

Appendix 3 Acoustic data on tones

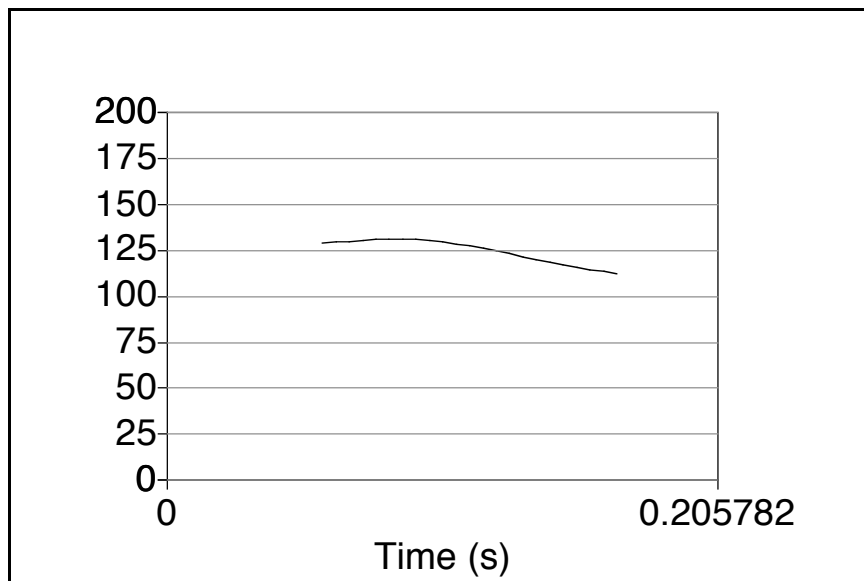
The analysis presented in chapter 2 has seven contrastive tonal patterns made up of five tone melodies and variable assignment of the tone melodies to the syllables (= tone bearing units) based on a lexical accent, for one of them, the HL contour. Since this is an analysis that exceeds the norms for languages of New Guinea, some acoustic data has been presented to back up the claims made in the earlier chapter. In this appendix I shall give both fundamental frequency (F_0) tracings of utterances representing the different tonal contrasts on words of one, two and three syllables, as well as some information on F_0 movement in phrases. These F_0 tracings have all been taken from recordings of a single speaker, a native of Skou Mabo. They represent naturalistic speech: no attempt was made to collect citation tones in an ‘artificial’ environment, but rather all the F_0 and formant tracings have been culled from texts and recorded conversations. The extraction of acoustic information has been made with the speech analysis software Praat.

A3.1 Minimal pairs

In chapter two I discussed the three distinctive pitch contours, which represent the realisation of five tonal melodies that are mapped onto word-level units. In this section I shall present introductory examples of the fundamental frequency correlates of these contours.

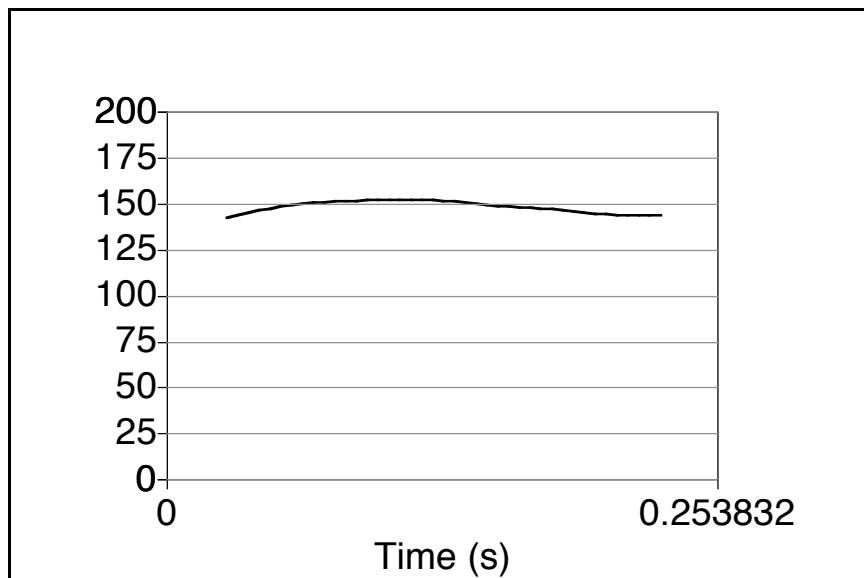
Contrasts between the three different pitch contours found on monosyllables can be seen in the following F_0 tracings of three segmentally identical words. In the first word in figure A1, which has a lexically-assigned low tone, we can see that the pitch contour starts quite low, and shows a gradual fall through the word. This fall is intonational, and not part of the phonological specification of the tone.

Figure A1. *pa* ‘water’



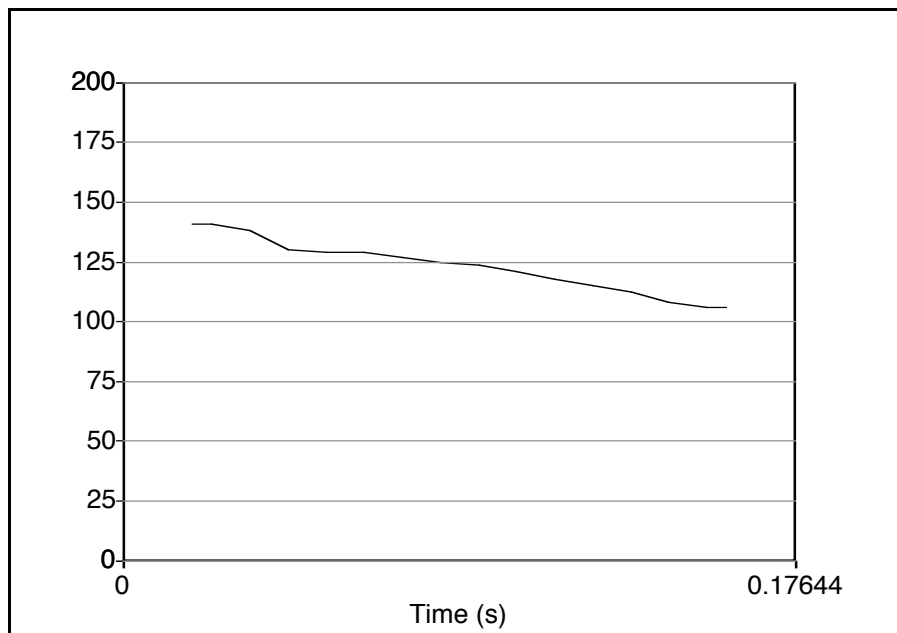
The next word, *pá* ‘house’ in figure A2, has a lexically assigned high tone. Here the F_0 at the beginning of the word has a much higher peak, and the fall that it displays is much less severe than that seen in words like ‘water’. The specification of a high tone then appears to involve a greater component of specific pitch targets than does that for a low tone. This is just one of the reasons that it might be better to think of low tones as being in fact the phonological absence of assigned tonal units. See 2.xx for more discussion of this point.

Figure A2. *pá* ‘house’



The final word in the series (because the LH and LHL melodies cannot be realised on monosyllables), *pà* ‘cult house’ in A3, has a falling tone; in terms of tonal units, it is assigned a HL tone melody. The fall associated with this word is noticeably sharper than with a simple H tone, and the duration of the word is also significantly less than either of the other two tones.

Figure A3. *pà* ‘cult house’



In the following sections I shall examine and discuss the F₀ contours associated with different words of various lengths, including compounds, and then examine the behaviour of F₀ in short phrases and clauses.

