Segmental Phonotactic Constraints of Vowels in Disyllabic Words of Tagabawa

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Abstract

This is a descriptive study which aims to identify the vowels that occur, and the segmental phonotactic constraints of vowels, in disyllabic words of Tagabawa language. Analysis is based on the responses elicited from   ten (10) Tagabawa native speakers, with ages 42-86 years old, at the Old Bulatukan, Makilala, Cotabato. During the interview, respondents have to provide the Tagabawa equivalents of one hundred (100) words based from Swadesh list written on flash cards, to determine the vowels and the segmental phonotactics of vowels in disyllabic words of Tagabawa. The analyses revealed that the vowel sounds in Tagabawa language: *a [a], é [e] or [ɛ], á [ə], i [i], ó [ɔ]*, and *u [u]* occur only in medial and final positions in disyllabic words. The vowel sound *[a]* occurred in *CVC/CV, CVC/CVC* and *CV/CVC* syllable patterns; the vowel sound *[ɛ]* in *CVC/CVC* and *CVC/CV* syllable patterns; the vowel sound *[e]* in *CV/CVC* and *CVC/CV* syllable patterns; the vowel sound *[ə]* in *CVC/CVC, CV/CVC* and *CVC/CV* syllable patterns; the vowel sound *[i]* in *CV/CVC* and *CVC/CVC* syllable patterns; the vowel sound *[ɔ]* in *CVC/CVC, CV/CVC* and *CVC/CV* syllable patterns; and the vowel sound *[u]* in *CV/CVC* and *CVC/CVC* syllable patterns. The study recommends other studies of Tagabawa language because of the need to help educational institutions to develop materials using local languages, help in the promotion of the local language, and to fill   the dearth of resources about the language.

Keywords: *Tagabawa, vowels, segmental phonotactic constraints*

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Introduction

Phonotactic constraints are defined as the restrictions on sound sequences of a language. It describes how speech segments are combined in a given language. These restrictions on the environments in which sounds appear are part of what defines the language's phonology (Goldrick, 2008).

These restrictions on sound sequences are encoded in terms of segments or grouped into syllable constituents in particular word positions (Coleman & Pierrehumbert, 1997). Syllables are important constructs in phonological system and can be derived from phonotactic patterns of word edges (Blevins, 2004). It was Duanmu (2009) who forwarded the idea that the "maximal syllable format in any language may be represented by CVX (which is either CVC or CVV)". The syllable is connected with segmental level. Hence, constraints are applied to consonants and vowels in a given language.

Sounds are classified into vowels and consonants and diphthongs, which are included in the vowel class. Vowels are those syllabic speech sounds that have a more resonant quality and are produced with less obstruction than that seen with the consonants or semi-vowels.

The basic parameters for describing vowels involve (i) the general position within the mouth where the vowel is articulated, (ii) the roundedness of the lips, and (iii) the general constriction of the musculature. Fery and de Vijver (2003) discussed that in higher prosodic level; both long vowels and closed syllables have a branching rhyme and differ in this respect from syllables with just a short vowel in their nuclei.

In the Philippines, Matsushita, Pelagio and Talavera (2013) studied the sound systems of Inivadoy and Ilokano through an acoustic phonetics approach. Their study showed the characteristics of vowels and some phonotactic constraints in Inivadoy and Ilokano languages.

The present study, however, focused more on the segmental phonotactic constraints of vowels in disyllabic words of Tagabawa. Tagabawa is an Austronesian language which belongs to the Manobo subfamily of Philippine languages (DuBois & DuBois, 2006). According to the study of DuBois and DuBois (2006) of Summer Institute of Linguistics (SIL), the phonemic inventory of Tagabawa consists of twenty-two (22) segmental phonemes; of which sixteen (16) are consonants and six (6) are vowels. These vowels are /a, e, ə, i, ɔ, o/. Dubois and Dubois also asserted that Tagabawa has four syllable

patterns, the CV, CVC, CCV, and CCVC. The CCV and CCVC syllable patterns occur only in borrowed words.

Aside from the data gathered by the Summer Institute of Linguistics (SIL) from the studies of DuBois and DuBois (2006) and Brainard (1990), there are no further studies made by other researchers or native speakers that describe the segmental phonotactic constraints of Tagabawa specifically in its vowels. Also, the data gathered by DuBois and DuBois (2006) in their study entitled "Phonemic Statement of Tagabawa" were collected throughout the years of 1987 and 1988 in Sitio Lambac, Malasila, Makilala, North Cotabato, over thirty years ago.

One of the motivations of the researchers is, therefore, to ascertain whether or not changes have occurred in the phonotactic constraints of Tagabawa vowels specifically in disyllabic words that can greatly affect the language and the future users of the language. Conducting this study which determined the phonotactic constraints of Tagabawa is deemed necessary for native and non-native speakers to understand and define the phonology and the way Tagabawas use words in their language, which is beneficial to the development of instructional materials intended for their implementation of Mother-Tongue Based Education. Learning the phonotactic constraints of Tagabawa would also allow individuals to know the possible sequences of sounds leading to better understanding of the Tagabawa phonology at the syllable level and to learn the language easily. Particularly, this study sought to answer the following questions:

1. What vowel sounds occur in Tagabawa language?
2. With the phonotactic pattern CVX, what are the segmental phonotactic constraints of vowels in disyllabic words of Tagabawa?

