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ON THE DISTRIBUTION OF CONSONANTS AND VOWELS IN HAWAIIAN

PART 1: The distribution of consonants and vowels in monosyllabic base words

PART 2: The distribution of consonants and vowels in disyllabic base words

PART 2

The distribution of consonants and vowels in disyllabic base words of Contemporary Hawaiian

Within *The Revised and Enlarged Edition of the Hawaiian Dictionary* (Pukui and Elbert 1986) were found 108 monosyllabic base words and 1,595 disyllabic base words. These 108 monosyllabic base words were analyzed in the article: *On the Distribution of Consonants and Vowels in Monosyllabic Base Words of Contemporary Hawaiian*. The data-driven approach to analysis of 108 monosyllabic base words revealed the division of consonants in Hawaiian into two significant groups: voiced sonorants: /l, m, n, w/ and voiceless obstruents: /ʔ, k, h, p/. It also showed the importance and even necessity of taking under consideration the division of base words into words with and without an initial consonant. The words without an initial consonant are very important, since they demonstrate that in Hawaiian (and comparison with other Polynesian languages supports it) there are base words consisting of only long vowels and diphthongs.

These findings about the division of Hawaiian (and also of Polynesian) consonants into obstruents and sonorants, and also the division of base words into words with an initial consonant and words without an initial consonant, made it possible to begin the analysis of 1,595 disyllabic base words. It is a much more complicated group of words than monosyllabic base words, since the nuclei of disyllabic base words consist of 5 short and 5 long vowels, and 9 short and 6 long diphthongs.

These 1,595 disyllabic base words were divided into nine groups: eight groups with an initial consonant and one group without an initial consonant. Within the eight groups with an initial consonant four groups (924 words) begin with obstruents: /ʔ, h, k, p/, and four groups (523 words) begin with sonorants: /l, m, n, w/. The group of words without an initial consonant contains 147 words, marked by zero (0) within Table 1.

While monosyllabic base words each can have either one of five long vowels or one of nine short diphthongs, each 1,595 disyllabic base word can have within the first or second syllable either one of five short vowels: a, e, i, o, u, indicated by V, or one of five long vowels: a, e, i, o, u, length indicated by a macron over the V, or one of nine short diphthongs: ae, ai, ao, au, ei, eu, oi, ou, iu, indicated as V V, or one of six long diphthongs: ae, ai, ao, au, ei, ou, length indicated by a macron over the first V: V V. These vowels and diphthongs were found within nine possible arrangements of nuclei of 1,595 disyllabic base words. These nine arrangements, or patterns, (shapes, as some of them are called in the *Hawaiian Grammar* Elbert and Pukui, 1979) are:

- Pattern N 1: V-V, with both syllables having short vowels;
 Pattern N 2: V-V, with both syllables having long vowels;
 Pattern N 3: V V-V V, with both syllables having diphthongs;
 Pattern N 4: V-V V, has a long vowel in the first syllable and a diphthong in the second syllable;
 Pattern N 5: V-VV, has a short vowel in the first syllable and a diphthong in the second syllable;
 Pattern N 6: V V -V, has a diphthong in the first syllable and a short vowel in the second syllable;
 Pattern N 7: V V -V, has a diphthong in the first syllable and a long vowel in the second syllable;
 Pattern N 8: V-V, has a short vowel in the first syllable and a long vowel in the second syllable;
 Pattern N 9: V-V, has a long vowel in the first syllable and a short vowel in the second syllable.

They are all included at the top of Table 1. Each initial consonant, marked by C or 0, is written at the left edge of nine lines showing four lines of words with initial obstruents: /', k, h, p/, four lines with initial sonorants: /l, m, n, w/, and one line without an initial consonant is indicated by 0.

The nine arrangements of vowels and diphthongs, written at the top, display only the nucleus of the first and of the second syllables found in the structure of these 1,595 disyllabic base words. Below each arrangement there is a column showing the number of words with that particular initial consonant on the left edge of the table and with the particular, above shown, one of nine arrangements of vowels and diphthongs.

TABLE 1

	1	2	3	4	5	6	7	8	9
C	V-V	V-V	V V-V V	V-V V	V-V V	V V-V.	V V-V	V-V	V-V
'	100	24	7	17	29	12+1	8	24	---
h	108	20	6	26	17	14	6	12	1
k	110	53	7	50	14	18+1	9	15	4
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	9	6	10	2	6	1
w	40	2	4	3	—	5	2	1	1
0	100	9	2	3	11	7	6	8	1
	828	194	36						

This kind of display of 1,595 words with initial consonants (C) or (0), written on the left and nine arrangements of nuclei of disyllabic base words on top of the table (the presence or the absence of C or 0 will be shown in Table 2) allows us to see more clearly the differences in the distribution of short and long vowels and diphthongs after each particular obstruent and sonorant and in words without an initial consonant. It immediately shows the prevalence of short vowels, that is the pattern N 1, within the structure of disyllabic base words, as compared with the number of words within the other NN 2-9 patterns. Out of 1,595 words more than half have only short vowels: 828, while 194 words were found with both long vowels, and only 36 words were found with both diphthongs.

Of interest is that the group of words, marked on the left by zero: 0, that is without an initial consonant, and containing only 147 words, has the same nine arrangements of vowels and diphthongs as words with initial consonants. In this group the pattern N 1 V-V, 100 words, also prevails over other eight NN 2-9 patterns, having only 47 words in all of them. The 1595 disyllabic base words of Table 1 could be shown as following:

- 828 words with both vowels short: V - V, pattern N 1,
- 194 words with both vowels long: V - V, pattern N 2,
- 36 words with diphthongs in both syllables: V V - V V, pattern N 3,
- 465 words with diphthongs in the first, second or both syllables: patterns N 4 - 7,
- 91 words with the first vowel short and the second vowel long: V - V, pattern N 8,
- 17 words with the first vowel long and the second vowel short: V - V, pattern N 9.

The most important features for the distribution of vowels and diphthongs within these 1595 words seems to be:

1/ The length of the vowel: short or long. There are 828 words with short vowels in both syllables, while 194 have long vowels in both syllables, and only 36 have diphthongs in both syllables.

2/ the placement of the short, long vowels and diphthongs within the first or the second syllable of base words. For example: when short and long vowels are within the first syllable and the diphthongs are in the second syllable, there were found more words when the long vowel precedes the diphthong: V- VV in 168 words, as compared to V- VV in 114 words. When diphthongs are within the first syllable and the long and short vowels are in the second syllable, more words were found with short vowels following the diphthongs: VV-V in 104 words, while VV- V in 53 words. In pattern N8: V- V were found 91 words, and in pattern N 9: V-V were found only 16 words. There are more words in pattern N8 with the long vowel in the second syllable than in pattern N9 with the short vowel in the second syllable.

Table 1 also shows, that pattern N9: V-V does not have words with the initial consonants: p, l, and ' (the glottal stop). In the case of CV'V words, see the Hawaiian Grammar 1979:34.

3/ Whether words have an initial consonant: C1, or they are without an initial consonant: C1 = 01. The bottom line: 01 of Table 1, without an initial consonant.

The analysis of Table 1 revealed that SHORT VOWELS are most often found within both syllables, in 828 out of 1,595 words. Within the first syllable of the rest of the words they are found in 205 words, while within the second syllable – in 122 words.

LONG VOWELS are most often found in both syllables: 194 words out of 1,595 words, or within the first syllable – in 186 words. Within the second syllable long vowels are found in 132 words.

DIPHTHONGS are most often found within the second syllable: 280 words out of 1,595 words. Within the first syllable – 149 were found, and only 36 words with diphthongs in both syllables. Within the second syllable diphthongs are found more often than the long and, especially, short vowels.

LONG DIPHTHONGS were found in disyllabic base words only in a few words marked by /+/ on Table 1, within the pattern N6 (V V – V).