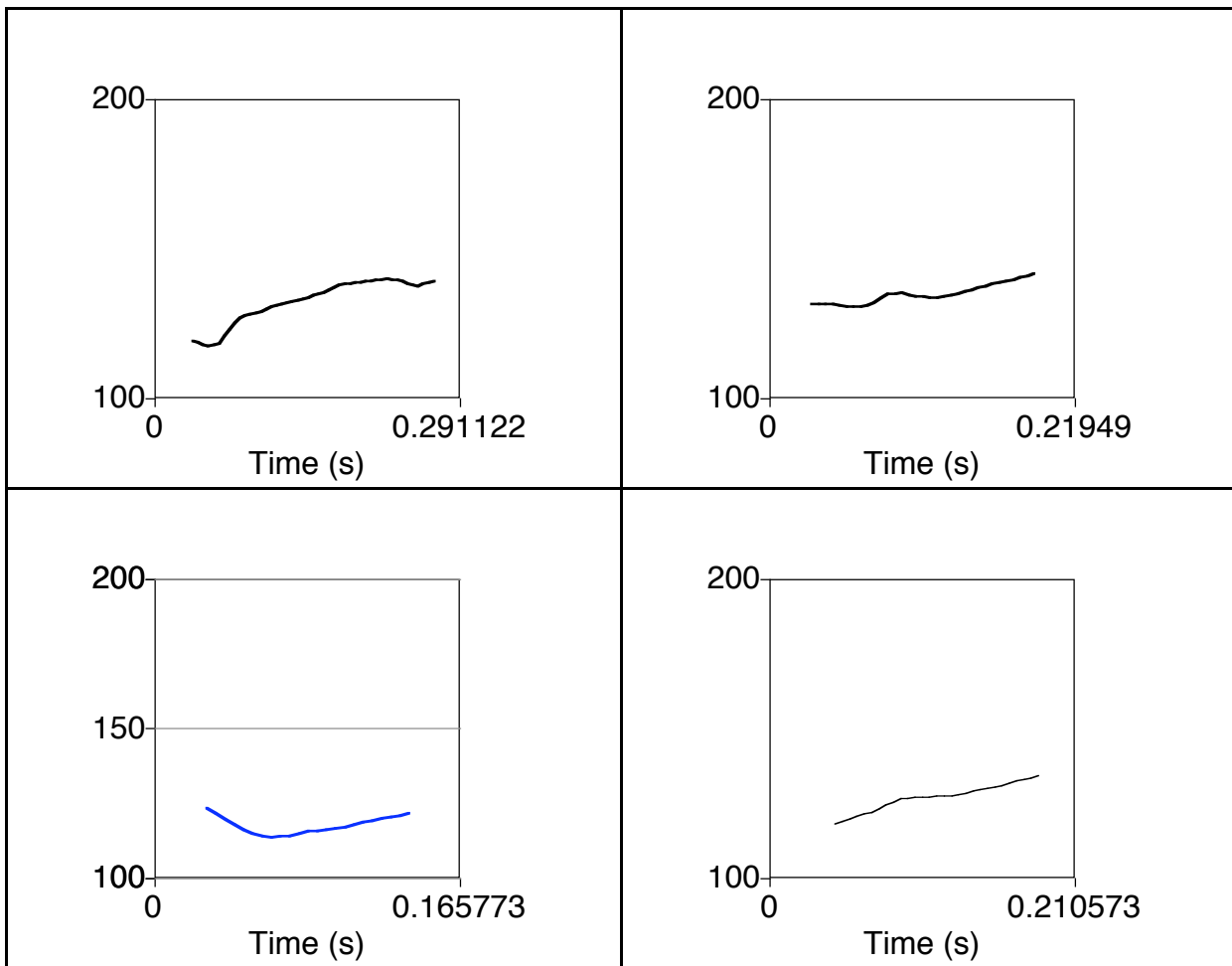
A3.2 Monosyllables

While the same tone melodies are available for all words, there are differences in their realisation since these melodies are assigned to the word, and not to the syllable. This section shows the contours associated with monosyllables assigned H, L or HL melodies.

A3.2.1 High pitch words

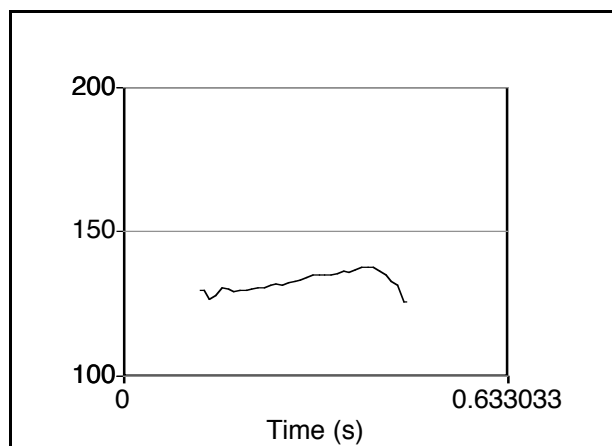
The high pitch represents an underlying H tone melody assigned to a monosyllable. It is realised by a predominantly high pitch over the voiced portion of the syllable, though there can be a noticeable rise in pitch at the start of an utterance. with a phonological H tone melody. Those found phrase-medially show a level high pitch, frequently with a gentle rise (this is more common with speakers from Skou Yambe). Figure xx shows the F₀ associated with four different repetitions of *móe* ‘fish’ by the same speaker.

Figure 1. *móe* ‘fish’



In figure xx we can see Te=Húng ‘Sentani’ which has a H associated with Húng. Since te= is cliticised to this morpheme, the H from Húng spreads over the combined two syllables.

Figure xx. Te=Húng ‘Sentani’



A3.2.2 Low pitch words

Words with low pitch are characterised by an F_0 pattern that is extremely subject to variation based on the intonation contour of the sentence. In chapter 2 we discussed the analysis under which many low-toned words can be viewed as being tonally unspecified,

Figure xx. *ang* 'poison root'

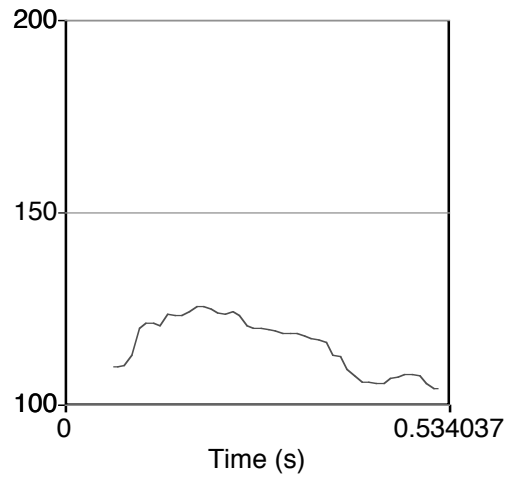


Figure 1. *tang* 'canoe'

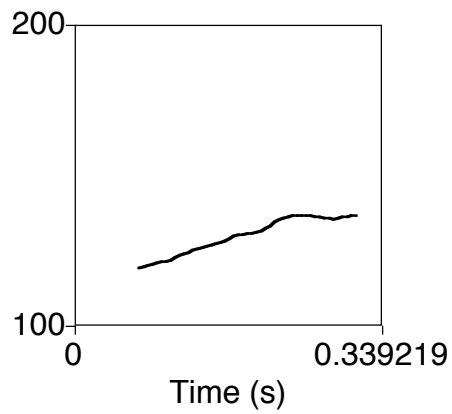
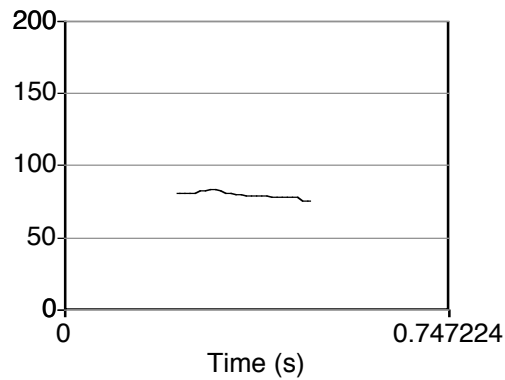


Figure 1. *Pa* 'Enggros'



A3.2.3 Falling pitch words

Falling pitch is always realised by a higher than average F_0 , and a fall in that F_0 . In many cases, when there is a following low-pitched syllable in an adjacent word, the falling contour continues over both syllables, with the phonologically low-pitched syllable dropping to a very low frequency. *fèng* 'bad'

Figure 1. *fèng* 'bad'

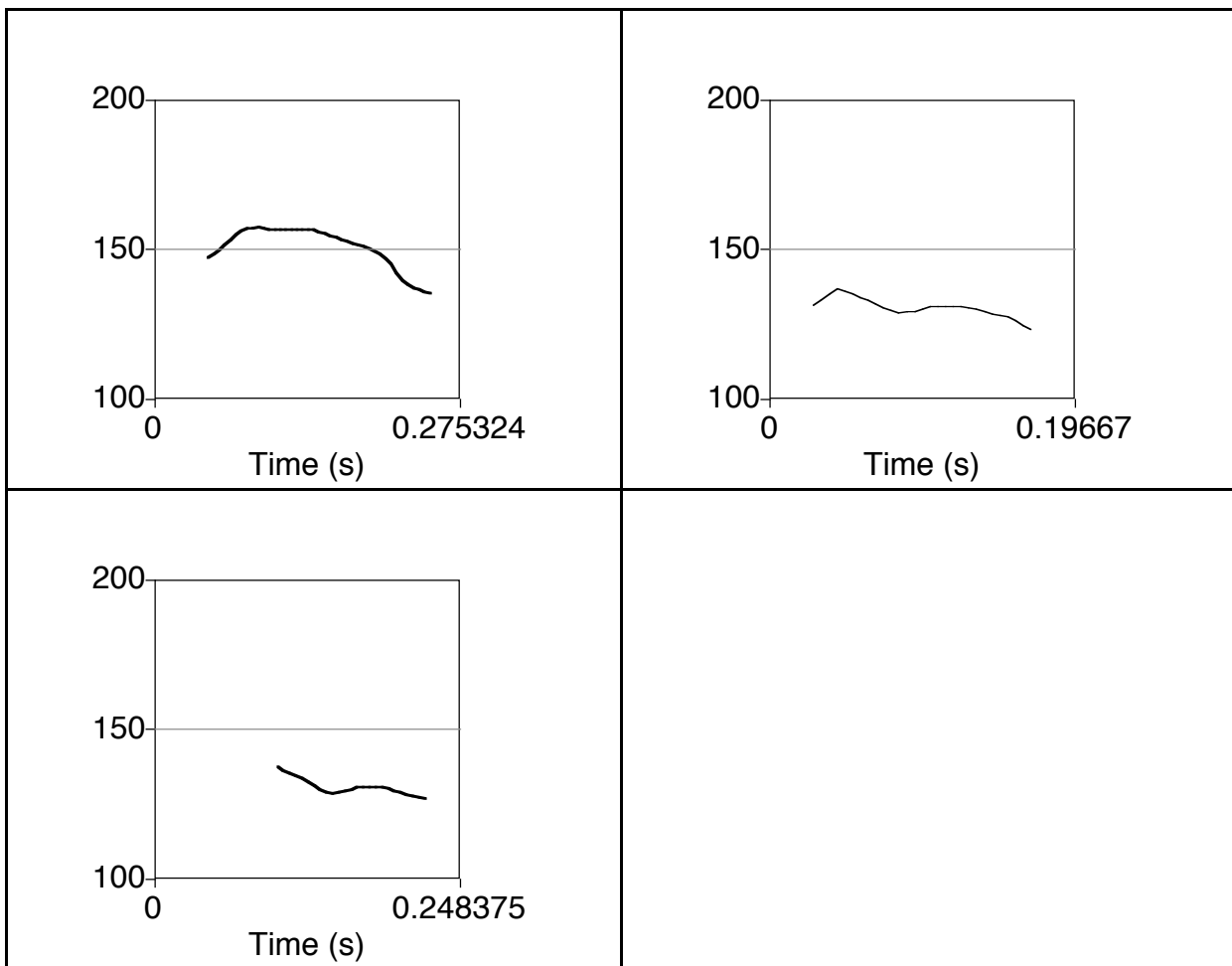


Figure 1. *hòe* 'sago'