Theoretical Framework

This study is anchored on Hayes' (2009) anatomy of vowels. Vowel sounds include three (3) modifications; rounding, height and backness. Rounding is characterized by the rounding of the lips, thus narrowing the passage at the exit. The phonemes [u], [ʊ], [o] are considered as round vowels. Another modification one can make to the shape of the vocal tract is to make the passage through the mouth wider or narrower. Widening is accomplished by opening the jaw and/or

lowering the body of the tongue towards the bottom of the mouth. Narrowing is accomplished by raising the jaw and/or raising the body of the tongue. The third primary way of changing the vocal tract shape is to place the body of the tongue towards the front part of the mouth or towards the back. These vowels are called front and back vowels, respectively; and vowels that are neither front nor back are called central.

Another theory that will be used in this study is the CVX theory of syllable structure (Duanmu, 2009). This theory proposed that in all languages the maximal syllable size is CVX, which can be CVV, such as [hau] how, and [bi:] bee, or CVC, such as [bɛt] bet. The CVX theory recognizes cross-linguistic variations in the maximal size of a monosyllabic word. In the CVX theory, the only restriction on syllable size is that it does not exceed CVX. Tagabawa has CV, CVC, CCV, and CCVC syllable patterns. Any extra consonants at word edges are either accounted for by morphology or can be treated as complex sounds. The researchers, at this level of analysis, would hence like to limit the study to words that follow the CVX syllable pattern to highlight the phonotactic constraints of vowel sounds.

Methodology

This study used the descriptive method to identify, analyze, and describe the segmental phonotactic constraints of vowels in disyllabic words of Tagabawa. Analyses were based on the elicited utterances of the selected participants, who were native speakers of Tagabawa; hence this study does not need any statistical treatment to validate the results. The researchers only described the segmental restrictions applied in vowels in disyllabic words of Tagabawa. One of the classifications of sounds falls under the segmental level (Ramelan in Prihati, 2011). Segmental refers to sound units arranged in a sequential order.

The researchers selected ten native speakers of Tagabawa as respondents of the study. They are currently residing in Old Bulatukan Makilala, North Cotabato and their ages range from 42-86 years old. These speakers are pure-blooded Tagabawas who stayed in the community for a long time and were considered fluent in Tagabawa language. These speakers were recommended by the residents within the community to be the respondents of this study.

Thus, the respondents' age, years of residency, expertise, and the credibility were considered in the process of selecting the respondents.

The researchers adopted some words given in the study of DuBois and DuBois (2006) entitled "Phonemic Statements of Tagabawa". The researchers chose twenty-four (24) examples of disyllabic words, particularly nouns. The researchers also utilized the Tagabawa dictionary and got 30 disyllabic words used in the study. During the conduct of the study, some disyllabic words were also naturally uttered by the participants, which the   researchers also recorded in order to obtain forty-six (46) more disyllabic words. Overall, the researchers were able to elicit from the native speakers   one hundred (100) Tagabawa disyllabic words.   The researchers utilized flashcards (containing the word from Swadesh list and the picture representing the word), and simply allowed the speakers to provide the equivalent Tagabawa words of the pictures in the flashcards.

Results and Discussion

Vowel Sounds that Occur in Tagabawa Language

Table 1. Vowels that Occured in Tagabawa Language in Old Bulatukan, Makilala, North Cotabato

Vowel	Anatomy of Vowels			Tagabawa Words
	Roundedness	Height	Backness	
a	unrounded	open	central	awak bakbak palad
é	unrounded	open- mid	front	léppa baskét
	unrounded	close- mid	front	délák sanglé
á	unrounded	open-mid	central	bállád atáp áppuy
i	unrounded	close	front	ikam dalid igas
ó	rounded	open- mid	back	bókkóg santól móllót rákkó

u				babuy
	rounded	close	back	gusuk
				uwak
				umpak

The disyllabic words in the phonotactic pattern *CVX* used in this study revealed that the vowels present in Tagabawa are: *a [a], é [e]* or *[ɛ], á [ə], i [i], ó [ɔ],* and *u [u].* Contrary to what Blust (1998) cited that almost all Austronesian specialists admit just four (4) Proto-Austronesian vowels namely /a/, /ə/, /i/ and /u/, Tagabawa language, a language which belongs to the Austronesian family of languages, has six (6) vowels.

This agrees in large part with the study of DuBois and DuBois (2006), which claimed that Tagabawa has six vowel sounds namely *[a], é [e]* or *[ɛ], á [ə], i [i], ó [ɔ],* and *u [o].* However, in the /u/ vowel sound, DuBois and DuBois (2006) transcribed it as [o] not as [**u**], yet the present study found out that **u** is transcribed and pronounced as [u] not [o]. The alternation of [o] and [u] in the transcription of DuBois and DuBois (2006) and the result of this study is related to Filipino language where there is an alternation between [o] and [u]. The vowel sound [o] changes obligatory to [u] regardless of the context when the suffix –an- is added (Harrington, 2009).

