

Changing Pronunciation of the Māori Language Implications for Revitalization

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L'accent est l'âme du discours, il lui donne le sentiment et la vérité.
'Accent is the soul of a language; it gives feeling and truth to it'
—Rousseau (n.d., 61)

Over the last century, the pronunciation of the Māori language has changed. An analysis of these changes indicates that the phonology of the dialect of English spoken in New Zealand is having a far-reaching impact on a number of aspects of Māori phonology. Implications of these changes for Māori language revitalization and the revitalization of other languages are discussed and preliminary developments in the production of a pronunciation aid are presented.

The sound system of a language is an important part of each language's identity. We know this at a community level because older generation speakers of all languages typically complain about innovations in pronunciation made by the young. Our written record shows us that older generations have been making statements like this for centuries, so pronunciation change is nothing new. However, the attitudes of older speakers tells us this: if it really didn't matter about how we pronounced a language, older generations wouldn't bother commenting about it. The way we pronounce a language says a lot about who we are.

Because ongoing sound change is a feature of all languages we also know that there really isn't much we can do to stop such change. Gordon (1998) suggests that it often takes up to 30 years from the beginning of a phonological change for members of the community to become consciously enough aware of it to comment negatively about it. However, by that time it is too late to do anything about it.

We also know that second language speakers of any language bring the phonological system of their first language with them when they come to learn and speak their second language. One of the ways we can usually pick a French person speaking English is because they have problems with the <th> sound which does not exist in the French sound system. Instead, French speakers use the closest sound they have in their phonological inventory: <z> thus rendering <the> as <ze>.

For all these reasons it is important for those of us working in the revitalization of heritage languages to pay attention to aspects of pronunciation especially with regard to vowels because they are particularly important in carrying the different accents that make up languages (see Wells, 1982). The MAONZE (Māori and New Zealand English) project¹ is looking at changes in the pronunciation

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of the Māori language over the last 100 years. In this chapter we present details of how we have undertaken this analysis and describe some of the results we have obtained for vowels and diphthongs. In the discussion of our findings we present a list of implications for language revitalization worldwide.

Method

The catalyst for the MAONZE research project is the existence of recordings of seven Māori men, born in the 1880s, made between 1946 and 1948 by the Mobile Disc Recording Unit of the New Zealand Broadcasting Service.² These speakers are referred to as the Mobile Unit speakers. We have used these recordings, consisting of interviews in both Māori and English, as a baseline for comparison with recordings made by the project team between 2001 and 2004 with ten older Māori men (born in the 1930s, termed *Kaumātua*) and ten younger Māori men (born around the early 1980s, termed *Young*). These more recent recordings include informal interviews in both Māori and English (about an hour of each language) as well as the reading of word lists and reading passages.

The early recordings have been digitized, and the more recent recordings have been made on digital equipment, in our case Sony TCD8 DAT recorders. The recordings are down-sampled to 22.05kHz and are transcribed into the Transcriber program (available free from the internet on <http://trans.sourceforge.net/en/presentation.php>) which allows us to time-align the sound files and the transcription. The Transcriber files are then converted into textgrid files for acoustic analysis using the program Praat (version 4.125, Boersma & Weenink, <http://www.fon.hum.uva.nl/praat/>). Data is entered into Excel and statistical analysis is performed using SPSS, SYSTAT 12 and R (<http://www.r-project.org/>).

To date the project has focussed on analyzing changes in vowel and diphthong pronunciation and these results are presented here. Analysis of changes in consonant production has been limited to investigation of the increase in aspiration (as measured by increases in voice-onset time) in the traditionally unaspirated stop consonants /p, t, k/ (Maclagan & King, 2007) and loss of diversity in the pronunciation of <wh> (Maclagan & King, 2002).

The vowel system

Māori has five vowels /i, e, a, o, u/ each of which has a long vowel variant which, phonetically, occurs when two of the same vowels occur alongside each other within the same morpheme. This length difference is phonemic, that is, can be used by Māori to distinguish different words. Following Wells (1982) we have assigned key words to each short and long vowel. Key words are useful in situations where sound change is occurring to avoid confusion when talking about the set of words which contain a particular vowel. The five short and long vowel pairs have been named thus: *PI/PIKI*, *KE/KETE*, *WĀ/WAKA*, *MŌ/MOKO* and *TŪ/TUKU*. Note that long vowels in Māori are orthographically indicated with a macron above the vowel.