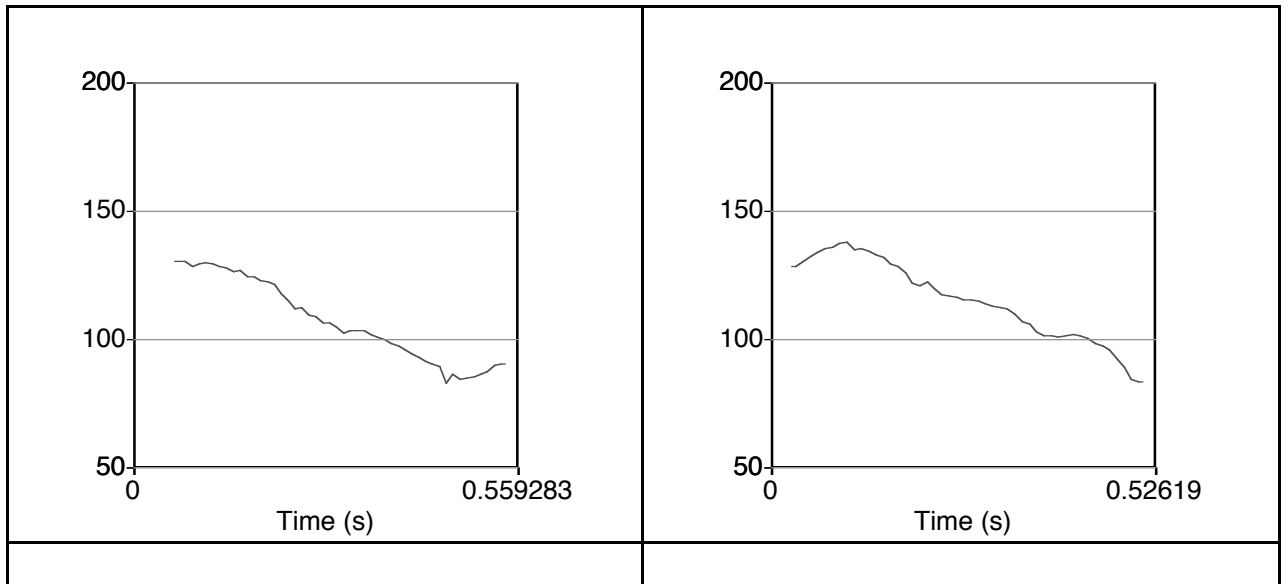


Figure 1. *pìng* 'war'

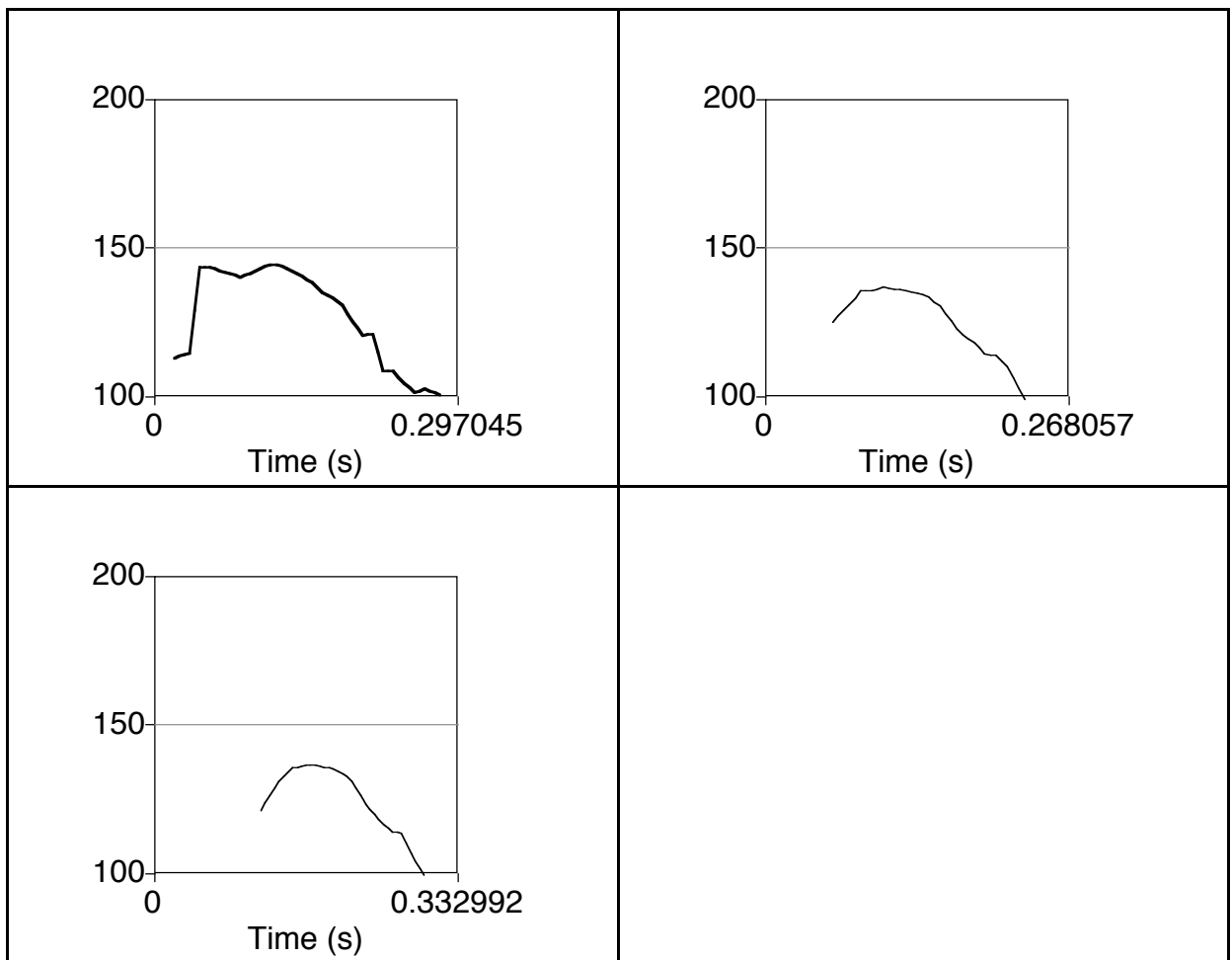
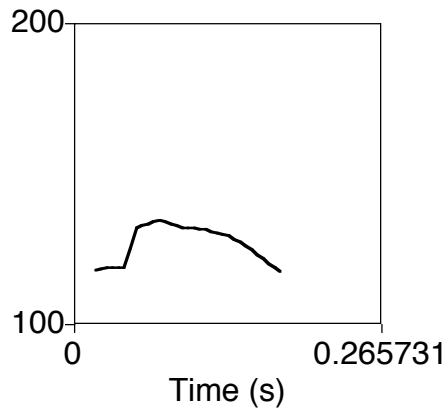
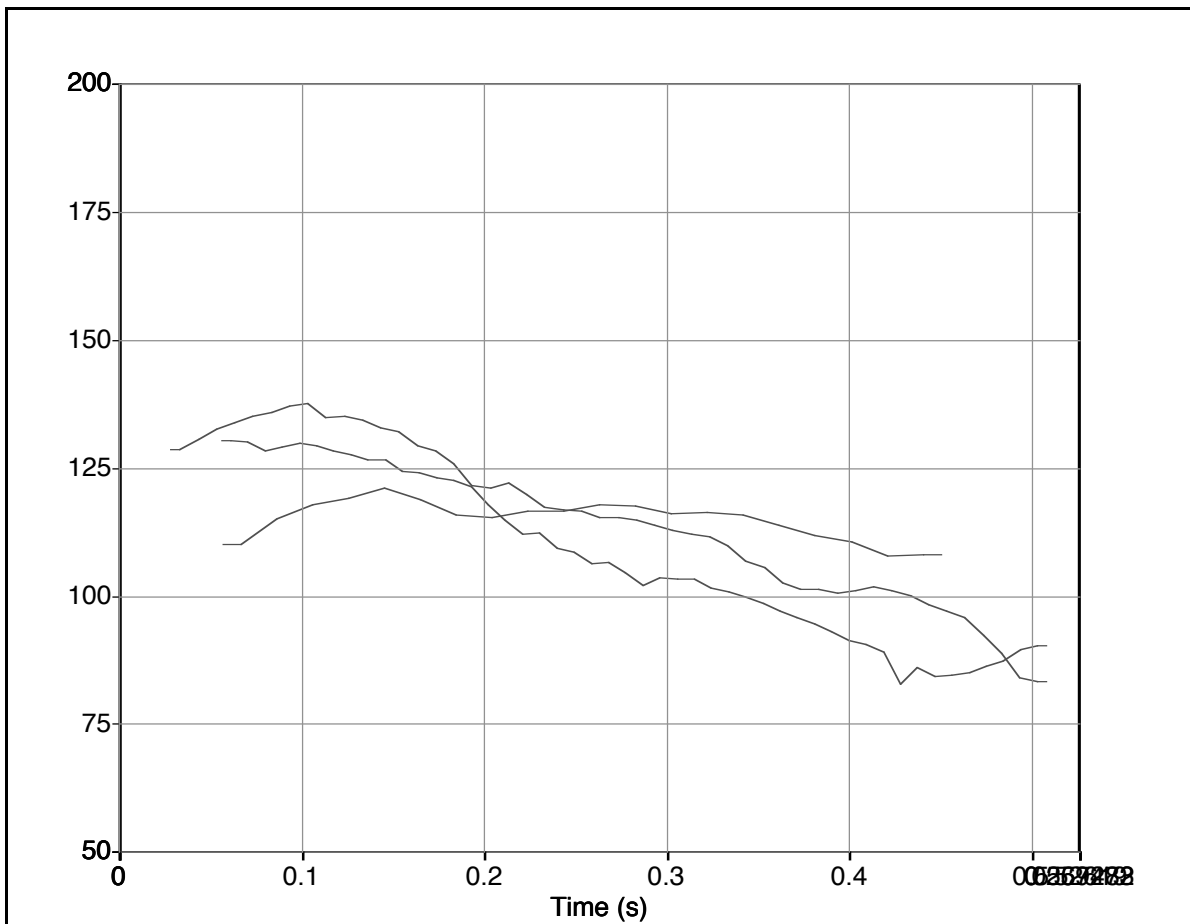