This is also related to the study of Matsushita, Pelagio and Talavera (2013) entitled *The Sound System of Inivadoy and Ilokano: An Acoustic Phonetic Approach* which proposed /o/ and /u/ to be merged and recognized as one sound in Inivadoy and Ilokano languages. The present study also found out that some respondents uttered /ɔ/ and /u/ interchangeably as in *['lɔkɔs]* (squid) and *['lukus].* This result is similar to the study of Cohn (1994) which revealed that there is a phonological alternation between /ɔ/ and /u/ in Madurese language, which is also an Austronesian language like Tagabawa language. Also, in Filipino, /o/ tends to become /ɔ/ in stressed positions, which might have confused Dubois and Dubois when they were making the vowel inventory of the language.

In this study, the vowel sound */a/* is characterized as an unrounded open central vowel as in *['palad̚]* (palm of the hand). This agrees with the study of DuBois and DuBois (2006), which claimed that the vowel sound */a/* is characterized as a voiced low open central unrounded vowel. Hence, the vowel sound */a/* is pronounced like the vowel sound in the English word *father.*

Among the disyllabic words in CVX pattern given in this study, there are only few words with *[ɛ]* or *[e]* vowel sound. Tagabawa has more

110

words with /ə/ and /i/ vowel sounds compared to [ɛ] or [e]. Tagabawa vowel /e/ has two allophones. The unrounded open-mid front vowel allophone [ɛ], which occurs only in syllables closed by voiceless stops, [p], [t] and [k], as seen in the word ['baskɛt] (basket) and ['kɛppa] (dry branch of coconut), and the unrounded close-mid front vowel allophone [e] occurs elsewhere as in ['delək] (small) and [saŋle] (salt). This agrees with the study of DuBois and DuBois (2006) which claimed that the Tagabawa vowel /e/ has two allophones, [ɛ] and [e]. The unrounded open-mid front vowel allophone [ɛ] occurs only in syllables closed by voiceless stops, [p], [t], [k], or [ʔ] and the unrounded close-mid front vowel allophone [e] occurs elsewhere.

The present study also revealed that the vowel sound /ə/ is characterized as an unrounded open-mid central vowel as in [ʔəssəm] (pomelo). The characteristics of Tagabawa /ə/ revealed in this study and the study of DuBois and DuBois (2006) are related to the result of the study of Matsushita, Pelagio and Talavera (2013) about the Inivadoy and Ilokano languages wherein the schwa /ə/ of Inivadoy may be relatively characterized as a mid-central vowel and the Ilokano schwa is also positioned in mid-central. Inivadoy and Ilokano are both Austronesian languages like the Tagabawa language.

The vowel sound /i/ is characterized as a voiced high close front unrounded vowel as shown in the word [bi'big] (lips). This agrees with the study of Dubois and Dubois (2006) as they also described /i/ as an unrounded close front vowel. The vowel sound /ɔ/ is a rounded open-mid back vowel as in the word ['bɔk˺kɔg˺] (one's back) which corresponds with the result of the study of DuBois and DuBois (2006).

The present study revealed that /u/ is characterized as a rounded close back vowel. This does not agree with DuBois and DuBois (2006) which claimed that /u/ is a rounded mid-close back vowel and is transcribed as [o]. From the utterances of the native speakers, the researchers found out that **u** is transcribed as [u] not as [o]. To clarify the phonetic inventory of the Tagabawa vowels is, hence, an important contribution of this study.

Segmental Phonotactic Constraints of Vowels in Disyllabic Words of Tagabawa

Table 2. Segmental Phonotactic Constraints of Vowels in Disyllabic Words of Tagabawa in Old Bulatukan, Makilala, North Cotabato
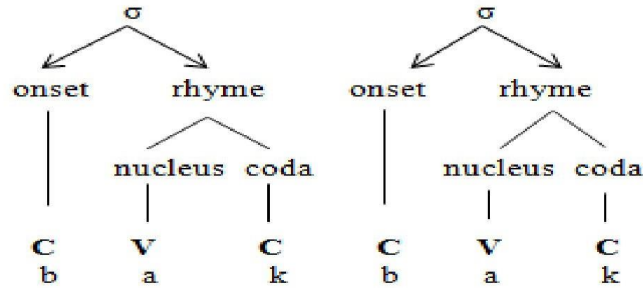
Vowels	Surface Form	Tagabawa Word	Transcription by DuBois and DuBois (2006)	Actual Utterances	Phonotactic Constraints
a	[a]	kagpa	[ˈkagˀpa]	[ˈkagˀpa]	CVC/CV
		awak	[ˈʔawakˀ]	[ˈʔawakˀ]	CV/CVC
		palad	[ˈpaladˀ]	[ˈpaladˀ]	CV/CVC
		batad	[baˈtadˀ]	[baˈtadˀ]	CV/CVC
		bakbak	[ˈbakˀbakˀ]	[ˈbakˀbakˀ]	CVC/CVC
é	[ɛ]	léppa	[ˈlɛppa]	[ˈlɛppa]	CVC/CV
		baskét	[ˈbaskɛt]	[ˈbaskɛt]	CVC/CVC
	[e]	délák	[ˈdelək]	[ˈdelək]	CV/CVC
		sangle	-	[saŋle]	CVC/CV
á	[ə]	gátták	[ˈgətˀtəkˀ]	[ˈgətˀtəkˀ]	CVC/CVC
		áppuy	[ʔəpˀˀpoj]	[ʔəpˀˀpuj]	CVC/CVC
		ipás	[ˈʔipəs]	[ˈʔipəs]	CV/CVC
		rákkó	-	[ˈrəkkə]	CVC/CV
i	[i]	simud	-	[ˈsimud]	CV/CVC
		piyak	-	[ˈpijak]	CV/CVC
		pitsay	[ˈpitsay]	[ˈpitsay]	CVC/CVC
ó	[ɔ]	bókkóg	[ˈbɔkˀkɔgˀ]	[ˈbɔkˀkɔgˀ]	CVC/CVC
		móllót	-	[ˈmɔlˀlɔt]	CVC/CVC
		lókkóy	-	[ˈlɔkˀkɔj]	CVC/CVC
		lópak	-	[ˈlɔpak]	CV/CVC
		rákkó		[ˈrəkkə]	CVC/CV
u	[u]	bubun	[ˈbobon]	[ˈbubun]	CV/CVC
		gusuk	[ˈgosok]	[ˈgusuk]	CV/CVC
		uwak	[ʔoˈwak]	[ʔuˈwak]	CV/CVC
		butbut	[ˈbotbot]	[ˈbutbut]	CVC/CVC

