Contents

GRADIENT MĀORI PHONOTACTICS[1]

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Abstract

This paper provides a descriptive analysis of segmental distributions in the Māori lexicon. Focussing on the strict-CV subset of the lexicon, we examine co-occurrence restrictions of consonantal onsets and vowel nuclei of adjacent syllables. For consonants, we find that sequences that share the same place of articulation are under-represented. This shows a similarity avoidance effect in Māori, reported for other languages (Frisch et al., 2004; McCarthy, 1986). When we correct for the presence of reduplicants in the data-set, this under-representation includes sequences of identical consonants. Sequences of identical vowels are overrepresented, even when reduplicated syllables are taken into account. The results show that gradient phonotactic processes are operating in Māori beyond the categorical restrictions on syllable shape.

1. Introduction

Phonotactic constraints, as originally construed in classical phonological generative models, constitute categorical restrictions on patterns of phoneme occurrence and co-occurrence. English allows consonant codas, for example, but does not allow /h/ in coda position. Māori does not allow codas but - unlike English - allows /ŋ/ in initial position. It is now well documented, however, that languages can also contain non-categorical phonotactic restrictions which operate in a gradient fashion. For example, a commonly reported gradient pattern regarding consonants is the Obligatory Contour Principle for Place of Articulation (OCP-Place) – a dispreference for consonants sharing a place of articulation to occur in close proximity to each other. While the principle was first proposed to account for observed categorical constraints against such co-occurrences (McCarthy, 1986), a gradient tendency has also subsequently been observed in many languages (McCarthy, 1988; Berkley, 2000; Martin, 2007). Across a number of languages, words having highly similar consonants in close proximity are preferred less and come up in the lexicon less often. Frisch et al. (2004) argue that such patterns arise from a similarity-avoidance constraint in processing that disfavours repetition.

Not only are gradient phonotactic patterns evident in language, but they are accessible to native speakers. Many studies show that native speakers prefer nonce words that adhere well to the statistical patterns in their language (cf. e.g. Hay et al. 2004; Frisch et al. 2000; Bailey & Hahn 2001). These results provide further evidence that language-specific phonotactics are not solely a categorical part of linguistic competence but rather are gradient and reflect the statistics of the lexicon.

This paper is a short descriptive report describing several gradient phonotactic patterns in Māori.

In terms of categorical phonotactics, Māori is relatively simple. Syllables comprise a vowel nucleus, which can be short, long or diphthongal, and an optional simplex consonantal onset. These syllables freely combine with each other (cf. Harlow 2007; Bauer 2003). In this respect, it differs from most languages which allow vowel-only syllables, in that these are usually only permitted word-initially. Unlike most languages, Māori vowel-vowel sequences are not broken up by epenthesis (Blevins, 2008).

The probabilistic phonotactics of the language appear to be much more complex. Some indicative patterns have been provided in simple tabulations

by Krupa (1968). He provides summary statistics for the segmental makeup of what he calls the possible set of Māori morphemes and words. Particularly relevant to the current paper, he notes that sequences of onsets where both onsets are either alveolar or labial (that is, have the same place of articulation) are less frequent than sequences with a different place. He also notes that some labial consonantal sequences are absent altogether. Krupa was writing before the term 'Obligatory Contour Principle' was first used in linguistics. Yet the tendency he notes is certainly consistent with the idea that a gradient OCP-type constraint is present in Māori. His analysis is restricted to two syllable words, and does not take into consideration the frequencies of the individual phonemes, and whether the apparent patterns of under-representation are statistically significantly different than would be expected if phonemes combined at chance.

Krupa's findings constitute an important starting point. Gradient OCP effects are reported from other languages, including Javanese, also an Austronesian language (Yip, 1988). Zuraw & Lu (2009) show that OCP effects in Austronesian languages are sensitive to morpheme boundaries. De Lacy (1997) finds OCP effects in Māori which mitigate against CV sequences in which both the C and V are labial. We are in fact studying the complementary case, relationships between CV sequences.

As noted in the literature on gradient OCP effects (McCarthy, 1986; Pierrehumbert, 1993; Frisch et al., 2004), pairs of identical consonants behave in two ways with respect to similarity avoidance. They might be avoided most markedly—as instances of maximum similarity. Alternatively, they might seem exempted from OCP altogether. Their prevalence in such cases can be seen as a result of copying processes in the morphology. This is, of course, a relevant point in the study of OCP in Māori, as the language has a number of reduplicative processes that can create pairs of identical sequences (Harlow, 2007).

Not all of these processes are necessarily transparent and active in the language. Blust (2007) convincingly argues that lexical bases in Austronesian languages are overwhelmingly bisyllabic. This means that longer Māori words—even if they are not the obvious result of an active morphological process—should be treated with the suspicion that they are historically morphologically complex.

This body of research points us to the following questions: Are there gradient restrictions on the co-occurrence of syllables in Māori? How are these restrictions affected by synchronic and diachronic morphological processes,

which are likely responsible for most longer lexical entries as well as for sequences of identical consonantal codas and vowel nuclei?

In this paper, we present a simple statistical analysis of phonotactic patterns in the Māori lexicon. We examine co-occurrence restrictions between consonants and vowels in adjacent syllables. Our analysis confirms that adjacent pairs of syllables with homorganic non-identical onsets are avoided, occurring statistically less frequently than would be expected by chance. This occurs in all word positions, and is not restricted to two syllable words. The vowel analysis, on the other hand, shows that sequences of identical vowels are favoured. We also examine positional preferences for the distributions of different classes of segments, showing that both consonants and vowels show significant deviations from random in terms of the distribution of segments across different syllables in the word. We used R and Sweave (R Core Team, 2016; Leisch, 2002) for the processing, analysis, and write-up of the data.

2. Māori Phonotactics

2.1 Consonantal Patterns

The consonants of the language can be seen in Table 1 (cf. Krupa 1968; Harlow 2007). The labial fricative has varying realisations across speakers, with [f] being the dominant variant by a large extent (Maclagan & King, 2002). In this paper, we assume this realisation.

Table 1: Māori consonants.

	LABIAL	ALVEOLAR	VELAR	GLOTTAL
Plosive	p	t	k	
Fricative	f			h
Nasal	m	n	ŋ	
Tap		r		
Approximant	w			

We extracted a list of Māori lemmata from Williams (1957) archived online by Victoria University of Wellington. We extracted all headwords, and derived subwords that were subentries under the heads. For example, *ahu* is listed as a headword, and words such as *ahunga*, *whakaahu*, and *ahuahu* were

listed as associated derived items.[2] All of these words were included in the initial lexicon. Māori contains a number of vowel sequences which may be pronounced as diphthongs, and also allows sequences of adjacent syllables which contain only vowels. Because a primary interest was in dependencies between adjacent syllables, we restricted our analysis to those cases where syllabification is unambiguous, and where we could be certain that the segments of interest were in adjacent syllables: namely, to words which do not contain any sequences of vowels, either as diphthongs or adjacent syllables. This subset of words provided a dataset of 8950 words. From this list we extracted a list of 22033 consonantal digrams (pairs of consonants) ignoring the intervening vowel (CVCV).

While morphological complexity undoubtedly affects the shape of these words, our main point of scrutiny is segmental patterns in the phonological word, and hence only took into consideration very broad and general patterns of word formation, such as reduplication (as will be described below). Figure 1 shows the distribution of consonants across different syllable positions in the word. As the syllable positions increase, we of course have diminishing observations. For example, all 6 syllable words also have a 2nd syllable, whereas the converse is not true. However, the rate of decrease and the overall distribution of observations differs across phonemes. Most saliently, the plosives (dashed lines) are over-represented towards the beginning of the word. The segment /r/ shows a unique profile. It is under-represented in initial position, but shows high rates of occurrence as onsets to the 2nd and 3rd syllables in the word. The segment /m/ appears to be over-represented at the beginning of the word, whereas the other nasals are underrepresented word-inititally.

It should be noted that Krupa also briefly discussed positional effects - preferences for first or second syllable in his two syllable words. Based on simple tabulations, he observed that labials prefer to be in the initial syllable, alveolars prefer to be in the second syllable, and that velars do not display a preference. As we have seen, rather than place of articulation, the strongest overall effect appears to be on manner of articulation—with plosives set apart from other phonemes. In Krupa's tabulations, labials appear to prefer first position, but as we can now see, this apparent effect is not carried by all labials, and is likely driven by /m/ preferring to occur in initial position (Figure 1). Initial /m/ seems to be an exception to the overall tendency for labials to occur proportionately more later in the word than early in the word.
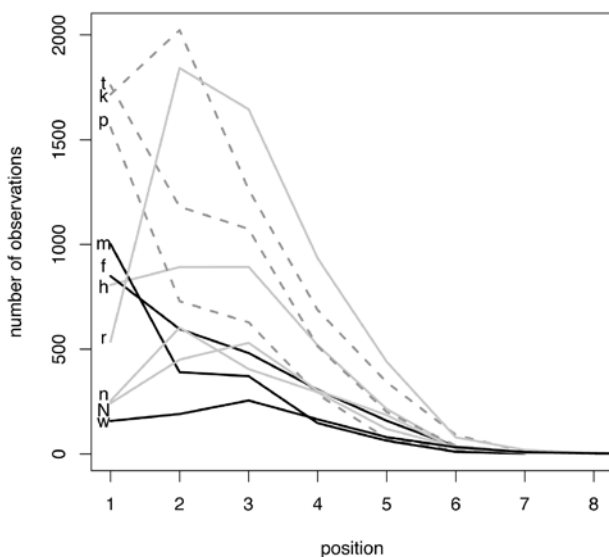
Figure 1: Positional distribution of consonants: stops (dashed) and labials (dark) each pattern together.

We next set out to test whether Māori has consistent restrictions on the co-occurrence of CV syllables as suggested by work on other languages (Frisch et al., 2004; McCarthy, 1986; Yip, 1988) and the patterns found by Krupa (1968).

The observed probability of each digram was calculated based on its frequency of occurrence in the corpus. Following Pierrehumbert (1993), this was contrasted with its expected probability, based on the observed frequency of the separate segments. More precisely, for a digram AB, the expected value was calculated as the observed frequency of A in position 1 of all digrams, multiplied by the observed frequency of B in position 2 of all digrams, divided by the total number of digrams observed. In this way, we could estimate the difference between observed and expected probability, by calculating the ratio of the observed value over the expected value. This Observed/Expected ratio (O/E) quantifies the degree to which a combination occurs more or less often than would be expected by chance. A value of 1 indicates that the combination occurs exactly with the frequency that we would expect, given the frequency of its parts. Numbers considerably smaller than 1 indicate under-representation,

and numbers considerably larger than 1 indicate overrepresentation. The sequence f/k, for example, occurs much more often than one would expect by chance. In this case, this is no doubt due to the highly frequent prefix *whaka-*.

The Observed/Expected ratio is one measure of over- and under-representation. Below we use various, independent measures to recognise trends of over- and under-representation in the data.

Table 2: Observed over expected ratio for consonants in adjacent syllables.
The first segment in the combination is listed vertically, the second is listed horizontally. 0 reflects non-occurrence.

	p	m	f	w	t	n	r	k	N	h
p	**1.29**	0.15	0.71	0.34	1.04	1.21	1.12	1.13	0.65	0.98
m	0.13	**1.36**	0.47	0.21	1.78	1.51	0.92	0.87	0.96	1.04
f	0.05	0	**1.90**	0	1.20	0.73	0.68	2.71	0.48	0
w	0.06	0.10	0	**1.76**	1.10	1.57	1.52	0.91	0.16	1.19
t	1.25	1.09	1.38	1.01	**1.00**	0.54	0.98	0.95	1.25	0.94
n	0.90	1.15	1.77	2.35	0.54	**2.41**	0.13	1.24	0.58	1.62
r	1.40	1.38	1.28	1.32	0.77	0.30	**0.86**	0.83	1.76	1.21
k	1.32	1.42	0.95	1.19	0.97	1.03	1.18	**0.70**	0.39	1.12
N	0.31	0.73	1.22	0.76	1.59	0.82	1.24	0.28	**2.01**	1.18
h	0.82	1.10	0.14	1.41	0.60	1.55	1.12	1.05	1.49	**0.72**

Table 2 shows O/E values for all consonant pairs in adjacent syllables. Consideration of the diagonal reveals no particularly strong patterns of under- or over-representation indicating that there are no strong constraints regarding sequences of identical consonants, though sequences of identical sonorants are over-represented. The pattern in the table does suggest that sequences of non-identical consonants sharing a place of articulation are dispreferred. Indeed, if we look at the overall pattern of O/E as a function of homorganicity, we see that homorganic sequences are less likely overall. This becomes evident if we look at O/E values for consonantal place only (cf. Table 4).

Table 3: Observed over expected ratio for consonantal place in adjacent syllables, All consonants. The first segment in the combination is listed vertically, the second is listed horizontally.

	labial	coronal	velar
labial	0.66	1.20	0.98
coronal	1.36	0.84	1.10
velar	0.99	1.14	0.84

Table 4: Observed over expected ratio for consonantal place in adjacent syllables, without sequences of identical consonants. The first segment in the combination is listed vertically, the second is listed horizontally.

	labial	coronal	velar
labial	0.25	1.20	0.98
coronal	1.36	0.54	1.10
velar	0.99	1.14	0.33

O/E values for homorganic sequences (in which the two consonants share a place of articulation) are lower than for other sequences (Table 3). This becomes even more apparent if we exclude sequences of identical consonants (Table 4). We performed chi square tests on contingency tables for observed counts of homorganic sequences (separately for coronal, labial, and velar). We did this separately for all consonant counts and for counts excluding identical sequences. The patterns are highly significant in all cases. This, however, might be partly due to the large sample size. In order to see the effect size, we calculated the phi coefficient for each contingency table separately. The results are in Table 5.

Table 5: Strength of the underrepresentation effect for homorganic sequences, across consonantal place for all counts and for counts excluding identical sequences.

	ALL CONSONANTS	W/O IDENTICAL
coronal	-0.13	-0.30
labial	-0.14	-0.27
velar	-0.12	-0.29

Note that coronal, labial, and velar sequences are avoided to roughly the same degree. This overall pattern of underrepresentation does not change when we exclude sequences of identical consonants, although its effect does become much stronger.

In order to establish the statistical robustness of this observation, we stepwise fit a linear regression model on our consonant co-occurrence data using *observed over expected probability* (O/E) as the outcome variable, and the phonological features of the members of the consonantal digrams and whether these shared the same place as predictors. In this and subsequent models, we use the log of O/E, as it can have a tendency to have a long right tail. We exclude from the analysis any digrams which are not observed at all in the data-set.

Since, as we noted, digrams of identical consonants behave differently, we coded place as a factor with three levels, (i) no shared place, (ii) shared place, (iii) identical.

Since not all combinations of factors exist (a Māori consonant cannot be labial and velar at the same time, for instance), and since shared place and various phonological features are potentially collinear, we proceeded with bottom-up stepwise regression, testing the predictors individually and combining the significant ones if possible. The best model for the consonants is a simple one, retaining the feature of place, as shown in Table 6.

Table 6: Regression model of consonantal co-occurrence in CVCV sequences.

	Estimate	Std. Error	t value	Pr (>|t|)
Intercept (diff place)	0.04	0.07	0.57	0.57
identical	0.21	0.19	1.10	0.28
same place	-1.38	0.16	-8.92	<0.001

This confirms that sharing a place of articulation makes co-occurrence less likely. However, the repetition of the same consonant does not suffer a significant penalty. No significant interactions were found. This indicates that the dispreferrence for homorganic consonants is not strongly restricted to any particular class of sounds. We re-fit the model using, as the outcome variable, Observed minus Expected as an alternative measure of underrepresentation. The effect is similar.

In their study of Arabic, Frisch et al. (2004) demonstrate that two major

factors determine consonantal co-occurrence: (i) whether the consonants are homorganic, i.e. share a place of articulation, as well as (ii) their general similarity, based on the number of natural classes they share. We used their measure of similarity (as implemented by Adam Albright, cf. Albright 2009) to calculate similarities between consonantal segments in Māori, and attempted to use this similarity measure in regression models, as above. However this approach did not deliver significant discrimination above the simple model reported in Table 3. This is chiefly, we believe, because the Māori consonantal inventory is relatively small and the number of homorganic segments is low.

Because our dataset includes words longer than two syllables, it is possible that the restriction on sequences of consonants sharing place of articulation is of different strength at different positions in the word. We thus calculated the observed/expected ratio for each consonant pair separately for each position in the word.

In Figure 2, we plot the observed counts of different digram types across specific positions. This plot faithfully shows the absolute values (which are diminishing). The plot shows lowess lines fit through relevant digrams. For example, at positions 1 and 2, the lines are fit through observation counts for 69 digrams not sharing place of articulation, 16 sharing place of articulation, and 10 which are identical. The number of digrams for which there are observations drops as we proceed through the word. Digrams for which we have no observations are not included in the plot. Thus, not only are the average number of observations per digram diminishing as we go through the word (as seen in the figure), so are the number of distinct digrams at each position (not visible from the figure). Consideration of the patterns indicates that the under-representation of adjacent consonants sharing a place of articulation is robust across all positions for which data is not scarce.

These results indicate the presence of co-occurrence restrictions that affect homorganic consonants but exempt identical ones. This is in line with the cross-linguistic pattern noted in Section 1 that co-occurrence restrictions can be upset by morphological processes that result in copying and reduplication.

Māori has a large number of word-formation processes that involve the reduplication of sequences of one or two syllables (Krupa, 1968; Harlow, 2007). Thus, while identical sequences appear not to be under-represented, it is likely that their frequency of occurrence is being bolstered by the inclusion of reduplicants in the data-set.

In order to see whether the observed patterns are an artefact of reduplication patterns, we created a restricted set of consonantal digrams. This set was based
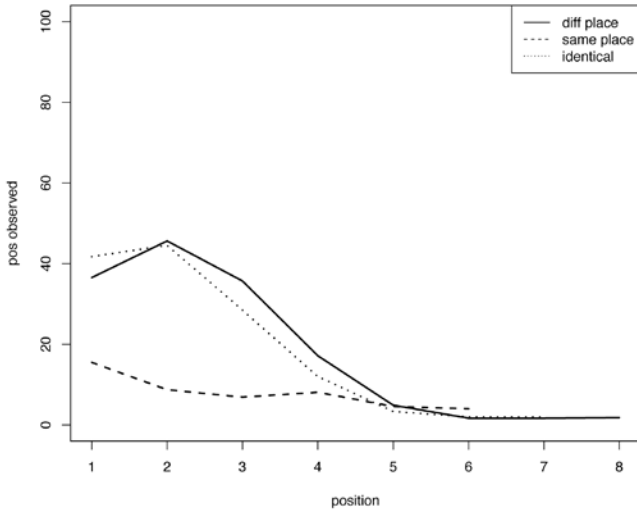
Figure 2: Observed/expected ratios of consonantal sequences across position in the word.

on only those words that had no direct repetition of syllables or sequences of syllables in them. This conservative approach to excluding effects of reduplication ensures that we can focus on patterns of co-occurrence that are independent from it.