Figure 1. *bà* ‘person’



Three tokens of *hòe* ‘sago’ compared



A3.3 Disyllables

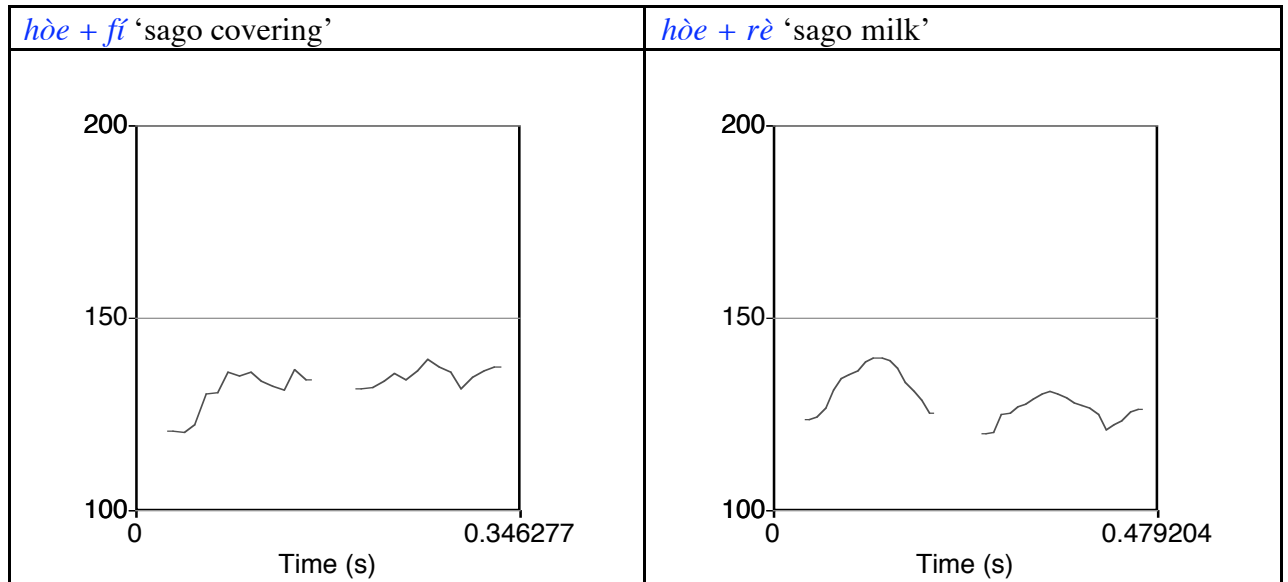
Disyllabic roots show more contrasts in pitch contours than do monosyllables, since xxx In addition to the increased number of pitch patterns that can be realised over disyllabic units, the effects of phrasal downdrift are also more apparent over the longer timing unit that is found with

A3.3.1 H melody

The high melody spreads over disyllabic words

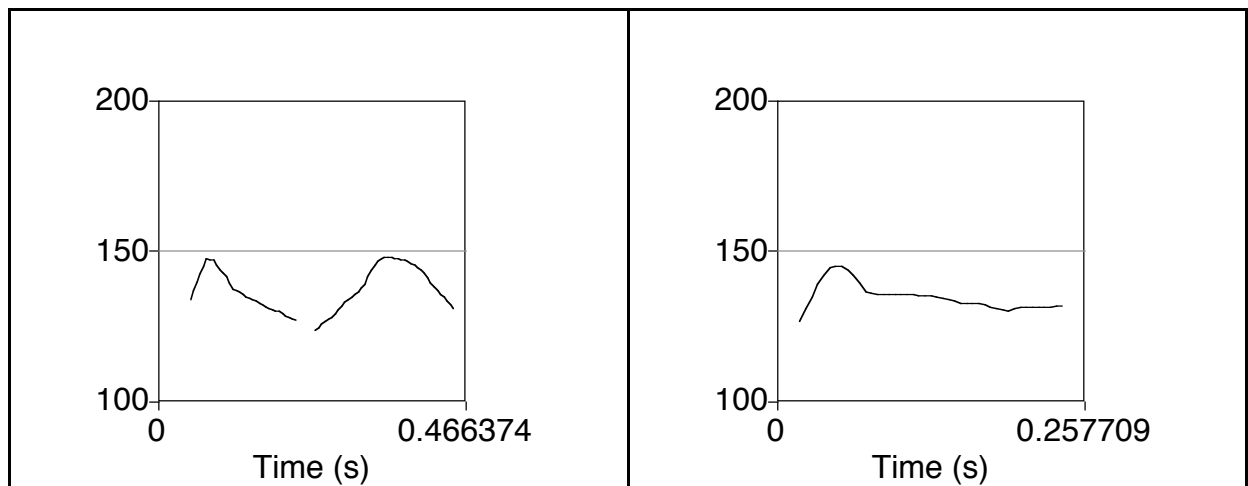
The following compound is interesting in that it shows the complete loss of the HL melody associated with *hòe* when compounded with the high-tone bearing *fí*.

Figure 1. Compounds involving the loss of the accented HL melody on *hòe* ‘sago’



A3.3.2 L melody

Figure 1. *yano* ‘thing’



A3.3.3 LH melody

A LH melody can only be realised on words of at least two syllables, and even then the differentiation from a simple L melody is not great. Figure xx shows *barí* ‘xxxx’, a word with a LH melody, and as can be seen the degree to which F_0 rises on the second syllable is not great.

Figure 1. *barí* 'xxxx'

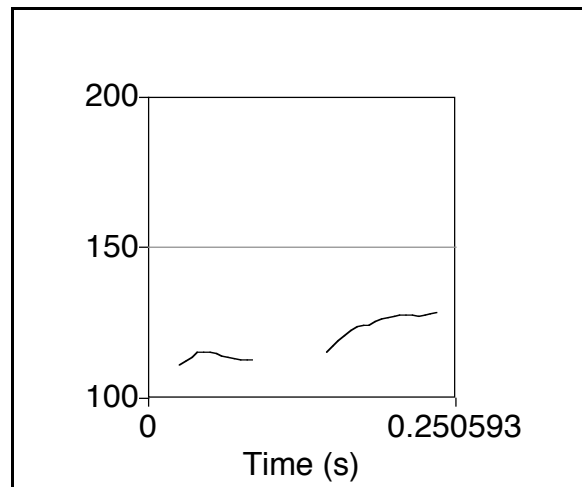
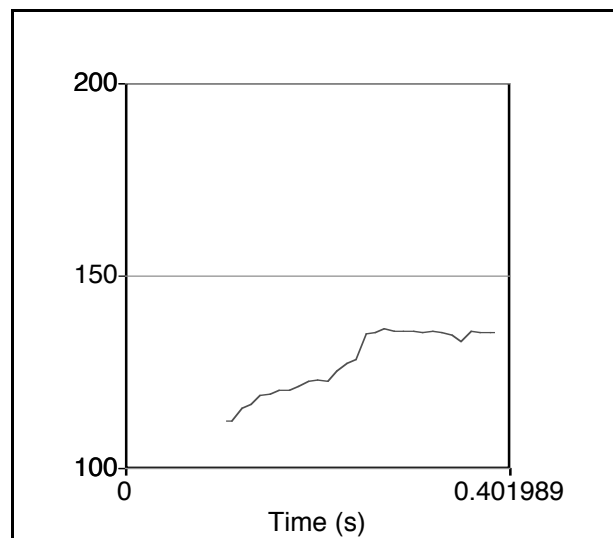


Figure xx. *rahé* 'sago strainer'



A3.3.4 LHL melody

A3.3.5 HL melody

The HL melody spreads over two syllables as a sequence of one high-pitched and one lowpitched syllable. There is considerable 'merger' between the end of the high pitch and the start of the low pitch, so that an idealised 44-22 shape is frequently changed to a 43-21. As with the other tones, phrase-initial position leads to a significant dropping of the pitch at the start of the syllable, and a perceptual rise in pitch. Acoustically there is a very great rise in F₀ from a very low level, but perceptually the rise is only slight. This might be due to the fact that radiated amplitude is very low for the early part of the rise, leading to a low perceptual salience. Both the F₀ trace and a xxxxx decibel trace are shown for the same phrase-initial token of *lópa*.

Figure 1. *lópa* 'xxxx'