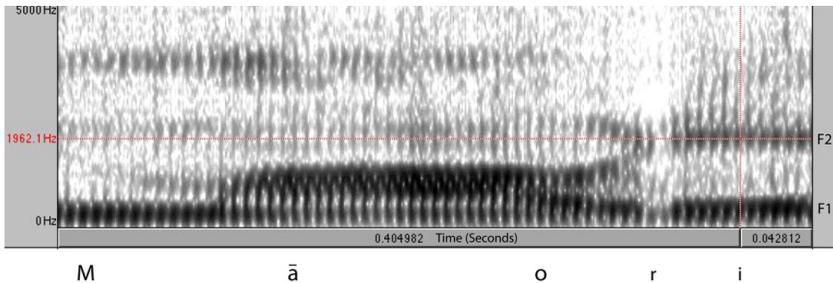
Diphthongs occur in Māori whenever a vowel pronounced lower in the mouth occurs before a vowel pronounced higher in the mouth. Results for an analysis

of five of these diphthongs are presented below, with the key words MAI /ai/, WAE /ae/, PAO /ao/, RAU /au/ and HOU /ou/ being used to refer to these sounds.

Vowel analysis

Vowel pronunciation is described through reference to the vertical and horizontal position of the tongue in the mouth when the vowel is being pronounced. That is, vowels are characterized by both the height of the tongue in the mouth and which portion of the tongue is raised at the time. Measurements of the formants produced by the sound waves of the vowel reflect both these aspects and allow us to produce diagrams of the vowel space of individual and collective groups of speakers. Figure 1 shows a spectrogram picture produced by the computer program Praat of a speaker pronouncing the word ‘Māori’.

Figure 1. Spectrogram in Praat of speaker pronouncing the word ‘Māori’



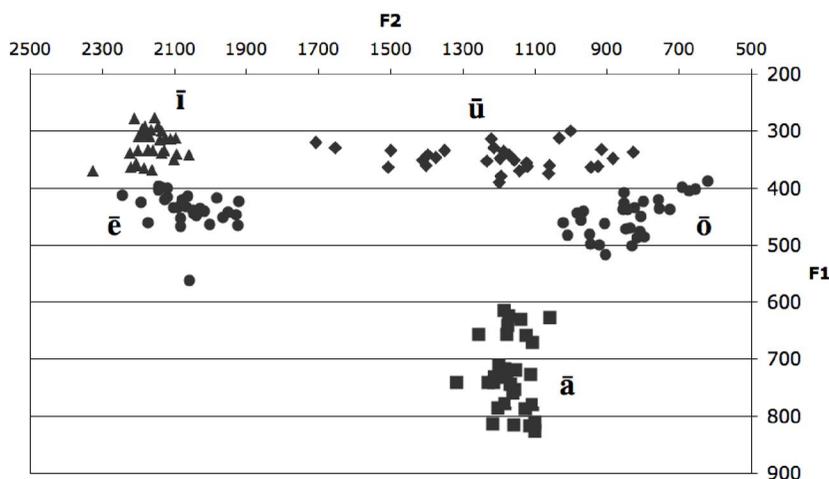
The difference between the /o/ and /i/ sounds shown in Figure 1 can be seen in the contrast between the first two formant values for each vowel. The formant values are indicated by the dark bars on the diagram. The frequency of F2 of /i/ (1962 Hz) is shown in the left hand grey margin. The /o/ sound has a low first formant (F1) value (indicating a raised tongue) and a low second formant (F2) value (indicating that the back part of the tongue is raised). In contrast, while the /i/ sound also has a low F1 value (indicating that the tongue is raised), it has a high F2 value, indicating that it is the front part of the tongue which is raised.

