAR-word pronunciations.

3.5 Summary of self-reporting

Of those who merge, five of the seven thought they probably said these two vowels the same, and two were less certain. These two commented with "I think I mean to say them differently", and "I don't imagine saying them the same but… maybe I do say them the same." Of those who distinguish, two were certain they pronounced them differently, and one (the sole Young distinguisher, daughter of the researcher) said, "It really varies. I say them differently but I definitely do mix them up sometimes."

4 Discussion

4.1 Evaluation of the Interactive Task

As a trial for the semi-spontaneous elicitation of NEAR/SQUARE tokens, the Interactive Task proved very successful. Over 103 tokens were obtained per participant in a short period of time (8–17 minutes) and in an enjoyable manner (as indicated in casual conversation with participants post-experiment). The design proved effective in that the only participant who was certain of the linguistic focus during the interactive task was my daughter, with whom I had previously had many discussions about the NEAR/SQUARE merger. Otherwise, only one Old and one Young participant suggested at the end of Task 1, amongst several other suggestions, that there was perhaps a general societal interest in the pronunciation of the words *beer* and *bear,* specifically. Generally, participants agreed that the task worked well in distracting them from monitoring their flow of speech.

In the Interactive Task, there is one SQUARE vowel in the category boxes (*Air*) and no equivalent NEAR category; there is also a slight imbalance of NEAR and SQUARE in the reading passage (23 vs 27 tokens). To initial queries from peers, I justified this asymmetry by arguing that slightly more tokens of SQUARE would be advantageous, given that variation in pronunciation is expected to be mostly in the SQUARE set (Hay et al., 2006). As it turned out, my results did not reflect this and instead more NEAR tokens might have been beneficial, although the imbalance is slight and the experiment design is probably adequate in terms of symmetry.

4.2 Discussion of results

Confident that my analysis would yield findings in line with the considerable literature on the topic, i.e., that the diphthongs NEAR and SQUARE in NZE are predominantly merged - perhaps completely - in young speakers and kept distinct by old speakers, and that the direction of the merger is on NEAR, and lastly, that more careful speech would generally result in less merging, I was most surprised to discover my data showed very different trends. Curiously, Task had minimal effect on results, with a modest *increase* in the degree of merging as participants went from most spontaneous to most controlled task. One potential explanation for this unexpected effect is that participants may not be relaxed at the beginning of a recording session, and are potentially at their most comfortable by the end, which may to some extent offset the intention of the task order.

In terms of direction of the merger, all speakers who merge approximated on SQUARE. While it is difficult to determine the statistical likelihood of selecting seven out of ten participants by random chance who happen to merge on SQUARE, it seems unlikely that this group is an anomaly in a population that is otherwise merging on NEAR.

In the auditory analysis across all participants, NEAR was pronounced as NEAR just under half the time (46.7%) and as SQUARE for just over half (53.3%). Very few tokens of SQUARE were pronounced as NEAR (4.7%), contrary to the great majority of findings in the literature to date.

Broken down by Age, we see considerably fewer pronunciations of NEAR words as SQUARE in the Old group than the Young (39.8% vs. 67.8 %), but a *greater* number of SQUARE words pronounced as NEAR (6.7% vs. 2.7%). I tentatively posit that this latter difference reflects the remnants of the merge on NEAR, albeit in small numbers, with a very strong trend towards merging on SQUARE for both age groups.

What explains this unexpected degree of merging in the Old speakers? There is a small amount of evidence in the literature for merging in older populations: Kennedy (2004, p. 19) reported 'considerable overlap' in the NEAR and SQUARE targets for older participants in her study. Maclagan and Gordon's 1996 study found 72.2% of older professionals maintained a distinction. This logically indicates that 27.8% of the same group merged (23.3 to NEAR, 4.5 to SQUARE). These participants were aged 45–60 at the time of recording, i.e., 1994, making them of an age with the Old in this study (i.e., they would be 71–86 in 2022; the Old in this study are 75–92). If these results were generalisable to the professional population at large (to which all my Old participants arguably belong, as indicated by their former occupations), one could estimate something close to a third of such speakers in 1996 merged, and my participants happen to have been drawn from this pool. This explanation may suffice for the extent of merging found in the Old group in my study, but the direction of the merger remains unexplained, as will be discussed further below.