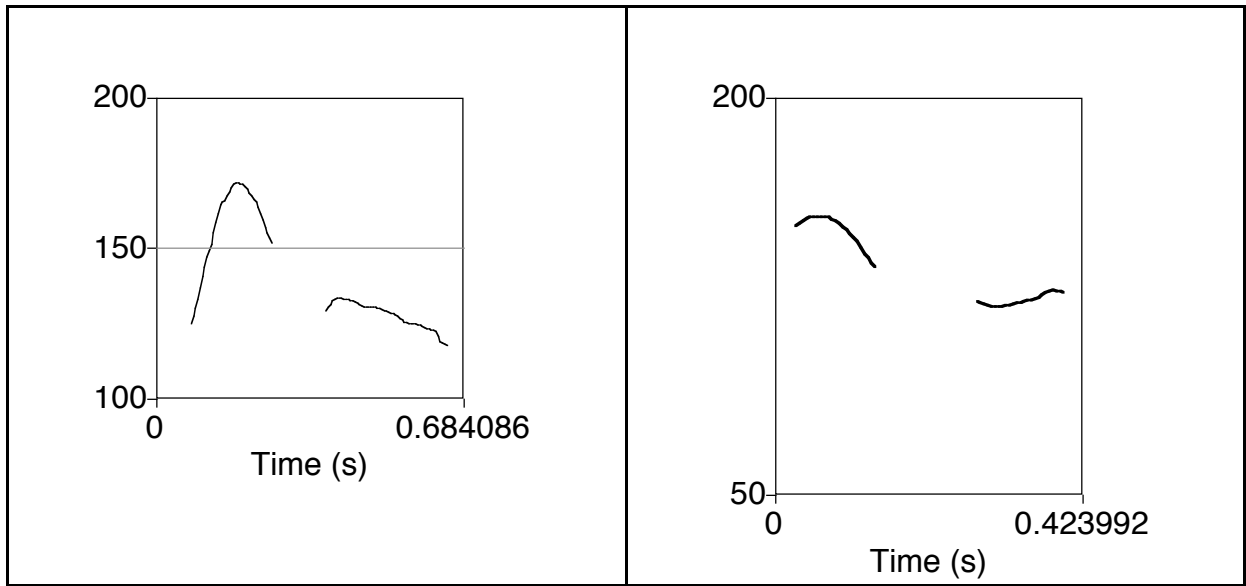
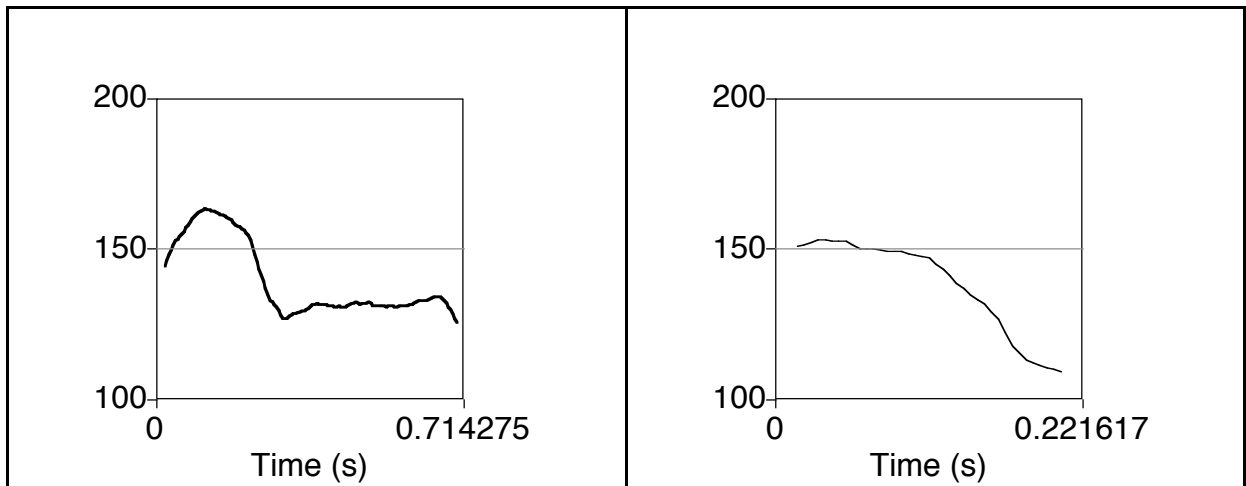


Figure 1. *Máwo* 'Mabo'



In Figure xx we can see Te=Tángpe 'Skou Yambe' showing the spread of the H tone from the first syllable of Tángpe onto the preceding clitic. This is shown in xxxxx.

Figure xx. *Te=Tángpe* ‘Skou Yambe’

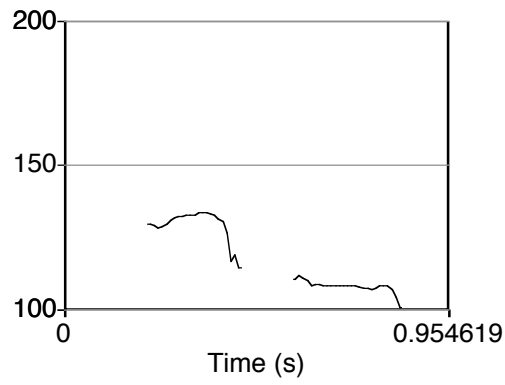


Figure xx. *táng=ing* ‘the táng nets’

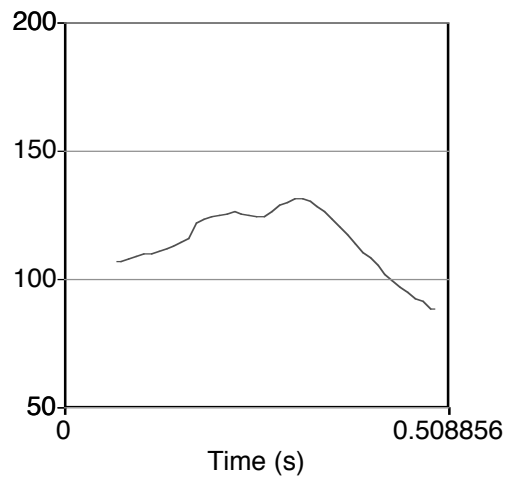
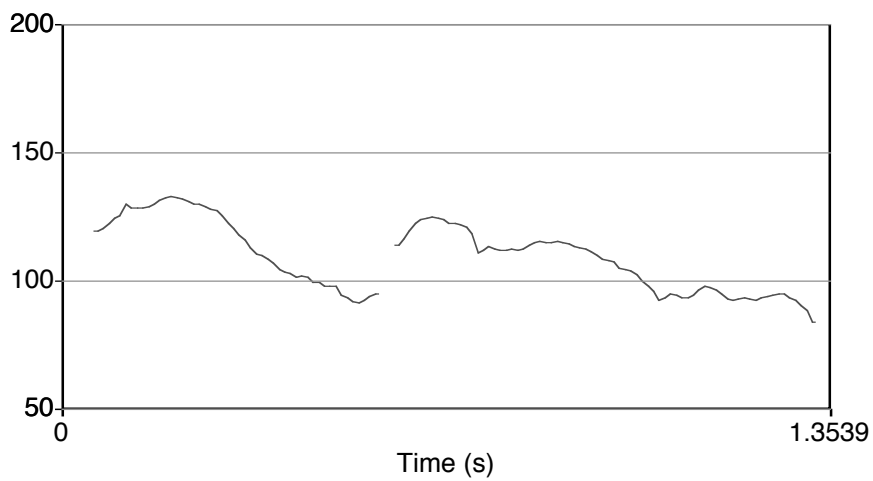


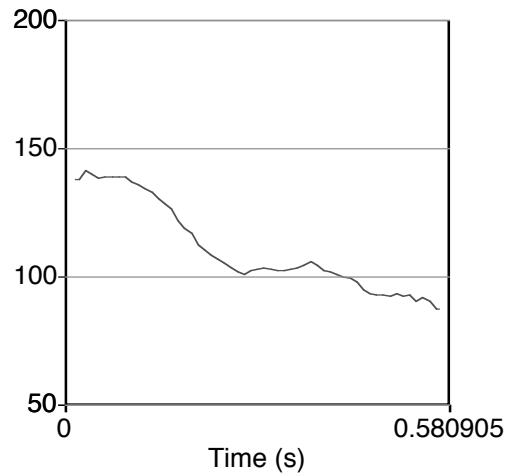
Figure xx. *nàli – hòenàli* ‘flesh – sago flesh’



A3.3.6 HL melody

A HL melody with an accent on the penultimate syllable

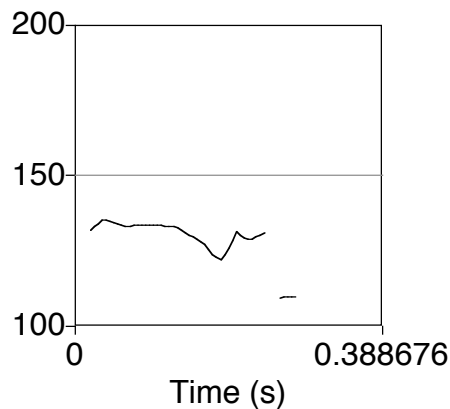
Figure xx. *bàme* ‘village’



A3.3.7 HL melody

A HL melody with a final accent results in a high-fall pitch contour, and this is represented acoustically by a predictable level slope followed by a fall on the second syllable. The drop in F0 is not as great as it is when a falling pitch contour is realised on a single-syllable word.

Figure 1. *héfèng* ‘good’



A3.4 Trisyllables

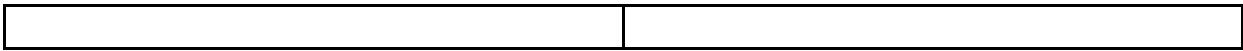
The number of contrasts found on trisyllabic words is no greater than those found on disyllabic words, but due to the greater distance from the beginning to the end of the word there is even more in the way of pitch perturbation.

A3.4.1 H melody

The high melody spreads over disyllabic words

A3.4.2 L melody

Figure 1. *yano* ‘xxxx’



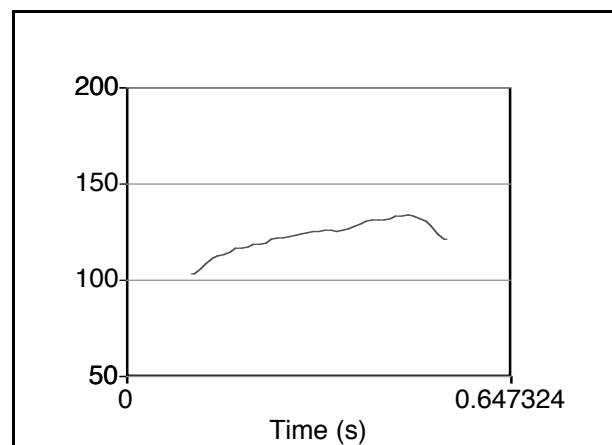
A3.4.3 LH melody

Figure 1. *barí* ‘xxxx’

A3.4.4 LHL melody

In figure xx we can see a LHL melody spread over three syllables. Impressionistically the F₀ contour appears to represent a LH melody, with the only drop appearing at the end of the last syllable. This, however, is due to the fact that the word is a CV-CV-V one.