Note: *The transcription of words under DuBois and DuBois (2006) with a (-) sign indicates that these words are not from the study and DuBois and DuBois (2006) but are new words discovered during the conduct of the study.*

This study revealed that Tagabawa vowel sounds have their different limitations in their arrangement in a syllable. The vowel sound /a/ can occur in both the first and second syllables of disyllabic words, and either syllable can have the form CV or CVC, as in the words *[ʔawakˈ]* (waist) and *[ˈkagˈpa]* (chest) illustrated below.
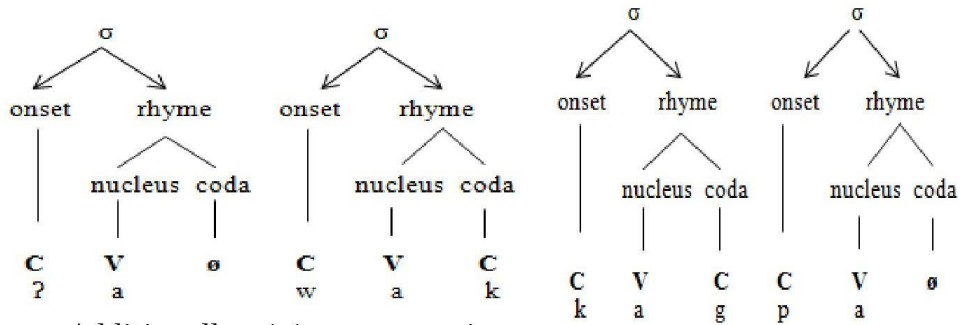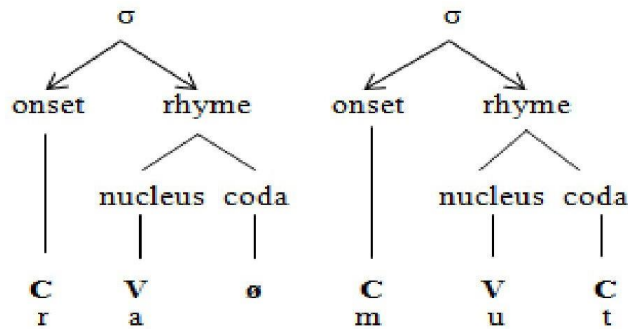

