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ON THE DISTRIBUTION OF CONSONANTS AND VOWELS IN PATTERN N2 OF DISYLLABIC BASE WORDS OF CONTEMPORARY HAWAIIAN

This is a continuation of my work on monosyllabic and disyllabic base words and is inspired by N.S. Trubetsky's statement: "The phoneme combinations in every language are governed by laws and rules, which are valid only for the particular language and must be established separately for each language." *Principles of Phonology*, 1969 p.248.

According to V. Krupa's *The Polynesian Languages*, 1982 p.20 "All Polynesian languages have vocalic subsystems consisting of five vowels. The consonantal subsystems are notable for the exceptional poverty of their inventories. The absolute minimum in the world is probably found in Hawaiian and Moi. Even Tongan which has the richest consonantal inventory among the languages of Polynesia proper can master no more than twelve consonants. This poverty of the Polynesian phonological inventory is accompanied by far-reaching restrictions on the syllable structure. Open syllables of the type V(V), CV(V) are alone permissible in languages of the Common Polynesian type." P.28. "The combinatorial possibilities are exceptionally restricted. Every consonant within the morpheme must be followed by a vowel. This means that there are no final consonants and consonantal clusters do not occur." P.32. So, this type of language could be called an open-syllable language. The Hawaiian language, with only eight consonants, looked especially interesting for analysis.

The authors of *Pocket Hawaiian Grammar. A reference Grammar in Dictionary Form*, Honolulu, 2005, by Albert Schutz, Gary Kahalo 'omalua & Kenneth Cook, also stated that "the Hawaiian language was regarded as an unusual one because of the low number of consonants and vowels" (p.211). However, they completely disagree about the vowels, quoting the article: *Reanalysis of the Hawaiian Vowel System*, by A. Schutz, 1981, which presented another way to look at the system. In this approach it was important to consider which vowels and vowel combinations (diphthongs) can function as the nuclei of a one syllable word. This gives a very different picture of the Hawaiian vowel system: to five short vowels: *a,e,i,o,u* add another five long vowels: *a:,e:,i:,o:,u:*. (The long vowels are marked by a colon). Next, add nine short diphthongs: *ai,ae,ao,au,ei,eu,oi,ou,iu*, and six long diphthongs: *a:i, a:u, a:e, a:o, e:i, o:u*. This means, that if we go beyond the Hawaiian alphabet and look at vowels in terms of their function, we see, that the vowel system is not as simple, as first thought.

In *Pocket Grammar* the term "base word" means a content word, that can function as the centre of a phrase, such as a noun or a verb, as opposed to such words as grammatical markers or modifiers. When the base words have one syllable, they have a long vowel (e.g. *ku:*) or a diphthong (e.g. *kai*). This description of one syllable words brought me to the search and then analysis of what I call monosyllabic base words in Hawaiian. In *The Hawaiian Dictionary* by Pukui and Elbert, 1986, I found 108 such base words with long vowels or short diphthongs. The analysis of these 108 words also found the base words without an initial consonant: C1 = O1, consisting only of vowels or diphthongs.

The comparison of those 108 words with corresponding words of four Polynesian languages: Maori, Tahitian, Tongan and Samoan (Tregear E. *The Maori-Polynesian Comparative Dictionary*) showed how close these languages are. These materials supported the finding that, while on page 21 V. Krupa states, that "there is no opposition of voiced versus voiceless consonants", there is basic important division of consonants into voiced consonants, which are sonorants: *l,m,n,w*, and voiceless consonants: *'h,k,p*, designated as obstruents in contrast to sonorants. (Trubetsky, 1969, p.141). It was also found that the other Polynesian languages also have base words without an initial consonant.

Hence, the analysis of monosyllabic base words of these Polynesian languages supported the division of initial consonants into voiced and voiceless, and the division of words into words with an initial consonant, which could be voiced or voiceless, and words without an initial consonant. These findings from monosyllabic material allowed me to proceed to the analysis of disyllabic base words in Hawaiian. In the Hawaiian dictionary by Pukui and Elbert, 1986, were found by me 1595 disyllabic base words. These 1595 disyllabic base words were divided into nine groups: four groups of words with initial obstruents: ' , h, k, p, four groups of words with initial sonorants: l, m, n, w, and one group of words without an initial consonant: C1 = O1.