Figure 1. *rangwáue* ‘axe’



A3.4.5 HL melody

The HL melody spreads over two syllables as a sequence of one high-pitched and one lowpitched syllable. There is considerable ‘merger’ between the end of the high pitch and the start of the low pitch, so that an idealised 44-22 shape is frequently changed to a 43-21. As with the other tones, phrase-initial position leads to a significant dropping of the pitch at the start of the syllable, and a perceptual rise in pitch. Acoustically there is a very great rise in F₀ from a very low level, but perceptually the rise is only slight. This might be due to the fact that the amplitude is very low for the early part of the rise, elading to a low perceptual salience. Both the F₀ trace and a decibel trace are shown for the same phrase-initial token of *lópa*.

Figure 1. *lópa* ‘xxxx’

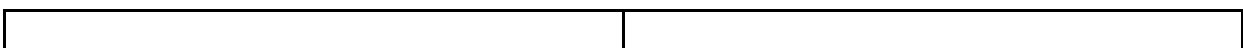


Figure 1. *Máwo* ‘Mabo’

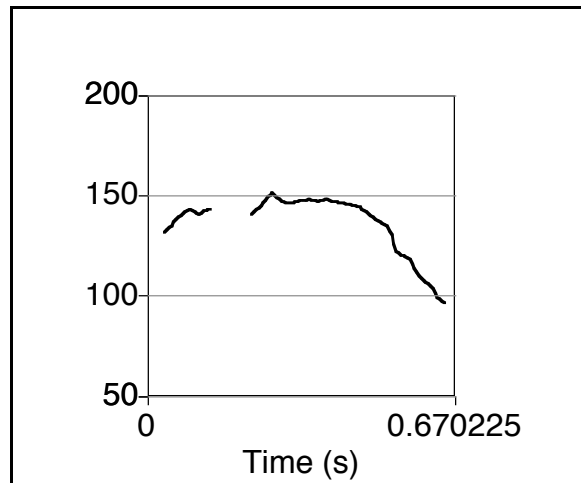


A3.4.6 HL melody

A3.4.7 HL melody

A HL melody with a final accent appears on three syllables much as does

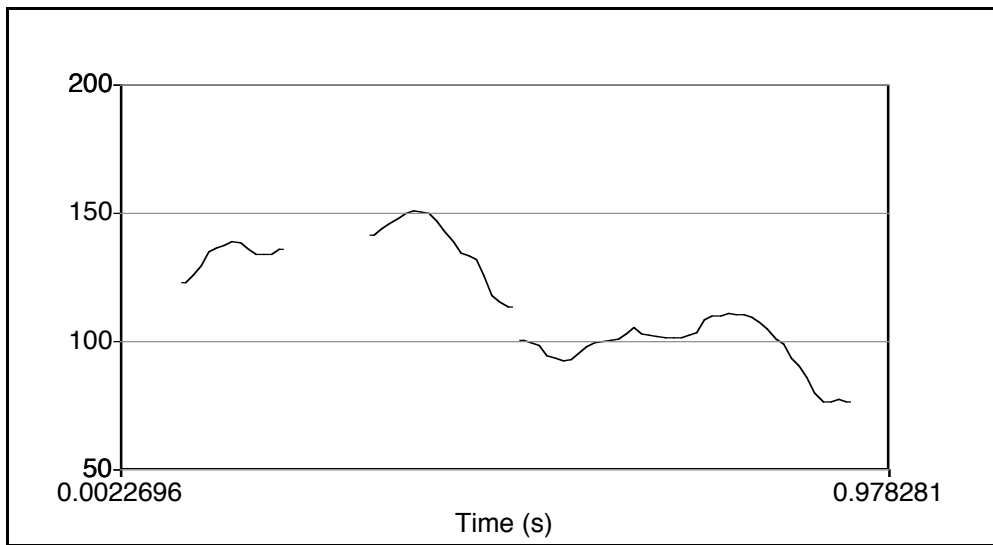
Figure 1. *ápólè* ‘xxxx’



A3.5 F₀ in phrases

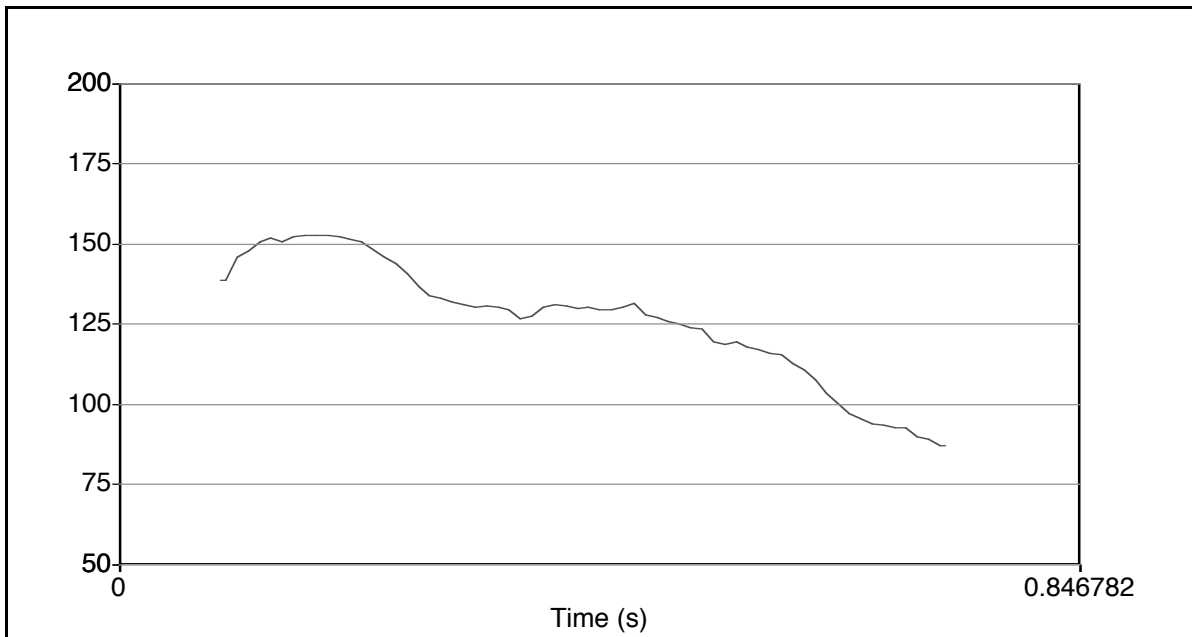
The behaviour of F₀ in phrases is an interesting study, and while a complete investigation of the effects of intonation and different tones on the F₀ of a phrase lies beyond the scope of the present work, some preliminary notes may be made. It is noteworthy that a falling tone has a depressor effect on a following low toned syllable, giving weight to the suggestion that these syllables are in some way phonologically ‘toneless’, being unassociated with a H tone unit. The following two F₀ traces show two utterances of the phrase *pìng te ti (e)* ‘they make war’, and in the second one we can clearly see that the F₀ on *te=*, the third person plural verbal proclitic, shows a sharp drop.

Figures xx. *Pìng-pìng nawò* ‘lots of fighting’



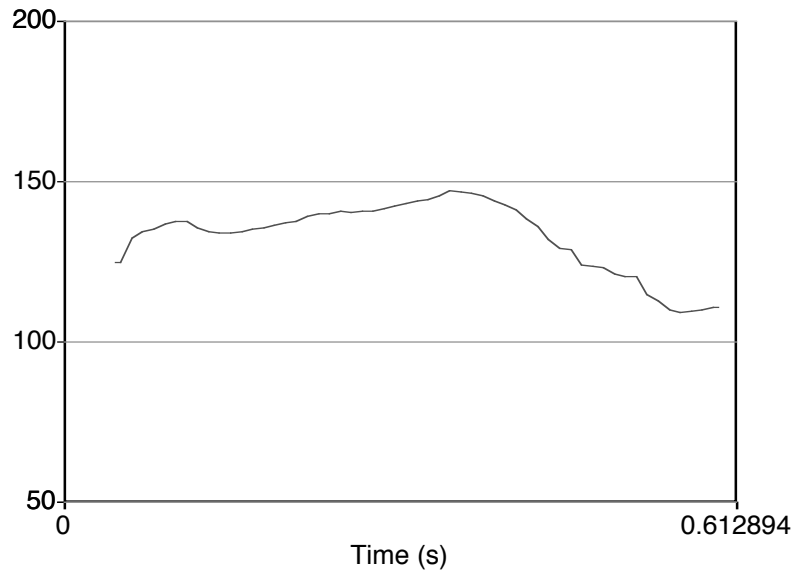
(99) $\begin{array}{cccc} \text{pī} & \text{pī} & \text{na} & \text{wo} \\ \text{HL} & \text{HL} & \text{L} & \text{HL} \end{array} \rightarrow \begin{array}{cccc} \text{pī} & \text{pī} & \text{na} & \text{wo} \\ \text{H} & \text{HL} & \text{L} & \text{HL} \end{array}$

Figure xx. *Jáwung=ing a* ‘the Nyao (people)’

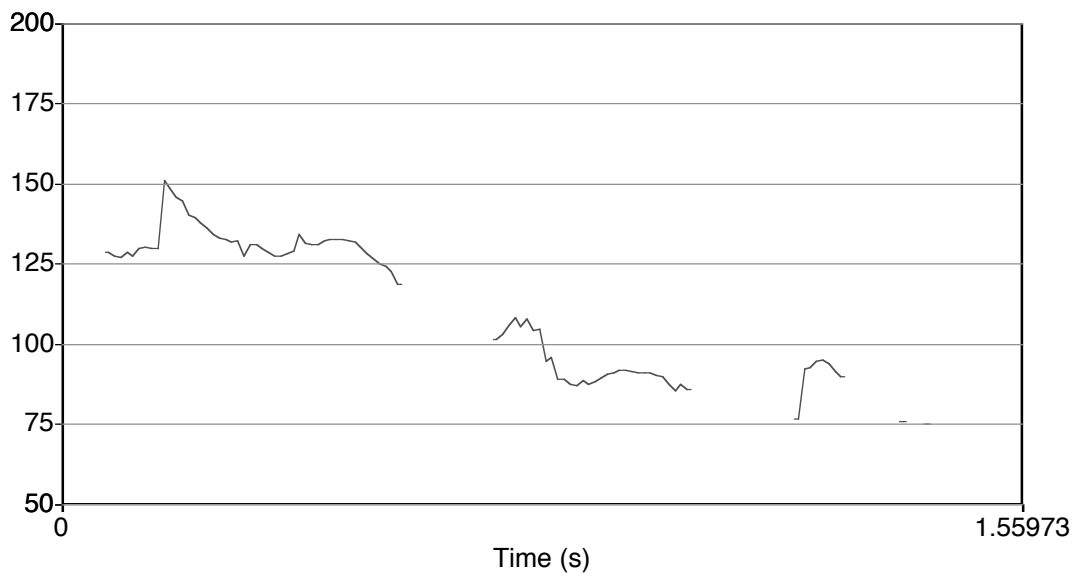


(99) $\begin{array}{ccc} \text{ja} & \text{wūī} & \text{a} \\ \text{HL} & (\text{L}) & \end{array} \rightarrow \begin{array}{ccc} \text{ja} & \text{wūī} & \text{a} \\ \text{HL} & (\text{L}) & \text{L}^* \end{array}$