While *Hawaiian Grammar* (Pukui and Elbert, 1979) notes that “no base exists in the shape of CV’V,” that is with C being the glottal stop, plus short vowel, the Table 1 shows that there are also no words in pattern N 9 (V-V) with initial obstruents: /p, glottal stop ‘/ and sonorant /l/.

All nine patterns of 1595 words could be shown as follows:

1/ C V – (C /0) V	- with both vowels short	- 828 words;
2/ C V – (C /0) V	- with both vowels long	- 194 words;
3/ C V V – C V V	- both syllables with diphthongs	- 36 words;
4/ C V – (C /0) V V	- with long vowel and diphthong	- 169 words;
5/ C V – (C /0) V V	- with short vowel and diphthong	- 112 words;
6/ C V V – (C /0) V	- with diphthong and short vowel	- 106 words;
7/ C V V – (C /0) V	- with diphthong and long vowel	- 43 words;
8/ C V – C /0) V	- with short vowel and long vowel	- 91 words;
9/ C V – (C /0) V	- with long vowel and short vowel	- 16 words.

For example, below are written nine patterns of disyllabic base words with the initial obstruent [k]:

1/ V – V	<i>ka.’a</i> vi. ‘to roll, turn’;	<i>ku.la</i> n. ‘plain, field.’
2/ V – V	<i>ka.ha</i> vs. ‘large, fat’;	<i>ki.ke</i> vi. ‘to rap, tap’.
3/ V V – V V	<i>kae.kae</i> vs. ‘smooth, polished’.	
4/ V – V V	<i>ka’ai</i> nvt. ‘sash, belt’;	<i>ka.kau</i> nvt. ‘to write, sign’.
5/ V – V V	<i>ka’ao</i> nvt. ‘legend, tale’;	<i>ku.ai</i> vt. ‘to rub, polish’.
6/ V V – V	<i>kei.ki</i> n. ‘child, boy’;	<i>kau.a</i> nvt. ‘war, battle’.
7/ V V – V	<i>kai.ka</i> n. ‘cultivated patch’;	<i>kau.li</i> vi. ‘to show off’.
8/ V – V	<i>ke.ke</i> nvi. ‘scolding, anger’;	<i>ko.na</i> vs. ‘hard, unfriendly’.
9/ V – V	<i>ko.mi</i> vt. ‘to press, bear down’;	<i>ka.ne</i> n. ‘male, husband.’

Table 1 shows only initial consonants C , or the absence of an initial consonant, marked by 0 on the left edge of the table, and the nine patterns displaying arrangements of

nuclei of 1,595 words at the top of the table. However, this table does not show the presence or absence of an initial consonant of the second syllable. Analysis of 1,595 disyllabic base words has also found that 138 words have no consonant at the beginning of the second syllable of these words, that is, no C , and 18 out of 1,595 words were found without both, C and C consonants, consisting solely of vowels and diphthongs (see Table 2 below).

It is interesting that in all patterns except one: N 3 CV V - C V V , with both syllables with diphthongs, there are words without C , that is, with zero consonant at the beginning of the second syllable.

Table 1 above displays on the left edge of the table the initial consonant as C , or its absence as zero: 0 . At the top of the table we see the nuclei of both syllables of 1595 words organized in nine patterns. The initial consonant or its absence within the second syllable is shown in Table 2 below.

Table 2 displays initial consonants of the second syllables: obstruents and sonorants, and zero consonants: 0 , when there is no C in those 1595 words. At the left edge of the table there are shown initial consonants: C and 0 , as in Table 1. At the top of the Table 2 there are written: obstruents as C , sonorants as C , and 0 cases. Inside the columns, there are numbers of words with this initial consonant (C or 0) of the second syllable.

Table 2 also separates words of N1 (V-V) pattern from the words of NN 2-9 patterns. This separation of the group N 1 pattern from groups NN 2 – 9 was necessary, since the group N 1 differs from all other patterns in that it is the biggest group of words, but also, most important, has both syllables with all short vowels, except the words with an initial sonorant /w/. Words of N 1(V-V) pattern are written within the Table 2 on the top line, marked: v-v . The words belonging to NN 2- 9 patterns are written below this v-v line, marked: 2-9 .

At the end of this study, on 17 pages there is a list of 1595 disyllabic base words, which are organized as follows: 1/ The first 2 pages contain words without an initial consonant. Putting them to the front will make them more visible. Next 8 pages contain words with initial obstruents : /ʔ, h,k,p/. Next 7 pages contain words with initial sonorants: /l,m,n,w/. The sonorant /w/ takes only 1 page. 2/ On odd numbered pages are words of pattern N1, written in 5 columns, according to the quality of vowels of the first syllable: Va-V, Ve-V, Vi-V, Vo-V, Vu-V. For example: ha.'a, he.'a, hi.'a, ho.'i , hu.'a. On even numbered pages words are organized in columns according to NN 2-9 patterns: ha.ha (p. N2 , both vowels long); hai.hai (p. N 3, both syllables have diphthongs); ha.'ao (p. N4, the first syllable has a long vowel, the second one has a diphthong); ha.hau (p. N5, the first syllable has a short vowel, the second one has a diphthong); hai.ka (p. N6, the first syllable has a diphthong, the second one has a short vowel); hai.na (p. N7, the first syllable has a diphthong, the second one has a long vowel); ha.ke (p. N8, the first syllable has a short vowel, the second one has a long one); ha.na (p. N9, the first syllable has a long vowel, the second syllable has a short one).

Table 2

C	C - obstruents :	C - sonorants :	C - 0
‘ v-v	‘ - 11, h-15, k-14, p- 14	l - 15, m-10, n - 11, w- 5	0 - 5
‘ 2-9	‘ - 22, h-15, k-23, p- 12	l - 14, m-3, n -11, w -6	0 - 17
h v-v	‘ -15, h- 9, k -14, p -7	l - 21, m - 8, n -19, w - 4	0 - 11
h 2-9	‘ -10, h -15, k-21, p -9	l -17, m - 4, n - 13, w- 2	0 - 9
k v-v	‘ -19, h -15, k-14, p- 10	l-19, m- 6, n -16, w- 3	0 - 8
k 2-9	‘ - 22, h -20, k-35, p-21	l-24, m- 9, n -14, w- 11	0 - 13
p v-v	‘ - 16, h-14, k-15, p -5	l -20, m -1, n - 14, w - 2	0 - 7
p 2-9	‘ - 21, h-26, k- 26, p -13	l -10, m --, n - 8, w - 6	0 - 7
l v-v	‘ - 17, h - 18, k - 11, p - 12	l -16, m- 8, n -11, w - 3	0 - 5
l 2-9	‘ - 4, h - 5, k - 7, p - 2	l -14, m - , n -6, w - 1	0 - 3
m v-v	‘ - 14, h - 8, k - 12, p -	l -18, m -6, n -13, w -1	0 - 5
m 2-9	‘ - 10, h - 14, k -29, p - 3	l - 11, m -6, n -13, w -3	0 -12
n v-v	‘ - 14, h -18, k -13, p - 8	l -12, m -5, n - 16, w -3	0 - 9
n 2-9	‘ - 13, h - 3, k - 4, p -1	l - 1, m - , n -13, w -3	0 - 7
w v-v	‘ - 7, h - 8, k - 4, p —	l - 13, m - , n -3, w -3	0 -2
w 2-9	‘ —, h - 4, k - 2, p -1	l - 3, m - , n - 1, w - 5	0 -1
0 v-v	‘ - 12, h - 16, k - 13, p - 4	l - 15, m - 12, n -16, w - 5	0 - 7
0 2-9	‘ - 1, h - 7, k - 9 p - 4	l - 6, m - 1, n - 4, w - 5	0 -11

As was already stated, the Table 2 presents (C) consonants, or the absence of (0), the initial consonants of the second syllable of 1595 words. Out of this number 850 words have an obstruent as C ; 606 words have a sonorant as C , and 139 words do not have an initial consonant of the second syllable, indicated by 0 .

