The Duration Ratios of Short and Long Segments in Mele and their Linguistic Functions

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Abstract

This paper aims to clarify the duration ratios (DR) of short and long segments in Mele [mxe], one of the Polynesian Outliers spoken in Vanuatu. Data collection was conducted in Mele village. Not only short and long vowels, but also short and long consonants perform to show grammatical distinctions, in addition to semantic contrasts. The DR of vowels in Mele was found to be 1.125. That value is compared with the DR of six non-Polynesian languages.

Two other field studies were held on Tuvaluan and Hawaiian, and linguistic functions of these languages are compared with those of Mele, such as singular and plural differences and intransitive and transitive differences. The ultimate goal of this research is to construct the typological relations between the linguistic functions and segmental durations of Polynesian outliers.

The Conference On Oceanic Linguistics (COOL) is a one week conference held every two to three years. Only one session runs at a time, so people can attend all the presentations. Participants look forward to these times of focused interaction and renewed friendships. July 10–15, 2017, the 10th Conference On Oceanic Linguistics (COOL10), Honiara, Solomon Islands, was co-sponsored by the Solomon Islands National Museum, led by Tony Heorake, Museum Director, and the Solomon Islands Translation Advisory Group (SITAG), led by Karen Ashley, as Conference Coordinator. COOL10 papers are published as a mini-series in SIL LCDD, issue numbers 41–50, as Proceedings of the conference. The co-editors of these issues also have connections to SITAG: Brenda Boerger, as a former member, and Paul Unger, as a current member.
Contents

Abstract
Contents
1 Introduction
2 Procedure
  2.1 Participants
  2.2 Measurement
3 Functions of Mele segmental duration
  3.1 Data
    3.1.1 Semantic group
    3.1.2 Grammatical group
  3.2 Research questions
4 Results and discussion
5 Further research
References
1 Introduction

The purpose of this paper is to clarify the duration ratios of short and long segments in Mele [mxe], one of the Polynesian Outliers spoken in Vanuatu. Data collection was conducted in Mele village near Port Villa and the result will be reported.

The value of duration ratio (hereafter DR) can be gained through the calculation of dividing the average duration of long segments by that of short segments. For example, Lehiste (1970:46) mentions that the ratio between short and long vowels in Estonian is 58.1%. In this case the DR is 1.72 (1 ÷ 0.581 = 1.72). Sato (2004) found the DR of short and long vowels in Japanese to be 2.66. Furthermore, Sato (2010a) presents the DRs of six other languages, and compares them with each other. The values of DRs differ from language to language, and the order of DRs was found out, which will be shown and compared with this Mele result in Section 4. Further investigations have been conducted on other Austronesian languages, because the number of Austronesian languages which contain short and long segments turned out to be the largest among the world’s language families in corpus-based examinations by Sato (2016).

The main reasons for these investigations are as follows: First, accurate measurements based on acoustic analyses can provide better pedagogical suggestions in differentiating the semantic contrasts produced by duration differences for the learners of a target language. Second, the acoustic information gained through this kind of measurement can be useful for better speech synthesis of the language. In addition, by examining languages relatively less investigated before, a good description based upon acoustic and objective observations can be obtained, resulting in new preservation of linguistically unknown or less investigated languages.

The experimental procedure will be shown in the next section. Section 3 will introduce the examples of short and long segmental contrasts in Mele, then, follow with conclusions in section 4. Finally, remarks on further investigation will be given in section 5.

2 Procedure

The participants and method on measurement will be introduced in the following subsections.

2.1 Participants

The test tokens had been randomly written on a sheet of paper, and they were presented to the following six native speakers, three males (M) and three females (F), of Mele village:

MK (M, 73), KM (M, 55), TA (M, 52), TM (F, 70), AT (F, 63), TS (F, 76)

The average age is 64.8 years old. The reason why these relatively old participants were chosen is that they can understand words which had been collected in Clark’s dictionary for the period of 1974 to 1986 (Clark 1998:vii).

They were individually asked to pronounce the tokens one by one, with five repetitions of the whole list. In this way, 1380 tokens (46 x 6 x 5 = 1380) were recorded using a Sony M10 linear PCM recorder.

2.2 Measurement

The duration of vowels or consonants in the tokens were measured by using waveform and wide-band spectrogram produced by the speech analysis program called Praat.¹ Both first and

¹ See http://www.fon.hum.uva.nl/praat/
second vowels were measured in the pairs, *popo/popoː, susu/suːsuː, jila/jiləː, and siva/siːvaː.* In measuring plosives, the voice onset time was calculated, that is, the interval between the burst and the onset of the following vowel. In the case of double bursts, the first burst was chosen for the measurement.