This reduces the number of digrams under consideration from 22033, to 11854. The observed and expected values of digrams change considerably in the restricted set. Specifically, sequences of identical consonants become under-represented. However, homorganic sequences also remain under-represented relative to sequences of differing places of articulation, as can be seen in Figure 3.

This suggests that the pattern of Māori 'suspending' positional restrictions for sequences of identical consonants is only apparent - it is the artefact of the reduplication processes in the language. If we exclude words with reduplicated sequences, this pattern disappears and we arrive at a simpler tendency of broad homorganicity avoidance in onset sequences. This finding is consistent with earlier work on co-occurrence restrictions (cf. Section 1).

This becomes even clearer if we look at the observed over expected ratios of consonantal pairs in the restricted set (without reduplication) in Table 7.
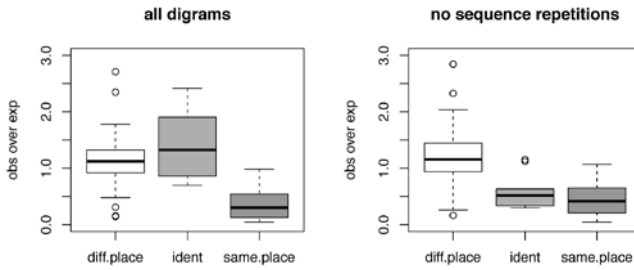
Figure 3: Positional distribution of consonants.

Regression analysis reveals that, in the restricted dataset, digrams of identical and homorganic consonants pattern together vis-à-vis other consonants (8). This is true both for distributions of observed over expected and observed minus expected counts. Reordering of factor levels reveals that the observed over expected ratio for identical and homorganic consonants significantly differs from the ratio for other consonants - their difference from each other, however, is only marginally significant (p=0.066).

Table 7: Observed over expected ratio for consonants in adjacent syllables.

Excluding words with reduplication patterns. The first segment in the combination is listed vertically, the second is listed horizontally. 0 reflects non-occurrence.

	p	m	f	w	t	n	r	k	N	h
p	**0.44**	0.19	0.93	0.43	1.01	1.36	1.20	1.26	0.65	1.02
m	0.21	**0.32**	0.66	0.30	2.01	1.69	0.84	0.86	0.94	1.15
f	0.05	0.00	**0.33**	0.00	1.30	0.75	0.73	2.84	0.38	0.00
w	0.00	0.21	0.00	**0.63**	1.06	0.97	1.71	0.93	0.17	1.50
t	1.33	1.20	1.43	0.94	**0.63**	0.61	1.07	0.99	1.13	1.05
n	0.84	1.35	1.82	2.33	0.64	**1.15**	0.10	1.42	0.91	1.70
r	1.69	1.53	1.29	1.45	0.87	0.42	**0.59**	0.75	2.04	1.21
k	1.50	1.61	1.11	1.28	1.00	0.93	1.25	**0.45**	0.41	1.19
N	0.50	0.55	1.54	1.37	1.85	1.07	1.05	0.35	**1.12**	1.14
h	0.95	1.16	0.26	1.42	0.64	1.77	1.15	1.04	1.63	**0.30**

Table 8: Regression model of consonantal co-occurrence in CVCV sequences.

Excluding words with reduplication patterns.

	Estimate	Std. Error	t value	Pr (>ltl)
Intercept (diff place)	0.11	0.07	1.63	0.11
identical	-0.73	0.18	-3.97	<0.001
same place	-1.14	0.15	-7.54	<0.001

Thus, Māori shows a clear effect of OCP, in which sequences of homorganic consonants are under-represented. This dispreference includes sequences of identical consonants. However, because of the high rate of reduplication in the lexicon, sequences of identical consonants are not under-represented in the lexicon as a whole. In other words - sequences of identical consonants are underrepresented, unless they are embedded in sequences of identical syllables.

2.2 Vowel patterns

We now turn to constraints on vowel position and vowel co-occurrence. Due to the orthographic conventions of Māori, adjacent sequences of vowels indicate either a diphthong or a vowel sequence. Since these are impossible to tell apart automatically, we again restricted our analysis to non-diphthongal nuclei of adjacent CV syllables (CVCV). This also includes long vowel nuclei. The Māori vowels are /i/, /e/, /a/, /o/, /u/, and their long equivalents.

Figure 4 shows the occurrence frequencies of the different segments across different syllable positions. As with the consonants, there is a reasonable amount of variation across distributions. /a/ is by far the most frequent vowel. Short vowels (dashed lines) are more frequent than long vowels (dotted lines). Long vowels are relatively rare beyond the second syllable. In initial position, back vowels and low vowels appear more frequent than front vowels and high vowels. /i/ and /e/ occur with higher frequency in the 2nd and third syllable than they do in the first.

In order to study co-occurrence patterns, we extracted digram frequencies of vowels in adjacent syllables in a way similar to the extraction of consonantal digrams discussed above. We calculated ratios of observed over expected values, and these are given in Table 9.
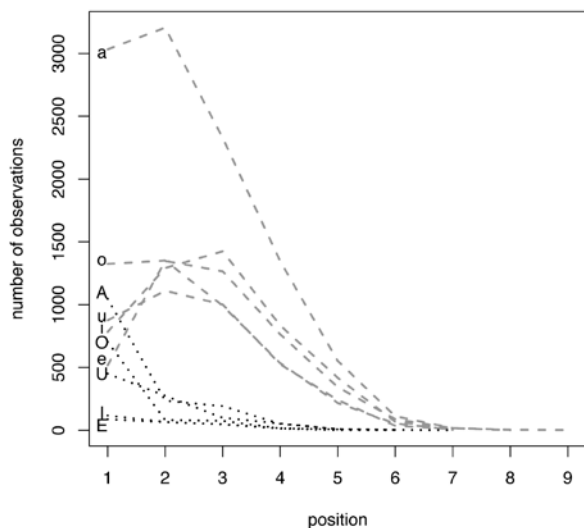
Figure 4: Positional distribution of vowels. Capital letters represent long vowels.

Table 9: Observed over expected ratio for vowels in adjacent syllables.
The first segment in the combination is listed vertically, the second is listed horizontally. 0 reflects non-occurrence. Capitalisation indicates a long vowel.

	i	I	e	E	o	O	u	U	a	A
i	**2.05**	0.86	0.45	0.12	1.33	0.53	0.47	0.40	0.85	0.64
I	0.75	**30.66**	0.65	2.19	1.11	2.46	0.00	0.00	1.06	2.07
e	0.49	0.31	**2.30**	0.60	1.00	0.36	0.78	0.62	0.79	0.28
E	0.32	0.00	1.78	**42.97**	0.12	3.12	0.32	0.00	0.80	1.50
o	1.03	1.15	1.18	0.65	**2.06**	0.38	0.77	0.69	0.61	0.41
O	0.92	4.92	0.95	3.87	0.79	**5.82**	1.10	2.83	0.73	2.51
u	0.84	0.20	0.82	0.26	0.39	0.15	**2.65**	0.60	0.89	0.52
U	0.38	1.03	1.02	2.64	0.89	2.48	0.81	**8.86**	0.94	4.03
a	0.93	0.51	0.75	0.76	0.69	0.98	0.88	0.71	**1.37**	0.80
A	0.85	1.24	0.82	1.19	0.83	2.99	0.90	2.50	0.92	**4.88**

Examination of the diagonal of this table reveals that identical vowels appear consistently over-represented in adjacent syllables. All sequences of adjacent identical vowels are more frequent than one would expect based on the frequencies of occurrence of the phonemes alone. Segments /i:/ and /e:/ are relatively rare in isolation. This fact contributes to the large O/E values for co-occurrence. They are quite rare phonemes, and thus the fact that they occur quite frequently in combination amounts to a large degree of statistical over-representation.

We stepwise fit a linear regression model on the vowel co-occurrence data *using observed over expected probability* as the outcome variable, and the phonological features of the members of the vowel digrams and whether these shared the same place and whether they were identical as predictors. The model returns a significant three-way interaction, indicating a significantly large degree of over-representation of sequences of adjacent identical long front vowels. The model shows that sequences of identical vowels are over-represented in general.

In order to determine whether the over-representation of identical vowels is related to reduplication, we excluded all words with repeated sequences from our material—restricting the set of word chunks the same way as we did for the consonants. This reduced the total vowel digrams under consideration from 22664 to 12409. We recalculated the O/E. The values are shown in Table 10.

This changes the profile quite considerably. While pairs of identical vowels still remain somewhat over-represented, it appears that the very strong tendency for identical vowels to occur in adjacent syllables was to a large degree carried by syllables that also share onsets. Notably, sequences of two /i:/s and two /e:/s are now unattested. Their over-representation in the larger data-set was driven entirely by words in which they occurred in adjacent identical syllables. This goes some way to explaining the previously observed interaction—in which sequences of identical long front vowels were over-represented.

Next we fit a simple linear regression model to the restricted data-set in Table 7, testing the phonological characteristics of the vowel sequences. The resulting model is shown in Table 11. It is very simple, revealing a remaining significant over-representation of sequences of identical vowels. We re-fit the model using observed minus expected as the outcome variable. That model shows the vowel identity factor to be highly significant.

Table 10: Observed over expected ratio for vowels in adjacent syllables, excluding repeated sequences.

The first segment in the combination is listed vertically, the second is listed horizontally. 0 reflects non-occurrence.

	i	I	e	E	o	O	u	U	a	A
i	**1.68**	1.55	0.56	0.23	1.45	0.88	0.46	0.61	0.90	0.78
I	1.02	**0.00**	0.97	0.00	1.21	3.77	0.00	0.00	1.12	2.51
e	0.57	0.53	**2.01**	1.02	1.03	0.71	0.94	1.07	0.86	0.27
E	0.33	0.00	2.33	**0.00**	0.22	3.38	0.46	0.00	1.18	1.69
o	1.04	1.34	1.25	1.04	**1.82**	0.60	0.86	0.73	0.65	0.52
O	0.94	4.74	0.83	4.61	1.08	**1.07**	1.15	3.02	0.70	2.76
u	0.92	0.35	1.01	0.23	0.39	0.24	**2.06**	0.96	0.95	0.71
U	0.39	1.75	1.11	3.40	1.01	2.76	0.94	**1.49**	0.90	4.60
a	1.00	0.61	0.78	0.98	0.74	1.09	0.93	0.84	**1.24**	0.87
A	0.82	1.38	0.78	0.67	0.80	2.49	0.99	2.23	1.07	**2.64**

Table 11: Regression model on the restricted set.

	Estimate	Std. Error	t value	Pr(>|t|)
Intercept (different segments)	-0.04	0.07	-0.51	0.61
identical segments	0.56	0.24	2.3	0.02

This means we have strong support for the overrepresentation of identical vowel sequences even if we remove all sequences of identical syllables.

3. Discussion

This paper builds on the simple tabulations provided by Krupa (1968), which examined some frequencies of occurrence and co-occurrence in two-syllable words. We extend this analysis to include longer words, and conduct statistical analysis to identify the degree to which co-occurrence patterns deviate significantly from chance.

Our analysis reveals consistent and statistically significant deviations from

chance in the co-occurrence of Māori consonants and vowels. Adjacent onsets sharing the same place of articulation are avoided. Adjacent identical vowels are overrepresented. Both vowels and consonants show positional effects in terms of their overall distributions across syllables.

The consonant analysis confirms that the trends reported in Krupa (1968) are robust, and do appear to be a manifestation of an OCP-type pattern. This closely compares to the gradient avoidance of similarity observed in other languages (Frisch et al., 2004; Martin, 2007). By way of explanation for such patterns, Frisch et al. (2004) point to work on the effect of repetition on speech production and speech processing, showing that the repetition of segments is taxing to language processing and increases the chance of parsing errors. Frisch and his colleagues show that gradient similarity avoidance in the lexicon (wherein sequences of similar segments occur less often than they would if co-occurrence were based on chance) is relatively common, citing the example of Pierrehumbert (2006), who demonstrates that triconsonantal clusters in English morphemes are more restricted than similar clusters on morpheme boundaries. McCarthy (1986) and Frisch et al. (2004) discuss the fact that languages vary in with respect to the treatment of identical consonants. Totally identical consonants are sometimes permitted by languages displaying OCP-constraints, and sometimes excluded. In Māori, adjacent identical consonants are under-represented in the monomorphemic lexicon. However, they are well represented when sequences of identical syllables are included.

If CV syllables do not combine freely, as our results indicate, this could also be helpful for word segmentation, since the transitional probabilities of syllables within and across word boundaries will be different (Harris, 1955), a cue which adult listeners can exploit to locate word boundaries (cf. e.g. Saffran et al. 1996; Cairns et al. 1997). Many segmentation algorithms rely on identification of low probability diphones. Our results however suggest that, if Māori listeners use phonotactic patterns to segment the speech stream at all, then the relevant patterns extend over greater distances than the diphone.

This simple examination reveals that Māori phonotactics are more complex than what the simple syllable structure of the language might imply, and that a number of significant statistical tendencies underlie the phonological grammar. We have not yet examined longer-distance dependencies, nor whether there are patterned constraints that occur within the syllable. Considerable future work also awaits with respect to word shapes that contain sequences of multiple vowels.

According to our analysis, Māori restricts the co-occurrence of homorganic

codas, with the exception of identical ones. As such, it fits into the cross-linguistic typology of co-occurrence restrictions (McCarthy, 1988). The exception of identical consonants disappears in a subset of the vocabulary that excludes words containing reduplicated sequences. This supports the assumption that the apparent exceptionality of identical consonants results from morphological processes in the language (cf. e.g. Yip 1995).

What remains clear is that while Māori phonotactics may appear simple on the surface, a number of gradient patterns and restrictions work together to shape the Māori lexicon. An interesting question for future experimental work is how much implicit knowledge of these gradient patterns speakers of Māori might have.

Note

2   'Ahu', *a heap*; 'Ahunga', *heaping up*; 'Whakaahu', *to make a heap*; 'ahuahu', *to heap*.

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THE EFFECT OF RECORDING SETTING IN ACCENTEDNESS PERCEPTION[1]

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Abstract

This study investigates the effect of recording setting on accentedness perception. It specifically tests Piller's (2002) claims that certain settings are conducive to 'passing' for a native speaker. A number of non-native speakers of English were recorded in four different settings communicating on different topics (family, university, speaking with friends, and in short service encounters). Short clips from these recordings were subsequently played in two experiments to native speaker listeners who rated them on an accentedness scale. The results suggest that listeners rate clips recorded in the services and, under some conditions, family settings as less accented. The results of this perception study are discussed in light of a production study of sociolinguistic variation in non-native speakers (Gnevsheva 2015b).

1. Introduction

An accent is a '… cumulative auditory effect of those features of pronunciation which identify where a person is from, regionally or socially' (Vishnevskaya 2008: 235). Every speaker has an accent; however, lay people often believe that they do not have an accent, and only people who speak differently from them do. A difference might come in many forms, such as when someone meets a speaker whose first language (L1) is different from their own, they

may hear differences in the person's pronunciation in the second language (L2) which are a result of the speaker's L1, cumulatively perceived as a 'second language accent'. When they meet a speaker of a shared L1, they will probably regard the speaker as a native speaker of a language without any second language accent; however, if the speaker is a native speaker of a different variety of L1, they will hear a 'foreign accent', and if they are a native speaker of the same variety of L1, they will most likely believe that the person does not have an accent in that language.

In accentedness perception tasks listeners are presented with utterances which they are asked to rate on an accentedness scale (e.g., from 'No foreign accent' to 'Strong foreign accent'). Presumably, listeners somehow assess the amount of deviation from their 'native speaker ideal' present in the utterance and assign it a numerical representation. This understanding is supported by Munro & Derwing (1995), who found that the majority of listeners in their experiment exhibited a significant correlation between their perceived accentedness scores and quantitative measures of intonation, segmental, and grammatical errors, and Munro (1993), who found that the speakers with more target-like F1 and F2 measurements in their vowels were rated to be less accented.

However, accentedness perception is not just affected by the linguistic content of the audio stimuli. Ratings are highly variable and are known to be influenced by a number of speaker-independent factors. Kraut & Wulff (2013) found an effect of familiarity with foreign accents such that listeners who often interacted with non-native speakers (NNSs) perceived a weaker foreign accent. The same study found that female speakers at lower and intermediate proficiency levels were rated to be significantly more accented compared to males of the same proficiencies. Word frequency was also found to be a significant predictor as words of higher frequency were perceived to be significantly less accented (Levi, Winters, & Pisoni 2007). This finding is compatible with usage-based accounts of perception (e.g., Johnson 1997) which may predict that less frequent words would be perceived to be more novel and, potentially, more accented compared to less novel and more frequent words. Listener-dependent factors have been found to affect not only accentedness ratings but comprehension of foreign accented speech. For example, teenagers were found to understand more of the foreign accented speech than younger children, and although not tested statistically, adults were informally assessed to understand more of the foreign accented speech than teenagers (Munro, Derwing, & Holtby 2011).

Rubin & Smith (1990) explored the way listeners' stereotypes and expectations as to the relationship between speaker accent, ethnicity, and certain topics (the former two also explored in, for example, Rubin 1992) affect their perception. The same Chinese-accented speakers delivered a 'science' and a 'humanities' lecture. Although no significant effect of topic on perceived accentedness was found, they were perceived to be significantly more 'oriental' in the humanities subject. One methodological criticism that could potentially account for this finding is that the humanities lecture was about an Indian classic tale, the Mahabarata, a clearly 'oriental' subject, and the effect of a 'culturally neutral' topic remains unknown. The lexical frequency effect found by (Levi et al. 2007) potentially predicts a higher accentedness rating for the 'science' lecture which might contain more lower frequency vocabulary, such as 'growing scarcity of helium supplies' (Rubin & Smith 1990: 342). The word frequencies of the vocabulary in these particular texts are not known, but it has been shown that a 'science' text contains more technical vocabulary than a humanities text (Chung & Nation 2003).

Piller (2002) claimed that certain settings (namely, communication with friends and short service encounters, such as buying coffee in a coffee shop) are conducive to 'passing' for a native speaker (NS), that is being perceived to be a NS. She explained such variation in passing as being a result of speakers' identity negotiation. The identity construction account of variation posits that linguistic variation reflects speakers' changes in projected identity as it is being negotiated in communication (e.g., Eckert 2000). Piller (2002) argued that L2 speakers may be less focused on projecting their L2 identity in communication with close friends who know them well or with strangers in short service encounters when identity is presumably less of an issue. This study was based on self-reports and the variation in passing was not confirmed experimentally. Piller's (2002) claims were specifically tested in a production study exploring within-speaker variation among settings (Gnevsheva 2015b).