Of special interest to us is a group of words without an initial consonant, indicated by 0 , at the left edge of two bottom lines of this table. This group is one of the smallest: 147 words out of 1595 disyllabic base words. However, it is a very important group, since it contains (see Table 2) 18 words consisting only of vowels and diphthongs, which together with 8 monosyllabic base words without an initial consonant presents a group of

26 base words without consonants. This group reveals the essential importance of vowels and diphthongs within the sound system of the Hawaiian language. While Krupa (1982:27) speaks about “poverty of phonological Polynesian inventory”, the Hawaiian language (see Schutz 1981, 2005, and our analysis of monosyllabic base words) reveals the wealth and complexity of the sound system in Hawaiian, which has a small number of consonants (8), but exhibits the intricate and complex system of distribution of 5 short, 5 long vowels, and 9 short and 6 long diphthongs. A phonological inventory should not pass over such parts of the language as 26 monosyllabic and disyllabic base words without consonants in Hawaiian. The phonological inventory of such, we can call them, open-syllable languages, should include not only consonants but also short and long vowels and short and long diphthongs.

The data-driven approach used here reveals the importance and the essential place of vowels and diphthongs within the sound system of such open-syllable languages as Hawaiian. It also stresses the importance of the initial consonant, its presence or absence within the structure of monosyllabic and disyllabic base words in Hawaiian.

Disyllabic base words without an initial consonant / 0 /:

This group consists of only 147 words. Out of these 147 words, the pattern Number 1 (V-V), with short vowels, contains 100 words, that is two-thirds of the words of this group, while patterns NN 2-9 have only 47 words in all of them.

In this analysis, as was already mentioned before, the group N 1 (V-V) and groups NN 2-9 are analyzed separately, since the group N 1 (V-V) is the biggest and also has both syllables with all short vowels, with more or less (in case of mid vowel /e/) the same number of short vowels: /a, e, i, o, u /.

Within 100 words of N 1 (V-V) pattern, the short vowel /a/ predominates as the vowel of the first syllable in 29 words, while the short mid vowel /e/ was found only in 9 words out of 100. Short vowels: /i/ was found in 20 words, /o/ in 20, and /u/ in 22 words. As for C, the initial consonant of the second syllable of 100 words, the [+grave] consonant /p/ was found in 14 words, the [+grave] sonorant /w/ was found in 5 words, while 7 words (except (Va -V) group) were found without an initial consonant.

The NN 2-9 patterns of words without an initial consonant have only 47 words in all of them. Out of 47 words, 12 words are without both consonants: C, and C. However, there are words in all patterns. Here it is possible to begin seeing the difference between the words of pattern N 1 (V-V) and patterns NN 2-9, where not all vowels were found and some with significantly different number of words. (See also list of 1595 words.) The biggest pattern N5 (V-V V) has 11 words. Out of these 11 words, eight words begin with the vowel /u/, two words with an initial /o/, one word with initial /a/, and there are no words with initial vowels /e/ or /i/. The pattern N9 (V -V) has only one word: *e.we*, *nvi*. ‘sprout, rootlet’. Some other patterns have only 2 or 3 words. The small number of words further limits our analysis.

Of interest is that this small group of 147 words without an initial consonant has its biggest group containing 100 words of N1(V-V) pattern, it has as many words as words with initial obstruents and some sonorants (see Table 1). And also, that this group has words within all other NN 2-9 patterns, the same as the words with initial obstruents and sonorants, although in much smaller numbers.

Disyllabic base words with the initial glottal stop / ʔ /:

This group contains 222 words, of which 100 words belong to pattern N1(V-V) with short vowels. Within this pattern N1 (V-V), the low vowel /a/ prevails within the first syllable of this pattern in 29 words, while mid vowel /o/ is in 21 words, and /e/ is in 20 words; high vowels /i/ and /u/ each has 15 words. In all 100 words there are 5 words without C. Out of 100 words [+grave] sonorant /w/ is absent after [+grave] vowels /o/ and /u/. As it was already mentioned, [grave] consonants and [grave] vowels can prevent or reduce the presence of [grave] consonants or vowels in the second syllable.

Within the 122 words of patterns NN2-9 of this group there are no words in pattern N9 (V-V). It was already written earlier, that *Hawaiian Grammar* (Elbert and Pukui 1979:34) notes that “no base exists in the shape CV 'V”. It corresponds to our pattern N9 of words with initial glottal stops and also to words with initial obstruent /p/ and sonorant /l/ (see Table 1). In this group there is one word with a long diphthong : ‘ai.na n. ‘land, earth’. It was found within the pattern N6 (V V-V). The presence of the word with a long diphthong is marked in Table 1 by the sign: / + / . This group is interesting by some limitations on front vowels in the first syllable, especially on the high vowel /i/, short one in pattern N 5 (V-V V) in two words out of 30 and one word of pattern N 8 (V-V) out of 24 words, and long /i/ was found in only one word of pattern N 2 (V-V) out of 24 words and one word in pattern N 4 (V-V V) out of 17 words. It means four words are with /i/, two short and two long vowels, out of 94 words. The long /e/ is more limited than the short one. It was found within the first syllable of only 3 words out of 41 in patterns N 2 (V-V) and N 4 (V-V V). Within patterns NN 2-9 we see the role of the vowel’s length in the distribution of vowels, especially front ones, within the first syllable. The distribution of vowels is interesting but quite complex. The short [e], it seems, is more common than the long one in this group. Of interest is also the diphthong /iu/ found within the first syllable: ‘iu.i, n. ‘Ceremonial feeding by the high chief of the messenger carrying the image Lono about the island’. Within the second syllable there is the diphthong [iu] in 4 words: ‘a.hiu, ‘o.niu, ‘u.kiu, and ‘a.kiu.

As for C, in 122 words the sonorants /m/ and /w/ were found only in a few words of patterns N3 and N5. More often as C were found obstruents /k/ in 23 and glottal stop / ʔ / - in 22 words. 17 words were found without C, an initial consonant of the second syllable. These 17 words were found only in groups : N 5 (four words), N6 (6 words), N7 (two words), N8 (5 words) - the biggest numbers of words without C out of all groups, either with initial obstruents or sonorants.

Disyllabic base words with initial obstruent /h/:

This group contains 210 words, of which 108 words belong to pattern N1 (V-V) with short vowels. The vowels of the first syllable of 108 words are: /a/ - 28 words, /e/ - 22 words, /i/ - 20 words, /o/ - 20 words and /u/ - 18. As for C, there are only 7 words out of 108 with /p/, and only 4 words with /w/, but not after [grave] vowels /o/ or /u/. Consonants /p, w/ and vowels /o/ and /u/ are all [+grave]. Out of 108 words, 11 words are without C. The biggest number : four words out of 11, is in the group Vu -V.

Patterns NN 2– 9 contain 102 words, of which the pattern N 9 (V-V) has only one word: *ha.na* vs. ‘alert’. The pattern N9 (V-V), as was already mentioned, has no words in groups with initial / ‘, p, and l/.

Within NN 2-9 patterns of words, the long /a/ prevails in two biggest patterns: N 4 (V-V V) – 17 words and pattern N 2 (V-V) - 6 words. Out of 46 words long / a/ was found in 23 words. Short /a/ was found in 6 words out of 17 words of pattern N5 (V-V V) . Within the biggest patterns the long vowel /u/ was found in 11 words, while long vowels / e/ and /i/ have only one or two words each. There are a bit more examples of short /e/ and /i/ in other NN 2-9 patterns. It differs for /a/ after continuant /h/ as compared to the glottal stop. The vowel’s length seems again, as in the case of words with initial glottal stop, to play a role in the distribution of long and short vowels /a/ and /e/.