In conducting the vowel analysis the formant values of thirty tokens of each vowel were measured for each speaker. However, with some of the rarer vowels such as *pī*, it was not always possible to obtain thirty tokens. In addition, a maximum of five tokens of any one word were analyzed for any particular vowel in order to ensure the final sample was representative of the possible variations for that particular vowel. Because vowel length was also being measured care was taken to avoid tokens of vowels in phrase final position, tokens occurring alongside other vowels and tokens in words affected by speaker hesitation. However, with rarer sounds, where it was difficult to obtain thirty tokens, it was sometimes necessary to include such tokens. In those cases measurements of vowel length were excluded from the length analysis. Measurements were taken in the steady state portion of the production of each vowel. As well as F1 and F2 measurements, values for F3, fundamental frequency F_0 and vowel length were also taken.

Vowel results

Figure 2 shows the vowel space of one of the Mobile Unit speakers' long vowels where each of the tokens measured for each of the five vowels is shown.

Figure 2. Māori long vowel space of one Mobile Unit speaker showing token distribution



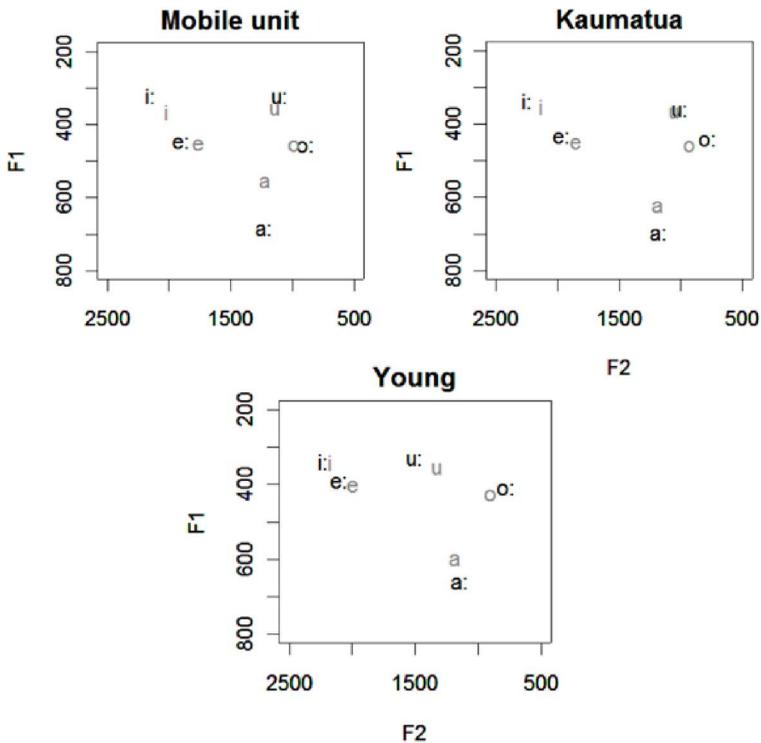
Note that both axes, which display F1 and F2 measurements, are shown in reverse order so that the final diagram is representative of the mouth space, with the left side indicating the front of the mouth and the right side the back of the mouth. Tokens produced near the top of the diagram are indicative of a tongue position near the roof of the mouth and tokens produced near the bottom are indicative of a lowered tongue position.

Results for each group of speakers were combined and averages obtained. Figure 3 shows the change over time in the pronunciation of the long and short vowels in Māori from our oldest speakers through to the youngest. The means for the long vowels in these figures are shown in the darker shade while means for short vowels are shown in the lighter shade.

Starting with the oldest (Mobile Unit) speakers we note that in all instances long vowels are pronounced more peripherally than short vowels. As we progress to the next set of speakers, the Kaumātua, note that the main changes are a reduction in the difference between *wā* and *waka* and a raising in the mouth space of the *kē* and *kete* pair towards *pī* and *piki*. These two sets of changes continue to advance through to the young speakers and are joined by a fronting of the *tū* and *tuku* vowels and raising of the *mō* and *moko* vowels. Although most evident amongst the youngest speakers, the beginning of the fronting of the *tū* and *tuku* vowels can be seen in Figure 2 where fronted versions of *tū* are evident (usually after /t/) amongst even the oldest speakers (this also applies to *tuku*). This feature is more fully discussed in Maclagan et al. (2005) and Harlow et al. (in press). From the Mobile Unit speakers through to the youngest speakers we can

also see the short vowels becoming more peripheral and being produced nearer to the corresponding long vowels.