Additionally, */a/* may occur in only one syllable, with another vowel sound in the adjacent syllable as in the words *[ʔatəpˈ]* (roof), *[ʔaˈtin]* (if), *[raˈmut]* (lower part of the tree), *[ˈbaskɛt]* (basket) and *[ʔikam]* (mat). Therefore, /a/ in syllable pattern can be in *CVC/CV* syllable pattern as in *[ˈkagˈpa]* (chest), *CVC/CVC* as in *[ˈbakˈbakˈ]* (frog), and *CV/CVC* as in *[ˈbasal]* (squash) illustrated below.
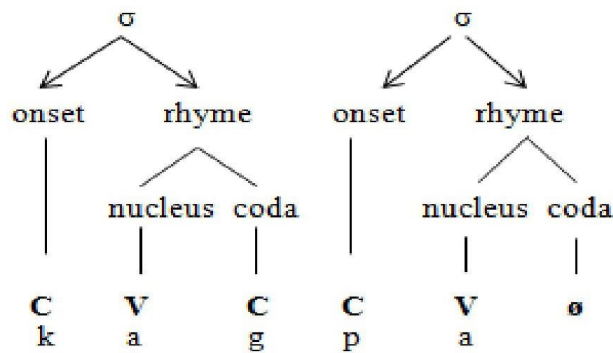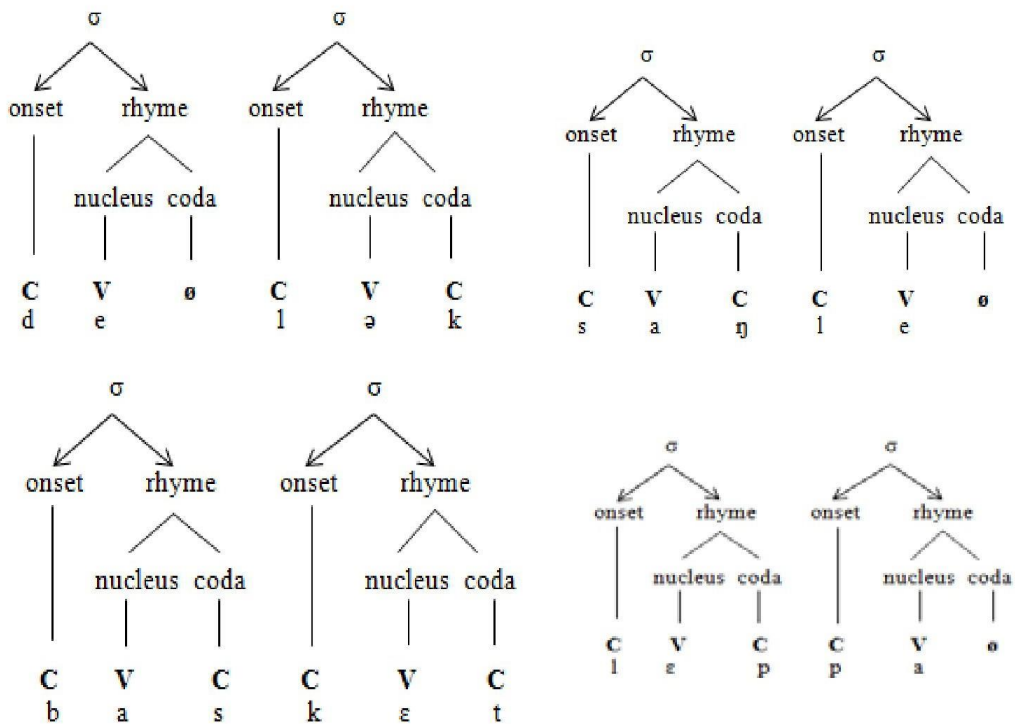
With /e/ vowel sound, the allophones [e] can be in a CV/CVC as in ['delək] (small) and in *CVC/CV* as in [saŋle] (salt), while the allophone [ɛ] can be in *CVC/CVC* as in ['baskɛt] (basket) and *CVC/CV* syllable pattern as in ['lɛppa] (dry branch of a coconut) shown below.