Out of 102 words, 10 words do not have C , the consonant of the second syllable, these ten words were found only in patterns NN 4 - 8.

The diphthong /iu/ was found within the first syllable after obstruent /h/: *hiu.a* 1. n. ‘a game like checkers’; 2. vs. ‘menstrual’. Within the second syllable /iu/ was found in words: N 4(V-V V) pattern: *ha.kiu*, *ha.niu*, *ha.liu*, after long /a/, and pattern N5 (V-V V), after short /i/ and /o/: *hi.hiu*, *hi.liu*, *ho.hiu*.

The diphthong /iu/ is the only diphthong discussed here. It became an accidental finding which shed some light on the sound system of Hawaiian when work was done on monosyllabic base words of this language. Within monosyllabic base words it was found after all consonants: obstruents and sonorants, but was not found in words without an initial consonant. In disyllabics it was found within the first syllable only after obstruents: ‘*iu.i*, *hiu.a*, *piu.la*. Within the second syllable it was found after all consonants but only in words which had obstruents as initial consonants. All diphthongs will be discussed separately later.

As for C , it seems that sonorants /m/ and /w/ were much less used in this position than other consonants. Consonants /m,w/ and initial /h/ are all [+grave]. There are 4 words out of 102 with /m/ as C : N4(V-V V): *ha.mau* . v. ‘be silent’; and N6(V V-V) :*hao.ma*. n. ‘name of a fish’; N8(V-V) : *he.mu*. interj. ‘shoo, scat, be off’; N2(V-V) *ho.mi*. vi. ‘withered, stunted’. And there are 2 words with /w/ as C out of 102 words: N4 (V-V V) *ha.wai*. vt. ‘to generate stream, to purify with water’, and N 7 (V V -V) *hai.wa*. vt. ‘to plant far apart, as taro, coconut’ (Rare).

Disyllabic base words with initial obstruent /k/:

This group contains 281 words. Out of this number, 110 words have N 1 (V-V) pattern with short vowels. Patterns NN 2 -9 contain 171 words.

110 N1 (V-V) words within their first syllable have short vowel /a/ in 23 words, short vowel /e/ in 17 words, short vowel /i/ -in 21 words, short /o/ -in 25 words, and short vowel /u/ in 24 words. The smallest number of words has the short mid vowel /e/-17. As for C , the [grave] sonorant /w/ was found as an initial consonant of the second syllable only in 3 words: *ka.wa*, *ke.we*, *ki.wi*, all with identical vowels. Out of 110 words, 8 words do not have C , all groups, except V -V group of 23 words.

Of interest is, that after [low] vowel /a/ and [mid] vowel /o/ of the first syllable, when the second syllable for /a/ before the initial /n/, and for /o/ before the initial glottal stop and /l/ of the second syllable were found with all short final vowels: a,e,i,o,u: ka.na, ka.ne, ka.ni, ka.no, ka.nu; ko.la, ko.le, ko.li, ko.lo, ko.lu.

171 words of NN 2–9 patterns have one word with the long diphthong within the pattern N6 (V V -V): *kai.a*, vi. 1. ‘fast asleep’, 2. ‘to swing, as arms’.

There are three words with the diphthong [iu]: *ko.’iu*, *ka.hiu*, *ka.niu*, all words with patterns N4 (V-V V) and N5 (V-V V), as in words with initial /h/. Both patterns have diphthongs in the second syllable.

The most of the 171 words are in patterns with long vowels within the first syllable: N 2 (V-V) pattern has 53 words, and pattern N 4(V-V V) has 50 words. Both have 103 out of 171 words. Patterns with short vowels within the first syllable have significantly fewer words: N 8 (V-V) pattern has 15 words, and N5 (V-V V) pattern has 14 words.

Of interest is the distribution of mid vowel /e/: long /e/ was found in N 2 (V-V) pattern in 5 words, in N4 (V- V V) pattern long /e/ was found in 6 words. Short vowel /e/ is missing in N 5 (V-V V) pattern and only one word was found with short vowel /e/ within the first syllable of N 8 (V-V) pattern: *ke.ke*, 1. nvi. ‘scolding, shrieking angrily’; 2. vs. ‘bony, skinny’. Long /e/ is used more in these patterns than short /e/. This is different than in words with initial /h/, where it is opposite. The consonant /k/ is a stop, while /h/ is a continuant. Could the length of the front vowels in these cases, after /k/ and /h/, be dictated by the quality of the preceding consonant? As for C , obstruents were found in 99 words, sonorants in 59 words, and 13 words were found with zero consonant as C . C was not found in words of patterns NN 8 (V-V) and 9(V-V). Out of all consonants, the sonorant /m/ was found as C in only 9 words. Both consonants /k/ and /m/ are [+grave]. The feature [grave] limits or prevents the usage of other [grave] consonants or vowels within the second syllable of disyllabic base words. This group of words with initial /k/ is the only group which in patterns NN2-9 contains all 9 diphthongs within either the first or second syllables.

Disyllabic base words with initial obstruent /p/:

This group of words with initial /p/ contains 212 words. Compared with other obstruents, it has a comparatively smaller number of words with N1 (V-V) pattern with short vowels: 94 out of 212 words. NN 2-9 patterns contain 118 words.

Out of 94 N1 (V-V) words, 28 have identical short vowels in both syllables: 7 words with /a/, 6 with /e/, 5 with /i/, 6 with /o/, and 4 with /u/, for ex.: *pu.’u*, *pu.ku*, *pu.pu*, *pu.lu*.

As for C , there are no words with /m/ as C , except: *pu.ma* n. ‘Small opening or door’. There are only 2 words with another [+grave] consonant /w/, as C : *pa.wa*, *pe.wa*. Consonants /p/, /m/, and also /w/ are [+grave]. The feature [grave] limits the use of [+grave] consonants as C . Obstruent /p/, as C , was found but only in words with identical vowels: *pa.pa*, *pe.pe*, *po.po*, *pi.pi*, *pu.pu*.

118 words within NN2-9 patterns do not have words of N 9 (V-V) pattern, the same case as described in the *Hawaiian Grammar* (Elbert and Pukui, 1979) where it is written: “No base exists in the shape CV ‘V’”. To this we will also add words with initial sonorant /l/, as it is shown in Table 1. Within NN2-9 patterns, we find pattern N2 (V-V)

-33 words, and N4 (V - V V) -31 words, having 64 out of 118 words. These two patterns have long /a/ in 18 words, and long /u/ in 18 words, that is in 36 words out of 64. The other 5 patterns have much less than these two. As for C, there are no /m/, and only two words with /w/ as C: N2 (V-V) pattern word *pu.wa* vi. 'to shine, glitter'; N4 (V- V V) pattern word *pu.wai* n. 'a sentinel's call of alarm, a trumpet call, as in war'. Consonants /p, m, w/, as was already mentioned before, are [+grave]. The obstruent /p/ was found as C after all long vowels, except long /e/: in N2 (V-V) pattern: *pa.pa*, *pa.pu*, *pi.pa*, *pi.pi*, *po.po*, *pu.pu*, and there is one word with short /e/: *pe.pei*, rare var. of *paipai*, 'to encourage'. Again we see the role of the vowel's length in the vowel's distribution. Of interest here is that words with initial [+grave] /p/ can have another /p/ as C. Out of 118 words, 8 words are without C in patterns N2 (one word), N4 (one word), N6 (5 words), one word in N8.