Figure 3. Long and short vowel means of Mobile Unit, Kaumātua and Young speakers

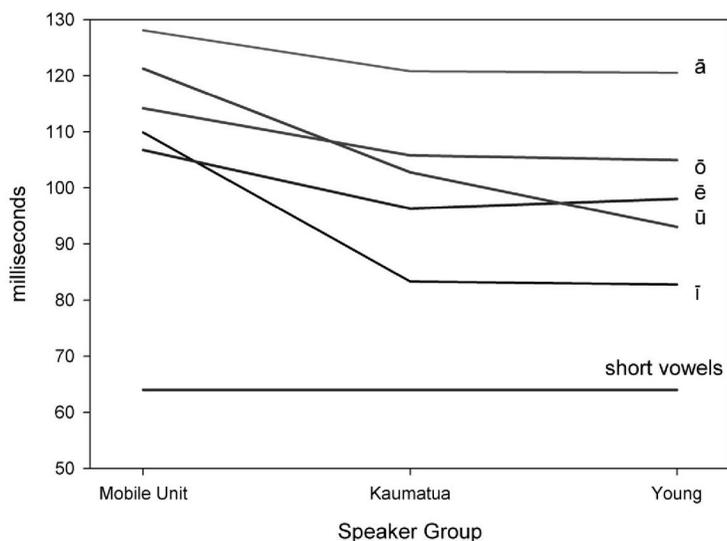


Although changes such as these could be naturally occurring ones, we note that changes with *KE/KETE* and *TŪ/TUKU* parallel changes which have occurred in New Zealand English over the corresponding time period. As the New Zealand English *DRESS* vowel has risen, so has the pair of Māori vowels *KĒ* and *KETE*, which are produced in a similar place in the mouth. Similarly, the New Zealand English *GOOSE* and *FOOT* vowels are fronting (Maclagan & Hay, 2007), as is the corresponding Māori pair, *TŪ* and *TUKU*. Thus, while we cannot rule out language internal change (Labov, 1994), it is likely these changes in Māori have been strongly supported by changes in New Zealand English. This is confirmed by the fact that an analysis of the English of our speakers shows that for each group their English is similar to the English of similarly matched non-Māori speakers of English. Thus it is likely that their vowel production for English is influencing their pronunciation of Māori (Watson et al., 2008).

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Noting that the differences between most of the short and long vowels in Māori were reducing we also looked for changes in the length of the vowel pairs. These results are shown in Figure 4:

Figure 4. Average vowel length by speaker group



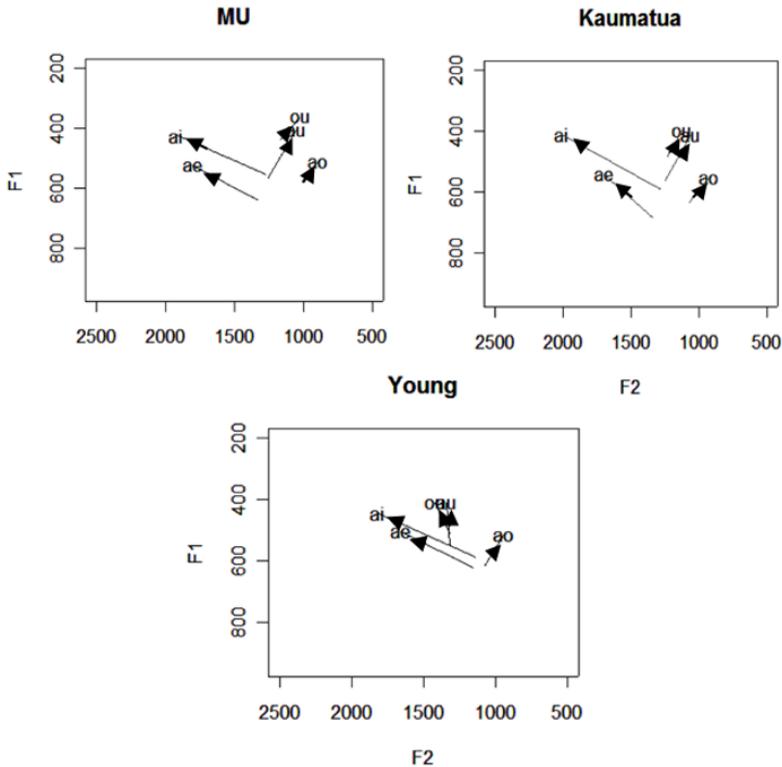
Values for the short vowels over the three groups of speakers have remained relatively constant at just over 60 milliseconds. The long vowels of Mobile Unit speakers were typically about twice the length of short vowels, consistent with the analysis that long vowels phonemically consisted of two of the same short vowels. However, over time this distinction has reduced substantially, with the vowels pronounced higher in the mouth, *PI* and *TŪ*, in the advance of this change. This reduction in the difference between four of the short and long vowel pairs is likely to be an influence from New Zealand English where the corresponding long vowels do not have short and long vowel variants. It is notable, however, that the length distinction between *WĀ* and *WAKA* has generally been preserved. This is probably partly due to functional load as *WĀ* occurs much more frequently than other long vowels and to the existence of a short and long vowel pair *START* and *STRUT* in the corresponding New Zealand English vowel space.