3 Functions of Mele segmental duration

While searching for the DRs of more and more languages, more functions performed by short and long segmental oppositions were discovered, in addition to the semantic oppositions. For example, Lynch and Piau (1989:36) describe the “extremely crucial” functional contrast between short and long [o] in Aroma (PNG). The long vowel in (1b) indicates the negative imperative form.

(1) a. *ponoðao* ‘go!’ (Lynch and Piau 1989)
   b. *poːnoðao* ‘don’t go!’

Other instances of grammatical functions were indicated in previous works by Sato. Singular and plural relations are denoted in Hawaiian, Tuvaluan, and Kiribati, respectively, in (2):

(2) a. *wahine* ‘woman’ / *waːhine* ‘women’ (Sato 2017:50)
   b. *tagata* ‘man’ / *tagata* ‘men’
   *ssulu* ‘dive’ (sg.) / *ssulu* ‘dive’ (pl.) (Sato 2018:4)

In Tuvaluan, a noun and its stative verb counterpart is represented by a difference in vowel duration, as in (3):

(3) a. *lafa* ‘ringworm’ / *lafaː* ‘have ringworm’
   b. *aka* ‘roots’ / *akaː* ‘be heavily rooted’
   c. *kaumana* ‘cloud’ / *kaumanaː* ‘be cloudy’ (Sato 2018:4)

3.1 Data

Mele is a rich language in its linguistic functions by the short and long segmental contrasts, that is, the duration oppositions of vowels and consonants. As Clark (1998) states, “the vowel length has a fairly high functional load.” The examples hereafter are quoted mainly from the Mele dictionaries compiled by Biggs (1975) and Clark (1998). These were carefully checked from cover to cover. Then, seven pairs containing short and long vowels and nine pairs with short and long consonants were chosen for the semantic group, and four pairs containing short and long vowels and three pairs with short and long consonants were selected for the grammatical group. In total, 23 pairs (46 words) were prepared as test tokens.

3.1.1 Semantic group

In some instances, contrasts of short and long vowels and short and long consonants change the meanings of words. They are referred to as semantic contrasts in this paper.

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2 Long vowels are represented with a length mark [:] and long consonants are marked by geminate representation such as [ss].
3.1.1.1 Vowels

(4) a. sisi ‘snail’ / sisi ‘cut coconut’
   b. lekina ‘have’ / lekina ‘clear away’
   c. fefe ‘read’ / fefe ‘fan’
   d. mara ‘garden’ / mara: ‘eel’
   e. tu ‘we’ / tu ‘stay’
   f. popo ‘heart’ / popo: ‘sit on egg’
   g. susu ‘breast’ / susu: ‘dress’ (v)

3.1.1.2 Consonants

(5) a. mau ‘plenty of food’ / mmau ‘find’
   b. mara ‘garden’ / mmara ‘sour’
   c. namu ‘mosquito’ / nnamu ‘smell’ (v)
   d. pua ‘back’ / ppua ‘deep’
   e. tao ‘spear’ (n) / ttao ‘count’
   f. tua ‘outside’ / ttua ‘outermost part’
   g. sau ‘dew’ / ssau ‘blow’
   h. saːia ‘led by hand’ / ssaiə ‘hit’
   i. viːsia ‘lash’ / vviːsia ‘roll a rope’

3.1.2 Grammatical group

In addition to semantic contrast, Mele has grammatical oppositions. Examples such as (6a–d) and (7a–c) are called grammatical contrast in this paper.

3.1.2.1 Vowels

Mele vowels have phonological oppositions, which demonstrate grammatical contrast. See selected examples 6a–d:

(6) a. jila ‘steer’ / jiːlaː ‘steer a boat’
   b. siva ‘bounce’ (vi.) / siːvaː ‘bounce (vt.)
   c. soro ‘cut with a saw’ (v) / soːro ‘saw’ (n)
   d. jiːjika ‘hopping’ / jiːjika ‘hop’

As a comparison, Mongolian vowels also demonstrate grammatical contrast, as in (6e).

More examples are listed in Sato (2010b:28):

   e. asax ‘catch fire’ / asax ‘make something burn’

Intransitive / transitive contrast

First, Mele grammatical contrast is evident when short and long vowels show intransitive and transitive contrasts as in (6b).

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3 Clark (1998:ix, 37) cites a word, mara ‘breadfruit, tree’, and the word could have been used as a corresponding token to the word, mmara ‘sour’. However, mara was not familiar to the participants of this study, and so the word, mara ‘garden’ was selected.
siva ‘bounce’ (vi.) / sivaː ‘bounce (vt.)