This group contains within the pattern N6 (V V -V) a word with a long diphthong: *pao.'o* n. 'name of several varieties of 'o'opu'. It is this pattern N6 (V V - V) that has words with a long diphthong also after initial glottal stop and after /k/. They are identified in Table 1 by the sign: +. Within this group of 118 words there is also a word with diphthong /iu/ within the first syllable: *piu.la* n. 'mule, donkey', and within the second syllable there are 2 words with diphthong /iu/, pattern N4 (V-V V): *po.hiu*, *pu.niu*.

Disyllabic base words with initial sonorant /l/:

This group contains 143 words. Out of this number, 101 words belong to the pattern N1 (V-V) with short vowels; NN2-9 patterns contain 42 words.

In the first syllable of 101 words there are 21 words with /a/, 19 with /e/, 18 with /o/, 23 with /i/, and 20 with /u/. As for C, there were found all consonants except sonorant /w/, which was found only in 3 words out of 101: *la.wa*, *la.we*, *le.wa*, and 5 words are without C: *le.o*, *li.a*, *li.o*, *lo.a*, and *lu.a*, from all groups except the group Va -V.

While sonorant /l/ in pattern N1 (V-V) was found preceding all short vowels in more or less the same number of words, 42 words of p.NN 2-9 present completely different picture. There are no words in patterns N8 (V-V) and N9 (V-V). In the rest of NN 2-9 patterns, most of the words were found in pattern N2 (V-V): 18 words, and in pattern N4 (V-V V): 11 words. They both have long vowels in the first syllable. Together they contain 29 out of 42 words, including 4 words without C. The pattern N3 (V V-V V) contains only one word: *lau.lau*. Other patterns have too few words for analysis.

As for C, there are no words with /m/ as C, and /w/ was found only in one word of pattern N7 (V V-V): *leu.wi* n. 'canoe with extra-wide weatherboard', and there are 6 words without C: in pattern N2(V-V): *la.a*, *la.i*, *li.o*, pattern N4 (V-V V): *la.au*, were mentioned before, and pattern N6 (VV- V): *lau.a*, *loi.o*.

Disyllabic base words with initial sonorant /m/:

This group contains 178 words. It differs from other groups since it has more words in patterns NN2-9: 101 words, than 77 words in pattern N1 (V-V) with short vowels.

Within the first syllable of 77 words with N1 (V-V) pattern, the short vowel /a/ was found in 22 words, while /e/ - in 12, /i/- in 15, /o/- in 16, and /u/ - in 12 words. The biggest group of 22 words with [low] vowel /a/ does not have words without C, while other

groups have 5 such words: *me.a*, *mi.o*, *mo.a*, *mu.a*, *mu.i*. Of interest is, that words after [low] /a/ of the first syllable, followed by the /glottal stop, n, and l/ as C of the second syllable have all short vowels: a,e,i,o,u, following these consonants. Ex.: *ma.la*, *ma.le*, *ma.li*, *ma.lo*, *ma.lu*. The same was found before in Pattern N1 of some other groups. As for C, there is no /p/ a only one word with /w/: *ma.wa*, short for *manawa* 'time' (Rare). Consonants: /m, p, w/ are all [+grave].

101 words with NN 2-9 patterns have most words within 3 patterns: N2 (V-V) -24 words, and patterns N4 (V-V V) and N5 (V-V V), each with 19 words. The last two patterns have a second syllable with a diphthong. Within these patterns there is no long /e/. The short vowel /e/ was found only in two words of N 5 (V- V V) pattern: *me.heu*. nvs. 'track, footprint,' and *me.'eu*. vi. 'rising up'. The pattern N 7 (V V-V) contains only one word: *mau.a*. vs. 'lame, sore', which has no C, the consonant of the second syllable. These 101 words with initial /m/ have 13 words without C, in all patterns except pattern N8 (V-V) and pattern N9 (V- V), both without diphthongs. It is interesting, that pattern N3(VV -V V), with both diphthongs, out of 5 words has three words without C: *Mai.ao*, *mai.au*, *mau.ae*.

As for C, obstruent /p/ was found only in 3 words out of 101: N2 (V-V) *ma.pu*, n. 'ape', N9 (V-V) *ma.pu*. nvs. 'fragrance', and N8 (V-V) *ma.pu* (same as pu, 'rope tied to'). There are 3 words with /w/ as C, but only after long /a/ of the first syllable and diphthongs after C /w/: pattern N4(V-V V): *ma.wae*, *ma.wai*, *ma.wao*. The obstruent /k/ prevails as C. It was found in 29 out of 101 words.

Disyllabic base words with initial sonorant /n/:

This group contains 144 words. Out of these, 98 words have N1 (V-V) pattern with short vowels, while NN 2-9 patterns contain only 46 words.

Within the first syllable of 98 words of N1 (V-V) pattern prevails [low] vowel /a/ in 30 words, while mid vowel /e/ was found in 21 and /o/ - in 20 words. High vowels were found in less words: the high vowel /i/ in 14 words, and high vowel /u/ - in 13 words. Out of 98 words there are 9 words without C, in all five groups. Like sonorant /m/, sonorant /n/ has all short vowels after consonants: /glottal stop, l, n/ of the second syllable. As for C, sonorant /w/ was found only after vowels /a/ and /e/ of the first syllable: *na.we*, *ne.wa*, *ne.we*.

In 46 words of patterns NN 2-9 there are 3 patterns with only one or two words. These patterns are: pattern N3 (VV-VV): *nao.nao* n. 'ants, formicidae'; pattern N7 (V V - V): *nau.a*. n. 'a secret society', *noi.ku*, vt. 'to ask rudely', and pattern N 9 (V -V) has only one word: *ne.wa*, n. 'war club'; v. 'to reel'.

The bigger patterns: N2 (V-V) has 11 words, pattern N6 (V V-V) has 10 words and N4 (V-V V) pattern has 9 words. It seems that in this group of 46 words within patterns 2-9, quite interesting is the distribution of short and long vowels in the first syllable (diphthongs will be discussed later). In 46 words there are only eight words with short vowels. Out of these, in pattern N5 (V-V V), there is only one word with short /i/: *ni.au*, vi. 'moving silently, swiftly', without C, and only one word with short /u/: *nu.'ao*. There are 18 words with long vowels. The long [low] vowel /a/ was found in 8 words (patterns N2 and N4), the long vowel /i/ was found in 5 words of pattern N4 (V-V V). Other vowels, long /e, o, u/, were found in only two words each.

Of interest here is that in monosyllabic base words there are no words with long /i/ after initial sonorant /n/, and other Polynesian languages also do not have long /i/ after initial sonorant /n/. In Hawaiian, as it was said above, within 46 words of patterns NN 2-9 there are only eight words with short vowels. Out of these 46 words, there is only one word with short /i/ and five words with long /i/. As for C, /m/ is absent, and /l/ and /p/ were found only in one word each: *nou.lu*, pattern N6(V V -V) var. of *loulu* 'a palm'; and *na.pai*, pattern N4(V-V V) same as *napa* 1. As C prevail glottal stop / ' / -12 words, / n/ itself - 11 words -it is half of all words.

Disyllabic base words with initial sonorant /w/:

This group contains 58 words. Out of these, 40 words have N1 (V-V) pattern with short vowels. NN 2-9 patterns have only 18 words.

40 words of pattern N1(V V) have 16 words with vowel /a/, 14 with [mid] vowel /e/, 7 words with [front, high] vowel /i/ and 3 with [mid] vowel /o/. The [+high,+grave] vowel / u/ is absent. Out of 37 words, 13 words have identical vowels: /a/ - 5 words, /e/- 4 words and / i/ - 4 words.

It is of interest, that while in all groups pattern N1 (V-V) usually has all short vowels present within the first syllable, here, after initial [grave] sonorant /w/, there are no words with [high, grave] vowel /u/, and only three words with [grave] vowel /o/.