All these 1595 words were analysed for long, each of those 9 groups proceeding with an initial consonant, voiced or voiceless, or without C 1, separately, for years, until were found, what is called here: The Nine Hawaiian Nuclei Patterns. These Patterns contain only the nuclei of 1595 Hawaiian disyllabic base words, but these nuclei became the most important key to the analysis and the discovery of the sound system organization of the Hawaiian language. See Table 1 below.

Table 1
This table presents the Nine Nuclei Patterns in Hawaiian

	1	2	3	4	5	6	7	8	9	
	v-v	V-V	VV-VV	V-VV	v-VV	VV-v	VV-V	v-V	V-v	
C1:										
'	100	24	7	17	29	12+1	8	24	---	
k	110	53	7	50	14	18+1	9	15	4	
h	108	20	6	26	17	14	6	12	1	
p	94	33	3	31	14	14+1	6	16	---	
l	101	18	1	11	2	7	3	---	---	
m	77	24	5	19	19	16	1	9	8	
n	98	11	1	6	9	10	2	6	1	
w	40	2	4	3	---	5	2	1	1	
O1 :	100	9	2	3	11	7	6	8	1	147

	828	194	36	166	115	106	43	91	16	

In this Table 1 are written at the left edge of this table from top to the bottom, the eight initial consonants: C1 and O1 of nine lines of 1595 disyllabic base words: four are obstruents: ' , h, k, p, four are sonorants: l, m, n, w, and O1 of these 1595 disyllabic base words, found in *The Hawaiian Dictionary*. Hence, this table contains the initial consonants and the nuclei of 1595 disyllabic base words. The v marks a short vowel, capital V marks a long vowel, and VV stands for a diphthong. The dash divides each pattern's nucleus of the first syllable from the nucleus of the second syllable. (This table was first done for the article on disyllabic base words in Hawaiian).

Below each Pattern is written the number of words found with this particular nucleus and with the initial consonant written at the left edge of the table.) Hence, this table only presents: at the top, the nuclei of 1595 words and, on the left side, the initial consonants (C1 or O1) of all 1595 Hawaiian disyllabic base words. The Pattern N2 has 194 words. Below is the analysis of 194 words of Pattern N2, which has the words with long vowels in both syllables: V-V.

The Distribution of Consonants and Vowels in Pattern N2: V-V

The Pattern N2 in Hawaiian contains 194 disyllabic base words, which have long vowels in both syllables. These 194 words were divided into three groups: one with initial voiceless obstruents: /*h,k,p*/, the other with initial voiced sonorants: /*m,n,w*/ and the third one without an initial consonant: C1=O1. It turned out that most words: 131 out of 194 begin with a voiceless obstruent /*h,k,p*/, 55 words begin with a voiced sonorant: /*m,n,w*/, and 9 words do not have an initial consonant: C1=O1. Voiceless obstruents prevail at the beginning of words in Pattern N2 with both vowels long. Special attention was paid to the distinctive feature [+grave], which is usually attributed to back vowels /*o* and /*u*/ and to the labial, velar/glottal articulation of consonants such as: /*w,m,h,k,p*/ (see V. Krupa, 1982, p.26.)

In each group of words special attention was paid first of all to the quality of long vowels of the first syllable. All long vowels are marked by a colon: /*a:,e:,i:,o:,u:*/.