Verbal action / instrument

Second, verbal action and its tool or instrument can be expressed by short and long vowels as in (6c).

soro ‘cut with a saw’ (v) / soro ‘saw’ (n)

Derivation of word form: verb / noun

Third, the derivation of a word such as a verb form to a noun form is another example of Mele vowel contrast, as in (6d):

jijika ‘hopping’ (n) / jijika ‘hop’ (v)

Sato (2011) has treated derivation by short and long vowel contrasts in Hindi, and the following examples (6f, g) are quoted here for comparison:

f. anuhaːr ‘imitate’ / anuhaːr ‘imitation’
g. sarbariː ‘equal’ / sarbariː ‘equality’

3.1.2.2 Consonants

Among Mele consonants a contrast of length is evident in fricatives (7a), nasals (7b), and oral stops (plosives) (7c). As demonstrated in short and long vowels in (6c), consonant length can affect verbal action / instrument, as illustrated by (7a) and (7b).

(7)  a. ffana ‘shoot with a bow’
    b. mmata ‘watch’
    c. fikkau ‘give orders’

Word pairs with associated meanings

Finally, Mele consonant contrast can denote a pair which can be associated with each other in the words’ meanings as in (8).

(8)  a. fikkau ‘give orders’ / fikkau ‘give orders’

Examples of word pairs with associated meanings were found in Hindi as well. Instances (8b, c) were quoted from Sato (2011:70):

b. tantiː ‘musician’
c. plavan ‘water’ / plavan ‘floating’
3.2 Research questions

In previous studies of Mele, no quantitative analysis seemed to be made on the segmental length differences between the short and long segments. This study aims to investigate the differences. The research questions of this study are the following two points:

- What is the DR of Mele short and long segments?
- How and where is the value compared and ranked in comparison with the DRs of other languages?

4 Results and discussion

The average duration ratios of vowel contrasts and consonant contrasts in Mele are as follows:

- Vowel contrast of semantic group = 1.2
- Vowel contrast of grammatical group = 1.05
- Consonant contrast of semantic group = 1.055
- Consonant contrast of grammatical group = 1.005

The average DR of vowels was found to be 1.125. This is compared to six other non-Polynesian languages selected from different language families (Sato 2010a) as below. In descending order of DR, these are:

Japanese 2.66 > Mongolian 2.27 > Kiribati 1.855 > Hindi 1.29 > Silozi 1.14 > **Mele 1.125**
> Miskito 1.0005

The DR of Mele is rather low; the second lowest, in fact. As for consonants, the average DR is 1.03. To compare this value with those of other languages, more data on consonantal oppositions are necessary in addition to those of Tuvaluan (Sato 2018), and should be investigated further. The average DR of vowels and consonants of all the tokens in Mele is 1.077.

Kozmin (2011), comparing vowel length of six Polynesian languages, assumes that Tongan retains Proto-Polynesian long vowels, and Hawaiian retains part of Proto-Polynesian long vowels; however, Rapa Nui loses long vowels. One interpretation of the DR of Mele is that Mele might be in the stage of losing the short and long segmental oppositions.

Another possibility is that other phonetic cues than duration may play a role such as pitch or intensity for Mele speakers to distinguish the contrasts. Sato (2012) posits that pitch-peaks on second syllables may play a role in distinguishing short vowels from long ones in the stressed first syllables in Miskito, the DR of which had been found to be 1.0005, the lowest of the seven languages above. Like Miskito, the segmental contrast is not so much a short-long duration opposition as a prominence with higher pitch and/or stronger intensity.

Further investigation will be needed to clarify the cause of this relatively low DR of Mele.

5 Further research

As stated in section 3, Austronesian languages are rich in their grammatical functions of segmental duration contrasts, such as: singular/plural, transitive/intransitive, and derivation of word formation. More research will be carried out on the relationship between grammatical functions and corresponding duration ratios of other Polynesian outliers than Mele. For instance, as an example of Polynesian outlier in Micronesia, singular/plural relations by short and long consonants are given in Lieber and Dikepa (1974:xviii) in the Kapingamarangi lexicon, such as /wele/ ‘burned’ (sg.) and /wwele/ ‘burned’ (pl.). Lynch (1998:51) cites 14
Polynesian outliers: Nukuoro and Kapingamarangi in Federated States of Micronesia; Nukuria, Nukumanu, and Takuu in Papua New Guinea; Luangiua, Sikaiana, Rennellese, Pileni, Tikopia-Anuta in Solomon Islands; Ifira-Mele, Emae, West Futuna in Vanuatu; and Fagauvea in New Caledonia. More about grammatical functions performed by segmental duration contrasts in these Polynesian outliers will be investigated, and attempts will be made to see if Micronesian or Melanesian languages influence the outliers.

The functions performed by segmental duration contrasts of Austronesian languages examined so far by the author can be summarized as follows:

- singular/plural: Hawaiian vowels, Tuvaluan vowels and consonants, Kiribati vowels
- intransitive/transitive: Mele vowels
- derivation: Mele vowels
- verbal action and its equipment: Mele vowels and consonants

The ultimate goal of this research is to find more grammatical functions of short and long segments in Austronesian languages, in addition to their semantic contrasts, and construct the typological relations between the functions and languages.
References