As for C, [grave] consonants /p/ and /m/ are absent, the same as [grave] vowel / u/. The feature [grave], as we see it in all previous material, plays an important role in the distribution of consonants and vowels in the Hawaiian sound system. It limits or prevents the usage of another [grave] consonant or a vowel within the second syllable of disyllabic base words. There are 2 words without C: *we.o* and *wo.a*, both with [mid] vowels after / w/. This small group of words has 10 words, which, after /wa/ and /we / of the first syllable, after sonorant /l/ of the second syllable have all short vowels: a,e,i,o,u: *wa.la*, *wa.le*, *wa.li*, *wa.lo*, *wa.lu*; *we.la*, *we.le*, *we.li*, *we.lo*, *we.lu*. In other groups, as it was shown in words with initial /m/ and /n/, all short fine vowels were found after /a/ and, sometimes, after /o/ before /l/, glottal stop / ' /, and /n/.

18 words of NN 2-9 patterns do not have words in pattern N5: (V-V V). Three patterns: N 7 (V V - V), N 8 (V-V), and N 9 (V-V) have one or two words within each one: N 7(V V-V): *wai.ki*, 'waiter'; N 8(V-V): *wa.hi*. There are 4 words with diphthongs in both syllables: pattern N3 (V V-V V): *wai.lau*,. n. 'large leaf bundles of food'; *wai.wai*. nvs. 'goods, property'; *wai.hae*. n. (Maui term), *wai.hau*, nvt. 'a small, tight bundle' (Rare).

As for C, there is neither /m/ nor glottal stop. More often as C were found: /w/- in 5 words and /h/ - in 4 words. There is one word with /p/ in C position: pattern N7 (V V -V) *wai.pa*. n. 'request, prayer, as to the gods'. Of interest here is that while [+grave] sonorant /w/ does not have [grave] /m/ as C, it has as C: /w/, /h/ and /p/, which are also [+grave] consonants. Hence, [grave] consonant /w/ differs from all other [grave] consonants, both sonorants and obstruents.

A small number of words within NN 2-9 patterns makes it difficult to analyze.

Table 3
Disyllabic base words with diphthongs within
the first, both or second syllable

‘	V V - V	12+1		V - V V	29
			V V - V V	7	
‘	V V - V	8		V - V V	17
h	V V - V	14		V - V V	17
			V V - V V	6	
h	V V - V	6		V - V V	26
k	V V - V	18+1		V - V V	14
			V V - V V	7	
K	V V - V	9		V - V V	49
p	V V - V	14+1		V - V V	14
			V V - V V	3	
P	V V - V	6		V - V V	31
l	V V - V	7		V - V V	2
			V V - V V	1	
l	V V - V	3		V - V V	11
m	V V - V	16		V - V V	19 +
			V V - V V	5	
m	V V - V	1		V - V V	19
n	V V - V	10		V - V V	6
			V V - V V	1	
n	V V - V	2		V - V V	9
w	V V - V	5		V - V V	0
			V V - V V	4	
w	V V - V	2		V - V V	3
0	V V - V	7		V - V V	11
			V V - V V	2	
0	V V - V	6		V - V V	3

Table 3 shows 465 words with diphthongs within the first, second, or both syllables. They were organized as follows: patterns of words with diphthongs within the first syllable were written on the left side of the table, patterns of words with diphthongs within the second syllable were written on the right side of the table, patterns of words with diphthongs in both syllables were placed in the middle. The initial consonants, C or 0, are written on the left edge of the Table 3.

Pattern N 6 of words with short vowels within the second syllable: (V V –V) was written above the pattern N 7 of words with long vowels within the second syllable: (V V –V). Correspondingly, pattern N 5, with short vowel within the first syllable: (V –V V), was written above the pattern N4 with long vowel within the first syllable:(V –V V). For example:

k	V V - V - 18 +1	V V - V V -7	V - V V - 14
k	V V - V - 9		V - V V - 49

The pattern N3 of words with diphthongs in both syllables is written between them. All these words begin with an obstruent /k/ written on the left. The C or 0 could be found in the Table 2. The number on the right of the patterns shows the number of words found within this pattern. Words without an initial consonant are shown as follows:

0	V V - V - 7	V V - V V - 2	V - V V - 11
0	V V - V - 6		V - V V - 3

All these five groups of words are without an initial consonant, marked by zero: 0.

The analysis of Table 3 shows that out of 465 disyllabic base words with diphthongs within the first, second, or both syllables, 310 words begin with obstruents, 126 words begin with sonorants, and 29 words are without an initial consonant. As for the placement of diphthongs, out of these 465 disyllabic base words, most of the words – 280 - have diphthongs in the second syllable, 149 words have diphthongs in the first syllable, and only 36 words have diphthongs in both syllables.

In Table 3 there are three words written by hand at the right side of the pattern N 6. They have long diphthongs in the first syllable: '*ai. na, kai. a, and pao. 'o*. They all begin with obstruents and all have short vowel in the second syllable. These words are marked in Table 1's pattern N6 (VV –V) by the /+/- sign.

There are also three words written by hand at the left side of the Table 3: '*iu.i, hiu.a, piu.la*, and they also begin with obstruents: ', h, p. These are the only words with diphthong /iu/ in the first syllable. The diphthong /iu/ was found also in the second syllable of fifteen words. These words are written by hand at the right side of the Table 3, since they all were found in the second syllable of patterns N4 and N5, with C being obstruent or sonorant. However, it was found that the first syllable of all these words with /iu/ begins with an obstruent, and this seems to be a very important finding.

There is also one word with a long diphthong marked by + in the pattern N5 (V-V V): *ma.kau*. However, this word has a long diphthong in the second syllable and in the dictionary it is shown: Var. of *makaau*, which is a three-syllable word.

For 465 words in Table 3 with diphthongs, most important is the position of diphthongs: are they within the first syllable (149 words), the second (280 words), or in both syllables (36 words).

The last group of 36 words is the smallest one of these three groups. The most interesting feature of this group is that within diphthongs in both syllables, the [low] vowel /a/ prevails as V of VV diphthong: in 33 words out of 36. And only 3 words out of

36 have [mid] vowels /e/or /o/ as V of VV after C : *hei.au*, *hei.hei*, and *hoi.hoi*. All these tree diphthongs follow the glottal continuant /h/. Within the second syllable, 31 out of 36 words have [low] vowel /a/ as V. Only 5 words out of 36 have [mid] vowels /e/ and /o/ as V of VV after C of the second syllable: *hei.hei*, *kau.lei*, *hoi.hoi*, *hau.koi*, *pae.heu*. In these words there is no diphthong /ou/. Out of 36 words, 17 have the same diphthongs in both syllables, and 12 words have the same consonants as C and C : ‘*ai*.’*ai*, ‘*ao*.’*ao*, *hei.hei*, *hoi.hoi*, *kae.kae*, *kao.kao*, *kau.kau*, *pae.pae*, *lau.lau*, *mao.mao*, *nao.nao*, *wai.wai*. In these words there are all obstruents: /’ , h, k, p/, and all sonorants: /l, m, n, w/. Also there is one word without consonants: *ae.ae* nvi. ‘a prolonged sound, wail’. Hence, even such a small group can present quite interesting material on the distribution of sounds in Hawaiian.

As for other four groups of 465 words, the most important fact is: whether the word begins with an obstruent, sonorant, or is without an initial consonant. They are presented separately in Table 4. It contains:

- a/ pattern N 6 (V V - V): diphthongs of the first syllable are followed by the short vowels of the second syllable;
- b/ pattern N 7 (V V -V): diphthongs of the first syllable are followed by the long vowels of the second syllable;
- c/ pattern N 5(V -V V): short vowel of the first syllable is followed by the diphthongs of the second syllable;
- d/ pattern N 4 (V - V V): long vowel of the first syllable is followed by the diphthongs of the second syllable.

Table 4 is presented on a separate page 16 a, written by hand.