An acoustic analysis was undertaken for the Wordlist data (Task 3) for more ready comparison with independent data from other studies. Warren's mean formant values for his Young and Old groups were plotted against the full range of NEAR and SQUARE target vowels analysed for each of my ten participants. As can be seen in the selected graphs (Figures 1–4), all data points for vowels for the participants who merge were lower than the relevant *mean* SQUARE vowel from Warren's data. I tentatively interpret this as some independent evidence for the validity of my auditory judgement of many of my participants' vowels as SQUARE.

More telling perhaps is the graph of the means (Figure 5). In Warren's data from 2002, both the Young and Old groups had mean NEAR and SQUARE target vowels that were more raised and fronter than their equivalents in my data. This indicates a general opening and backing of the target vowels of both NEAR and SQUARE, for both Young and Old speakers. Interestingly, it appears that the 2002 speakers were also more merged, though this might be a misinterpretation: a graph of overlapping mean ellipses across participants would better show degree of merge between the two data sets. The greatest shift appears to be in the F1 of the Young: participants in my study appear to have much more open NEAR and SQUARE vowels–particularly SQUARE–than the Young participants of the 2002 study.

If the merger is not settling as assuredly on NEAR as is perhaps thought, but appears for some speakers to be swinging decidedly to SQUARE and to something in between for others, is there a possibility of an "unmerger" in progress? In a near-merger, as identified by Labov (1994), speakers still have access to both variants of the merging vowels in their speech communities, which makes the mechanism for an unmerger theoretically possible. While my results do not indicate a movement towards an unmerging of these two sounds, they strongly suggest a change in the direction of the merger.

It may be worth reconsidering Holmes' (1992) proposition of an EAIR vowel, an approximation somewhere between *EAR* and *AIR*. Several participants who merged in this

study did so to the extent that identifying the vowels by ear was occasionally very difficult. Perhaps the cloud of phonemes they employ to represent both NEAR and SQUARE vowels is expanding to encompass both traditional ellipses, giving such individuals access to a range of approximations from a close initial FLEECE vowel through to a relatively low initial DRESS? A trend in this direction would indicate the merger is progressing towards becoming a "merger of expansion" rather than a "merger of approximation" (Labov, 1994, as cited in Gordon & Maclagan, 2001). Such merging participants exhibited a particularly wide spread of vowels. Interestingly, the spread in the F2 direction in the Old group was much greater than in the Young, and the reverse was true for the F1 spread, with the Young exhibiting a greater range (see Table 6 for standard deviations). However, due to physiological changes during the process of ageing, both F1 and F2 generally become lower (i.e., more close and more backed) (Xue & Hao, 2003), so these results may in part be a reflection of this – at least, this might explain the greater F2 variation in the Old group. The lesser F1 variance in the Young group however, remains unexplained.

Evidence in the literature for an approximation on SQUARE is scant. Holmes and Bell (1992) noted among certain participants a merge on SQUARE, labelled in subsequent research as "short-lived" (e.g., by Warren & Rae, 2002). Maclagan and Gordon (1996) noted that the older women in their study merged on SQUARE more than any other groups, which is certainly relevant to this study, as discussed above. Hazenberg (2017, p. 191) notes that it is not clear that the direction of the merger is universally on NEAR across the different regional dialects of the country, though he elaborates no further on this point. He also suggests that an unmerger is in process in Auckland, with the change being led, unusually, by younger men.

An important consideration in evaluating the results of this study is that there appears to be very little recent data (if any) on the merger. Hazenberg's doctoral thesis from 2017 cites studies from 2001 and 2003 as evidence for the direction of the merger (specifically, Gordon & Maclagan, 2001; Warren et al., 2003), and indeed other recent publications (e.g., Kiesling, 2019) quote no more recent studies than 2001 in support of the claim that NEAR and SQUARE are merging on NEAR.

It is quite feasible that the direction of the merger has changed, but there is little current data on the subject.