The words used in this study also suggest that the vowel sound *[ə]* only occurs in closed syllable like in the word *['pusəd]* (umbilical cord) and *['gət'tək˺]* (stomach), never in an open syllable. Furthermore, *[ə]* is never followed by *[ʔ]*, and never preceded or followed by *[h]*, *[w]* or *[j]*. These results agree with the findings of DuBois and DuBois (2006), which claimed that /ə/ vowel sound only occurs in closed syllables *(CVC)* and never occurs adjacent to (either preceding or following, i.e in the same syllable with) the phonemes /h/, /w/ and /j/. The vowel sound /ə/ does not occur at the beginning of the syllable; the glottal stop *[ʔ]* does. The vowel sound /ə/ can also occur in the first or second syllable and can follow or precede a syllable with another vowel as in *[bət'˺'tuk]* (face), *['ŋipən]* (teeth), *['rəkkɔ]* (temporary shelter), *[bəg'˺'gas]* (rice) and *['delək]* (small). In disyllabic words, the /ə/ vowel sound can occur in the first or second syllable as in *[ʔəssəm]* (pomelo) and *['gət'tək˺]* (stomach). The given examples above using /ə/ vowel sound show that words with /ə/ vowel sound can be in *CVC/CVC* syllable pattern as in *['gət'tək˺]* (stomach), *CVC/CV* as in *['rəkkɔ]* (temporary shelter), and *CV/CVC* syllable pattern as in *['bukəd]* (forehead) (refer to the syllable structure below).
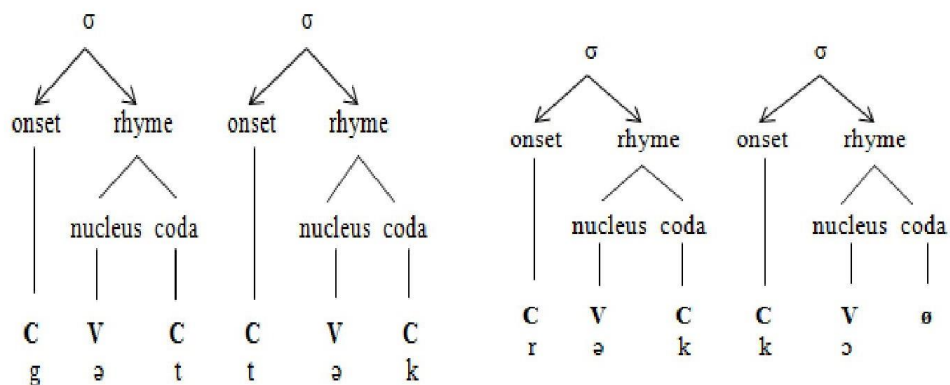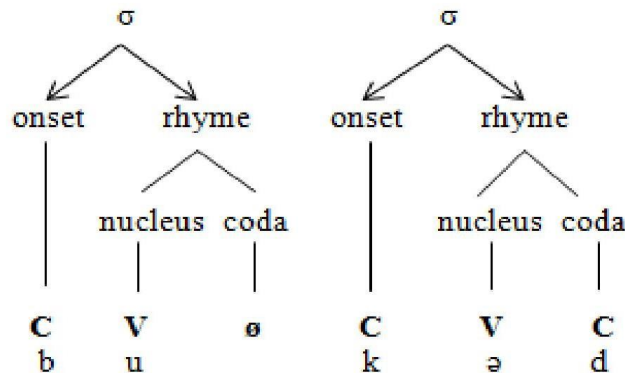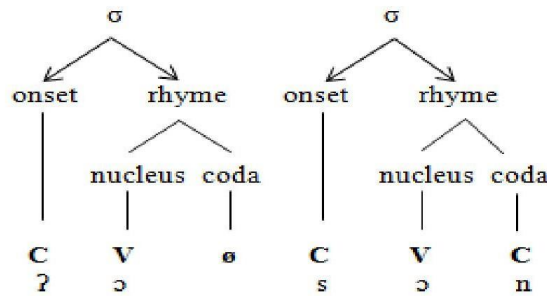
This study also revealed that the vowel sound /i/ can also occur in the first or second syllable of the word as in *['pitsaj]* (petchay) and *[ʔəndin]* (what). The vowel sound /i/ can occur with other vowels located whether in the first or second syllable as in *['pijak]* (chick), *['simud]* (upper lip), *['ŋipən]* (teeth), except /ɔ/ and /ɛ/ or /e/ vowel sounds. Accordingly, in the given disyllabic words used in this study the /i/ vowel sound can occur in *CV/CVC* as in *['pijak]* (chick) and in *CVC/CVC* as in *['pitsaj]* (petchay) illustrated below.
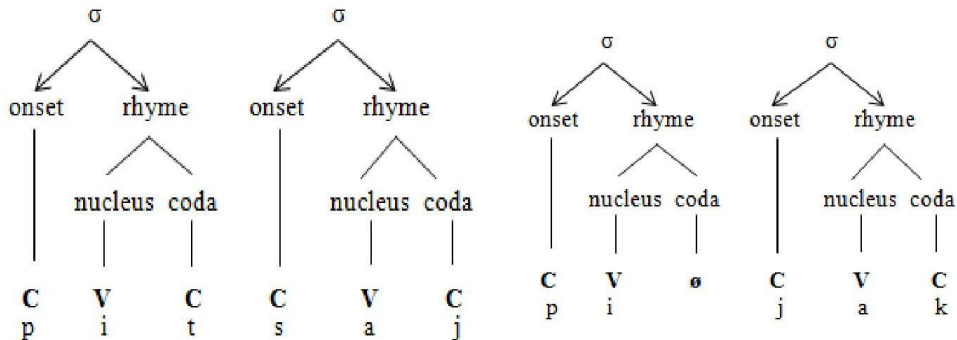

Like the other vowel initial words, the vowel sound /ɔ/ can occur after the *[ʔ]* as in *[ʔɔsɔn]* (to be mad or angry) and is still considered as *CV/CVC* as illustrated below.