Table 4 presents separately diphthongs of patterns N6 and N7, from diphthongs of patterns N5 and N4. Within each pattern there are nine lines of diphthongs of words: one line with initial zero (0), 4 lines with initial obstruents: /’ , h, k p /, 4 lines with initial sonorants: / l, m, n, w/ and, at the right end of each line – in “ a frame”- missing diphthongs. The number of words with each particular initial 0 or C is written before these C or 0 .

It is easy to note that pattern N 7 (V V –V) with a long vowel in the second syllable, has the smallest number of diphthongs out of all 4 patterns: 43. It also has the largest number of missing diphthongs: 48. There are two times fewer diphthongs in lines of words with initial sonorants than in lines with initial obstruents. But most of these diphthongs have the [low] /a/ as V of V V diphthongs.

The 6 words with initial 0 (zero consonant) have 5 words with the diphthong /au/ and one word with /oi/. The rest of the diphthongs are missing.

29 words with initial obstruents: /’ , h, k, p/ have 14 words with diphthong /ai/ , 13 words with /au/, all with the [low] vowel /a/ as V of V V , and only one word with diphthong /ei/ and one word with /ou/, that is [mid] vowels /e/ and /o/ as V of V V .

Eight words with initial sonorants /l, m, n, w/ have 4 words with the diphthong /au/, 2 words with /ai/, and only 2 words with /eu (after /l/) , and oi (after /n/, that is with /mid/ vowels /e/ and /o/ as V of V V . The rest of diphthongs are missing.

It seems that this group of words with a pattern which has a LONG VOWEL within the second syllable, because of its structure: a diphthong in the first syllable and a long vowel

in the second syllable, is the most limited: it can have only a particular set of possible sounds: diphthongs /ai, au/ after obstruents and either /au/or /ai/ after sonorants and 0 . All these words are even more limited in having diphthongs with [mid] vowels /e/ and /o/ as V of V V. They have : diphthong /ei/ after initial /h/, /eu/ after /l/, /oi/ after /n/ and diphthong /ou/ after glottal stop /ʔ/. Only four diphthongs with [mid] vowels as V of V V for 43 words.

Pattern N 6 (V V – V), which has a SHORT VOWEL in the second syllable, has more diphthongs in the first syllable of all groups of words: with initial 0, initial obstruents and sonorants: 104. They have from two (after /l/ and /n/) to four diphthongs (after /h/ and /k/) with initial /a/ as V of V V, and from two to three diphthongs with /e/ and /o/ as V of V V . There are fewer missing diphthongs: 28. Most often it is /eu/ in 8 lines of words out of 9, and /ao / in 4 lines out of 9. The difference in the structure of words is the most visible in disyllabic base words with diphthongs within the first syllable and short and long vowels within the second syllable. As a result, there are 104 words with a short vowel (V V-V) and 43 words with a long vowel in the second syllable (V V- V).

While Albert J. Schutz (personal communication) pointed out that the diphthong /ao/ is disappearing in some Polynesian languages, in Hawaiian /ao/ is absent in 4 lines of words in the pattern N6, and is absent in all words of the Pattern N7, yet /ao/ was found in Hawaiian, especially in words with initial obstruents, in patterns N 5 and N4 of the Table 4.

Words of patterns N5 (V-V V) and N4 (V-V V) have diphthongs in the second syllable and in the first syllable they have a short vowel in the pattern N5 and a long vowel in the pattern N4. 266 words of patterns N5 and N4 are very different from 147 words of patterns N 7 and N6 not only in the number of words, but, first of all, in the number of diphthongs found in the second syllables of words pattern N5 and N4 with INITIAL OBSTRUENTS. These words have all diphthongs with the [low] vowel /a/ as V of V V (except no /ae/ after /p/), and some words of pattern N5 have one or two diphthongs with /e/ and /o/ missing. However, in words with INITIAL SONORANTS many diphthongs in the second syllable are missing, except in words with initial sonorant /m/. Words with initial sonorant /m/ of the patterns N5 and N4 have all diphthongs except /eu and ou / in the pattern N4. They have the same number of diphthongs as words with initial obstruents. Other words with initial sonorants of patterns N5 and N4 should be considered separately. After initial sonorant /l/ in the pattern N5 only 2 words were found with diphthong /au/, and, in pattern N4, 11 words were found with diphthongs:/ai, au, ei/. Only 15 words were found within both pattern N 5 and N4 of words with initial sonorant /n/ There are no words with initial sonorant /w/ within the pattern N5, and only three words with /ae / and /eu/ were found in the pattern N4.

As for WORDS WITHOUT AN INITIAL CONSONANT, marked by 0 , Table 4 shows that in pattern N5 (V–V V) they have the same diphthongs as words of the same pattern with initial obstruents, only diphthong /eu / is missing.

In pattern N4 (V–V V), after the syllable with long vowel, the group without an initial consonant, has the same number of words (that is only half of the diphthongs with /a/ as V of the V V) as words of the same pattern with initial sonorants (except /m/). But it misses all diphthongs with /e/ and /o/ as V of V V.

In pattern N6 (V V-V) words without an initial consonant are closer to words of the same pattern with an initial obstruent: they have 5 out of 8 diphthongs, while in pattern

N7 they are close to words of the same pattern with initial sonorants: they have only 2 out of 8 diphthongs. The rest are missing.

Hence, the words without an initial consonant before or after SHORT vowels of the other syllable are closer in the number of diphthongs to words with initial OBSTRUENTS (patterns N5 and N6), while before or after LONG vowels of the other syllable they are closer in the number of diphthongs to words with initial SONORANTS (patterns N7 and N4).

Table 4 presents extremely interesting material for further research of vowel length and diphthongs in Hawaiian.

All this material shows how important the division of consonants into obstruents and sonorants is, as is the division of words into three groups: without initial consonant, with initial obstruent, and with initial sonorant. Also important is the placement of diphthongs in the word: whether it is in the first syllable or the second. Also, important is the length of the vowel of the other syllable, first or second.

CONCLUSIONS

As was already stated (see page 1), “The phoneme combinations in every language are governed by laws and rules valid only for the particular language”, Trubetzkoy, 1969:248. The purpose of this study was to find laws and rules governing the distribution of consonants and vowels in Hawaiian. This language is especially interesting, since it has one of the smallest inventories of consonants out of all Polynesian languages: eight consonants, while Tongan has twelve (see Lynch, 1998: 78).

Part I of this study was concerned with the analysis of 108 monosyllabic base words found in the *Hawaiian Dictionary* (Pukui and Elbert, 1986) and the comparison of these words with corresponding words in Maori, Tahitian, Tongan, and Samoan languages found in Tregear’s *Dictionary of 1891/1969* and in other dictionaries of these languages. This comparison shows how close these languages are. However, the most significant finding was the realization that the voicing is distinctive in these languages. It became clear that consonants of Polynesian languages, be it eight in Hawaiian, the smallest number, or twelve in Tongan, the largest number (see other languages in Krupa, 1982: 24-27) consist of two distinct groups of consonants, divided by the distinctive feature [+/- voice]: sonants and obstruents. As for Hawaiian, consonants /l, m, n, w/ are sonants, they are voiced, while consonants /k, h, ‘, p/ are voiceless, and, as such, are obstruents. Here we use the term sonorants instead of sonants used by Krupa, 1982. In ‘*The Sound Pattern of English*’ (1968:85 note 34, 223) Chomsky and Halle write that “The feature “sonorant” is redundant in English, though not in all languages. It distinguishes vowels, liquids, glides, nasals’ from obstruents. Ladefoged (1971:109) writes: “Our definition makes voicing prerequisite for sonorants”. In Hawaiian, and in all Polynesian languages, this division of consonants into [voiceless] obstruents and [voiced] sonorants is of the most importance, as became obvious during this analysis.