Diphthong analysis

The project also undertook an investigation of the pronunciation of five of the most common diphthongs in Māori: *MAI*, *WAE*, *PAO*, *RAU* and *HOU*. Anecdotal evidence suggested that the pronunciation of two pairs of these diphthongs were merging. The results of the analysis are shown in Figure 5. The diagrams show the starting point for each diphthong with the arrowhead showing the direction of travel and the diphthong end point. The first diagram shows that the Mobile

Unit speakers keep both the starting and end points of the two fronting diphthongs MAI and WAE separate. Following this pair over time we see changes occurring in the speech of the Kaumātua leading to the situation with the Young group where both the start and end points have become very similar.

Figure 5. Diphthong plots of Mobile Unit, Kaumātua and Young speakers



The results are similar for the two diphthongs which end with /u/: RAU and HOU. The Mobile Unit speakers keep the start point of each of these diphthongs separate but by the time we get to the Young speakers this distinction has been substantially diminished. Added to this, these diphthongs have also been affected by the fronting of the TUKU vowel, with the end point of RAU and HOU fronting over time. These mergers seem to be affected by New Zealand English in which there are only two diphthongs, GOAT and PRICE, covering the vowel space of the pairs RAU and HOU and MAI and WAE respectively.

Implications

The results of the vowel and diphthong analyses suggest that Māori may be heading towards a phonological inventory of six rather than ten vowels and fewer distinct diphthongs. When considering the diphthongs in particular there

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will continue to be increased homophony between pairs such as *tae* (to arrive) and *tai* (tide) and *pou* (post) and *pau* (to be used up). However, as these pairs illustrate, context avoids any problems with ambiguity as often these pairs occur as different parts of speech.

With the short and long vowel length differences collapsing we would also predict uncertainty as to the shape of word stress. Already there are indications for length of vowels to be assigned by a template where the first syllable in a three syllable word is stressed and lengthened (following the way English indicates stress). Thus “takoto” is now often being pronounced as “tākoto”, “taringa” as “tāringa” and “tikanga” as “tīkanga.” The extent of the uncertainty about word shape is also indicated by the fact that “tīmata,” which traditionally has a long vowel in the first syllable, is often pronounced “timata.”

These sorts of changes indicate that there are likely to be changes happening in the rhythm of Māori (*te mita o te reo*) and this is supported by anecdotal evidence from older native speakers. Conventionally, Māori is regarded as being ‘mora-timed’ in contrast to the stress-timed rhythm of English. (Mora-timing means that each short vowel and any preceding consonant take up approximately the same amount of time.) Results so far indicate that the Māori language is moving to a more syllable-timed rhythm, and may well be moving towards a stress-timed rhythm. Currently the MAONZE project is extending its project to analyze women’s speech as well as investigating changes in the rhythm of the language.