Figure xx. *kóeng-nì=ne* 'my teeth'



ke=balèng tena è-ke 'a man and his wife'



hòefí ke ké pa

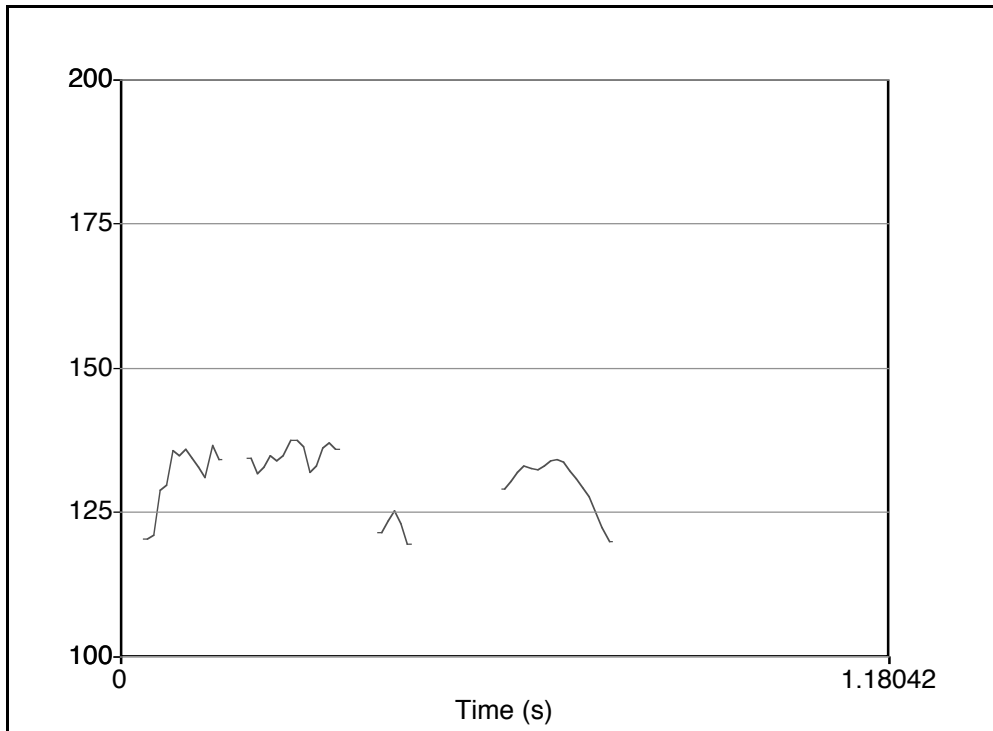


Figure xx. *Rangwáue te wí, te hòe te já te hí*
‘They take an axe, and they pound the sago so it goes down (into the strainer)’

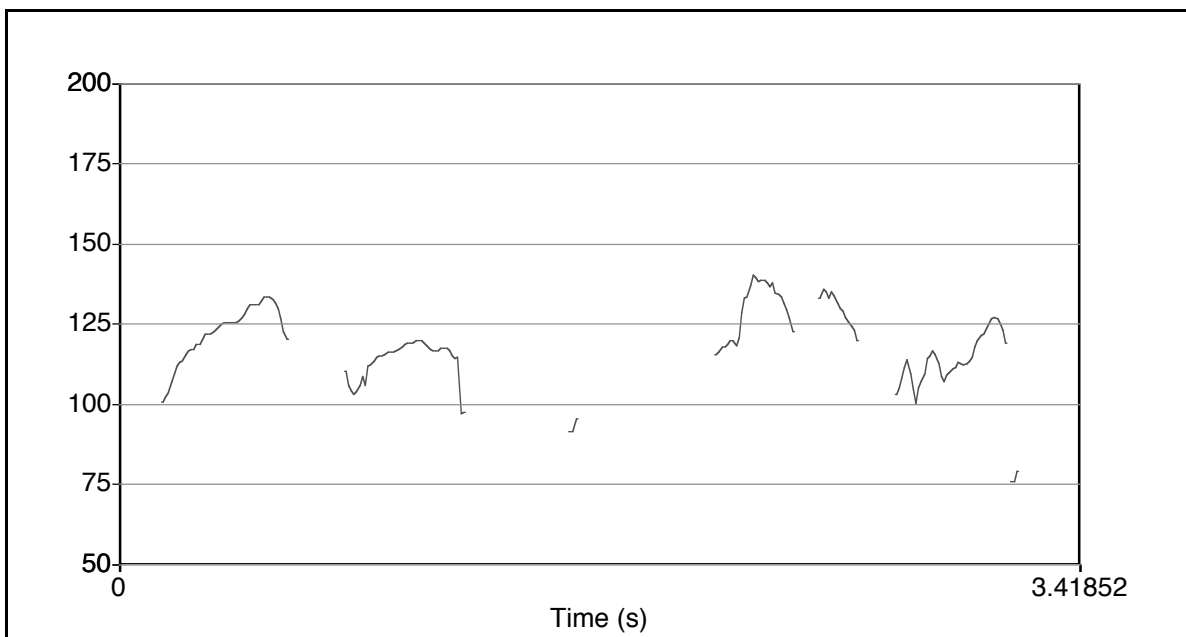


Figure 1. *ka* 'negative'

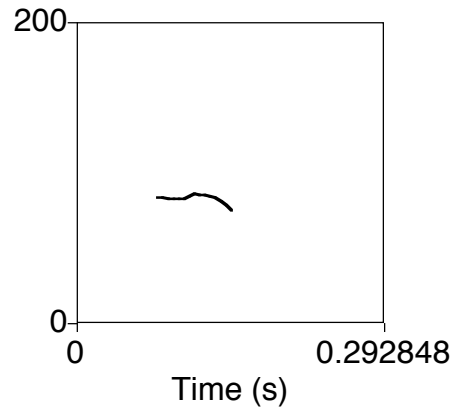
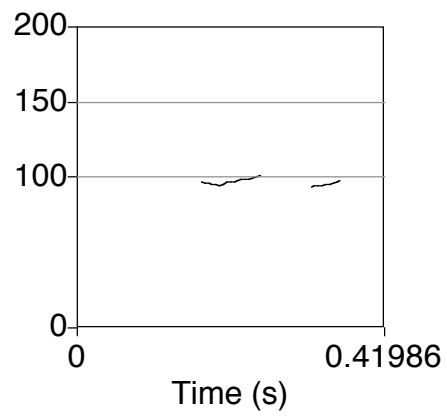


Figure 1. *ka* 'negative'



rahé pe wá 'she beats a coconut sago strainer'

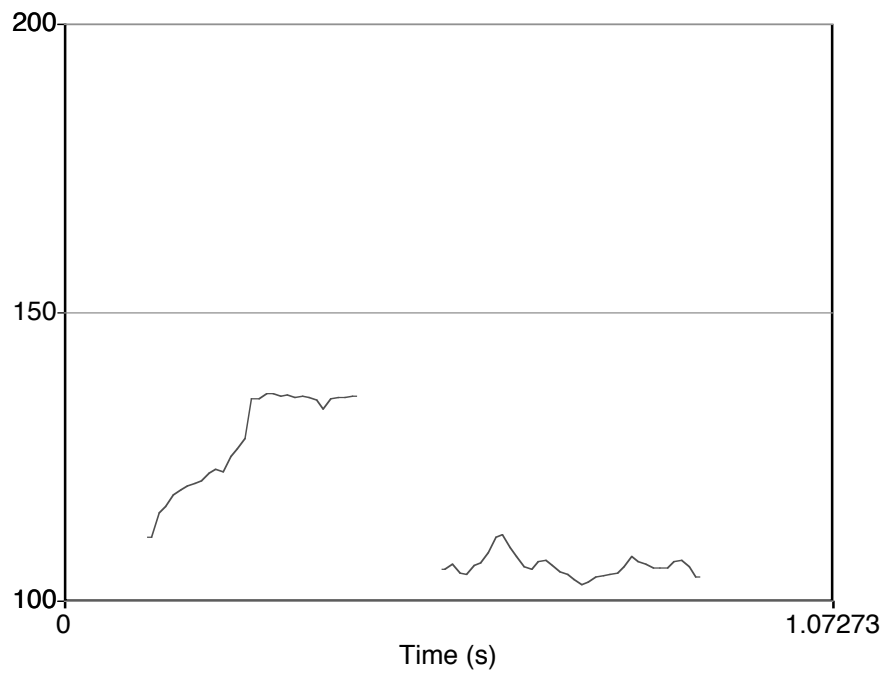
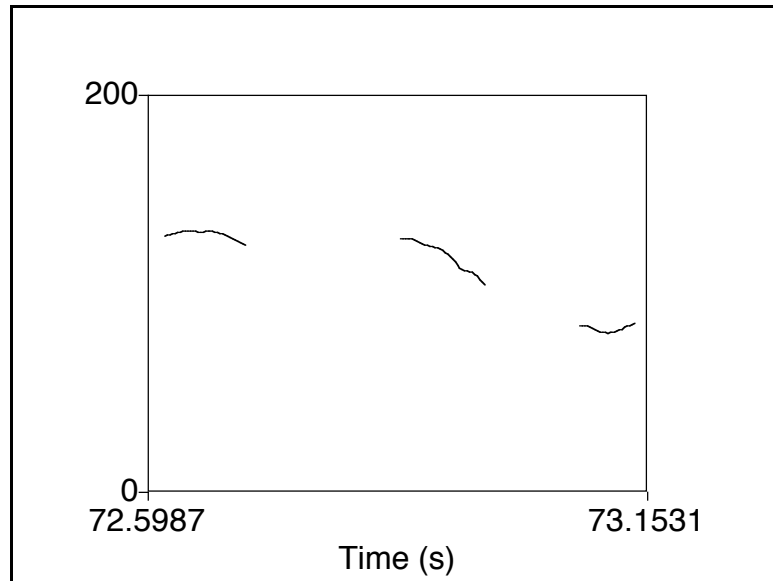