Disyllabic base words of Pattern N2 with initial obstruents: 131

'a:-'a:	'e:-ka:	'i:-'i:	'o:-ha:	'u:- ki:
'a:-he:	he:-he:	hi:-ka:	' o:-hu:	'u:-pa
'a:-'i:	ke:-ke:	hi:-'o:	'o:-ka:	'u:-pe:
'a:-ke:	ke:-la:	ki:- 'a:	'o:- ku:	'u:-pi:
'a: -ki:	ke:-na:	ki:-ha:	'o:-lu:	hu:-ha:
'a:-no:	ke:-pa:	ki:-ka:	'o:-nu:	hu:-ha:
'a:-pa:	ke:-wa:	ki:-ke:	'o:-pa:	hu:-ke:
ha:-ha:	pe:-la:	ki:-ki:	'o:-pe:	hu:-na:
ha:-ki:	pe:-na:	ki:-mo:	'o:-pi:	hu:-pe:
ha:-ko:	pe:-'u:	ki:-na:	'o:-pu:	hu:-pa:
ha:-lo:	10	ki:-pa:	'o:-'u:	hu:-pi:
ha:-na:		ki:-pe:	ho:-'a:	ku:-'e:
ha :-no:		ki:-po:	ho:-ku:	ku:-ka:
ka:ha:		ki:-pu:	ho:-lu:	ku:-ku:
ka:-he:		pi:-'a:	ho:-mi:	ku:-le:
ka:-ka:		pi:-ha:	ko:-'a:	ku:-lo:
ka:-ku:		pi:-he:	ko:-'i:	ku:-mu:
ka:-le:		pi:-pa:	ko:-ha:	ku:pa:
ka:-li:		pi:-pi:	ko:-ka:	ku:-pi:
ka:-mu:		19	ko:-ke:	ku:-po:
ka:-pa:			ko:-ki:	ku:-pu:
ka:-pi:			ko:-ko:	ku:-wo:
ka:-wa:			ko:-lu:	pu:-'a:
ka:-wi:			ko:-pi:	pu:-ha:
pa:-'a:			ko:-wa:	pu:-ho:
pa:-'e:			ko:-wi:	pu:-ke:
pa:-'u:			po:-ha:	pu:-ki:

pa:-ha:			po:-ka:	pu:-ko:	
pa:-ka:			po:-ke:	pu:-lo:	
pa:-ke:			po:-ku:	pu:-pu:	
pa:-ku:			po:- po:	pu:-wa	
pa:-pa:	10	19	31	31	125
pa:- pu:					
pa:-wa:/	34				

words without C2:

ka: -i:		ko: -i:	ku:-a:	
ka:-o:		po:-a:	pu:-a:	
2		2	2	6

Disyllabic base words, Pattern N2 with initial sonorants:

la:-la:	le:-ko:	li:-la:	lo:-ku:	lu:-ka:
ma:-ha:	ne:-ne:	li:-le:	lo:-la:	lu:-ke:
ma:-hu:	ne:-'u:	mi:-ka:	lo:-lo:	lu:-la:
ma:-ka:		mi:-mi:	lo:-nu:	lu:-lo:
ma:-ke:		wi:-wi:	lo:-pa:	lu:-lu:
ma:-ki:			mo:-'i:	lu:-po:
ma:-ku:			mo:-ha:	mu:-'a:
ma:-lo:			mo:-ki:	mu:-ka:
ma:-ma:			mo:-ku:	mu:-ki:
ma:-pu:			mo:-li:	mu:-mu:
ma:-ko:			no:-'a:	mu:-na:
na:-'a:			no:-ki:	mu:-no:
na:-'u:			wo:-wo:	nu:-ne:
na:-na :				nu:-hu:
na:-nu:				
na:-wa:				

words without C2:

la:-'a:	li:-o:
la:-'i:	
ma:-'a:	

19	3	6	13	14	55
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Disyllabic Pattern N2 nine base words without an initial consonant: 9

a:-he:	e:-ha:	i:ka:	o:-pu:	u:-pe:
a:-mu:			o:-wi:	
a:-wa:				u:-ko:

3	1	1	2	2
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Hence, it turned out that the [low] vowel /a:/ prevails in 58 words out of 194. Of those 58 words with /a:/ in the first syllable, 36 words begin with obstruents, 19 words begin with sonorants and 3 words were found without an initial consonant: C1=O1: a:-he:, a:-mu:, a:-wa:.

The [mid,-grave] vowel /e/ was found only in 14 disyllabic base words out of 195. 10 words were found after initial obstruents, 3 words after initial sonorants and one word without an initial consonant: e:-ha:.

The [high,-grave] vowel /i:/ was found in 26 words out of 194. Out of these, 19 words begin with obstruents, 5 words with initial sonorants, and one word without an initial consonant: i:-ka:.

The [mid,+grave] vowel /o:/ was found in 49 words, 34 of which were with initial obstruents, 13 with initial sonorants, and 2 words were found without an initial consonant: o:-pu:, o:-wi:.

The [high,+grave] vowel /u:/ was found in 48 words, of which 32 words were with initial obstruents, 14 were with initial sonorants, and 2 words were without an initial consonant: u:-pe:, and u:-ko:.