One explanation for the merger on NEAR invokes the gradual shift of the short front vowels of NZE over the last century (Bauer & Warren, 2008; Trudgill et al., 1998). Strong evidence points to a push chain effect at work (Langstrof, 2006), a process by which one vowel begins encroach on the phonetic space of another, which in turn moves away in order to avoid merging and the subsequent loss of a phonemic contrast (Gordon et al., 2004). Part of this chain-shift raising of the short front vowels in NZE may mean that the initial target of the SQUARE vowel has also raised towards NEAR, as posited by Maclagan and Gordon (1996). Further complicating matters, other research has indicated that the DRESS vowel in NZE has even been found to be higher than FLEECE in some speakers (see Maclagan & Hay, 2007; Warren, 2018). However, this explanation for the merger on NEAR would only be correct if diphthongs are part of the same system as short monophthongs, which is disputed by many linguists.

This contentious aligning of the short front vowels with the diphthongs notwithstanding, DRESS does remain distinct from FLEECE in NZE. Despite its raised position, DRESS as a first target of the diphthong creates a realisation that I have identified as SQUARE. In other words, without a detailed analysis of my participants' entire phonological system, or at least the first formant frequencies for their DRESS and FLEECE vowels, it is hard to ascertain whether those who merge are consistently pronouncing all NEAR/SQUARE diphthongs with an initial DRESS-

like target. However, this is the position I have argued, with some external data in support, in order to make the claim that these participants (or at least seven of the ten) merge on SQUARE.

If this is correct, and further research will be required to investigate this claim, then the forces at work to initiate and diffuse this change of direction through the speech community remain a mystery that would be well served by more exploration of the topic.

4.3 Linguistic factors

4.3.1 Phonetic context

Following Warren (2006), an investigation of the effect of a preceding coronal consonant showed a moderate increase in NEAR pronunciations of SQUARE words (4% for non-coronals vs. 7.3% for coronals – in raw numbers, the results were 22/543 and 3/41). While it is beyond the scope of this study to test this result for statistical significance, I tentatively posit this effect may be caused by the front articulation of coronal consonants (or 'frontish' in the case of /k/) on the realisation of the following vowel, in support of Warren (2006). It should be noted here that these results are limited by the relatively small numbers in the 'preceding coronal' group (41 tokens vs 543 tokens in the non-coronals group).

4.3.2 Orthographical factors

An investigation of an unusual NEAR spelling, *-ier*, was undertaken on the intuition that such a spelling was influencing NEAR words towards a more raised, fronted realisation than might be expected in speakers who otherwise merge on SQUARE. Again, the disparate numbers in these two groups should be taken into account (43 tokens contained *-ier* orthography, 459 did not), however, that said, there appeared to be a strong effect: across all participants, all other spellings of NEAR words were pronounced as NEAR only 23% of the time, but when the spelling was *-ier,* a NEAR pronunciation resulted 54% of the time. The initial 'i' in this particular orthography may well influence the realisation of the target vowel towards the higher, more fronted position of FLEECE, as this vowel is often spelt with an <i>, (especially in so-called borrowed words, e.g., *ski*, *kiwi*, *filo*).

5 Conclusion

5.1 Implications and future research

This study challenges the well-established hypothesis that the NEAR/SQUARE merger is almost complete on the NEAR realisation for young New Zealanders, with seven of the ten participants merging on SQUARE. Further, the extent of merging among the Old in this study (three out of five participants) is in contrast to the oft-reported tendency for old speakers to maintain a distinction. These challenges to established findings, however, are tentative, given the small number of participants and a largely auditory analysis. The acoustic analysis would also benefit from a Euclidean Distance analysis to determine the significance (or otherwise) of the differences between the Old and the Young in terms of the degree of merger present across the two groups. I should also re-emphasize here that there are several compound words in this experiment containing NEAR or SQUARE tokens in an unstressed syllable and these may have affected results. It would be advisable to remove these tokens in any replication studies.