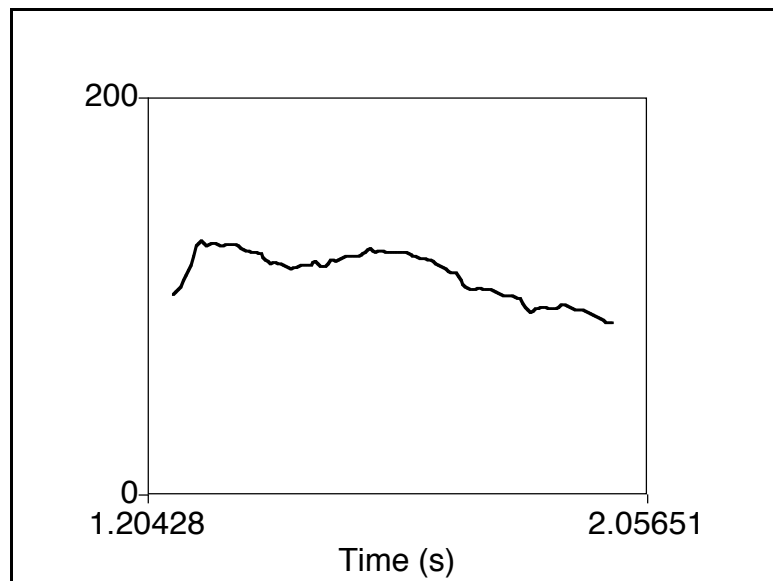
Figure 1. *Máwo* 'xxxx'

Figure 1. à-pè=pe ‘(her) roots’



(99) $\begin{array}{c} a \quad pe \quad pe \\ \swarrow \quad \swarrow \quad | \\ HL \quad HL \quad (L) \end{array} \rightarrow \begin{array}{c} a \quad pe \quad pe \\ | \quad \swarrow \quad | \\ H \quad HL \quad L \end{array}$

Figure xx. bàme-ni=ne ‘our village’



pá=ing a / pà=ing a

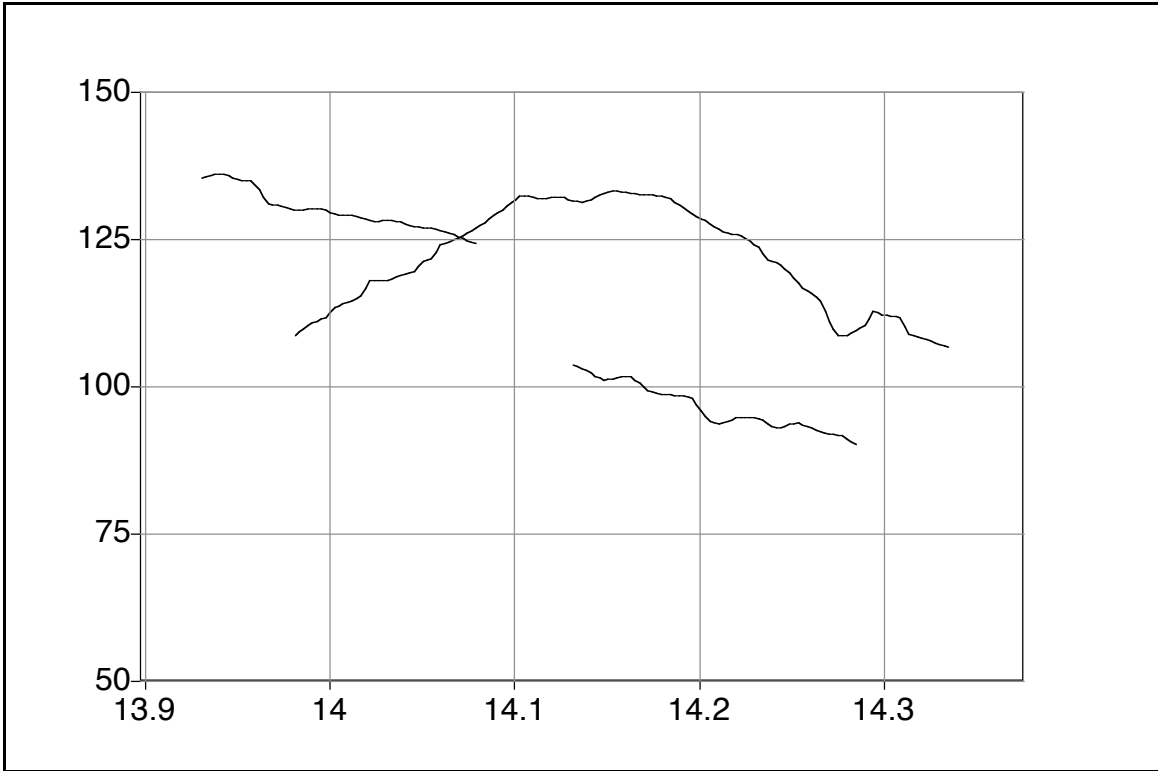
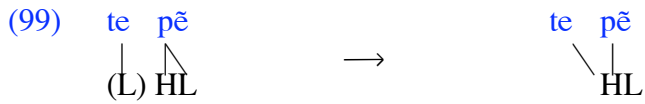
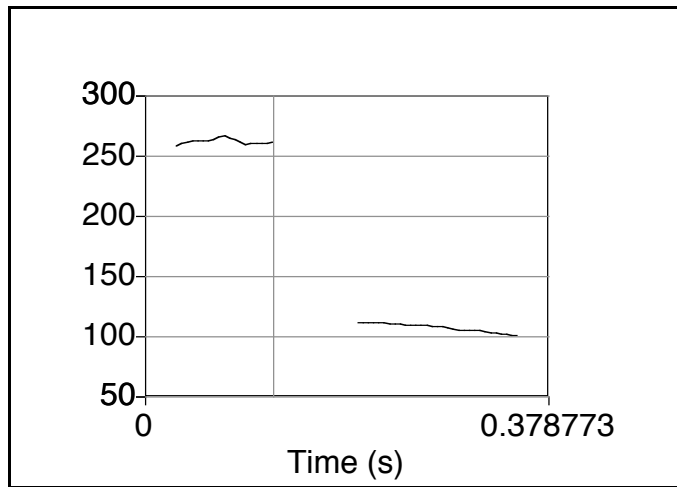


Figure ss. *te=pèng* 'they (went) outside'



Comparing these three F_0 tracings together xxxxx, the following points are most relevant to an understanding of the differences between them, from an acoustic point of view: xxxxxxxx

Figure xx. Pà 'cult house' vs. pá 'house'

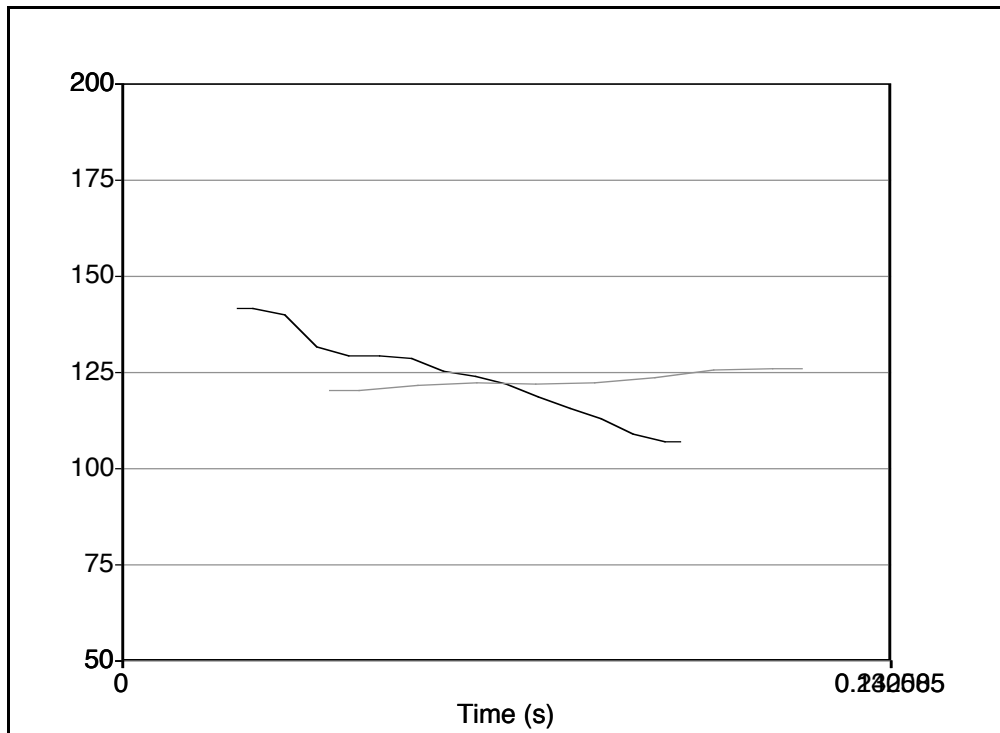


Figure 1. *pa=ing a* 'the water', *pá=ing a* 'the house', *pà=ing a* 'the cult house'

