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The Distribution of Consonants and Vowels in Disyllabic Base Word  
Patterns N8 (v-V) and N9 (V-v) in Hawaiian

This small article undertakes the analysis of the distribution of consonants and vowels in words of two out of so called Nine Hawaiian Patterns of nuclei. The Pattern N8 and Pattern N9 are the last Patterns in Table 1 where are presented all nine patterns of nuclei of 1595 disyllabic base words: Pattern N1: v-v; Pattern N2: V-V; Pattern N3: VV-VV; Pattern N4: V-VV; Pattern N5: v-VV; Pattern N6: VV-v; Pattern N7: VV-V; Pattern N8: v-V; Pattern N9: V-v.

Table 1

This table presents the Nine Nuclei Hawaiian Patterns:

	1	2	3	4	5	6	7	8	9
C1	v-v	V-V	VV-VV	V-VV	v-VV	VV-v	VV-V	v-V	V-v
'	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
01	100	9	2	3	11	7	6	8	1
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	828	194	36	166	115	106	43	91	15

This table was first prepared for the article on the disyllabic base words in Hawaiian. Below each pattern is written the number of words found with this particular nuclei configuration, which has the initial consonant written at the left edge of the table. The Nine Hawaiian Patterns are marked like this: the lower case v stands for a short vowel, and upper case V stands for 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 of these words. These nine nuclei contain each their own combination of vowels and diphthongs. Patterns N8: v-V and N9: V-v do not have diphthongs and differ only by the length of the vowel in the first and the second syllables of these words.

According to Table 1, the Pattern N8 contains 91 words, while there are only 15 words in Pattern N9. (Out of 91, the 8 words without C2, were excluded.) Words of both patterns were divided into three groups: 1) the first one with an initial obstruent: /',h,k,p/, 2) the second group with an initial sonorant: /l,m,n,w/, and the 3) group: C1 = O1: one word of only pattern N9: e: we. n.'sprout; lineage; kin'. The length of the vowel is marked by the colon .:

1) Words of both patterns with initial obstruents /',h,k,p/

The Pattern N8 words: v-V:

'a a:	ha 'a:	pa 'e:	ka 'a:
'a ku:	ha ke:	pa he:	ka 'u:
'a la:	ha ku:	pa ho:	ka hi:
'a le:	he he:	pa hu:	ke ke:
'e he:	he le:	pa ke:	ki ka:
'e ki:	he mu:	pa ki:	ki ki:
'i 'i:	hi pu:	pa ku:	ko 'u:
'o 'a:	ho ho:	pa pa:	ko ha :
'o ha:	hu hu:	pa 'u:	ko ko:
o la:	hu la:	pe he:	ko lu:
'o le:		pi ho:	ko li:
'o mi:		po ha:	ko na:
'o 'o:		po ho:	ku ho:
'u he:		pu 'o:	ku ku:
'u hu:		pu pu:	ku wa:
'u ka:			
'u ke:			
'u ki:			
'u li:			

and also the words without C2 of the second syllable:

'u a:			
'e a:	hi o:	pu o:	8
'o a:	hu a:		
'o e:			
'u i:			

2) Words of both patterns with initial sonorants /m,n,w/:

The Pattern N8 words v-V:

l ---	ma 'u:	na ha:	wa hi.
	ma ha		
	ma ka:1		
	ma lo:	na 'iu:	
	ma lu:	na 'u:	
	ma no:	no no:	
	ma pu:	no 'u:	
	mo ha:		
	mo ki:		

-----9-----5-----7-----

The Pattern N9 words: V-v:

' ---	ha: na	p ---	ka: ki
			ko: hi
			ko: mi
			ka: ne

The Pattern N9 words V-v:

l--	ma: nu:	ne: wa	wa: hi
	ma: ki		
	ma: la		
	ma: na		
	ma: no		
	ma:pu		
	mo:mo		

Of interest is the usage of [short low] /a/ in 19 words after initial obstruents: /',h,k,p/ and of [short low] /a/ in 11 words after initial sonorants: /m,n,w/. There are none after /l/ and only one word after sonorants /n/ and /w/. This reveals the usage of vowel lengths in this language.