Nonetheless, the strong tendency for merging on SQUARE across participants in two diverse age groups in this study is one well worth investigating further. A more comprehensive study would ideally analyse the formants of all diphthongs produced by participants,

especially those produced during the more spontaneous speech collected in the Interactive Task, and include an analysis of participants' front vowel positions in addition to their NEAR/SQUARE diphthongs. A greater number of participants would also be advisable, across a wider range of social factors, primarily gender, ethnicity and socioeconomic background.

Most importantly, this study has highlighted the need for more recent data in order to gain a fuller understanding of the direction and spread over the speech community of this fascinating merger-in-progress over the last ten or fifteen years in New Zealand English.

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References

Batterham, M. (2000). The apparent merger of the front centring diphthongs—EAR and AIR—in New Zealand English. In A. Bell & K. Kuiper (Eds.), *New Zealand English*. John Benjamins Publishing Company. http://ebookcentral.proquest.com/lib/vuw/detail.action?docID=811300

Bauer, L., & Warren, P. (2008). New Zealand English: Phonology. In K. Burridge & B. Kortmann (Eds.), *Varieties of English. 3, The Pacific and Australasia* (pp. 39–63). Mouton de Gruyter.

Boersma, P., & Weenink, D. (2022). *Praat: Doing phonetics by computer (Version 6.2)* [Computer software]. https://praat.org

Foulkes, P., & Docherty, G. (2006). The social life of phonetics and phonology. *Journal of Phonetics*, 34(4), 409–438. https://doi.org/10.1016/j.wocn.2005.08.002

Fry, D. B. (1947). The frequency of occurrence of speech sounds in Southern English. *Archives néerlandaises de phonétique expérimentale*, *20*, 103–106.

Gimson, A. C. (1963). *An introduction to the pronunciation of English*. Edward Arnold.

Gordon, E., Campbell, L., Hay, J., Maclagan, M., Sudbury, A., & Trudgill, P. (2004). *New Zealand English: Its origins and evolution*. Cambridge University Press. http://ebookcentral.proquest.com/lib/vuw/detail.action?docID=259855

Gordon, E., & Maclagan, M. (2001). 'Capturing a sound change': A real time study over 15 years of the NEAR/SQUARE diphthong merger in New Zealand English. *Australian Journal of Linguistics*, *21*(2), 215–238. https://doi.org/10.1080/07268600120080578

Gubian, M., Harrington, J., Stevens, M., Schiel, F., & Warren, P. (2019). Tracking the New Zealand English NEAR/SQUARE merger using functional principal components analysis. In G. Kubin & Z. Kačič (Eds.), *Proceedings of Interspeech 2019* (pp. 296–300). ISCA. https://doi.org/10.26686/wgtn.12319358.v1

Hay, J., Warren, P., & Drager, K. (2006). Factors influencing speech perception in the context of a merger-in-progress. *Journal of Phonetics*, *34*(4), 458–484. https://doi.org/10.1016/j.wocn.2005.10.001

Hazenberg, E. (2017). *Liminality as a lens on social meaning: A cross-variable study of gender in New Zealand English* [Doctoral dissertation, Victoria University of Wellington]. Open Access Institutional Repository. https://doi.org/10.26686/wgtn.17061014.v1

Holmes, J., & Bell, A. (1992). On shear markets and sharing sheep: The merger of EAR and AIR diphthongs in New Zealand English. *Language Variation and Change*, *4*(3), 251–273. https://doi.org/10.1017/S0954394500000806

Holmes, J., & Wilson, N. (2022). *An introduction to sociolinguistics*. Taylor & Francis Group.

Kennedy, M. (2004). Prince Charles has two ears/heirs: Semantic ambiguity and the merger of near and square in New Zealand English. *New Zealand English Journal*, *18*, 13–23. https://doi.org/10.3316/informit.584882688817929

Kiesling, S. F. (2019). English in Australia and New Zealand. In B. B. Kachru, Y. Kachru, & C. L. Nelson (Eds.) *The handbook of World Englishes* (pp. 70–86). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781119147282.ch5

Labov, W. (1994). *Principles of linguistic change. Volume I: Internal factors (Vol. 1).* Blackwell.