Pronunciation aid

A practical offshoot of the MAONZE project is work on designing a computer based pronunciation aid for Māori language learners. The aid is based on the principle generated from this research that the oldest generation of native speakers should be the model for pronunciation. However, it is impossible to supply native speaking teachers to all learners. Existing cassette based pronunciation aids typically allow learners to listen to exemplars and try to copy what they hear. However, such aids rely on the learner’s own ability to interpret what they hear, reproduce it and evaluate their own efforts. As most teachers know, the listening skills of learners can often be less than ideal. The computer program being developed aims to overcome some of these traditional shortcomings in the learning of pronunciation.

Figure 6 illustrates the components of the computer based aid developed by Gutla (2006) and Rivers (2006). The prototype has been named M-PAi, an acronym of the phrase **M**āori **P**ronunciation **A**id. The acronym also plays on the Māori word *pai* which means ‘good, correct.’ The pronunciation aid uses a database of recordings of a number of speakers speaking a list of Māori words. Word recognition software allows the program to be ‘trained’ to recognize the extent of variations in the pronunciation of each word amongst the speakers. The learner uses a microphone to record their own speech and feedback of their efforts is provided through speakers attached to the computer and in on-screen ratings.

Figure 6. System diagram of M-PAi pronunciation aid (from Gutla, 2006)

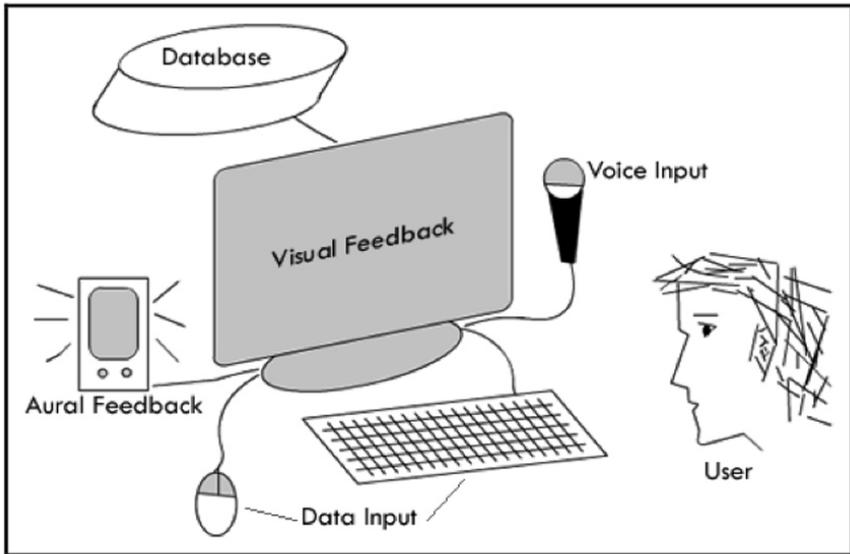
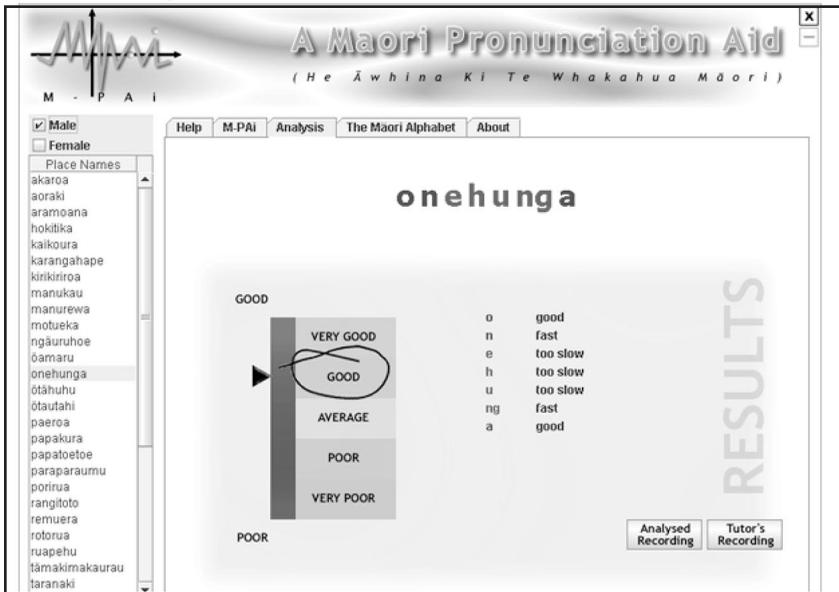