### 3) Words of Pattern N9 V-v without C1: 1 e: we

In the above displayed words of Patterns N8 V-v and N9 V-v the most interesting are the two absences. The first one is the absence of words with initial sonorant /l/ in both these Patterns, which, as is shown in Table 1, are the only two patterns out of 1595 words without this sonorant in C1 position. (As for C2, an initial consonant of the second syllable, the sonorant /l/ was found in words with all initial consonants, as shown in Table 2, in the article on disyllabic base words.)

The other is the absence in Pattern N9 of words with the initial glottal stop /' and an initial obstruent /p/, which also is a stop. (See also Table 1). In both cases words with the initial glottal stop and /p/ in Pattern N9 V-v would have to have a short vowel in the second syllable. Is it somehow connected with the sound arrangement of these words? It is hard to say. The Pattern N9 has only 15 words, with 7 of those words having a sonorant /m/ in the initial position (see above).

Of interest is also the significant prevalence of 67 words with initial obstruents /',h,k,p/ in Pattern N8 with the short vowel in the second syllable V-v, while Pattern N9 v-V, with the long vowel in the second syllable has only 5 words with initial obstruents: one word with initial /h/ and four words with initial /k/ (see above).

Only 26 words are with initial sonorants /m,n,w/ (/l/ is absent) in both patterns. The sonorant /m/ prevails as an initial consonant in 9 words out of 15 of Pattern N8 v-V and in 7 words out of 9 in Pattern N9 V-v.

As for the distribution of vowels within the first syllable of Pattern N8 and Pattern N9 words, of interest is the role of the distinctive feature [grave] in this case. It is well known that the [+grave] phonemes are labial and velar consonants and back vowels /o/ and /u/, while the [-grave] phonemes are dental and palatal consonants, and front vowels /e/ and /i/. In case of these patterns, the analysis of Pattern N8 words reveals the differences in the distribution of [-grave] vowels after initial obstruents and initial sonorants. The [-grave] vowels /e/ and /i/ are significantly limited after initial obstruents. Thus, out of 24 words with initial glottal stop /' were found only 3 words with /e/ and one word with /i/: 'e he:, 'e ki:, 'e a:, 'i i:. Out of 12 words with initial /h/, 3 words were found with /e/: he he:, he ke:, he mu:, and two with /i/: hi pu:, hi 'o:. Out of 16 words with initial /p/ one word was found with /e/: pe he:, and one word with /i/: pi ho: within the first syllable. And 15 words with initial obstruent /k/ have one word with /e/: ke ke:, and 2 words with /i/: ki ka:, ki ki: within the first syllable. Hence, out of 67 Pattern N8 words with initial obstruents /',h,k,p/, only 13 words have [-grave] vowels: 8 /e/ and 5 /i/ within the first syllable of these words. However, after these initial obstruents within the first syllable of Pattern N8 words were found: 19 words with /a/, 17 words with /o/, and 17 words with /u/.

The same limited use of [-grave] vowels in the first syllable was found in the material of words of Pattern N2 V-V, which has both vowels long (with both vowels long).

The other thing of interest is the distribution of vowels after initial sonorants of Patterns N8 and N9. Both of them, and even the words after initial obstruents in Pattern N9, have only vowels /a/ and /o/, after initial sonorants /m,n,w/ of both patterns and also after obstruents: /h and k/ of Pattern N9 words. Thus, we see how different is the distribution of vowels after initial sonorants and obstruents in these two patterns: N8 v-V and N9 V-v, without diphthongs.

All this shows the significance of the discovery of the Nine Nuclei Patterns in Hawaiian introduced and described in the material of disyllabic base words in Hawaiian. Also important was the division of consonants into obstruents and sonorants, which revealed how different is the distribution of vowels: short, long and diphthongs after voiceless consonants, obstruents, and after voiced consonants, sonorants, (see above). All these findings let us to discover how complicated and sophisticated is the distribution of vowels short, long and diphthongs after voiceless obstruents and after voiced sonorants. Also the role of the distinctive feature [grave] for the relationship between the C1, an initial consonant, and C2, a consonant of the second syllable within the words, and also to the distribution of vowels in the first syllable of these words. It reveals the need for analysis of other Patterns. It also shows the importance of such a base-driven approach, as this one, to the analysis of such open-syllable languages as Hawaiian.

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