The vowel sound /ɔ/ can also be found in the first or second syllable in a disyllabic word with *CVC* pattern as in *['mɔl'lɔt]* (part of the roof) and *['bk'kɔj]* (branch of a coconut tree). It occurs in a closed syllable as in *[santɔl]* (santol), and in an open syllable as in *['lɔpak]*. It can be combined with other vowels whether in the first or second syllable as in *['lɔpak]* (dry branch of coconut tree) and *[santɔl]* (santol). However, it cannot be combined with /u/ on the first or second syllable, rather it requires the same vowel sound in both syllables as in *['mɔl'lɔt]* (part of the roof), *['bɔk'kɔg]* (one's back) and *['lɔkkɔj]* (branch of a coconut tree). It occurs in syllable pattern *CVC/CVC* as in *['mɔl'lɔt]* (part of the roof), *CV/CVC* as in *['lɔpak]* (dry branch of coconut tree), and *CVC/CV* as in *['rɔkkɔ]* (temporary shelter) shown below.
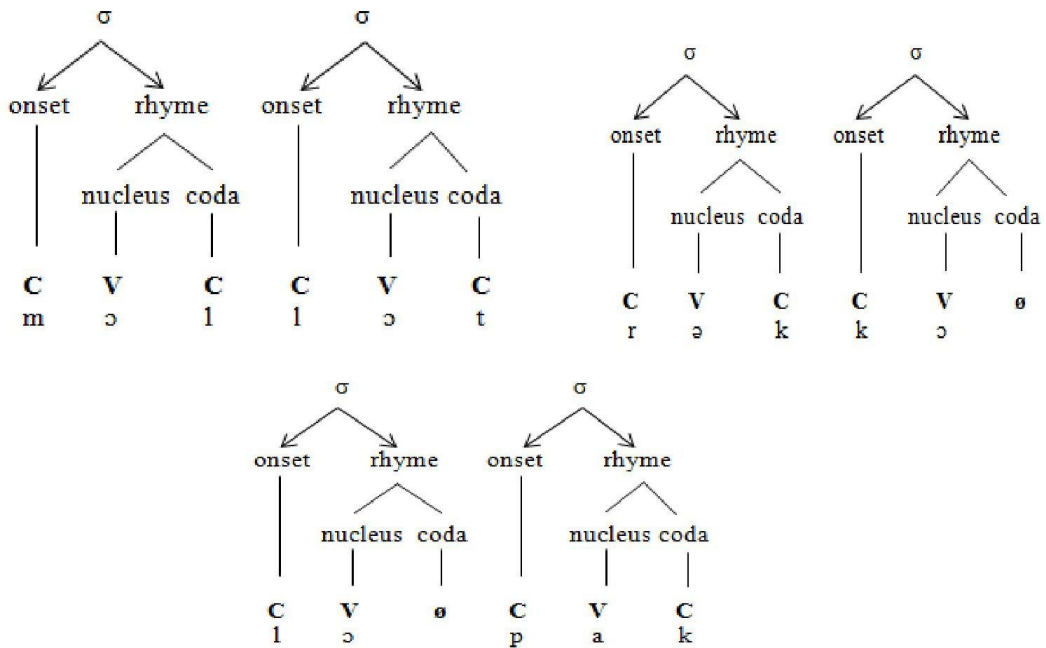
Lastly, the vowel sound /u/ is very frequent in the disyllabic words used in this study. It can also appear as the nucleus of a *CVC* syllable pattern within the first or second syllable as in *[tarum]* (papaya) and *['tullan]* (bone). The vowel sound /u/ can be combined with another vowel sounds on the first or second syllable as in *['tuŋjab]* (pineapple), *['bukəd]* (forehead), and *['luwit]* (skin) except the vowel sound /ɔ/. It means the vowel sound /u/ cannot be combined with the vowel sound /ɔ/ as in *['bubun]* (one's thigh), *['gusuk]* (ribs), *['kukug]* (temporary shelter) and *['dugsun]* (milk from animals/human) given that /ɔ/ cannot also be combined with /u/. Thus, it can appear in syllable pattern *CVC/CVC* as in *['tullan]* (bone) and *['təbbuʔ]* (sugarcane), and *CV/CVC* as in *[tarum]* (papaya).
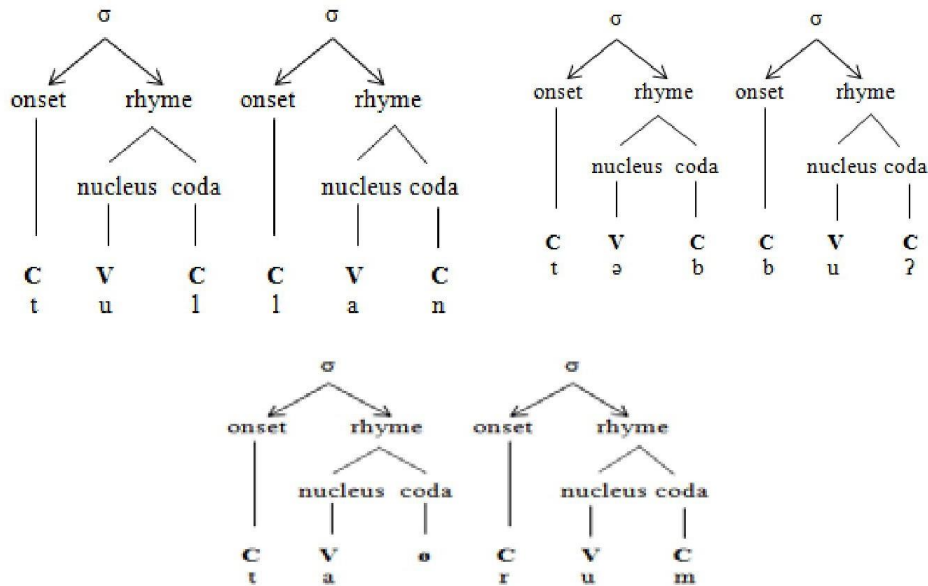
The presence of glottal stop is evident in the words used in this study. The study of DuBois and DuBois (2006) claimed that vowel initial words usually have initial glottal stops as shown in the words *[ʔawakˀ]* (one's waist) and *[ʔipəs]* (cockroach). The glottal stop is generally characterized by a voiceless and momentary closure of the air stream in the glottis (Talavera et.al, 2013). The glottal stop is considered as a consonant in Tagabawa yet is not written when it occurs initially in a word, that is *awak* is transcribed as *[ʔawakˀ]* (one's waist). The syllable pattern is *CV/CVC* not *V/CVC*.

Conclusions and Recommendations

It can be concluded from the findings that Tagabawa language has six (6) vowel sounds and is not a vowel sound-initial language. In addition, the most frequent syllable patterns of vowels in disyllabic words of Tagabawa are CV/CVC and CVC/CVC. The least frequent syllable pattern is CVC/CV. Future researchers could examine other features of Tagabawa vowel sounds when they appear in the initial or final position of the word, in order to come up with materials for more comprehensive discussion and appreciation for the language. The researchers also strongly recommend further studies of local languages to fully understand the restrictions on sound sequences, or even phrasal structures, of the language that can guide in the learning and teaching of the language, and help promote local languages.