Gnevsheva (2015b) investigated non-native English speakers' (NNESs) production of several monophthongal vowels when speaking about their family, university life, and in short service encounters in New Zealand. German and Korean L1 speakers were recorded speaking English in interviews with a NNES of a different L1 about their family at home (family setting) and university life on the university campus (university setting); they also self-recorded themselves in short service encounters (e.g., buying a coffee in a coffee-shop) speaking predominantly to native speakers of New Zealand English (NZE) (see Section 2.2 for a summary of the recording procedure).

It was hypothesized that the speakers would use more L1-like vowels when speaking about their family to a NNES (family setting), that they would use more L2-like vowels when speaking about the university life in New Zealand to a NNES (university setting), and that their production of vowels would be most L2-like when speaking to native English speakers (NESs) in the services setting. Both groups of speakers were found to produce more L2-like vowels when participating in short service encounters compared to the other two settings, and the Korean group additionally produced more L1-like vowels when speaking about their family compared to when speaking about the university with the same NNES interviewer. In particular, German L1 speakers produced a lower KIT vowel (more NZE-like) in the services setting compared to the university one, and Korean L1 speakers produced a lower KIT and TRAP (less L1-like) in the services setting and a backer GOOSE (more L1-like) in the family setting compared to the university one. Despite an effect of speaker sex found in previous studies of the use of ethnically-marked variants in style-shifting (e.g., Sharma 2011), no effect of speaker sex was found in this production study.

Variation in perceived accentedness of a speaker may be affected by variation in both production and perception, and a production study by itself will not offer a clear picture of variation in passing as Purnell (2010) and Munro & Derwing (2015) have noted that acoustic measurements of production do not always correlate with perception ratings. This study explores the potential for between-setting variation in accentedness perception and aims to complement the Gnevsheva (2015b) production study. It particularly tests Piller's (2002) predictions that certain settings produce a different effect on perception of NNSs. It also considers the effect of variables which have been explored in previous studies: speaker sex and word frequency, among others. To address this matter, native English-speaking listeners were presented with clips from the recordings in different settings produced by the L2 speakers in Gnevsheva (2015b) in two accentedness rating experiments. I elaborate on the speakers and the two experimental conditions in the next section.

2. Method

2.1 Speakers
Nine German, nine Korean, and six English L1 speakers (2 from each of New Zealand, the USA, and England) were recruited for the study (24

speakers in total, evenly split by sex). The speakers' average age was 25 (age range = 21–34). All were studying towards or had completed a higher academic degree (8 Bachelor's, 4 Master's, and 12 PhD) and were affiliated with the same university in New Zealand. The NNESs' age of acquisition of English was ten or higher. They all had demonstrated a level of English high enough to be accepted into an English-medium program at a New Zealand university; however, six participants in each L2 English group (3 males and 3 females) were informally categorized by the author to be of higher English proficiency, and three were categorized as lower English proficiency. The higher proficiency speakers exhibited less L1 interference, more fluency, and fewer grammatical mistakes while the lower proficiency speakers sounded clearly foreign-accented and made more grammatical mistakes. The speakers were recruited to represent a variety of proficiencies in order to create a range of accentedness in the perception experiments.

2.2 Recording procedure

The twenty-four speakers were recorded in four different settings with a head-mounted Opus 55.18 MKII beyerdynamic microphone and an H4n Zoom audio-recorder which allowed for speaker mobility (see Gnevsheva 2015a) for full details on recording procedure). Here setting is understood quite broadly and includes differences in topic, context, and interlocutor. I interviewed all speakers on family-related topics at their home (hereafter referred to as the *family* setting) and about their research and studies on the university campus (the *university* setting). In the family setting the speakers were asked about their family and childhood, and in the university setting the speakers were asked to describe their PhD or term paper research depending on their level of education. The order of the two types of interview was counterbalanced. After the first interview, the speakers were instructed to record themselves in natural communication with friends (the *friends* setting) and in a minimum of four short service encounters in a public space, such as ordering a drink at a coffee shop (the *services* setting). A total of about 1 hour of recorded speech was collected per speaker. This data now forms the 'Accent of Non-Native English' (ANNE) corpus (Gnevsheva 2015a).

In a post-recordings interview the speakers reported that they believed that more than 90% of their interlocutors in the services setting were NSs of New Zealand English, but there was much more variation in the friends setting as the speakers reported more than 50% of their interlocutors being L2 speakers. The friends setting varied most on topic as well with a wide range of topics

covered as the speakers were not constrained the way they were in the family and university semi-structured interviews which followed the same order and format of questions. Thus, the results pertaining to the friends setting should be interpreted keeping this variation in mind.

2.3 Stimuli

The audio stimuli in Experiments 1 and 2, reported below, were the same short clips extracted from the recordings of the twenty-four speakers in the four different settings (family, friends, services, and university). Where possible, the clips were extracted after the initial 5 minutes of recording, by which point the speaker would feel more comfortable with the recording procedure. Most clips were of a minimum of 25 words, but because service encounters can be quite brief, some clips in that setting were shorter than 25 words: mean length 22.2 words and 10.1 seconds.

Additionally, the clips contained complete phrases, so the exact length of clip in words varied (mean length 26.6 words and 13.0 seconds for all clips). Most of the clips from the family, friends, and university settings were uninterrupted; however, many of the services clips were sometimes interrupted by very short periods of silence as interlocutor turns had been edited out. To minimise the undue effect of individual differences between clips, three clips per setting per speaker were extracted, resulting in a total of 288 clips (24 speakers * 4 settings * 3 clips). The recordings were normalized to remove variation in volume.

To avoid an undue effect of grammatical inaccuracies and disfluencies on accentedness ratings, I made an attempt to choose clips without errors and hesitations. The clips did not contain names of persons, geographical locations, or any other extra-linguistic information that might draw attention to the speakers' foreignness.

2.4 Experimental procedure

This paper presents two perception experiments, both of which explored the effect of setting on accentedness perception but which also differed in a number of ways, making them partially independent of each other. Firstly, the two experiments employed different accentedness rating tasks. In the first experiment, four clips recorded in different settings from the same speaker were presented at the same time which allowed for direct comparison. This discrimination task was used first in order to assess the effect of recording setting. After a statistically significant effect was found in experiment 1, in the

second experiment, which is in essence an identification task, the clips were presented randomly one clip at a time.

Secondly, Experiment 1 employed the 216 clips from the NNESs only; Experiment 2 used all of the 288 clips from both NESs and NNESs. Because the goal was to assess the relative perceived accentedness of the clips recorded in different settings, the second experiment, which presented the clips individually, employed NES clips in order to create a range of English language proficiencies. In the first experiment the clips in the four different settings were presented at the same time allowing for a direct comparison of settings, so the creation of a proficiency continuum among the speakers was not seen as essential to experiment design.

Thirdly, there were also differences in the rating scales used: in Experiment 1 the speakers were rated on a scale which read 'I can hear a very strong foreign accent' and 'I cannot hear a foreign accent at all' at the two extremes and in Experiment 2 the scale read 'Definitely a first language speaker of English' and 'Definitely a second language speaker of English'. Thus, in the first experiment any deviation from the NZE target (even native to other varieties of English such as American English) would be considered a manifestation of an accent while in the second experiment only deviations due to an assumed L1 interference would result in a lower score. Consequently, Experiment 1 explores variation in NZE-accentedness (with implications for passing for a NS of the same dialect as listeners) and Experiment 2 explores variation in English-native-likeness (with implications for passing for a NS of any English variety). I elaborate on the methodological details for Experiment 1 and Experiment 2 below.

3. Experiment 1

3.1 Participants and procedure

The listeners in Experiment 1 were twenty five native speakers of New Zealand English who were recruited through announcements posted around the University of Canterbury campus. There were sixteen females and nine males. The age, education, socio-economic class of the participants were comparable to those of the speakers: average age 27, age range 18–69, all had achieved or were studying towards a Bachelor's degree or above at the time of the study. Ten claimed no knowledge of a foreign language.

The listeners were seated individually in a quiet lab in front of the computer

with head-phones. Stimuli were presented electronically using the E-Prime 2.0 software (Psychology Software Tools 2012). Before starting the actual task the listeners read the instructions on the screen, completed a practice trial with comparable clips from a male NS of New Zealand English and if needed, adjusted the volume and clarified the procedure with the research assistant (the author). After that, the listeners were presented with eighteen sets of four clips, each set corresponding to a speaker with a random combination of clips from the four settings. In the task, the listeners were instructed to rate the presented clips and place them on a scale which read 'Very strong foreign accent' and 'No foreign accent at all' at the two extremes (Figure 1). At the top of the screen there were four symbols associated with the four clips recorded in the different settings. The listeners played the clips by clicking on each of the four symbols one at a time and indicated their accentedness rating by clicking on the scale below where an identical symbol then appeared (Figure 2). They could replay the clips for a given speaker and change the position of symbols on the scale until they moved on to the next speaker by clicking on 'Done'.
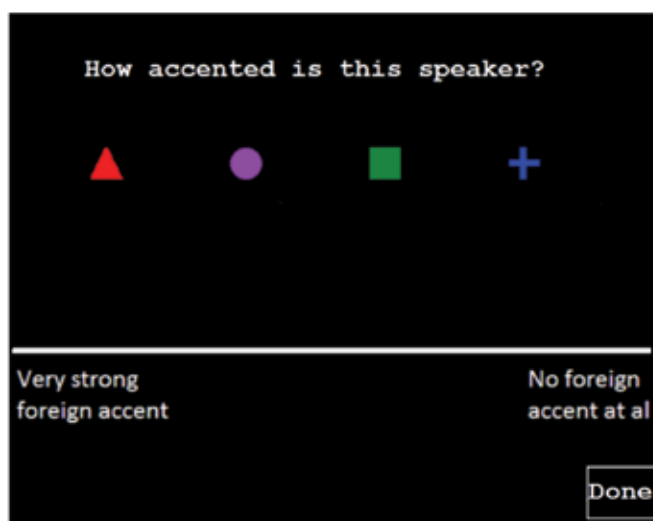

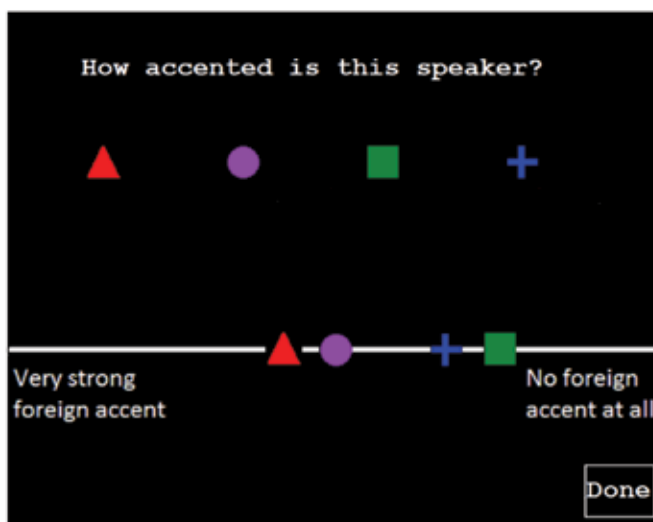**Figure 1: Slide presented to listeners in Experiment 1.**

Figure 2: Slide with listener response in Experiment 1.

The order of the eighteen speakers in the experiment, clips (the choice of one of the three clips for each speaker in each setting), the order of the four symbols and the four settings on the screen were randomized. The task was self-paced and took about 30 minutes. At the end, the listeners completed a short biographical questionnaire. They were given a $10 voucher for completing the task. The research was reviewed and approved by the University of Canterbury Human Ethics Committee.

3.2 Results and discussion

The position of the symbols on the scale was recorded as an accentedness rating from 1 (Very strong foreign accent) to 100 (No foreign accent at all) which was subsequently analysed in R (R Core Team, 2014). A linear mixed-effects model was fit to the data with the perceived accentedness rating as the dependent variable. The fixed effects in the full model included two-way interactions between *setting* and each of the other variables as well as their main effects (Table 1). *Speaker*, *clip*, and *listener* were included as random intercepts, and *setting* was introduced as a random slope for *listener* (Barr, Levy, Scheepers, & Tily 2013). If an interaction or a fixed effect was found

to be non-significant, I simplified the model by excluding the interaction or the variable from the model and then compared the previous and the current models with an ANOVA. The significantly better or simpler model was kept.

Table 1: The effects included in the statistical model.

SPEAKER-RELATED FIXED EFFECTS	LISTENER-RELATED FIXED EFFECTS	CLIP-RELATED FIXED EFFECTS	RANDOM INTERCEPTS
L1	Age	Setting	Speaker
Proficiency	Sex	Word frequency[3]	Listener
Sex	L2 knowledge (binary)[2]	Clip length in seconds	Clip
		Clip length in words	
		Speech rate (words per second)	
		Progression in the experiment (1 through 18)	

Table 2 represents the final model. The higher proficiency speakers in the university setting were chosen as the reference level (Intercept). The *estimate* and the *standard error* columns in the table give us the predicted accentedness rating and standard error for a level respectively. So for the Intercept (the higher proficiency speakers in the university setting), the predicted accentedness rating is 45.696. To calculate the predicted accentedness rating for a different level, the respective value in the estimate column is added or subtracted. For example, the higher proficiency speakers received a rating 5.081 higher in the services setting than in the university setting; this difference was significant, as indicated in the significance column. The difference in accentedness ratings between the friends and the university settings was not found to be significantly different. The difference between the family and the university settings did not reach the level of significance (p=0.05); however, the trend was in the direction of the family setting being judged less accented.

This finding suggests that listeners' accentedness perception may vary by setting of recording. As predicted by Piller (2002), who found that L2 speakers believed they passed for a native speaker more commonly in short service encounters, the clips in the services setting in this experiment were

Table 2: Model summary for accentedness ratings of non-native English speakers in different settings.

	Estimate	Standard error	df	t value	Pr(>ltl)	Significance
(Intercept)	45.696	4.951	34	9.230	0.000	-
setting_family	2.456	1.307	169	1.879	0.062	
setting_friends	0.600	1.325	1567	0.451	0.652	
setting_services	5.081	1.309	169	3.881	0.000	***
proficiency_lower	-19.789	7.147	19	-2.769	0.012	*
progression	-0.132	0.067	1717	-1.972	0.049	*
setting_family : proficiency_lower	-0.368	2.263	169	-0.162	0.872	
setting_friends : proficiency_lower	0.697	2.267	166	0.307	0.759	
setting_services : proficiency_lower	-4.561	2.264	169	-2.015	0.046	*

Note: * p<0.05; ** p<0.01, *** p<0.001

rated as less accented. However, contrary to her prediction, the friends setting was not among the less accented ones. Admittedly, the friends setting is very broad as the only variable defining it is audience, and there is much potential for variation, for example, in topic, which could have an effect on perception. Additionally, some speakers spoke to NSs of NZE, and others to NNESs of a shared or not shared L1. Speaking to non-NZE-speaking friends could have resulted in convergence to more accented speech, which is compatible with the current findings. This study focuses on the speakers as a group; however, future analysis of the specific effects of different audiences would allow to disentangle the effects of audiences that have different relationships with the speaker.

As expected, proficiency was found to have a significant effect such that the speakers who I had assigned to the lower proficiency group received a stronger accentedness score compared to the higher proficiency group. This finding is not meant to be an important focal point but simply is reported to lend support to my division of the speakers into the two groups. Furthermore, I found a significant interaction between setting and proficiency, such that lower proficiency speakers in the services setting did not receive the advantage that higher proficiency speakers did and were judged more accented

in that particular setting. This interaction is plotted in Figure 3. It suggests that it is only the higher proficiency speakers who receive a setting advantage and are judged less accented in the services setting. When the model was re-run with levels of proficiency re-leveled and lower proficiency as the Intercept, no significant main effect of setting was found. This means that lower proficiency speakers were judged similarly foreign-accented irrespective of setting.
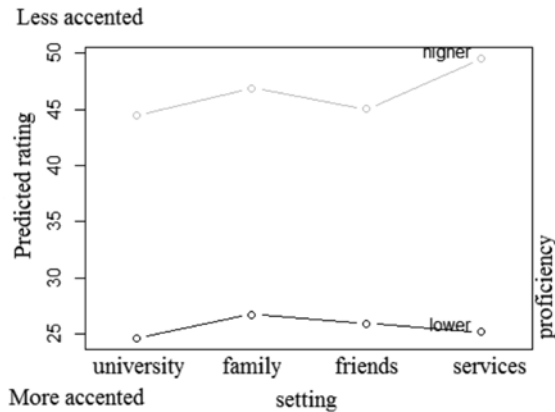

Figure 3: Model prediction for accentedness rating in the four settings (from model in Table 2).

Finally, there was a significant effect of progression in the experiment such that the clips presented to the listeners later in the experiment were judged to be more foreign-accented and received a stronger accentedness score. I argue that this effect is due to the listeners' expectation to hear accented speech (Lindemann & Subtirelu 2013). This experiment did not employ NESs as controls, so the listeners may have noticed that the range of accentedness they heard was from light to strong and realized that the experiment included NNESs only. This may have brought them to expect to hear foreign accented speech and rate it in accordance with their expectations.

4. Experiment 2

4.1 Participants and procedure

The listeners were thirty native speakers of New Zealand English, similar to the speakers and the listeners from Experiment 1, with the age range 18–50, age mean 24, fourteen females and sixteen males. The majority had achieved or were studying towards a Bachelor's degree. Fourteen listeners claimed no knowledge of a foreign language.

The participants completed the task on a computer with E-Prime 2.0 (Psychology Software Tools 2012) in a quiet room. They heard the audio stimuli via head-phones, saw the instructions on the screen, and entered their responses on the keyboard. Each listener was presented with 1 clip from each speaker in every setting (24 speakers x 4 settings x 1 random clip = 96 clips). The task consisted of four quarters with three breaks in between. Each quarter used one clip from each speaker in one of the settings, with the order of speakers and settings randomized. After a clip presentation, the listener rated the speaker on an accentedness scale from 1 (Definitely a first language speaker of English) to 7 (Definitely a second language speaker of English), then guessed where the speaker was from, and commented on what influenced their decisions in the first and second questions. After the task, which took about one hour, the listeners completed a biographical questionnaire and received a $10 coffee voucher for their time. The research was reviewed and approved by the University of Canterbury Human Ethics Committee. This paper focuses on the listeners' responses to the first question (perceived accentedness); for a discussion of the responses to the second and third questions see (Gnevsheva 2016, under review).

4.2 Results and discussion

A mixed-effects regression model was fit to the NNES data in R (R Core Team 2014) with perceived accentedness rating as the dependent variable. As setting was the primary variable of interest, the fixed effects were its two-way interactions with all the other variables and their main effects (Table 3). *Setting* was introduced as a random slope for *listener*, but the model did not converge and the random slope was excluded (Barr, Levy, Scheepers, & Tily 2013).

If an interaction or a main effect did not reach significance, the model was re-run without it, and the older and the newer models were compared with an ANOVA. The better or the simpler model was kept, and the process was

Table 3: The effects included in the statistical model.