The smallest two groups of words with the front vowels within the first syllable both have [-grave] vowels /e/ and /i:/, while the biggest groups have [+grave] vowels: /a:,o:,u:/ (It was already mentioned that according to *Introduction to Linguistics*, by Ronald Wardhaugh, 1972, p. 46, the vowel /a/ is a [+grave] vowel.

All above said could be presented as follows:

Long vowels:	a:	e:	i:	o:	u:
After initial [-voice] obstruents:	36	10	19	34	32
Ater intial [+voice] sonorants:	19	3	6	13	14
Without an initial consonant:	3	1	1	2	2

	58	14	26	49	48

The distinctive features: [voice] and [grave] after initial consonants of Pattern N2 words with long vowels in both syllables seem to be decisive for the distribution of the vowels. The absence of the initial consonant explains the small number of only 9 out of 194 words of Pattern N2. But what is interesting is that this group without an initial consonant contains all five vowels, but with a small number of words. These nine words without an initial consonant are:

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- 3 words with [low,+grave] long vowel /a/: a:-he:, a:-mu:, a:-wa:;
 - 2 words with [mid,+back,+grave] long vowel /o/: o:-pu:, o:-wi:;
 - 2 words with [high,+back,+grave] long vowel /u/: u:-pe:, u:-ke:;
 - 1 word with [high,-back,-grave] long vowel /i/: i:-ka:;
 - 1 word with [mid,-back,-grave] long vowel /e/: e:-ha:.

Of interest here is that in nine disyllabic base words without an initial consonant, the initial consonant of the second syllable, C2, is one of the [+grave] consonants: /h,m,w,p,k/. Also of interest is that in the previous analysis of monosyllabic base words it was found that the group N1 of words without an initial consonant can have only [+grave] vowels and diphthongs in Hawaiian, and also in some other Polynesian languages. Here the C2 consonant is [+grave].

131 words with initial obstruents and 55 words with initial sonorants reveal a quite interesting distribution of vowels after initial consonants. Thus it was found that in some 131 words, words with initial glottal stop /ʔ/ have only 2 [-back,-grave] vowels /e/ and /i/: 'e:-ka: and 'i:-i: within the first syllable. And the continuant /h/ has only 3 words with these [-grave] vowels: he:-he:, hi:-ka:, hi:-'o: within the first syllable. That is there are only 5 words out of 131 with [-grave] vowels /e/ and /i/ within the first syllable. The rest of the words have [+grave] vowels.

55 words with initial sonorants also have some interesting distribution of vowels. The sonorant /w/ was found only in two words: *wi:-wi:* and *wo:-wo:*, both with identical vowels. Notice the distribution of [-grave] vowels /e/ and /i/ within the first syllable of words with initial nasal sonorants. The [-back,-grave] vowels /e:/ and /i:/ were found only in two words each with initial sonorants /n/ and /m/, and one word with the same vowels: *ne:-ne:* , *mi:-mi:* .

This resembles the findings made during the analysis of monosyllabic base words. In monosyllabic base words after initial sonorants /n/ and /m/, the [-grave] vowel /i/ is absent after sonorant /n/ not only in Hawaiian but also in other Polynesian languages, while the [-grave] vowel /e/ was found after /m/ only in Tongan. Of interest is that both monosyllabic base words and Pattern N2 words in Hawaiian are the only groups of words which have only long vowels.

To conclude: this analysis of the distribution of consonants and vowels within Pattern N2 words with long vowels in both syllables reveals the limitations on the usage within the first syllable of [-grave] vowels /e/ and /i/ after initial glottal stop /ʔ/ and /p/; and limitations or absence of [-grave] vowels after nasal sonorants.

Above presented analysis emphasizes the importance of the division of consonants into voiceless obstruents: /ʔ, h, k, p / and voiced sonorants: /l, m, n, w /, and stresses the existence of words without an initial consonant: C1=O1. It also turned out that there are more words with initial obstruents than with initial sonorants. It was already stated before that all obstruents in Hawaiian are [+grave] consonants. The [grave] is the other distinctive feature (beside the feature +/- voice) found of importance in Hawaiian. It can relate to both consonants and vowels and helps to better understand the distribution of sounds in such an open-syllable language as Hawaiian.

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