References

Blevins, J. (2004) *Syllable Typology*. Retrieved from https://goo.gl/LYXMDq. 28 Aug. 2015

Blust, R. (1998). *The Austronesian Languages*. (2nd Ed.). Australian National University.

Brainard, S. and DuBois, L. (1990). *Some Functions of Direct Quotes in Tagabawa Narrative Discourse*. Studies in Philippine Linguistics. 8(1). 77-90. Retrieved from http://www.sil.org/asia/philippines/. ISBN 971-1059-15-0. 19 Aug. 2015

Cairns, C.E and Raimy E. (2011). *Handbook of the Syllable. Brill's Handbook in Linguistics*. Boston. IDC Publishers. Retrieved from http://www.northeastern edu/berentlab/wp-content/uploads/2012/11/Berent-syllable-handbook.pdf. ISBN 978-90-04-18740-5 28 Aug. 2015

Chen, C.M. (2009). *Phonetic Structures of Paiwan*.

Cohn, A. & Lockwood. K. (1994) *A Phonetic Description of Madurese and its Phonological Implications*. Working Papers of the Cornell Phonetics Laboratory, 9, pg. 67-92.

Coleman, J. & Pierrehumbert, J. (1997). *'Stochastic Phonological Grammars and Acceptability', in Computational Phonology. Third Meeting of the ACL Special Interest Group in Computational Phonology*, Association for Computational Linguistics, Somerset, NJ.

Cox, F. and Harrington J. (2009) *Phonotactic Constraints: Syllable Onset, Coda and Rhyme*. Macquarie University. Retrieved from http//clas.mq.edu.au/phonetics/ phonology. 27 Aug. 2015

Duanmu, S. (2009). *The CVX Theory of Syllable Structure*. Retrieved from http://www-personal.umich.edu/~duanmu/CUNY-CVX-2010Oct.pdf. 24 Aug. 2015

DuBois, C. & DuBois, L. (2006). *Phonemic Statements of Tagabawa.* Summer Institute of Linguistics

DuBois, C., DuBois, L. and Lambac, P. (1998) *People Conversing with Each Other in the Tagabawa Language.* Summer Institute of Linguistics, Inc.

Fery, C. and de Vijver, R. V. (2003). *The Syllable in Optimality Theory.* Germany. Cambridge University Press

Goldrick, M. (2008). *Phonological Features and Phonotactic Constraints in Speech Production.* Retrieved from http://faculty.wcas.northwestern.edu/matt-goldrick/featurephono.pdf 23 Aug. 2015

Gregova, R. (2011). The CVX Heory of Syllable: A Single-Slot Analysis of The Initial Consonant Clusters in English and in Slovak. Philology and Cultural Studies 4(1), 205-212. 24 Aug. 2015

Handbook of the International Phonetic Association (1999). Cambridge University Press. Retrieved from https://goo.gl/LYXMDq. 24 Nov. 2015

Harrington, J. (2009). *Generative Phonology.* Australia. Macquarie University Press. Retrieved from http://clas.mq.edu.au/speech/phonetics/phonology/generative/. 29 Aug. 2015

Hayes, B. (2009). *Introductory Phonology.* Wiley-Blackwell

Jones, D. (1914) *The Pronunciation of English.* London. Cambridge University Press. Retrieved from https://goo.gl/jlqNFR. 23 Jan. 2016

Lapayag, J. & Mata, D. (2013) *Phonological Constraints in Monosyllabic Words of Children with Special Needs*

Larsen, D. n.d. *Phonotactics.* Retrieved from http://people.umass.edu/scable/LING201-SP13/Slides-Handouts/Syllables-Phonotactics.pdf. 22 Aug. 2015

Laver, J. (1994). *Principles of Phonetics*. Cambridge University Press. Retrieved from https://goo.gl/UldEFQ. ISBN: 9780521456555. 28 Aug. 2015

Lodge, K. (2009). *Fundamental Concepts in Phonology Sameness and Difference*. Edinburgh. Edinburgh University. Press. ISBN 978 0 7486   2565   9.   Retrieved   from https://bayanbox.ir/view/4963611440786152119/Fundamental-Concepts-in Phonology.pdf. 29 Aug. 2015

Matsushita,M. ; Pelagio, E. & Talavera, J. (2013). *The Sound System of Inivadoy and Ilokano: An Acoustic Phonetics Approach*. Retrieved from https://www.academiaedu/4832009/The_Sound_System_of_Inva doy_and_Ilokano_An_Acoustic_Phonetic_Approach. 24 Aug. 2015

Nakagawa, H. (2010). *Phonotactics of Disyllabic Lexical Morphemes in G/ui*.

Prihati, D. (2011). *A Descriptive Analysis on the Interference of Phonetical Distinction from English to Indonesian Language towards Students' Pronunciation*. Retrieved from http://perpus.iainsalatiga.ac.id/docfiles/fulltext/6599ab800142c9

Tesar, B. et.al. (1999) Linguistic and Cognitive Explanation in Optimality   Theory.   Retrieved   from http://ruccs.rutgers.edu/images/personal-alan-prince/hold/Introot .pdf. 28 Aug. 2015