SPEAKER-RELATED FIXED EFFECTS	LISTENER-RELATED FIXED EFFECTS	CLIP-RELATED FIXED EFFECTS	RANDOM INTERCEPTS
L1	Age	Setting	Speaker
Proficiency	Sex	Word frequency	Listener
Sex	L2 knowledge (binary)	Clip length in seconds	Clip
		Clip length in words	
		Speech rate (words per second)	
		Progression in the experiment (1 through 96)	

repeated with the remaining interactions and main effects. The final model in Table 4 contains fixed effects which were significant or improved model fit.

The reference level (Intercept) is the clips recorded in the university setting by females of higher proficiency judged by listeners with no L2 knowledge; this allowed for a better comparison with Experiment 1 where the base level was higher proficiency speakers in the university setting. The estimate rating for this level is 3.781. Their counterparts in the family or services setting were judged significantly less accented. This finding partially supports Piller's (2002) claims about different settings and is aligned with the first experiment's results which investigated foreign accentedness with a slightly different method. Another statistically significant main effect was speaker proficiency. Unsurprisingly, speakers of lower proficiency were judged as more accented which shows that NSs of New Zealand English generally agreed with my assignment of the speakers to the two proficiency groups.

The main effect of listener L2 knowledge did not reach significance, but it participated in an interaction with setting such that listeners with L2 knowledge judged clips in the friends and services setting as less accented compared to the university setting (Figure 4). The interaction with the family setting did not reach significance at p=0.05 level, but the trend was in the same direction (p<0.1). This experiment was not designed to explain this finding, but it is possible that listeners with L2 knowledge use cues that are different from those used by listeners with no L2 knowledge. Previous research has

Table 4: Model summary for accentedness ratings of non-native English speakers in different settings.

	Estimate	Standard error	df	t value	Pr(>|t|)	Significance
(Intercept)	3.781	0.389	43.0	9.709	0.000	-
setting_family	-0.522	0.221	264.1	-2.359	0.019	*
setting_friends	0.005	0.221	263.5	0.023	0.982	
setting_services	-0.473	0.222	263.0	-2.133	0.034	*
speaker.sex_male	-0.843	0.433	25.6	-1.947	0.063	
L2.knowledge_yes	0.208	0.297	38.7	0.698	0.489	
proficiency_lower	2.143	0.398	17.9	5.384	0.000	***
setting_family: speaker.sex_male	0.622	0.284	188.4	2.194	0.030	*
setting_friends: speaker.sex_male	0.170	0.283	187.3	0.600	0.550	
setting_services: speaker.sex_male	0.430	0.284	187.9	1.514	0.132	
setting_family: L2.knowledge_yes	-0.305	0.171	1977.0	-1.788	0.074	
setting_friends: L2.knowledge_yes	-0.440	0.171	2003.0	-2.569	0.010	*
setting_services: L2.knowledge_yes	-0.377	0.171	1996.0	-2.202	0.028	*

Note: * p<0.05; ** p<0.01, *** p<0.001

found that listeners who rarely interacted with NNESs perceived a stronger accent in an accentedness rating task (Kraut & Wulff 2013). My finding may be reflective of a similar influence as I expect that listeners with L2 knowledge are more likely to interact with NNESs on a daily basis; however, I did not collect the listeners' social network information and cannot be certain of that. Three three-way interactions of (1) L2 knowledge, setting, and speaker sex, (2) L2 knowledge, setting, and word frequency, and (3) setting, speaker sex, and listener sex were tested post-hoc but were not significant.

Speaker sex did not reach significance at the level of p=0.05; however, the trend was in the direction of male speakers being rated less accented. These results are reminiscent of the finding by Kraut & Wulff (2013) that some
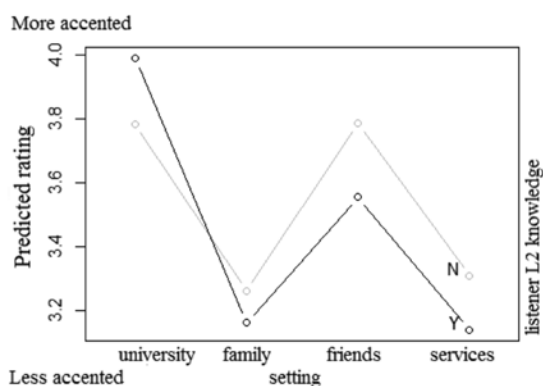
Figure 4: Model prediction for accentedness rating of listeners with and without L2 knowledge in the four settings (from model in Table 4).

groups of female NNESs received a higher accentedness score compared to male speakers of the same proficiency. Speaker sex also participated in a significant interaction with setting such that male speakers in the family setting were judged significantly more accented compared to the university setting in comparison to how less accented women were judged in the family setting compared to the university setting (Figure 5). When I re-ran the model with male speakers as the reference level, no significant difference was found between the settings.

On the one hand, this may be reflective of variation in speaker speech by setting (as in Sharma, 2011); on the other, listeners may react differently to male and female speakers in different settings. The Gnevsheva (2015b) production study did not find variation by speaker sex in the production of monophthongal vowels, but only a thorough investigation of male and female production of other features would be able to ascertain that. Although future research will be needed to explore this further, I can tentatively suggest that listeners perceive a different degree of accent when men and women speak on different topics. Psychology literature has shown that different sexes elicit a different expectation of expertise and women are often perceived to be less knowledgeable in a male-associated task (Thomas-Hunt & Phillips 2004 and references therein). As will be discussed in the next section, the family and university settings differed in formality and technicality of the vocabulary used. My data were not gathered to test this hypothesis specifically, but I
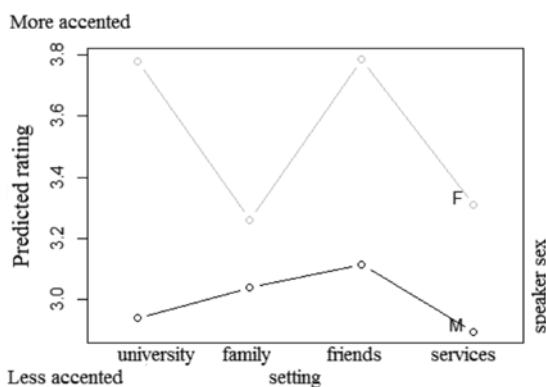
Figure 5: Model prediction for accentedness rating of male and female speakers in the four settings (from model in Table 4).

tentatively suggest that scientific or professional vocabulary produced in a female voice was perceived to be more 'foreign' than that produced in a male voice because of listener expectation of male expertise in a professional environment. Listener expectations and past experiences with males and females in different situations may affect perceived accentedness as other assumed social information (e.g., speaker ethnicity) has been found to do so as well (e.g., Rubin 1992; Gnevsheva in press).

5. General discussion

A number of variables were tested in the two accentedness perception experiments described above. The experiments differed in their methodology (see Table 5). By way of reminder, in Experiment 1 the listeners were presented with four clips at a time (one clip from each setting for NNESs only) and were asked to place them on a foreign accentedness scale. In Experiment 2 the participants listened to one clip at a time with four clips from an individual speaker (the four settings from NESs and NNESs) and rated them on a second language accentedness scale.

Despite these methodological differences between the two experiments, a number of similar trends emerged in the results. First, the effect of proficiency was found to be significant in both experiments and the speakers who I had

Table 5: Details about the two experiments.

	EXPERIMENT 1	EXPERIMENT 2
Dependent variable	Foreign accentedness rating	Second language accentedness rating
Stimulus presentation	4 at a time	1 at a time
Speakers	NNESs	NESs and NNESs
Variables retained in the best-fit model	Setting	Setting
	Proficiency	Proficiency
	Progression	Speaker sex
	Proficiency:setting	L2 knowledge
		Setting:speaker sex
		Setting:L2 knowledge

assigned to the lower proficiency group were rated significantly more accented in both experiments. This supports my division of the NNESs into two groups by proficiency and is not meant to be the focus of the study.

Setting, which was the main independent variable of interest, was found to be significant as a main effect and in interactions. The results of this quantitative study support some of the Piller's (2002) claims about passing based on qualitative data. According to her, NNESs are more likely to pass for a native speaker in short service encounters or in communication with friends. If extrapolated to the four settings in my experiments, this may predict a less accented rating in the friends and services settings. Both experiments found that the clips in the services setting were judged significantly less accented compared to the university setting (for both males and females in the first experiment and for females only in the second experiment). Additionally, the family setting was found to be rated significantly less accented than the university setting for female speakers in Experiment 2; it failed to reach significance in Experiment 1, but the trend was in the same direction with $p<0.1$. My findings support Piller's claims about the services setting; however, the friends setting was not among the less accented ones. I acknowledge that the clips in the friends setting varied dramatically in terms of topic, interlocutors, and conversation flow, so it is problematic to make such a generalization about all communication with friends. What the participants in Piller (2002) might be noticing is their increased confidence in communication

with people and topics that they are familiar and comfortable with. Under this interpretation my speakers' communication with the interviewer in the family setting may fit this criterion despite it being an interview: the speakers were speaking on an informal topic to someone they knew as part of their social circle in a comfortable environment (their home).

One reason for variation in perception can be listeners' reaction to variation in production. If the speaker style-shifts in a certain manner, it is important to know whether it is salient for the listener and if variation in production reflects the variation in perception. The variation by setting in perception partially matched the variation by setting in production found in Gnevsheva (2015b). The services setting was most native-like in the speakers' production of the vowels and the listeners' ratings of accentedness. This relative lighter accentedness in production and perception would, presumably, make it easier to pass for a native speaker in short service encounters as predicted by Piller (2002). The inter-relationship between the family and university settings in production and perception was not exact. Korean L1 participants were more native-like in their production in the university setting compared to the family setting while German L1 speakers' production was not different between the two settings. In perception, on the other hand, the university setting was rated as more accented for females of both language groups (Experiment 2) or no significant difference at $p<0.05$ was found (Experiment 1). Purnell (2010) and Munro & Derwing (2015) argue that the mapping of acoustic and perceptual cues is not exact, so while the speakers may be signalling nativeness in some elements, if the listeners are focusing on a different set of elements, the signal may not be noticed. Moreover, a more nativelike variable may be interpreted to signal other, non-nativeness-related social information as the same cue may activate a number of potential meanings in the indexical field (Eckert 2008). Finally, of course, this analysis compares variation in accentedness ratings of clips to variation in accentedness in production of vowels and there are many other features that may vary among settings in production and affect accentedness perception: consonants, prosody, etc. For example, because the university setting is more likely to contain longer, polysyllabic words, it could have provided more opportunities for non-nativeness for the speakers.

On the other hand, we can suspect that listeners react differently to different settings even when production is similar. The obvious difference between the family and services settings and the university setting is the topic, which was more professional, dealing with research and innovation and requiring the speakers to use more technical language, terms, and jargon in the university

setting while in the family and services settings the topic was more mundane and the language was less industry-specific as in the following examples.

1. *all cellulose composites are monocomposites and a monocomposite just um means that the fibre and the matrix are made of the same material which means they're chemically very very similar if not identical* (Jack. University interview. Perception clip 2)

2. *I would say that I'm closest to my mom because she's the one I I can have the most personal um discussions or conversations with* (Jack. Family interview. Perception clip 2)

3. *er no er the light is is fine I only need one but I need the bulb and the bulb that fits in there wasn't there do you have any other shelf or* (Jack. Services self-recording. Perception clip 3)

The topic of the university setting is less familiar and more 'foreign' to a non-specialized audience which could lead to a stronger accentedness perception. If we assume a usage-based account of accentedness rating, we presuppose that listeners compare the accent in the clip to an ideal representation based on their multiple experiences with other NSs. A more technical topic would be more novel than a family-related account resulting in stronger accentedness ratings. In a similar fashion, previous research has found an effect of word frequency on accentedness ratings such that the lower the word frequency the more accented the speaker was rated (Levi et al. 2007). Applying the word frequency hypothesis to the two interviews in this experiment, one could hypothesize that the university setting clips with their technicalities could produce a similar effect and attract higher accentedness ratings. For that reason, the mean word frequency in the clips was calculated and entered into the model. The effect did not reach significance or improve model fit and was dropped from the final model, but it is possible that this measure did not capture the word frequency effect well and a different one may prove a better prediction.

Experiment 1 found a significant interaction between setting and proficiency such that lower proficiency speakers in the services setting were not rated significantly less accented compared to the university setting. As opposed to Experiment 1, Experiment 2 revealed significant interactions of setting with listener L2 knowledge and speaker sex. The different interactions in the two experiments are possibly due to differences in methods used. In Experiment 2 the listeners were presented with one clip at a time, so four

clips from the same speaker were rated independently exhibiting an effect of setting in perception; in Experiment 1, however, the four clips were presented at the same time, and a listener could make direct comparisons between the settings. These differences may be a task effect. On the one hand, phonetic perception may vary in different environment as listeners have been shown to behave differently in discrimination and identification perception tasks. For example, Waylard (2007) found discriminability of non-native contrasts (Korean and Thai stop consonants) was better predicted by identification than discrimination data. On the other hand, it is possible that the accentedness ratings in Experiment 1 are more representative of the variation inherent in the clips than Experiment 2 where listener-dependent factors may play a larger role. Therefore, the significant interactions with speaker sex and L2 knowledge emerge when the listeners do not realize that they listen to the same speaker more than once and their stereotypes and expectations play a larger role in the assignment of accentedness ratings.

Progression was found to have a significant effect on perceived accentedness in Experiment 1. The listeners were more likely to perceive a stronger foreign accent closer to the end of the experiment. I argued that this effect is due to the listeners' expectation to hear accented speech. The listeners may have noticed that the range of accentedness they heard was from light to strong and realized that the experiment included NNESs only. This may have brought them to expect to hear foreign accented speech and rate it in accordance with their expectations. To sum up, the role of listener expectation in perception surfaces in these experiments several times and confirms earlier observations of its profound effect on foreign-accented speech perception (Lindemann & Subtirelu 2013).

6. Conclusion

To sum up, the two experiments reported on in this paper investigated the effect of setting on accentedness perception and found that the same speakers in different settings (e.g., university and services) may receive a different accentedness rating. The found variation was partially in line with Piller's (2002) predictions and the speakers were judged less accented in the services and, sometimes, family setting. Such variation in perception may be listener-dependent, speaker-dependent, or both. The significant interactions of setting with speaker sex and listener L2 knowledge have highlighted the role of

listener expectation and experience, and it may prove an interesting path for future research.

Notes

1 This research was partially supported by a University of Canterbury research grant. I am thankful to Kevin Watson, Jen Hay, and two anonymous reviewers for helpful and encouraging comments on an earlier draft. All the remaining shortcomings are naturally mine.
2 The listeners were asked whether they spoke any language besides English and how well. Because some participants only listed the languages and did not comment on their proficiency, it was impossible to make more minute distinctions. Listener L2 knowledge in this paper divides participants into two groups: those who reported any L2 knowledge and those that did not.
3 Mean log CELEX frequency of CELEX content words in the clip (Baayen et al. 1995).

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FRICATION, PRE-ASPIRATION AND TAPPING OF MEDIAL /t/ IN NEW ZEALAND ENGLISH[1]

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Abstract

Previous studies have shown that New Zealand English (NZE) medial /t/ can be realised as a canonical stop, with varying degrees of aspiration, a flap, a fully-voiced variant, a glottal stop and a fricative. The patterning of medial /t/ is highly socially conditioned: it has been shown that the use of medial /t/ variants in NZE varies according to speaker age, gender and occupation (Bell, 1977; Holmes, 1994, 1995; Bayard, 1999; Taylor, 1996). This study aims at replicating the results of those auditory-only analyses while combining acoustic and auditory analyses for the first time. The study also aims at uncovering new variants using the acoustic method. The key findings are the following: 1) The data confirm the claim by Taylor (1996) that the prestige medial /t/ variant is a fricative. The results further show that the fricative has entered NZE through the speech of females, and has strongly established itself in the dialect; 2) Conversely, analyses of T-voicing confirms the claim by Holmes (1994) that it has entered NZE through the vernacular style of working-class male speakers and has increasingly established itself in middle class speech; 3) A large amount of pre-aspiration for both stop and fricative realisations of /t/ in medial position. This is interesting because pre-aspiration is said to be rare diachronically and synchronically across languages, given its lack of phonetic salience (Silverman 2003).

1. Introduction

1.1 Background

Previous studies have shown that NZE medial /t/ can be realised as a canonical variant with varying degrees of aspiration, a flap, a fully-voiced variant, a glottal stop and a fricative (Bell 1977; Holmes 1994, 1995; Bayard 1999; Taylor, 1996). The reviewed literature showed that the patterning of medial /t/ is highly socially conditioned. Holmes (1994) found that medial T-voicing entered NZE through the vernacular style of working-class male speakers and increasingly established itself in middle class speech. Holmes (1994) analysed spoken NZE both in conversational settings in broadcast interviews. Furthermore Taylor (1996), who included wordlist data in his sample as well as conversational data, found that the voiced variant did not occur at all for females and gay males. He inferred that the prestige variant might be in fact the fricative as it was the most preferred form in his wordlist data. He suggests that the fricative is a prestige variant for the females and gay males specifically while straight men orient more towards aspirated, voiced and glottalised variants.

1.2 Limitations of previous studies

The number of participants in Taylor's study was low (4 gay males, 3 straight males and 2 straight females). It is unclear whether this pattern would hold true with a larger number of speakers due to individual phonetic variation. Also, he only analysed 15 tokens per speaker, so the total number of observations he made was 135. Given his small sample size he was not able to report statistical tests and suggested that the pattern he observed should be taken with caution. Also, while the auditory identification of T-voicing is relatively straightforward – there is no doubt that the T-voicing analyses done in NZE are very reliable – it is less so for the fricative variant. Auditorily, the fricative variant is not consistently saliently different from an aspirated stop. During the course of the present research, medial /t/ tokens were presented to 6 trained phoneticians who were asked for their judgements. They were presented auditorily and acoustically. It was not uncommon for listeners to respond that they heard aspirated stops, but that they could clearly see fricatives on spectrograms. In her analysis of medial /t/, Holmes (1994) categorised auditorily the realisations as being either voiceless aspirated stops, voiced variants (T-voicing) or glottal stops. Taylor (1996) was the first to discuss a

fricative as a possible variant of /t/ in medial position and his analysis was also auditory-based. It is possible that Holmes' identification of /t/ as an aspirated variant was in fact a fricative. So far I have uncovered no previous acoustic-based categorisation of medial /t/ in NZE.

1.3 Aim of this study

The study presented here is part of a larger set of speech production and perception experiments that focus exclusively on the variants of medial /t/. In this paper I present a sociophonetic analysis of the patterning of medial /t/ in NZE. I examined medial /t/ variants in free conversation as well as in wordlist data. Medial /t/ tokens were taken from archived speech of New Zealanders born as early as the late 19th century. Speakers were grouped according to year of birth, gender and professional status. Each medial /t/ token was analysed acoustically and auditorily. The first goal of this study was to verify claims on the sociolinguistic patterning of medial /t/ in New Zealand by utilizing auditory and acoustic analysis on a large data set, as opposed to auditory analysis only. In that sense, the aim was to replicate previous findings with a different method. The second goal was to extend previous documentation work on the dialect by providing a descriptive account of new variants, if any could be found.