Langstrof, C. (2006). Acoustic evidence for a push-chain shift in the Intermediate Period of New Zealand English. *Language Variation and Change*, *18*(2), 141–164. https://doi.org/10.1017/S0954394506060078

Maclagan, M. A., & Gordon, E. (1996). Out of the AIR and into the EAR: Another view of the New Zealand diphthong merger. *Language Variation and Change*, *8*(1), 125–147. https://doi.org/10.1017/S0954394500001095

Maclagan, M. A., & Gordon, E. (2000). The NEAR/SQUARE merger in New Zealand English. *Asia Pacific Journal of Speech, Language and Hearing*, *5*(3), 201–207. https://doi.org/10.1179/136132800805576951

Maclagan, M., & Hay, J. (2007). Getting fed up with our feet: Contrast maintenance and the New Zealand English 'short' front vowel shift. *Language Variation and Change*, *19*(1), 1–25. https://doi.org/10.1017/S0954394507070020

R Core Team 2021. *R: A language and environment for statistical computing* [Computer software]. R Foundation for Statistical Computing. https://www.R-project.org/

Rae, M., & Warren, P. (2002). Goldilocks and the three beers: Sound merger and word recognition in NZE. *New Zealand English Journal*, *16*, 33–41. https://doi.org/10.3316/informit.596379232084238

Trudgill, P., Gordon, E., & Lewis, G. (1998). New-dialect formation and Southern Hemisphere English: The New Zealand short front vowels. *Journal of Sociolinguistics*, *2*(1), 35–51. https://doi.org/10.1111/1467-9481.00029

Warren, P. (2019). Non-linear analysis of a diphthong merger. In S. Calhoun, P. Escudero, M. Tabain & P. Warren (Eds.) *Proceedings of the 19th International Congress of Phonetic Sciences* (pp. 1884–1887). Australasian Speech Science and Technology Association Inc., and International Phonetic Association. https://www.internationalphoneticassociation.org/icphs-proceedings/ICPhS2019/papers/ICPhS_1932.pdf

Warren, P. (2002). NZSED: Building and using a speech database for New Zealand English. *New Zealand English Journal*, *16*, 53–58. https://www.wgtn.ac.nz/lals/research/our-research-areas/new-zealand-english/nzsed/documents/NZSED4NZEJ.pdf

Warren, P. (2006). Word recognition and sound merger. In J. Luchjenbroers (Ed.), *Cognitive Linguistics Investigations: Across languages, fields and philosophical boundaries* (pp. 169–186). John Benjamins Publishing Company. http://ebookcentral.proquest.com/lib/vuw/detail.action?docID=622319

Warren, P. (2018). Quality and quantity in New Zealand English vowel contrasts. *Journal of the International Phonetic Association*, *48*(3), 305–330. https://doi.org/10.1017/S0025100317000329

Warren, P., & Hay, J. (2006). Using sound change to explore the mental lexicon. In C. M. Fletcher-Flinn & G. M. Haberman (Eds.), *Cognition and Language: Perspectives from New Zealand* (pp. 105–126). Australian Academic Press. http://search.informit.org/doi/10.3316/informit.803391542297179

Wells, J. C. (1982). *Accents of English: Beyond the British Isles (Vol. 3).* Cambridge University Press. https://doi.org/10.1017/CBO9780511611766

Wickham, H. (2016). *Ggplot2: Elegant graphics for data analysis* [Computer software]. Springer-Verlag New York.

Xue, S. A., & Hao, G. J. (2003). Changes in the human vocal tract due to aging and the acoustic correlates of speech production: A pilot study. *Journal of Speech, Language, and Hearing Research*, *46*(3), 689–702.

Appendix A: The Vowel-Initial Word Set in Task 1

The vowel-initial word set consists of 19 vowel-initial words altogether: 14 fillers, plus another 5 vowel-initial words from the NEAR/SQUARE set (at the bottom of the second column below). Each starts with a different vowel, supplying 18/20 of the NZE vowels for an investigation of the effect of phonetic context (there are no /ʉə/- or /ʊ/-initial words, and there are two instances of /eə/ words from the NEAR/SQUARE set).