Figure 7. Screen shot of M-PAi pronunciation feedback (from Gutla, 2006; Rivers, 2006)



The learner is able to set recording options, which include the ability to loop a repeated recording of their effort to pronounce a word alongside a recording of one of the database speakers. This enables the learner to directly compare their pronunciation with that of the model speaker. Feedback can also be provided

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by the word recognition part of the program. Figure 7 shows a sample feedback screen shot for the pronunciation of the word *onehunga* where the learner receives an overall rating for the word they have pronounced as well as feedback on individual component sounds in the word.

The database currently being tested consists of a range of common words with examples of all long and short vowel and diphthong sounds. Thus the learner can drill themselves on a complete range of vowel and diphthongs, including the less common sounds. This pronunciation aid is still in the development phase, but initial testing has elicited positive responses from learners. Eventually it is hoped to produce a program that can be readily adapted for use with other languages.

Discussion

The results of this analysis give us a number of useful pointers about the sound systems of indigenous languages undergoing revitalization.

1. Sound changes will parallel changes in the dominant language

Firstly, because a language undergoing revitalization will include at least one second language learning generation, the sound system of these speakers' first language will have a powerful effect on the revitalized language (Flege, Schirru & Mackay, 2003). In the case of Māori we have seen that changes in the pronunciation of vowels tend to parallel changes that are already occurring with vowels produced in a similar part of the vowel space in New Zealand English. What would these results imply, say, for a language such as Navajo with four basic vowels /i, e, a, o/ which may be either long or short? American English, unlike New Zealand English, has long/short pairs for /i/ (FLEECE and KIT) and /u/ (GOOSE and FOOT), but not for /a/ or /o/. We would therefore predict that the length distinctions for /a/ and /o/ would be more at risk than those for /i/ and /u/.

2. Phonemes which do not occur in the dominant language could be lost

Although not presented here, the MAONZE analysis shows that the traditionally unaspirated Māori stops /p, t, k/ have become increasingly aspirated, mirroring the fact that stops are not unaspirated in English (Maclagan & King, 2007), and <wh> which used to be a bilabial fricative is now an English-like /f/ (Maclagan & King, 2002). To continue with the Navajo example we would therefore predict a number of further changes in the Navajo vowel system. Each of the four Navajo vowels may also occur as nasalized and with one of four tones (high, low, rising, falling). Since these variations are absent from the phonemic inventory of American English we would predict that these distinctions would gradually be lost, because nasalization is purely contextual in English where vowels are nasalised between nasal consonants as in *man* or *moon*, and English does not use tone to distinguish vowels.

3. Changes in vowel length may produce changes in rhythm

In indigenous languages where vowels have both a long and short variant which is not part of the dominant language, there will be changes in vowel length, most

typically resulting in long vowels becoming shorter. This change will most notably affect high vowels which are usually shorter than low/open vowels in English (Peterson & Lehiste, 1960, pp. 701-02). These sorts of changes will affect the rhythm contours of words with the result that stress rules and patterns for the language are likely to change.

4. The oldest generation of living speakers should provide models for pronunciation

While we know that it is impossible to stop changes occurring in languages, awareness of the types of changes that are likely to occur means that we can pay particular attention to these areas when teaching pronunciation. In particular learners should ideally be exposed as much as possible to pronunciation models generated by older native speakers. As this type of exposure is often difficult to arrange, a pronunciation aid that allows learners to record and compare their pronunciation with such exemplars will be useful.