2. Methods

2.1 Dataset

The University of Canterbury holds recordings that span the history of New Zealand English from the late 19th century until the present. These recordings are part of the ONZE archive (Origins of New Zealand English), which comprises three main corpora: the Mobile Unit, the Intermediate Archive and the Canterbury Corpus (Gordon et al. , 2007). Comparing those three corpora is a means of tracking the evolution of the variants under study over the entire history of NZE. The content of the corpora will be described in detail in section 2. 3. All of the /t/ tokens used came from these three databases. All searches were carried out using LaBB-CAT (Fromont and Hay, 2008). LaBB-CAT is a browser-based interactive client which enables researchers to search across and interact with sound files with time- aligned lexical and phonetic transcriptions, and export the search results into CSV files together with links to the audio files. Lexical items, consisting of two syllables with a strong/weak

stress pattern, were analysed: *city*, *letter*, *fatter*, *scatter*, *better*, *batter* and *Peter*. Those words were chosen because a large number of speakers produced them in isolation in the Canterbury Corpus as part of a wordlist reading. This enabled the comparison of the same words produced in free conversations in the other corpora.

2.2 Grouping of the speakers

The speakers presented in the corpora below were all grouped according to age and gender. Age is the most self-explanatory sociolinguistic variable used in the ONZE Corpus since it refers to the year of birth of the speakers. Gender refers to male or female speakers. Additionally, the Canterbury Corpus has a binary professional/non-professional status associated with each speaker, as defined by Gordon et al. (2007).

2.3 Content of the corpora

2.3.1 The Canterbury Corpus

The data was collected by members of the NZE class of the Linguistics Department at the University of Canterbury between 1994 and 2009 (see Gordon et al. 2007). The Canterbury Corpus (CC) includes recordings of New Zealanders born between 1930 and 1985. Speakers were grouped according to age, gender and professional background so that female young professional speakers are labelled as FYP, old male non-professional speakers are labelled as MON and so forth. The wordlist data was taken from this corpus. A search through LaBB-CAT provided a total 432 wordlist recordings. 147 recordings were discarded because of bad recording quality reasons. 285 wordlist recordings were retained, thus providing 2,023 medial /t/ tokens for analysis. Another search for the same words in spontaneous speech taken from informal interviews yielded 385 words for analysis.

2.3.2 The Intermediate Archive

The data was collected by Rosemary Goodyear, Lesley Evans and members of the ONZE team in the 1990s (see Gordon et al. , 2007). The Intermediate Archive (IA) includes recordings of New Zealanders born between 1890 and 1930. Background information on the speakers included age and gender. A search matching the lexical items present in the word lists returned 138 tokens for analysis.

2.3.3 The Mobile Unit corpus

The data was collected by the Mobile Disc recording Unit of the NZ Broadcasting Service (see Gordon et al. , 2007). The Mobile Unit corpus (MU) includes recordings of New Zealanders born between 1851 and 1910. Background information on the speakers included age and gender. A search matching the lexical items present in the word lists returned 51 tokens for analysis.

2.3.4 Comparisons across corpora

The aim of combining those three corpora is to provide a descriptive account of variation and change of medial /t/ in New Zealand English over a relatively broad span of time. However, the number of tokens considered for each corpora is unbalanced, since the analysis was restricted to specific words as explained in section 2. 2,023 tokens of read speech were extracted from the CC, 385 tokens from spontaneous speech were extracted in the CC, 138 from the IA and 51 from the MU. Fortunately, modern statistical methods – such as random mixed effects models used in this paper (Baayen, 2008) – are specifically designed to handle unbalanced datasets.

2.4 Categorisation of /t/ variants

The realisations of intervocalic /t/ were divided into four main groups: canonical articulations, fricated articulations, glottal articulations and taps. Analyses were conducted auditorily and acoustically by looking at spectrograms for each word. Typical spectrograms for each realisation are presented in figure 1. Canonical articulations were defined as having a closure gap (silence after the first vowel) which was followed by a release burst. The release burst could be followed by a certain amount of aperiodic noise preceding voicing in the next vowel. It is not clear whether the release was followed by aspiration or frication noise. Although most of the tokens could be heard as heavily fricated they were collapsed together with aspirated stops, as the main criterion for grouping articulations in this group was too see a closure followed by a clear burst on waveforms and spectrograms. Fricated articulations were defined as having aperiodic noise following the first vowel all the way through the second vowel. The primary distinguishing characteristic of the canonical versus fricated categories was the period of aperiodic noise. Glottal articulations were defined as having a closure gap without any visible burst release between the first and the second vowel. The second vowel could show a certain amount of creaky voice. Contrary to canonical, fricated and glottal articulations, the

analysis of which relied solely on waveforms and spectrograms, taps were mainly analysed auditorily.

For taps, auditory analysis was considered more reliable than acoustic analysis, as they can take a multitude of acoustic forms and yet they can sound quite similar (Derrick and Schultz, 2013). Canonical and fricated articulations were frequently pre-aspirated. They were thus classified as being pre-aspirated post-aspirated variants or as being pre-aspirated fricated variants respectively. Pre-aspiration is understood in this study as the brief apparition of aperiodic noise in the 3–10 kHz range in the first vowel offset, similarly reported by Jones and Llamas (2003, 2008). Pre-aspiration is one of the areas of focus of this paper as its rarity in the world's languages (Silverman, 2003) makes it an important feature to report and discuss. Since this paper focuses on intervocalic /t/ exclusively, the analysis is restricted to this particular phonetic environment.

Pre-aspiration may also occur in different environments, and further studies could address that question. It is hypothesised that pre-aspiration might be the result of a sudden increase in sub-glottal pressure causing the glottis to spread and maintaining high air velocity for a few milliseconds. These articulatory suppositions will be investigated in further studies. In the case of pre-aspirated and fricated /t/s there is a drop in spectral energy at the offset of pre-aspiration followed by a rise in energy corresponding to the approximation of closure (*ie.* the frication of /t/). A clear gap between these two energy phases was hardly ever observed. Rather there was a smooth transition from the drop to the rise. Those acoustic characteristics are compatible with previous acoustic analyses of pre-aspirated variants of /t/, e. g. Jones and Llamas (2003).

Tokens in the three corpora were classified either as canonical articulations, fricated articulations, glottal articulations or taps. The further categorisation of /t/ into pre-aspirated variants was done for the Canterbury Corpus only.

3. Results

First, the results for the wordlist data within the CC corpus are presented. This corpus is the only one which provides carefully read speech and is treated separately. Secondly, the results for spontaneous speech are presented, including data from the CC corpus, together with data from the MU and IA. Thirdly, a direct comparison between wordlist data and spontaneous speech is established. Finally, the results for pre-aspiration in the CC with regards to carefully read speech are presented.
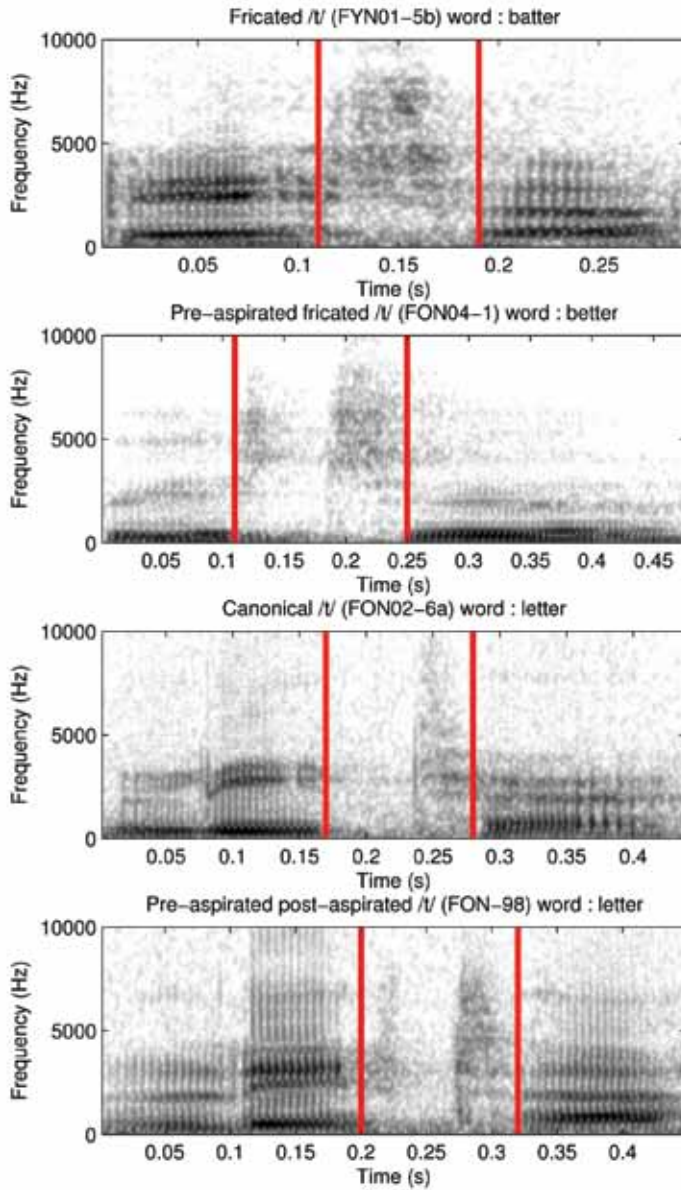
Figure 1: Spectrograms of words produced by four individual speakers in the Canterbury Corpus. Areas of interest are bounded.

3.1 Wordlist results within the CC (read speech)

Table 1 shows the distribution of the variants in the wordlist data. The most widespread variants are the fricated ones (including typical fricated variants and pre-aspirated fricated variants). They account for 67. 33% of the total number of observations. In second position come the alveolar stop variants (including canonical stops and pre-aspirated post-aspirated stops).   They account for 28. 87% of the total number of observations. Glottal and tap articulations are very rare in comparison: they account for less than 4% of the total number of observations in this dataset. Interestingly, 43% of all voiceless stops were pre-aspirated and 16% of the fricatives were pre-aspirated as well. A logit mixed model (Bates, 2010) was fitted in order to analyse the probability of use of the fricated variant. The dependent variable was a binary variable coding for either the presence or the absence of the fricated variant. The fricated variant and the pre-aspirated fricated variant were collapsed together. The independent variables were (i) year of birth: a continuous variable centred on its mean (1960), (ii) gender: a two level factor coding for either male or female, with female selected as the reference level, and (iii) professional status: a two level factor coding for either professional or non-professional status, with professional status selected as the reference level. Two random intercepts were added to the model, one that accounts for the variability across the 285 speakers who produced the words in isolation and one that accounts for the variability across the 7 words that were present in the wordlists (*city*, *letter*, *fatter*, *scatter*, *better*, *batter* and *Peter*). A total of 2023 binary measures were submitted to the model. The coefficients for

Table 1: Raw counts and total percentage per variant present in the wordlist data. Data are separated by gender and professional status. N = non-professional; P = professional.

	MALE		FEMALE		TOTAL
	N	P	N	P	%
canonical stop	141	99	69	25	**16.51**
pre-aspiratedpost-aspirated stop	57	51	50	92	**12.36**
fricated /t/	167	247	382	354	**56.85**
pre-aspiratedfricated /t/	27	70	48	67	**10.48**
tap	49	16	11	0	**3.76**
glottal stop	0	0	0	1	**0.05**

the interaction between year of birth and professional status as well as year of birth and gender were non significant ($p = 0.63$ and $p = 0.49$ respectively) and were dropped from the final model.

Table 2 shows the output of the logit mixed model. The year of birth coefficient is significant and the slope is positive. This means that the probability of observing fricated variants increases over time in the corpus. The gender coefficient is negative and significant. As females were selected as the reference level, this means that males produce fewer fricated variants than females. There is a significant interaction between professional status and gender and the slope of the coefficient is negative. Since professional status was selected as the reference level, this means that professional males use significantly more fricatives than non-professional males. Figure 2 makes these effects more clearly visible. For both males and females there is an increase in the use of the fricative variant over time. For any given age, females use the variant more than males. While there is little difference between professional and non- professional females overall, professional males are more advanced in the use of the fricated variant than non-professional males. A logit mixed model similar to the one described above was used to analysed the probability of observing stops. This time the dependent variable was a binary variable coding for either the presence or the absence of the stops. The canonical variant and the pre-aspirated post-aspirated variant were collapsed together. Year of birth, gender and professional status were selected as fixed effects and words and speakers were selected as random effects. Interactions between fixed effects were non-significant and were dropped from the final model.

Table 2: Output of the model estimating the use of the fricated variant in the CC corpus, wordlist data.

	Estimate	Standard Error	z value	Pr(> |z|)
(Intercept)	2.84032	0.45956	6.180	$p < .0001$
year of birth	0.08877	0.01398	6.352	$p < .0001$
professional status (N)	-0.26280	0.56203	-0.468	0.6401
gender (male)	-1.36131	0.57660	-2.361	0.0182
professional status (N): gender (male)	-1.93659	0.81044	-2.390	0.0169

Table 3: Output of the model estimating the use of stops in the CC corpus, wordlist data.

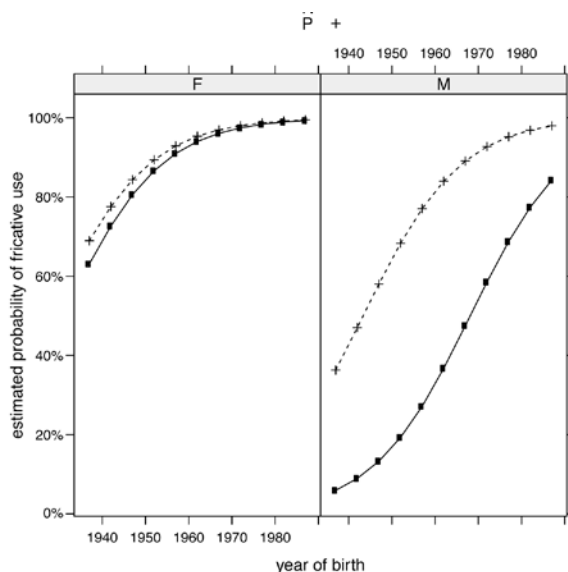|	Estimate	Standard Error	z value	Pr(>|z|)
(Intercept)	-2.87140	0.33218	-8.644	p<.0001
year of birth	-0.09397	0.01411	-6.660	p<.0001
gender (male)	1.66470	0.40764	4.084	p<.0001

Figure 2: Estimated probability of fricative use obtained from the model coefficients (careful speech). Left panel: females (F). Right Panel: males (M). Dashed lines and plus signs: professional speakers (P). Continuous lines and circles: non-professional speakers (N).

Table 3 shows the output of the model of the logit mixed model. The year of birth coefficient is significant and the slope is negative. Thus the probability of observing stops decreases over time in the corpus. The gender coefficient is positive and significant. As females were selected as the reference level, this shows that males produced more stops than females. These results can be seen in figure 3.
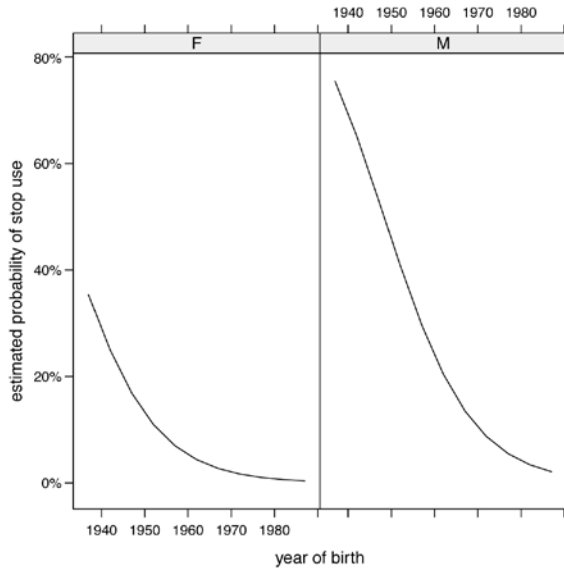
Figure 3: Estimated probability of stop use obtained from the model coefficients (careful speech). Left panel: females (F). Right Panel: males (M).

Seventy-six tokens out of 2023 were produced as taps, which accounts for less than 4% of the total number of observations in the dataset (see table 1). The individual patterns across words and speakers for those speakers who did produced taps (27 speakers in total) were examined. Amongst those speakers the majority of them used the variant only once across the list of words (11 males and 4 females). 5 speakers (4 males and one female) used the tap variant consistently. The words that were tapped the most were *city* and *Peter*. In summary, very few tokens in the corpus were tapped and the pattern observed a preference for males to tap over females, as well as preference for tapping *city* and *Peter* over the other words. Taken together the results support the conclusion of Taylor (1996) that the fricative is the prestige medial /t/ variant, since it is the preferred realisation found in careful speech. They also support his result that males used the variant less than females, at least at the time when his study was conducted. He recruited male speakers born between 1962 and 1976. It is clear from figure 2 that they male were not as advanced in the use of the fricated variant as the youngest speakers. Since the sexual orientation of

the speakers was not made available, it was not possible to examine his claim that gay men were more advanced in the use of the variant than straight men.

3.2 Results for the CC, IA and MU (spontaneous speech)

In order to allow a comparison with spontaneous speech, interviews from the MU, IA and CC interviews of New Zealanders were examined. There were very few instances of the same words that occurred in the wordlist. To balance the data set, the most common tokens (*city*, *letter* and, *better*) were used, providing 573 tokens for analysis. The distribution of variant 243 counts amongst the remaining data set is as shown in table 4.

Table 4: Number of observations per age group for the words *city*, *letter* and, *better*.