Lexical set	NZE	Item
KIT	/ə/	insect
DRESS	/e/	elephant
TRAP	/ɛ/	apple
LOT	/ɒ/	octopus
STRUT	/ɐ/	umbrella
FOOT	/ʊ/	-
FLEECE	/iː/	eagle
START	/ɐː/	arctic hare
THOUGHT	/oː/	orca
GOOSE	/ʉː/	ouzo
NURSE	/əː/	earl grey tea
FACE	/æɪ/	alien
PRICE	/ɑe/	ice-cream
CHOICE	/oe/	oyster
MOUTH	/æʉ/	owl
GOAT	/əʉ/	oak
NEAR	/ɪə/	earring
SQUARE	/eə/	airship, airgun (also arctic hare)
CURE	/ʉə/	-
commA	/ə/	éclair*

* Note that *éclair* may be pronounced with an initial FACE vowel by some speakers

Appendix B: Reading Passage

The nightmare began when the airship landed in the clearing and the old pirate appeared at the top of the stairs. Weirdly brandishing a spear, his gold earrings glinting in the sunlight, he declared, "Hear me now! I am Blackbeard. Prepare to die!"

"Spare me!" I cried. "I am nothing but a mere rabbit!" For it was true. Or nearly. I was a hare; slightly bigger than a rabbit and certainly more cunning.

The pirate glared at me, his great hairy nostrils flaring. "You dare to speak," he growled, baring his yellowing teeth. "Say your prayers, rabbit!" Trembling with fear, I called out as clearly and defiantly as I could, "You don't scare me! You couldn't catch me in a million years!"

Enraged, the pirate fairly flew down the airship stairs and, spear raised overhead, came charging towards me. In moments I was tearing through the undergrowth, bounding towards the hidden snare. Nimbly I leapt over it. Seconds later a piercing scream split the air as the trap snapped shut on Blackbeard's ankle.

A great cheer arose from all the other animals hiding in their lairs – the badgers, the foxes; even the deer. As Blackbeard's screams settled to a despairing whimper, a couple of daring meerkats crept out of the bushes. They stared wide-eyed at the writhing pirate.

"Now that's a rare sight," said one.

"Well done," said the other, nodding curtly at me, the pair of them completely failing to grasp what a hero I was.

"Cheers," I said graciously. "So much for *'Prepare to die.*'" And I gave them what I intended to be a hero's wry smile, but instead ended up bursting into tears of sheer relief.

Appendix C: Reading Passage - NEAR/SQUARE words (50 total)

NEAR items		SQUARE items	
1. clearing	12. years	1. nightmare	14. scare
2. appeared	13. spear	2. airship	15. fairly
3. weirdly	14. piercing	3. stairs	16. airship
4. spear	15. Blackbeard's	4. declared	17. stairs
5. earrings	16. cheer	5. prepare	18. tearing
6. hear	17. deer	6. spare	19. snare
7. Blackbeard	18. meerkats	7. hare	20. air
8. mere	19. hero	8. glared	21. lairs
9. nearly	20. cheers	9. hairy	22. despairing
10. fear	21. hero's	10. flaring	23. daring
11. clearly	22. tears	11. dare	24. stared
	23. sheer	12. baring	25. rare
		13. prayers	26. pair
			27. prepare

Appendix D: Wordlist of Minimal Pairs

ear	air
spare	spear
mare	mere
hear	hare
clear	Claire
chair	cheer
bear	beer
deer	dare
stairs	steers
sneer	snare
pier	pear
bared	beard
rarely	really

Appendix E: Instructions to Participants and Questions between Tasks

1. Interactive Task instructions (multiple)

   Question after Interactive Task:

   "*At this stage, do you know (or can you hazard a guess at) what aspect of language I am investigating in this experiment? No worries if you're not sure - I have tried to disguise it."*

2. Reading Passage instructions: "*Can you read this aloud, at a natural pace?"*

   Question after Reading Passage:

   "In this experiment, I'm looking at the pronunciation of particular sounds. Do you know which sounds?"

3. Wordlist instructions: *"Can you read aloud these words?"*

   Question after Wordlist:

   I. Do you pronounce these pairs of words the same? Or differently?

   II. Have you heard other people pronounce words like these the same? Or differently?