5. Pronunciation change can generate alarm amongst older speakers

Despite the fact that the sound systems of all languages are constantly in a state of flux, change of the type discussed here, that of an indigenous language undergoing revitalization, will be likely to be of an order of magnitude greater than that typically encountered in a language which isn't under the same stress. Accordingly, while we know that older speakers of most languages typically complain about the pronunciation of younger speakers we could expect an even greater concern amongst native speakers of endangered languages. For example, native speakers have been noted to comment with respect to Māori '*pai ake pea mena ka waiho taku reo ātaahua kia mate noa*' (perhaps it would be better to leave my beautiful language to die).

Those working with the revitalization of indigenous languages need to be aware that these feelings may be strongly held and devise strategies appropriate to the situation which ensure the continued cooperation of older generations in language revitalization. In particular, language teachers need to be made aware of the types of pronunciation changes which are likely and which have probably already been noted anecdotally. They also need to be able to develop skills which enable them to helpfully teach learners, while being aware that they will not be able to stop pronunciation change.

In that the sound system of a language conveys important aspects of the speaker's identity it is clear that the sort of changes likely to occur in languages undergoing revitalization will reflect important changes in the identity of new generations of speakers.

Notes:

¹The MAONZE project acknowledges funding from the University of Canterbury and the Marsden Fund of the Royal Society of New Zealand. For more information see our website at: <http://www.ece.auckland.ac.nz/~cwat057/MAONZE/MAONZE.html>

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²The MAONZE project acknowledges Radio New Zealand Sound Archives Ngā Taonga Korero as the copyright owner of these sound files.

References

- Flege J.E., C. Schirru & I.R.A. MacKay. (2003). Interaction between the native and second language phonetic subsystems. *Speech Communication*, 40, 467-491.
- Gordon, E. (1998). The origins of New Zealand speech: The limits of recovering historical information from written records. *English World-Wide*, 19, 61–85.
- Gutla, J.J. (2006). A Māori pronunciation aid. In *Proceedings of the 2006 Year Four Research Projects* (Vol. II, pp. 504-512). Department of Electrical and Computer Engineering, University of Auckland, New Zealand.
- Harlow, R., P. Keegan, J. King, M. Maclagan & C. Watson. (in press). The changing sound of the Māori language. In J.N. Stanford & D.R. Preston (eds.), *Quantitative sociolinguistic studies of indigenous minority languages*. Amsterdam, Netherlands: John Benjamins.
- Labov, W. (1994). *Principles of language change: Internal factors*. Oxford, UK: Blackwell.
- Maclagan, M., R. Harlow, J. King, P. Keegan & C. Watson. (2005). Acoustic analysis of Māori: Historical data. Proceedings of the Australian Linguistic Society conference, 2004. Retrieved Nov. 19, 2008 at <http://ses.library.usyd.edu.au/handle/2123/104>
- Maclagan, M., & J. Hay. (2007). Getting *fed* up with our *feet*: Contrast maintenance and the New Zealand English ‘short’ front vowel shift. *Language Variation and Change*, 19(1), 1-25.
- Maclagan, M. A., & J. King. (2002). The pronunciation of *wh* in Māori—a case study from the late nineteenth century. *Te Reo*, 45, 45-63.
- Maclagan, M.A., & J. King. (2007). Aspiration of plosives in Māori: Change over time. *Australian Journal of Linguistics*, 27(1), 81-96.
- Peterson, G., & I. Lehiste. (1960). Duration of syllable nuclei in English. *Journal of the Acoustical Society of America*, 32, 693-703.
- Rivers, D.T. (2006). A Māori pronunciation aid. *Proceedings of the 2006 Year Four Research Projects* (Vol. II, p. 513-519). Department of Electrical and Computer Engineering, University of Auckland, New Zealand.
- Rousseau, J. (n.d.) *Emile*. Paris, France: La Renaissance du Livre.
- Watson, C., M. Maclagan, J. King & R. Harlow. (2008). The English pronunciation of successive groups of Māori speakers. In J. Fletcher (ed.), *Proceedings of the 9th annual conference of the International Speech Communication Association (Interspeech 2008) incorporating the 12th Australasian International Conference on Speech Science and Technology (SST 2008)* (pp. 338-341). Brisbane, Australia.
- Wells, J. C. (1982). *Accents of English*. Cambridge, UK: Cambridge University Press.