YEAR OF BIRTH	CANONICAL	PRE-ASPIRATED POST-ASPIRATED	FRICATED	PRE-ASPIRATED FRICATED	GLOTTAL	TAP	**TOTAL**
1850–1870	8	0	2	0	0	6	**16**
1870–1890	14	0	4	0	2	10	**30**
1890–1910	15	0	11	0	0	10	**36**
1910–1930	26	0	48	0	0	21	**95**
1930–1950	13	5	41	3	0	31	**93**
1950–1970	1	2	49	2	0	39	**93**
1970–1990	4	0	55	0	1	150	**210**

Raw counts from this table were then expressed as a percentage per age group. Thus, to observe the probability prob(c) for canonical stops produced by speakers born between 1850 and 1870, they were proceeded as follows: prob(c) = 8/total per age group = 8/5 = 0. 5. This yielded a bar chart tracing the evolution of each variant, as shown in figure 4. Given that there were relatively few glottal stops or pre-aspirated variants in this data set, the focus was placed on canonical, fricated and tap variants. This is the bottom plot in figure 4. Both the bar chart and the bottom plot display the same information but they do it in a different way. On the bottom plot, the size of the dots represents the total number of tokens analysed for each birth year range (*i.e.* their relative size is calculated using the last column from table 4). Given that there were very few tokens for analysis for the spontaneous data, this gives an indication as to the reliability of these measures. It is relatively poor for speakers born between 1850 and 1910 but much higher for speakers born after 1910.
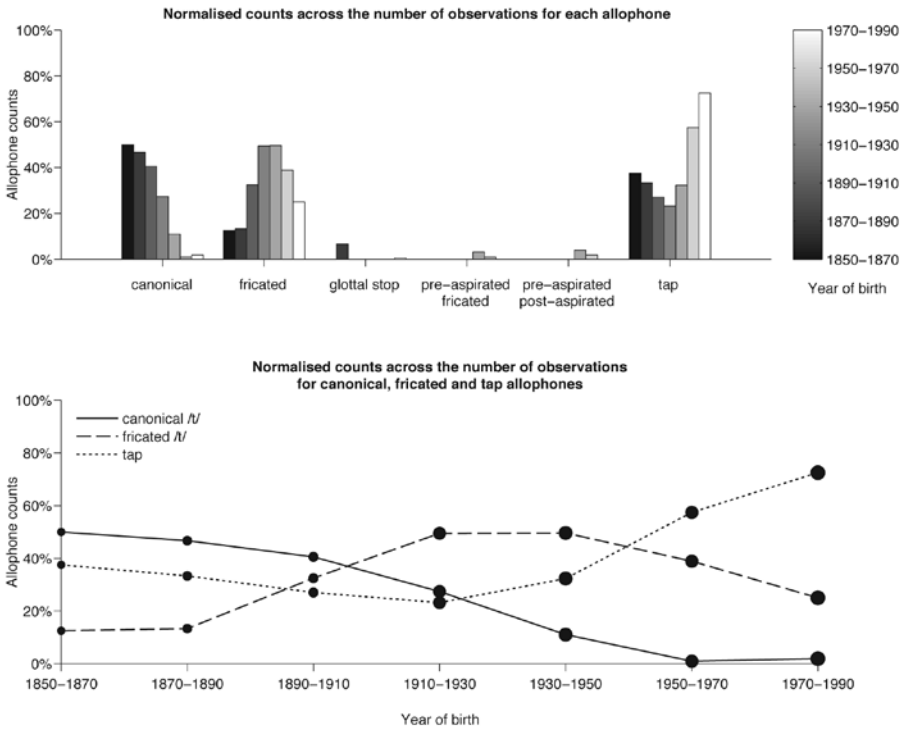
Figure 4: Normalised counts across the number of observations for the words city, letter and, better.

While canonical stops were the most used variants by the oldest speakers, they decrease steadily over time and are hardly to be found in the speech of young New Zealanders in the CC. Fricatives were already to be found in the speech of the oldest speakers. There is an increase in their use until they reach a plateau amongst speakers born between 1910 and 1950. For those speakers, the fricative is the most widely used variant. From 1950 onwards, there is a decline in its use in favour of the tap, which is the most widespread variant today.

Since the tap variant is the most widely used variant today, a logit mixed model was fitted on the CC spontaneous data. The analysis was not performed on earlier corpora given the lack of data points. The dependent variable was a binary variable coding for either the presence or the absence of taps. The

independent variables were (i) year of birth, a continuous variable centred on its mean (1960), (ii) gender : a two level factor coding for either male or female, with female selected as the reference level, and (iii) professional status :a two level factor coding for either professional or non-professional status, with professional status selected as the reference level. Two random intercepts were added to the model, one that accounts for the variability across the 164 speakers who produced the words and one that accounts for the variability across the 3 words that were used (*city*, *letter* and, *better*). A total of 383 binary measures were submitted to the model. Non-significant interactions (*p* > 0.2 using a Likelihood ratio test) were dropped from the final model using a backward stepwise procedure, see Baayen (2008).

Table 5: Output of the model estimating the use of taps in the CC corpus, spontaneous data.

	Estimate	Standard Error	z value	Pr(>|z|)
(Intercept)	-0.20957	0.46585	-0.450	0.653
year of birth	0.08817	0.01401	6. 295	p<.0001
professional status (N)	-1.69448	0. 39557	-4.284	p<.0001
gender (male)	2.41710	0. 40188	6.014	p<.0001

Table 5 shows the output of the logit mixed model. The year of birth coefficient is significant and the slope is positive. This means that the probability of observing taps increases over time in the corpus. The gender coefficient is positive and significant. As females were selected as the reference level, this means that males produce more taps than females. The professional status coefficient is significant and the slope is positive. Thus professional speakers use fewer taps than non-professional speakers. Figure 5 makes these effects more clearly visible. For both males and females there is an increase in the use of the tap variant over time. For any given age, males use this variant more than females and, overall, non-professional speakers are more advanced in the use of the tap variant than professional speakers. The results from spontaneous speech follow the pattern identified by Holmes (1994) whereby T-voicing has entered through the vernacular style of working-class male speakers and has increasingly established itself in middle class speech. The probability of observing fricatives was also analysed by submitting data to a logit mixed
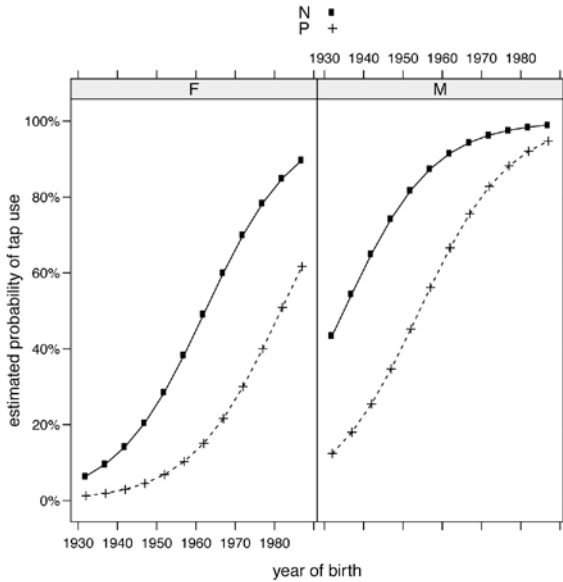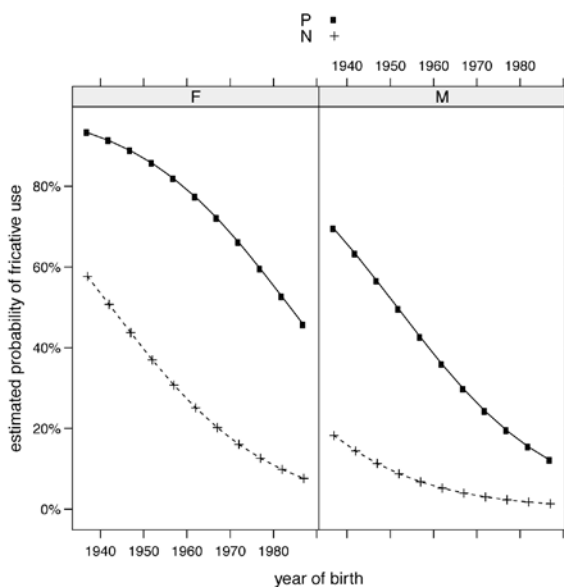
Figure 5: Estimated probability of tap use obtained from the model coefficients (spontaneous speech). Left panel: females (F). Right Panel: males (M). Dashed lines and plus signs: professional speakers (P). Continuous lines and circles: non-professional speakers (N).

model, following a similar method. This time the dependent variable was a binary variable coding for either the presence or the absence of fricatives. The fricated variant and the pre-aspirated fricated variant were collapsed together. year of birth, gender and professional status were selected as fixed effects and words and speakers were selected as random effects. Interactions between fixed effects were non-significant and were dropped from the final model. Table 6 shows the output of the model of the logit mixed model. The year of birth coefficient is significant and the slope is negative. Thus the probability of observing fricatives decreases over time in the corpus. The professional status coefficient is negative and significant. Professionals were selected as the reference level, thus non-professionals produced fewer fricatives than professionals. The gender coefficient is negative and significant. As females were selected as the reference level, this shows that males produced fewer fricated variants than females. These results can be seen in figure 6.

Table 6: Output of the model estimating the use of fricatives in the CC corpus, spontaneous data.

	Estimate	Standard Error	z value	Pr(>lzl)
(Intercept)	1.33717	0.43552	3.070	0.00214
year of birth	-0.05605	0.01260	-4.448	p<.0001
professional status (N)	-1.80663	0.37824	-4.776	p<.0001
gender (male)	-2.31774	0.38084	-6.086	p<.0001

Figure 6: Estimated probability of fricative use obtained from the model coefficients (spontaneous speech). Left panel : females (F). Right Panel : males (M). Dashed lines and plus signs : professional speakers (P). Continuous lines and circles : non-professional speakers (N).

3.3 Direct comparisons between careful speech and spontaneous speech

The results have shown that speakers use variants differently in careful speech compared to spontaneous speech (*e.g.* the fricated variant is most widespread in wordlist data while the tap is most widespread in conversation). In order to further account for the effect of type of speech on variant selection models on a subset of data that allows for direct comparison were fitted. Next data from speakers who produced the three words (*city*, *letter* and, *better*) in both spontaneous and wordlist data were collated. Grouping fricated and pre-aspirated variants together, and excluding the one glottal stop token, the results are shown in Table 7, giving a total of 719 tokens spoken by 141 speakers.

Table 7: Raw counts of broad variants in the comparative dataset.

	SPEECH STYLE	
	CAREFUL SPEECH	SPONTANEOUS SPEECH
stops	130	16
fricatives	280	114
taps	15	164

This set of models was obtained by testing separately for the probability of use of broad variants as a function of type of speech using a logit mixed model. This yielded 3 models: one for stops, one for fricatives and one for taps. Each dependent variable was a two level factor coding for the presence or absence of one of the broad variants. The independent variable was type of speech, a two level factor coding for either careful speech or spontaneous speech.

Careful speech was selected as the reference level. Speakers and words were included as random effects. In all 3 models the effect of type of speech was significant (p <.0001). When predicting the probability of observing fricatives and stops the coefficients werenegative (*coef* = -1.6680 and *coef* = -3.5253 respectively). When predicting the probability of ob- serving taps, the coefficient was positive (*coef* = 5.3371). As careful speech was selected as the reference level, the probability of observing fricatives and stops decreases in spontaneous speech while the probability of observing taps increases in spontaneous speech.

3.4 Pre-aspiration results within the CC (carefully read speech)

Pre-aspiration could not be clearly identified within the MU and IA data given the quality of the audio recordings. However the CC corpus provided higher quality recordings and pre-aspiration could be clearly seen on spectrograms. Within the CC wordlist data 43% of all voiceless stops were pre-aspirated and 16% of the fricatives were pre-aspirated, as shown in table 1. On the other hand, the spontaneous data provided 12 cases of pre-aspiration in total, as seen in table 4, which accounts for 3% of the number of observations in spontaneous speech. Thus only the results within the CC wordlist data are presented in this section. A logit mixed model was fitted on the CC wordlist data. The dependent variable was a binary variable coding for either the presence or the absence of pre-aspiration. The independent variables were (i) year of birth: a two level factor coding for either older or younger speakers, as defined by Gordon et al. (2007), (ii) gender: a two level factor coding for either male or female, with male selected as the reference level, and (iii) professional status: a twolevel factor coding for either professional or non-professional status,with non-professional status selected as the reference level. Two random intercepts were added to the model, one that accounts for the variability across the 285 speakers who produced the words in isolation and one that accounts for the variability across the 7 words that were present in the wordlists (*city*, *letter*, *fatter*, *scatter*, *better*, *batter* and *Peter*). A total of 2023 binary measures were submitted to the model. Non-significant interactions were dropped from the final model.

Table 8: Output of the model estimating the use of pre-aspiration in the CC corpus, wordlist data.

	Estimate	Standard Error	z value	Pr(>lzl)
(Intercept)	1.33717	0.43552	3.070	0.00214
(Intercept)	-2.3958	0.3318	-7.221	p<.0001
age (young)	-0.5804	0.4623	-1.256	0.209278
professional status (P)	1.6425	0.4347	3.779	p<.0001
professional status (P): age (young)	-1.6223	0.6355	-2.553	p<.02

Table 8 shows the output of the logit mixed model. The professional status coefficient is positive and significant. As non-professional status was selected as the reference level, this means that professionals produce more pre-aspirated variants than non-professionals. There is a significant interaction between professional status and age and the slope of the coefficient is negative. Since non-professional status was selected as the reference level, this means that age has an effect, with older professionals using significantly more pre-aspiration than younger professionals. This interaction also means that the age effect only holds for professionals, which can be more clearly seen in figure 7.
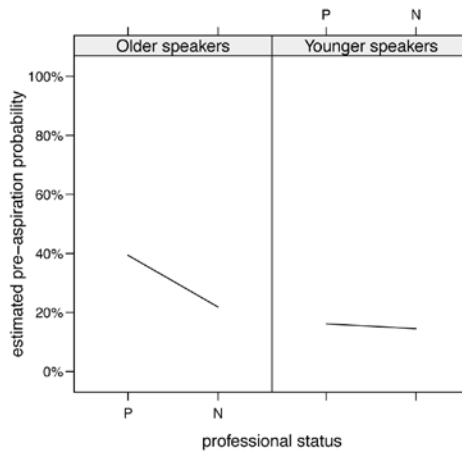
Figure 7: Estimated probability of pre-aspiration obtained from the model coefficients.

4. Discussion

Previous studies of medial /t/ have reported the existence of a canonical variant with varying degrees of aspiration, a flap, a fully-voiced variant, a glottal stop and a fricative (Bell, 1977; Holmes, 1994, 1995; Bayard, 1999; Taylor, 1996). This study presented here contributes to the literature on NZE by reporting frequent cases of pre-aspiration in wordlist data. Silverman (2003) argues that pre-aspiration is rare both diachronically and synchronically across human languages given its lack of phonetic salience. However recent acoustic evidence shows that pre-aspiration exists in several

varieties of English as a non-normative feature (*i.e.* a non-obligatory phonetic feature that can variably present or absent in different speakers of a single dialect). Jones and Llamas (2003) reported pre-aspiration of word-final plosives and fricated /t/'s in Middlesbrough English. Gordeeva and Scobbie (2007) identified pre- aspiration of fricatives in Standard Scottish English which may serve to enhance prosodic cues and phonemic voicing contrasts. They did not find a correlation between sociolinguistic variables and rates of pre-aspiration of fricatives. Non-normative pre-aspiration of /t/ has also been found in Northern Welsh dialects (Morris, 2010) and Australian English (Jones and McDougall, 2009). In the wordlist data pre-aspiration occurs in relatively high proportions : it accompanies 43% and 16% of all voiceless stops and fricatives respectively. On the other hand it appears in negligible proportions in spontaneous speech. It might be hypothesized that pre-aspiration is a feature of careful speech in NZE. Using a logit mixed effect similar to the ones reported in this paper, the dependent variable coded either for the presence orabsence of pre-aspiration. The model predicted that younger speakers use little pre-aspiration, regardless of their professional status. Older speakers use more pre-aspiration and even more so when they are professionals. There was no effect of gender,showing that males and females used pre-aspiration in equal proportions. Our research adds to the literature on pre-aspiration in other varieties of English by documentation another case of non-normative pre-aspiration, and by suggesting for the first time that pre-aspiration might be socially-conditioned. The results from the wordlist data also support the conclusion of Taylor (1996) that the fricative is the prestige medial /t/ variant, since it is the preferred realisation found in careful speech. The data shows that, overall, females use the variant more than males. The youngest females achieve a rate of a 100%, as predicted by our model. Moreover, the results show an interaction with gender and professional status so that the youngest male professionals also achieve similar rates. Professional males are more advanced in the use of the fricated variant than non-professional males. This prestige variant has therefore entered NZE through the speech of females and has strongly established itself in the dialect.

I reported very few instances of glottal articulations in this paper, which is in accordance with previous research on medial /t/ in NZE. Holmes notes that glottal replacement is very rare in intervocalic contexts and they are usually "all word-final not word-medial as in the stereotypical Cockney *bitter* and *butter* " (Holmes, 1994, p. 213). Word-final glottal stops before vowels are said to "function most frequently as an emphatic device in relation to

the following word" (Holmes, 1994, p. 220), therefore serving a pragmatic purpose in the speakers' discourse. In that case they were mainly reported in formal interviews and fewer occurrences were found in conversational speech with friends or family. The results on spontaneous speech also support the claim by Holmes (1994) that T-voicing has entered through the vernacular style of working-class male speakers and has increasingly established itself in middle class speech. The results showed that it was the most widespread variant in the conversational data. Evidence was also found within the Mobile Unit corpus that the fricative was already present in NZE and used by speakers born between 1850 and 1870. Clearly, the fricative variant is not a new feature of NZE but apart from the research conducted by Taylor (1996) no mention of the fricative as a possible variant for /t/ in medial position was made before. However the articulatory nature of the sound is not very well understood. This variant is very well-known to occur in Irish English. Hickey (1984, 234) describes it as "formed by bringing the apex of the tongue close to the alveolar ridge as if for the articulation of /t/ but stopping just before contact". He proposed the symbol [t̞]. Pandeli et al. (1997) provided EPG data on Irish English and demonstrated that this choice for a phonetic transcription was in fact problematic. They proposed to use the symbol [θ̱] instead. Also it is not guaranteed that the acoustic nature of the fricated variant is the same in Irish English and in NZE. So far I have not proposed a phonetic transcription but I believe it is safer to refer to the variant in plain text as a fricative or as fricated /t/. Finally, comparing careful speech data and spontaneous data directly, the probability of observing fricatives and stops decreases while the probability of observing taps increases in spontaneous speech. In summary, the present research replicated previous results on the distribution of medial /t/ variants in NZE. It also contributes to the description of the dialect by further identifying pre-aspirated variants and provides the first statistical results on the sociophonetic patterning of the fricated variant. Further work on medial /t/ in NZE will aim at better understanding the sociophonetic patterning of pre-aspiration observed. Further work is also needed to understand the acoustic, articulatory and perceptual nature of the fricated variant and will be presented in forthcoming papers.

Note

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UNDERGRADUATE LINGUISTICS AND HUMAN RESEARCH ETHICS

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Abstract

For students of linguistics at the University of Waikato, in Aotearoa/New Zealand, human research ethics has been something of a mystery. Delayed until graduate study, allocated to a generic Research Methods class, or even encountered for the first time in the preparation of an application for Human Research Ethics approval, ethics has been viewed as a separable module of learning, closely tied to graduate study, but less relevant to our undergraduate students. In this paper, the argument is put forward that ethical learning can and should be incorporated into the undergraduate linguistics curriculum. Two sets of ethical principles that could inform such a curriculum are presented, followed by the description of a pedagogic strategy that can be used to ensure that students graduating with a linguistics degree take with them an understanding of ethical considerations relevant to their discipline.

1. Introduction

Formalised ethical processes are comparatively new within tertiary institutions in New Zealand, established only following recommendations made by the Cartwright Inquiry (Cartwright 1988).[1] Today, while ethical considerations are undeniably relevant to our graduate students who are engaged in human research, it is less evident that our undergraduate students need to know about human research ethics. After all, many of our students will complete their

undergraduate degrees, and from there enter the work force without ever conducting human research projects.

As linguistic researchers, we are engaged in a human science, and many of us require ethical approval for the research that we conduct; however, our attention has long been fixed on the complexities of data analysis. One result of this is that our human data sources are often rendered invisible in our research reporting. Our fixation on data extends through to introductory linguistics and sociolinguistics textbooks, where ethical considerations are largely absent. Meyerhoff (2011: 44), who draws the student's attention to issues of consent, and Burridge and Stebbins (2016: 53-54), who ask students to consider participation, and the representation of project participants, are two recent exceptions to this general pattern.

In this paper, I assert that ethical learning **is** relevant to our undergraduate linguistic students (section 2). Not only do our institutions dictate that our students develop an understanding of ethics, knowledge generation in our discipline depends on observations of the linguistic behaviour of our fellow human beings. Because linguistic research is diverse, creating a stream of ethical learning for our undergraduates is likely to present challenges. In section 3, I consider two sets of ethical principles that could serve as the basis for ethical learning. In section 4, I suggest teaching and assessment strategies that can be used to embed ethical learning in the undergraduate linguistics curriculum. I illustrate practical methods that I have developed for linguistics students at the University of Waikato to provide opportunities for ethical learning to take place. In section 5, I offer a summary of the paper, and recommend that linguistic researchers in New Zealand engage in discussion and consultation on the relevance of ethical principles to our research as a means of informing our pedagogies.

2. Motivations for developing ethical awareness in undergraduate linguistics students

2.1 Compliance with Institutional Regulations

Waikato University students are bound by *Student Research Regulations*. The regulations apply whenever their activities involve "an inquiry of an investigative, experimental or critical nature which is driven by a question, hypothesis, or intellectual position capable of rigorous assessment, and the findings of which are open to scrutiny and formal evaluation", and when

these activities result in the production of "any intellectual or creative work published, exhibited, presented, or performed in a written, spoken, electronic, broadcasting, visual, performance, or other medium" (University of Waikato 2008a: *Student Research Regulations*). Broadly speaking then, we can see every student who is participating in tertiary study at Waikato as being engaged in research activities throughout their course of study. Indeed, it would be concerning if they were not.

When student research involves collecting information about and from other human beings, students are further bound by Waikato's *Ethical Conduct in Human Research and Related Activities Regulations* (University of Waikato 2008b). These regulations define when and how students and staff must seek approval for their research activities, and how they must conduct themselves personally through the research process, as representatives of their host institution. The regulations state that when staff or students are interacting with members of the wider community, "the staff member or student concerned is representing the University, and must therefore be mindful of the importance of professional conduct, with a view to upholding and enhancing the University's, as well as their own, reputation." (University of Waikato 2008b: Appendix 1) There is thus an institutional requirement that staff and students alike engage with ethics as they pursue research topics involving human participants.

Of specific relevance to undergraduate students, there is an expectation that students who graduate with a major in Linguistics, either through the Bachelor of Arts or the Bachelor of Social Science, will possess the attribute of ethical awareness, as relevant to the discipline of Linguistics.[2] Even if our undergraduate students are not asked to conduct their own research with human participants, they will be learning about linguistics from the research of others, and that research necessarily involves our fellow human beings as providers of language data. Documented graduate attributes or degree learning outcomes, whether generic or discipline specific, motivate at least some level of engagement with ethical issues.

It appears then, that compliance with institutional regulations obliges me to engage with ethical considerations, both with regard to my own research activities, and with regard to the educational outcomes of my students.

2.2 Compliance with Disciplinary Regulations

In addition to institutional compliance, there is also an expectation that our students' activities comply with existing professional and disciplinary codes.

There is currently no such professional or disciplinary code for linguists in New Zealand; however, there has been some interest in developing a set of ethical research guidelines. Meyerhoff, Brown, Barbour and Quinn (2013) presented a discussion paper at the biennial *Linguistics Society of New Zealand Conference* hosted by the University of Canterbury, to consider this matter. The paper was driven in part by the perceived need to support research practitioners through the ethical review process. It was thought that applicants and research ethics committee members alike might usefully refer to a set of ethical guidelines to better articulate and understand linguistic research. The paper was received positively, although as yet no formal consultation process has been set up to develop the guidelines. Should such a process be initiated, there would be room to consider our responsibility for developing ethical awareness in our students, among other matters.

In the absence of discussion about what constitutes ethical process and practice for linguists in the context of New Zealand, linguistic researchers are able to refer to numerous ethical statements and guidelines from other parts of the world, whether they be specifically concerned with linguistics, derive from neighbouring disciplines such as anthropology and applied linguistics, or be more generic statements that are broadly concerned with human research. In addition to describing ethical principles and how these should be enacted in research, such statements commonly articulate the importance of providing ethical training for students. The first excerpt below comes from the Linguistics Society of America's *Ethics Statement*.

> **Section 4: Responsibility to students and colleagues**
> Linguists should ensure that their students receive instruction in the ethical practices appropriate for their field. (Linguistics Society of America 2009)

The American Anthropological Association offers stronger guidance towards providing ethical training for students in their *Statement on Ethics: Principles of Professional Responsibility*.

> **Section 7: Maintaining respectful and ethical professional relationships**
> In their role as teachers and mentors, anthropologists are obligated to provide instruction on the ethical responsibilities associated with every aspect of anthropological work. They should facilitate, and encourage their students and research staff to engage in dialogue on ethical issues, and discourage their

participation in ethically questionable projects. (American Anthropological Association AAA 2012)

While adherence to a local set of guidelines for ethical linguistic research is not possible for linguists in New Zealand, there are many resources available to draw on, including clearly stated expectations that researchers will pass on their ethical understandings to students.

2.3 Best Practice

Alongside compliance, and in many cases overlapping with it, my personal experiences and beliefs motivate me to bring ethical considerations into the undergraduate linguistics classroom. Since my student days, I have transitioned from a position of good intentions to one of strong and informed convictions. As a student of linguistics in the early to mid-1990s, I carried out human research as part of the coursework for both my bachelors degree at the University of Waikato and my masters degree at the University of Auckland. I recorded speakers in controlled tasks to test hypotheses, analysed their data, and reported it back to my lecturers in a written format. I wrote a linguistics dissertation on field data collected for an earlier anthropological study. These activities clearly fall under the definition of research, and I was certainly engaged with human participants, even if secondarily in the case of my dissertation. During those years, however, I was not involved in any discussion of research ethics, or at least, I have no lasting memory of ethical concerns around my projects. Just over twenty years ago, Human Research Ethics committees were up and running in both tertiary institutions. It seems however, that their attention had not yet turned to student research. Most likely, linguists at the time were just coming to terms with the implications of newly established ethical review processes for their own research activities.

Around a decade later, in 2004, I was required to apply for formal ethical approval for my doctoral project on the Neverver language of Malekula Island, in Vanuatu. With no background in ethics, I initially engaged with the approval process in total ignorance of how ethical considerations might be relevant to my work. My naive understanding was that basic linguistic research was inherently harmless, and that because I had been invited into the community to conduct research, the community would be delighted to support my project. After all, I wasn't planning to do any secret recordings; I just wanted to learn about nouns and verbs. This starting point left me with a long

way to go in developing my ethics application, and a steep learning curve in the field as I encountered the reality of being a young female researcher in a patriarchal society with no social power beyond that which I was assigned by association (Barbour 2013).

Doctoral students at Waikato now have a six-month period of provisional enrolment to develop their research projects and complete the process of ethical approval where relevant, before they can apply to be formally enrolled. Ethical learning has trickled down into honours and masters degrees, with graduate students often being required to take a research methods paper with an ethics component as part of their studies. Last year, my faculty introduced a formal procedure to delegate the review and approval of undergraduate coursework projects to teaching staff, to enable students to engage in low-risk research activities.

3. Guiding Ethical Principles

If we accept that ethical learning should be a part of an undergraduate linguistics curriculum, we then need to consider the nature of the ethical principles that our students could usefully be exposed to. Like other aspects of the curriculum, the question of what our students need to learn has multiple answers. Guidance comes from existing statements on ethical conduct, and we may choose to frame our understanding of ethical principles in the dominant western world view. This world view is articulated in the Hippocratic Oath, the Nuremberg Declaration, the Helsinki Declaration, and more recently in documents like the Canadian *Tri-Council Policy Statement*. Alternatively, we may look to indigenous statements, such as *Te Ara Tika*, and frame our understanding of ethics within a more specific world view.

3.1 The Tri-Council Policy Statement [TCPS2] (2010)

The Tri-Council Policy Statement on Ethical Conduct for Research involving Humans [TCPS2] was jointly authored by members of three national bodies: the Canadian Institutes of Health Research, the Natural Sciences and Engineering Research Council, and the Social Sciences and Humanities Research Council of Canada. The second version of the statement was released in 2010. In TCPS2, respect for human dignity is considered fundamental and relevant to all types of human research.[3] Respect for human dignity is articulated through

three core ethical principles, these being Respect for Persons, Concern for Welfare, and Justice.

The principle of **Respect for Persons** "recognises the intrinsic value of human beings ...[encompassing] the treatment of persons involved in research", either directly, or through their data or biological materials. It focuses on the obligation that researchers have to respect the autonomy of individuals, and their right to make informed decisions about participation. It extends to cover the protection of children, whose autonomy is developing, as well as the protection of those members of society with impaired or diminishing autonomy. (TCPS2 2010: 8-9)

In the TCPS2, **Concern for Welfare** "recognises that research has impacts on participants", and particularly acknowledges that the welfare, or quality of a person's life experiences can be affected by research. Guided by concern for welfare, researchers should identify and minimise potential impacts of research on participants. Such impacts can include effects on aspects of health, as well as impacts on the physical, economic and social circumstances of participants (TCPS2 2010: 9-10)

Finally, the principle of **Justice** recognises the need for fair treatment of participants by the researcher. Guided by the principle of justice, researchers are directed to ensure that participants have an equitable share in both the benefits and the burdens of research participation, where benefits include access to the outcomes of research projects. Researchers are directed to pay particular attention to vulnerable populations. (TCPS2 2010: 10-11)

The core ethical principles of TCPS2 are not intended simply to inform the writing of a successful ethics application, but also to inform the researcher's conduct of their research project as a whole. In the conclusion to the section on core ethical principles, the authors of the Canadian document comment that, "applying the core principles will [...] maintain free, informed and ongoing consent throughout the research process and lead to sharing the benefits of the research." Ethical conduct is seen as having impacts beyond the project itself, in that researchers have a responsibility to the general public also, "to build and maintain the trust of ... the public in the research process." (TCPS2 2010: 11)

3.2 Te Ara Tika

Published in the same year as the Canadian guidelines is the more locally relevant document *Te Ara Tika: Guidelines for Māori Research Ethics: a*

Framework for Researchers and Ethics Committee Members (Hudson et al. 2010). This is a multi-authored document that was prepared for the Health Research Council of New Zealand, and forms a major component of the latest *Guidelines for Researchers on Health Research Involving Māori* (Health Research Council of New Zealand 2010). Like the Canadian document, *Te Ara Tika* identifies core ethical principles. These principles derive from a Māori world view, and there is perhaps a stronger emphasis on research relationships and responsibilities than we find within Western academic traditions. Nonetheless, respect for human dignity is clearly central to the conduct of ethical research within a Māori world view.

In the research context, **Manaakitanga** establishes respect for persons, and places social and cultural responsibility on the researcher to ensure that respect for persons is maintained. We might see this principle as supporting the protection of participants.[4] **Whakapapa** considers "the quality of [research] relationships and the structures or processes that have been established to support these relationships" (Hudson et al. 2010: 6). We might see this principle as allowing for enhanced participation in research, participation that extends through the life of the project and beyond, at the same time attending to the ongoing protection of participants. **Mana** considers equity and justice. This principle requires researchers to acknowledge "issues of power and authority" in relation to research (Hudson et al. 2010: 13). Particularly, researchers must consider project outcomes, and who has the right to determine these. This principle can guide researchers to develop research partnerships with their participants.

The fourth principle, **Tika,** considers the validity of the proposed research. In *Te Ara Tika*, "the design of a research project is a critical determinant in whether the research is successful in achieving proposed outcomes, benefiting participants and communities, and bringing about positive transformative change" (Hudson et al. 2010: 8). This fourth principle encompasses research methodology, and is typically handled outside of the ethical review process. Instead, research design is described as ideally being dealt with through the peer review of research proposals, prior to application for ethical approval (see e.g. Tolich & Smith 2015: 216). In *Te Ara Tika,* research design is considered inseparable from the ethical constitution of the project.

The authors of the TCPS2 take the position that human research must be informed by ethical principles, and that these principles need to be enacted through or embodied within the research process. The authors of *Te Ara Tika* go further, taking the position that human research must be informed by ethical

principles, and that these principles will underpin the research design, be enacted through the research process, and be evident in the project outcomes. In a sense, *Te Ara Tika* offers a more holistic view of ethical research, rather than one that is driven by regulatory compliance.

4. Ethical learning through research experiences

In the linguistics classroom, research ethics can be taught in dedicated lectures which tick the compliance boxes, ensuring that our students exit their tertiary experience with an understanding of ethical issues relevant to our discipline. My preference however, is to combine the formal presentation of ethical principles with a more practical approach to ethical learning. I create opportunities to expose my students to human research experiences, and encourage them to develop an awareness of ethics through their own research to reinforce theory-based understandings. These opportunities move from autoethnographic research, to single-participant project work, and eventually to data collection from a small sample.[5]

4.1 Starting with Autoethnography

Autoethnographic research provides "a method for exploring, understanding, and writing from, through, and with personal experiences in relation to and in the context of the experiences of others" (Adams, Jones & Ellis 2014: 23). For undergraduate linguistics students, autoethnography allows them to make connections between their own lives (personal experiences), and disciplinary understandings expressed in the technical literature (the experiences of others). Because students are asked to speak from their own experiences, they can be guided to produce material that is relevant to the discipline of linguistics, and they are thus empowered to participate in the discipline. Classroom discussion tasks transfer smoothly into written assessment, exemplified in four summary descriptions of tasks used in *LING132 Introduction to Linguistic Communication* and *LING203 Language, Society and Culture*.

a) *LING132* – describe linguistic markers of your identity. Link each marker to the observations in the sociolinguistic literature (Holmes 2013).

b) *LING132* – write a personal Ethnography of Communication for a cultural, religious or sporting/hobby event that you have participated in recently (Saville-Troike 1989; Wardhaugh 2010).

c) *LING203* – describe a personal experience of language acquisition. Explain the experience in terms of the reading on language acquisition (Fromkin et al. 2015).

d) *LING203* – explain the different types of person reference (Stivers 2007), and illustrate each type with an example from your own person reference behaviours.

In autoethnographic activities, students are not simply required to describe a personal experience that focuses on language. They must link their experience to the literature under study. There is therefore, an element of interpretation to their autoethnographies, not merely the telling of a story. Further, there is also the potential to critique technical material, by identifying mismatches between published accounts of language behaviour, and the lived experiences of students.

No formal ethical approval is required for students to discuss, write up, and reflect upon their personal experiences. There are however, still opportunities for ethical awareness to be developed through these tasks. Autoethnography places students in the role of "researched", where they are generating their own linguistic behaviour, or accounts of their behaviour, for inquiry. At the same time, students assume the role of "researcher", where they are required to interpret their behaviour in specific ways. These dual roles introduce students to the complexities of qualitative research.

In terms of ethical principles, autoethnography requires students to attend to the principle of respect for person, particularly with regard to representation. The person to be respected is the researched self. Students have to make choices around which of their personal experiences they will use to represent their researched self. As they position themselves in their writing, students eliminate options which they feel may be inappropriate or even potentially harmful representations of the self in the tertiary context. As Adams, Jones and Ellis (2014: 19) note, "doing autoethnography requires researchers to foreground research and representational concerns throughout every step of the research and representation process".

Ethical learning around respect for person can be enhanced by drawing students' attention to their decision making processes. While students are engaged in second-year autoethnographic writing, I include a classroom discussion task which asks them to identify communicative behaviours that they would comfortable to have observed by researchers. At the same time, they notice that there are also aspects of their communicative behaviour that

they would not want to make available for research. While there is often debate around whether and what kinds of intimate verbal encounters might become research data, through our discussions, my students become aware that they have boundaries, and that their classmates also have boundaries around aspects of their lives. They recognise that the researcher's gaze could potentially be intrusive and unwelcome.

4.2 Engaging in Single Participant Projects

From autoethonography, the next step in the research progression is a single-participant project, located in *LING203 Language, Society and Culture*. I ask my second year students to collect linguistic and cultural commentary from a speaker of another language. For many students the project provides an opportunity to learn more about a heritage language, or the language of a close friend or colleague. The project is run over a six week period, during which time the student arranges to meet with the speaker several times. Together they work through a series of research topics. The final output of the project is an extended report or research portfolio on linguistic and cultural behaviours and categories, representing the information that the student has learned from the speaker, seen through an anthropological linguistic lens. Students are cautioned about over-generalising from their data. Most demonstrate a clear understanding of the limitations of this type of research, often reinforced by the mismatch between the lived experiences of their participant, and published information that students may "search up" as they progress through their projects. The report ends with a reflective section where student discuss the challenges and successes of the project work.

Much has changed in terms of ethical approval from when I conducted undergraduate research in the 1990s. Waikato University now requires formal written ethical approval for coursework research projects where a human participant is involved. Requirements differ depending on the level of the course. At second year the lecturer completes the application process on behalf of the student cohort. To set up second year ethical approval, I have to supply a full application to the Chair of the Ethics Committee, outlining the project in the context of the paper. The application includes a disciplinary justification for completing coursework research at second year level, and specific reference to how the students will be introduced to ethical principles during the course. The full project rubric, 6 pages in length, is also included. The project rubric serves as the information sheet for participants, so that the nature of the project is fully disclosed to potential participants before they sign

on. The application also includes a generic consent form, which each student completes by filling in the participant's name and language, and collecting the participant's signature.

In addition to the basic documents for an ethical application, I also include a report template. I have developed this over a number of iterations of the course to guide the interpretive lens through which my student researchers view and present their data. The report template provides me with an opportunity to model conventions around presenting linguistic data from languages other than English. The paper outline for the course, detailing the place of the research project within the course content as a whole is supplied, and finally I submit a formal request for delegated authority to manage the student research projects myself. In exchange for delegated authority, I undertake to ensure that students receive training in research ethics through dedicated lectures, as well as training in research interviewing, through in-class activities. I require students to submit their signed consent forms with their projects. Final course grades are withheld until the consent forms are received.

Although the request for delegated authority to approve course work research involves a lot of paperwork, the learning opportunities for the students, both in terms of research experiences and in terms of ethics, far outweigh the time needed to complete the approval process. In terms of ethical learning, principles that derive from the Māori world view apply comfortably to this research project. Students conduct their research from the established principle of respect for person (manaakitanga). They add to this by building a research relationship on top of an existing social relationship (whakapapa). This new relationship involves two roles. The student is required to take the role of "learner" and the participant is offered the role of "expert". In the expert role, the participant is handed control over the flow of information to the student researcher. Every research area covered in the project includes a set of sub-topics. Participants are invited to choose the sub-topics that they feel most interested in and comfortable about discussing. From the outset of the project, students understand that they must return their research reports to their participants (mana). In that way, issues of representation remain at the front of their minds in writing their reports, and they are obliged to honour the choices of their participants, and faithfully report the information that they have been offered.

The only exception to the sharing of project outputs is the reflective section at the end of the project. This section is shared only with the lecturer, and in it students are asked to describe the research techniques they employed, and

the successes and challenges that they encountered during the project. We spend time in class discussing the importance of taking responsibility for the unfolding project, and consider how a researcher's inexperience and lack of knowledge can lead to difficulties in research. "My participant's language was really hard" can be rephrased as, "I had difficulty in hearing the difference between some of the sounds of language X, and I had to ask my participant to repeat words many times. I found this a bit embarrassing." The final section of the report concludes with a description of how students have enacted ethical principles in the way they have conducted their research project.

One of the most important outcomes of these projects, whether they are heritage language projects conducted in New Zealand, or Skype interviews with friends or family in different parts of the world, is the positive effect on both researchers and participants. It comes through in the detailed descriptions of almost-forgotten preparations of indigenous plants as food, recounted during walks with grandma or aunty. It is evident in the accounts of the induction into key participant roles at kava ceremonies. It is demonstrated through the meals that participants voluntarily prepare to recreate and share the smells and tastes of home. When the framing of the project is successful, the result is engaging and empowering for both parties.

4.3 Conducting multi-participant research projects

Linguistics students progress into *LING304 Sociolinguistics*. In their third year of study, they conduct a sociolinguist research project. Recently, this has involved a topic in cross-cultural politeness. Students are given the choice of studying different types of politeness features in a single language for comparison with English, or studying one politeness feature in a set of different languages. They are required to develop their own research tool, drawing heavily on published research. They may choose to use a questionnaire, or a semi-structured interview schedule. The numbers of participants, and the length of the research tools are kept small, so that the project can be approved, data collected, and the write-up completed within the timeframe of the course.

In the past few years, *LING304* has been taught either by Dr. Nicola Daly or Dr. Andreea Calude. I hold delegated authority to review the research project for this paper and have seen the process of ethical approval shift considerably. In the first few years when I was involved with this project, predating Nicola and Andreea's involvement, I simply met with the lecturer to discuss the proposed list of student topics. Together we would anticipate and head off potential difficulties, such as the student who wanted to learn

about profanity in language X. Now, the process for ethical approval is much closer to the process that our graduate students go through. The lecturer and I create a partial ethics application, and supply this to the Chair of the Ethics Committee. We also provide a generic information sheet and consent form for the research, the paper outline, project rubric, and a letter requesting formal delegated authority. Delegated authority is then given with the understanding that I will teach a lecture on research ethics and ara the classroom lecturer will support the development of appropriate research tools.

Having been introduced to research methodology and research ethics, student researchers then select their topic, customise their ethics application form, information sheet and consent form, and develop their research tool. They submit all of their documents to the lecturer, and when she is satisfied, the paperwork is sent through to me as the delegated reviewer. Because the ethics process is supported or scaffolded through the provision of nearly-complete model documents, students have the benefit of working with a full set of ethics paperwork for their projects. The task of gaining ethical approval, ordinarily rather time-consuming for both students and teaching staff, is made manageable for coursework research.

The place between research methodology and research ethics is somewhat uncomfortable. Already, I have noted that *Te Ara Tika* treats research design as being intertwined with research ethics, while the Western academic tradition separates research design from ethical considerations (§3.2.). In their third year research projects, linguistics students are twice scrutinised for the research tools that they develop, as both the lecturer and the delegated reviewer may offer critique. The lecturer's critique tends to focus on the student's engagement or lack thereof with the literature, and she examines whether or not the student is asking robust questions. My interest as the delegated reviewer attends to how the research instrument will be employed by the student, and in how participants may respond to it. I evaluate whether the student is planning to ask questions in a manner which is likely to lead to productive responses. I often meet with students who are planning to carry out semi-structured interviews to discuss ethical research conduct and to share tips on successful data collection. I check the applications for compliance with regulations and when I too, am satisfied that the the project is meaningful, and that the student is sufficiently prepared, the project is formally approved and the student can begin to arrange data collection.

Like the autoethnographic tasks and the single-participant projects that precede it, the third year sociolinguistic project embeds ethical learning in the

disciplinary objective to engage students in research as a means of knowledge enhancement and production. By third year, the expectation of compliance with institutional ethics regulations is overtly stated and pursued through the review process which replicates the full ethical review of graduate and staff research projects, and yet is supported so that it can be managed within a semester.

Ethical principles arising from a Western world view are comfortably relevant to the multi-participant sociolinguistic research projects. The principle of respect for persons is applied in seeking the informed consent of participants, in the attention students give to the representation of their participants' identities, and the careful disposal of research materials at the conclusion of the assessment period. The principle of concern for welfare is applied in the attention students give to the linguistic and personal needs of participants, and in the representation of research data in such a way that does not negatively impact on the participants and their speech communities. The principle of justice is applied again in the attention given to the needs of participants, and also in the return of research data to participants at the conclusion of the project, as a way of allowing participants to benefit from their engagement with research.

Where the single-participant projects conducted by second-year students of linguistics are only loosely guided by disciplinary agendas, the sociolinguistics research projects respond strongly to disciplinary agendas. The student researcher's chosen topic develops understandings of topics raised in lectures, and responds to parameters identified by sociolinguistics as being relevant. While student interests and their social networks drive the selection of languages to be included in the projects, the eventual participants are conceptualised as "providers of data". Ethical learning takes a different shape from that which is available at second year.

5. Summary and recommendations

In summary, the inclusion of ethical learning in the undergraduate linguistics curriculum can be motivated by institutional requirements, disciplinary expectations, and personal pedagogic beliefs. The selection of ethical learning components can be guided by generic "Western" ethical principles which are well established in the international literature, as well as by local

expressions of ethical principles. Where sociolinguistic research is perhaps more appropriately guided by more generic models of ethical research, the locally relevant principles articulated in *Te Ara Tika* have been found to fit anthropological linguistic research projects more comfortably.

While it is possible to respond to ethical learning motivations by teaching dedicated lectures on the ethics of linguistic research, in this paper I have advocated a more practical programme, where ethical learning is embedded in guided research activities that develop our students' understanding of the discipline of linguistics, and offer genuine opportunities for knowledge creation. Today, course work research requires careful planning and institutional approval. The processes for gaining approval are likely to vary considerably from one institution to the next. Regardless of the ethical hoops we may be required to jump through before course work human research can begin, such research enables our student to be made aware of, and reach a practical understanding of ethic considerations relevant to our discipline.

Finally, the absence of ethical research guidelines for linguistic researchers in New Zealand is problematic and could even be construed as a lack of disciplinary interest. Tolich and Smith (2015: 218), in a recent work on Ethics Review in New Zealand, recommend that the Royal Society of New Zealand assume "responsibility of *all* ethics review in New Zealand" and in doing so, create "a single code of ethics for health and social research". Should this come about, and such a document be developed, the appropriateness of the guidelines to the various sub-disciplines of linguistics is likely to emerge as an area where significant consultation is required. In this paper, I have touched on socio-/anthropological research. Many linguists, including myself, also work in other sub-disciplines of linguistics. The ethical principles that are central to one type of research activity are likely to be only loosely relevant in other areas. Respect for persons is an obvious starting point, but how that principle is, could be, or should be enacted in different types of research, and conveyed to our students at all stages of their tertiary education, is a discussion that I welcome.

Notes

1 Judge Dame Sylvia Cartwright, in "The report of the cervical cancer inquiry", recommended that the independent review of human research be conducted for the protection of research participants, saying that "ethical assessment for all

research projects must be developed to meet modern standards" (Cartwright 1988: 213)

2   The University of Waikato's Graduate Attributes for the degrees of Bachelor of Arts and Bachelor of Social Sciences are internal documents and as such references are not available. These documents are both under review through the unfolding Curriculum Enhancement Project. On its linguistics webpage, Victoria University of Wellington lists among its graduate attributes for linguistics students "intellectual integrity" and an understanding of "the ethics of scholarship" (2010). The University of Canterbury aims for its BA graduates, including linguistics majors, to have "*an in-depth discipline-based knowledge* within their majoring programmes and a broad knowledge of the social world including its ethical, bicultural and multicultural aspects" (2007 (2015), italics original).

3   Respect for Human Dignity appears as a core ethical principle in multiple statements of ethics, although it is often packaged in different ways. It can be seen in Australia's *National Statement on Ethical Conduct in Human Research* (2007, 2015) as Respect for Human Beings, in the American Anthropological Association's (2012) *Statement on Ethics: Principles of Professional Responsibility* ((Principle 1. Do no harm, Principle 3. Obtain informed consent and necessary permissions); in the Royal Society of New Zealand's (2012) *Code of Ethics* (Principle 5.1. Respect for Colleagues, Principle 6.1. Respect for Communities, Principle 7.1. Protection of the wellbeing and privacy of individuals), in the Linguistics Society of America's (2009) *Ethics Statement* (Section 2. Responsibility to individual research participants, Section 3. Responsibility to communities), in the British Association for Applied Linguistics' (1994, 2006) *Recommendations on Good Practice in Applied Linguistics* (Section 2. Responsibilities to informants).

4   The interpretation of the four ethical principles in *Te Ara Tika* derives from the document itself, as well as from my understanding of how these principles might apply in research. The conceptual links that I have made of Manaakitanga/ Protection, Whakapapa/Participation, and Mana/Partnership are deliberately simplistic. While the explicit link between Manaakitanga and Protection is made by the authors of *Te Ara Tika* (Hudson et al. 2010: 10), as researchers engage more closely with participants, collective participation is emphasised, ultimately enabling research partnerships to develop (Hudson et al. 2010: 11-12). Thus, I understand Manaakitanga as encompassing all three principles of Protection, Partnership and Participation, with an emphasis on Protection.

5   Although the ethical learning discussed in this paper is located overtly in the socio-/anthropological linguistics stream, there are opportunities throughout Waikato University's undergraduate linguistics programme to incorporate ethical learning. Our students are expected to fairly represent, acknowledge, and formally cite the contributions that others have made to their assessment activities. Steps taken to avoid plagiarism of peers and academic sources alike constitute ethical conduct in the tertiary context.

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REVIEW

Biewer, Carolin 2015. *South Pacific Englishes: A Sociolinguistic and Morphosyntactic Profile of Fiji English, Samoan English and Cook Islands English.* Amsterdam: John Benjamins.

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Carolin Biewer's book *South Pacific Englishes* presents a thorough and meticulously documented examination of the morphosyntax of three under-studied varieties of English, through the lens of sociolinguistics.

The first chapter lays out the rationale for the book, identifying a research gap (the study of L2 varieties of English in the Pacific), and laying out some of the frameworks that are put into practice throughout the study. Biewer reviews some of the competing models of English as a global language, and reports on previous studies of L2 varieties. In particular, she introduces the readers to *epicentre theory* (e.g., Clyne 1992; Leitner 1992), which posits a reorientation to a regionally relevant local norm. In the case of the South Pacific, she puts New Zealand English (NZE) forward as a potential candidate norm, in competition with the more (geographically) distant Standard British and Standard American Englishes.

Chapter 2 presents an overview of the geography, demography, and language situations in Biewer's three target countries: Fiji, Samoa, and the Cook Islands. This includes a more in-depth discussion of the role of English in these communities, touching on a number of potentially relevant factors on

the emergence of English as a local language. These include the nature of early contact with English-speakers and the socio-cultural landscapes that emerged, as well as attitudes to English, and the role of English in education, media, and religion. This is also where we begin to look at her data, via excerpts from interviews that illustrate her participants' attitudes and orientations to English in their communities. Her discussion is structured thematically around reported differences (e.g., *young* vs *old*, *urban* vs *rural*) rather than regionally, making it a bit counter-intuitive to process. Rather than coming away with a clear sense of attitudes and orientations across the three countries (Biewer uses the term *ethnicity* to differentiate between Fijians, Samoans and Cook Islanders), the reader is instead left with the sense that there are very probably differences between the three groups, but precisely what those differences are is hard to recall. Nevertheless, Biewer's social snapshot of these language situations is commendably grounded in ethnographic research, and she is generous in the evidence she provides.

The third chapter, which addresses the theoretical framework underpinning the study, is perhaps the densest. Biewer discusses static models of global English, with particular focus on three approaches: Kachru's (e.g., 1992) tripartite model, the epicentre theory introduced in chapter 1, and Mufwene's (e.g., 2009) feature pool model, which dovetails nicely with several cognitive principles of second language acquisition. While all three frameworks are referred back to throughout the subsequent analyses, and therefore require a well-founded introduction, the level of detail included here can bog the reader down. The chapter culminates in the adoption of Mufwene's feature pool model, adapted for the South Pacific context (pp. 111–114) that elegantly ties together the various threads discussed in depth in the chapter: a competition-selection model involving linguistic, cognitive, and socio-cultural factors.

In chapter 4, the methodologies of the study are discussed, focusing on both data collection considerations and analytical processes. Biewer describes her strategy as "employing a variationist approach that combines corpus linguistics methodology with sociolinguistic considerations" (p.115). She comments on the particulars of conducting fieldwork in the South Pacific, and specifically the collection of the interviews that comprise her corpus, the SaFiRa-s. This collection includes 61 interviews with 72 participants in total, containing approximately 120,000 words, which she uses for "both corpus-driven and corpus-based research" (p.116). It should be pointed out that a clear definition is never provided for either *corpus-driven* or *corpus-based*, or indeed a clear distinction drawn between the two, but this observation

is hardly unique to this study, as there seems to be some discipline-internal disagreement as to what constitutes 'corpus linguistics'. Setting that issue aside, the range of participants is nicely balanced, given the types of real-world problems that inevitably arise in fieldwork-based data collection. In response to one particular such constraint – namely, that the classical urban/rural split operationalised in many studies of Western Englishes is more complicated in Pacific cultures – Biewer adapts Britain's (2010) idea of *attitudinal space* as a useful workaround for differences in culture, context, and experience, as it includes geography and speaker orientation to local or urban ways of life. This chapter also discusses the statistical approaches taken in the subsequent analysis, including a nicely summarised description of the variationist framework.

Chapter 5 is where the actual data analysis begins. Using a restricted subset of the SaFiRa-s corpus (four speakers from each of the three ethnicities, controlled group-internally for gender and age and evenly divided between urban and rural identities), Biewer explores a number of morphosyntactic variables across the three varieties. This descriptive analysis includes: determiners and articles; count, non-count, and collective nouns; zero and irregular plurals; the progressive aspect; copula and auxiliary *be*; resumptive pronouns and pronoun omissions; and subject-verb disagreement. Each variant is illustrated with examples from the corpus, and is accompanied by a thorough discussion of possible substrate influences on the production of the observed forms. A larger sample of speakers in this analysis would made the claims of representativeness more robust (with so few participants, it is difficult to identify what is systematic and what is idiosyncratic), but such an increase would presumably have been too large an undertaking for this study. As it is, the discussion – for what it is – is well-presented and thorough.

The analysis continues in chapter 6, which provides a multivariate examination of verbal past-tense non-marking across the three varieties. This includes a more detailed description of the methodology of analysis, and a concise review of relevant literature, including t/d deletion, from a number of non-native varieties of English and English-based creoles. Across all three varieties, Biewer reports that zero marking of past tense is a consistent indicator of the habitual aspect, and remarks that "the strong effect of this conditioning factor is not restricted to creole languages" (p.242). The social factors show a less consistent pattern across the varieties, with a slightly clearer picture emerging in the case of Fiji English. Biewer attributes this to Fiji having had a different historical relationship with English as a colonial

language than either Samoa or the Cook Islands. These localised instabilities are perhaps to be expected, however, as all three are still emerging varieties, and local norms have yet to become firmly entrenched.

Given these observations, chapter 7 turns its attention back to the question of epicentre theory: can NZE be shown to be acting as a norm for South Pacific Englishes? Biewer discusses the relative positioning of New Zealand as a power in the region, with particular emphasis on social and linguistic sources of possible influence, such as education, media, and migration. She then conducts a multivariate analysis of verbal singular concord across Fiji, Samoan, and Cook Islands Englishes, with British and New Zealand Englishes (both Pākehā and Māori varieties) as potential sources for norm orientation within the Pacific varieties. She concludes that, despite the wealth of external and internal evidence that NZE "constitutes an important external model competing with others in the South Pacific" (p.360), its role as an epicentre cannot be confirmed using structural evidence. However, as this study uses only one variable to test this hypothesis, the conclusion seems strongly worded: it could either be the case that (as Biewer argues) other linguistic processes are masking any systematic effect of norm orientation, or it could be that this particular variable is not a good candidate for observing an epicentre effect. More evidence of the unsuitability of this approach would make her claims considerably stronger.

Chapter 8 provides a short summary of the aims and main findings of the study, and makes some recommendations for directions of future study.

Overall, the research behind this book is well-motivated and thorough. As well as documenting linguistic variation in the Englishes of Fiji, Samoa and the Cook Islands, Biewer's study also provides some interesting theoretical implications for studies of emerging L2 varieties of English. First, she argues that Kachru's tripartite model (of English as a native langauge, as a second language, and as a foreign language) would perhaps better be replaced by a simple distinction between contact and non-contact varieties. Kachru's model excludes pidgins and creoles, but Biewer reports many structural parallels with South Pacific Englishes that make this *a priori* exclusion questionable. Second, she shows that Mufwene's feature pool model is a particularly useful framework for analysing emerging varieties of English, as it concentrates on the "internal and external ecology of a language" (p.307) without prioritising any one perspective. And finally, Biewer remarks that although "norm reorientation cannot become visible on the structural level if other factors such as substrate influence and SLA have a stronger influence" (p.303), the

evidence of epicentric influence can be found in external (e.g., participant commentary) and potentially in non-structural (e.g., phonological) sources.

The book has a slightly disjointed feel to it, not least because of the level of detail that is maintained throughout. Although it is always nice to get a glimpse of the nuts and bolts that underlie any study, the readability of the text can sometimes suffer. Such is the case here: by going into the depth that she does for theoretical frameworks and methodologies, the first half of the book can be unfortunately dense and seemingly disconnected in places. However, occasional readability issues aside, the book is a solid piece of research that provides an excellent overview of the morphosyntax and sociolinguistic landscape of South Pacific Englishes.

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THE EDITOR'S NOTICEBOARD

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I'm pleased to bring you volume 59 of Te Reo. It is somewhat later than advertised, for which I apologise to the authors, who have been waiting for some time to see their papers in print.