In monosyllabic base words obstruents were found preceding all long vowels and all diphthongs (except: no diphthong /ei/ after the glottal stop), while sonorants were found to be more limited in their use with long vowels and diphthongs.

However, the Hawaiian language differs from all other Polynesian languages (see table 1 in Krupa, 1982:18-19) in that, it became the only Polynesian language in which the [-grave] consonant /t/ was replaced with [+grave] consonant /k/, although not in all dialects. As it was found in this analysis, the feature [grave] plays a very important role in the distribution of vowels and consonants in Hawaiian. Especially it became obvious in case of monosyllabic base words without an initial consonant. These words without an initial consonant can have only [+grave] long vowels /o, u / and /a/ and their diphthongs. (Wardhaugh,1972: 46 considers /a/ to be a [grave] vowel.) In disyllabic base words, when initial consonant (C) is a [+grave] consonant , it can limit or prevent the usage of another [+grave] consonant as C of the second syllable.

The other important finding was the understanding of the role and the presence of the initial consonant in base words. In all Polynesian languages there are base words with initial consonants (C) and words without an initial, or zero (0), consonants. The very fact that there are monosyllabic and disyllabic base words without an initial consonant and that there are disyllabic base words without any consonant, C and C (see Table 2), speaks against phonological inventories considering mainly consonants within the sound systems of languages and paying no attention to short and long vowels and diphthongs.

Hence, the analysis of 108 monosyllabic base words helped to find out the division of consonants into sonorants and obstruents, and to see the importance of the presence or absence of initial consonants. The analysis of 1595 disyllabic base words helped to see not only the importance of above findings, but also revealed how very important is whether the syllable within the word is the first or the second one, and, most of all , to see the decisive role and the place of vowels and diphthongs within the sound system of such open-syllable languages as Hawaiian.

While monosyllabic base words have only long vowels or short diphthongs, disyllabic base words can have within both syllables of these words all short and long vowels and short and long diphthongs.

Part II of this study analyzes the distribution of consonants and vowels in 1595 disyllabic base words of Hawaiian. This part contains 4 Tables.

Table 1 shows, on the left edge of it, all initial consonants (C): obstruents and sonorants and, by zero (0), the absence of initial consonants in 1595 disyllabic base words. The top of the Table 1 displays nine patterns of nuclei of these 1595 words: N1(V-V), N2 (V- V), N3 (V V -V V), N4 (V -V V), N5 (V -V V), N6 (V V -V), N7 (V V -V), N8(V -V), N9 (V - V). The number below of each pattern shows how many words are with this pattern and with the consonant (or zero) on the left. Hence, these patterns reveal the distribution of vowels and diphthongs within disyllabic base words.

This table also shows that 828 words out of 1595 words have short vowels in both syllables, 194 words have long vowels in both syllables, and only 36 words have diphthongs in both syllables.

Table 2 shows (C), the initial consonants of the second syllable: are they obstruents or sonorants, or (0), that is, the absence of the initial consonant of the second syllable of these 1595 words.

Tables 1 and 2 show that SHORT vowels prevail, they are more often found in both syllables of disyllabic base words: in 828 out of 1595 words. Within the first syllable short vowels were found in 203 words, in the second – in 122 words.

LONG vowels, as was already stated, characterize monosyllabic base words, while in disyllabic base words they were found in both syllables of 194 words out of 1595. Within the first syllable – in 185 words, while in the second syllable long vowels were found in 134 words.

DIPHTHONGS most often were found within the second syllable of 280 out of 1595 words, within the first syllable - in 149 words, while in both syllables they were found only in 36 words.

Table 2 presents initial consonants (C) or the absence of the initial consonant as (0) of 1595 disyllabic base words. Out of this number 850 words have an obstruent as C; 606 words have a sonorant as C, and 139 words do not have an initial consonant of the second syllable, marked as 0.

Table 3 contains 5 patterns of nuclei of 465 disyllabic base words with diphthongs within the first, second, or both syllables. They were organized as follows. Patterns of words with diphthongs in the first syllable were written on the left side of the table. Patterns of words with diphthongs in the second syllable were written on the right side of the table. Patterns of words with diphthongs in both syllables were placed in the middle. The initial consonants (C or 0) are written at the left edge of the table 3. The numbers to the right of each pattern show the number of words found with this particular pattern, for example :

L (V V – V) – 7, means, that there are 7 words with the initial sonorant /l/, which have a diphthong in the first syllable and a long vowel in the second.

For 645 words in Tables 3 (and 4) with diphthongs, most important is the position of diphthongs : are they within the first syllable (149) words, the second (280) words or in both syllables (36) words.

Table 4, written by hand, presents only the rising diphthongs of four patterns with diphthongs within the first and within the second syllables, and also indicates “ in frames” the missing diphthongs in each particular pattern.

Within each pattern there are 9 lines of diphthongs of words : one line with initial zero (0), 4 lines with initial obstruents : /t, h, k, p/, 4 lines with initial sonorants: /l, n, m, w/, and , at the right end of each line - in “ a frame” - missing diphthongs.

It was easy to note that pattern N7 (V V -V) has the smallest number of diphthongs in 2 all 4 patterns. It also has the largest number of missing diphthongs. There are two times fewer diphthongs in lines of words with initial sonorants than in lines with initial obstruents. As for words without an initial consonant, marked by zero (0), Table 4 shows that in pattern N5 (V -V V) they have the same diphthongs as words of the same pattern with initial obstruents, only diphthong /eu/ is missing. In pattern N4 ((V-V V) the group without an initial consonant (0) has the same number of words as words of the same pattern with initial sonorants (except /m/), but it misses all diphthongs with /e/ and /o/ as V of V V.

The analysis of 1595 disyllabic base words revealed the differences in the distribution of consonants and vowels within the first and the second syllable, also the difference between the presence or absence of the initial consonant in one of the syllables or in both of them. It became possible to see the role of the vowel's length and the role of diphthongs and their place within the first, second, or both syllables of words in such an open-syllable language as Hawaiian.

For the distribution of short and long vowels and diphthongs, the most important considerations are: the presence or absence of an initial consonant and its quality: is it an obstruent or sonorant and is it [+grave] or [-grave], and also whether the syllable is the first or the second within the word. This could be best shown in the example of words with the diphthong /iu/.

Words with /iu/ are written by hand at the left and at the right side of the Table 3. The diphthong /iu/ was found within the first syllable of only three words of the pattern N 6 (V V –V): *'iu.i*, *hiu.a* and *piu.la*. They all have a short vowel within the second syllable, and all these words begin with obstruents: / ' , h, p/. Within the second syllable of disyllabic base words, the diphthong /iu/ was found in fifteen words. After obstruents: *'a.kiu*, *'a.hiu*, *'u.kiu*, *hi.hiu*, *ho.hiu*, *ha.kiu*, *ka.hiu*, *ko.'iu*, and after sonorants: *'o.niu*, *hi.liu*, *ha.niu*, *ha.liu*, *ka.niu*, *po.niu*, *pu.niu*. However, in all these fifteen words as the initial consonants (C) of words were found only obstruents: / ' , h, k, p/.

The diphthong /iu/, consisting of two high vowels, differs from all other diphthongs in that it was found only after an initial consonant in monosyllabic base words (and was not found in words without an initial consonant). As it is shown above, in disyllabic base words it was found either in the first syllable after obstruents (three words), or within the second syllable after both obstruents and sonorants, but only when the first syllable begins with an obstruent. There is no diphthong /iu/ in disyllabic base words beginning with sonorants. The diphthong /iu/ demonstrates the importance of the division of the Hawaiian consonants into voiceless obstruents and voiced sonorants and the role this division plays in the quite complex system of distribution of vowels and diphthongs in this language. Words with the diphthong /iu/ were not included inside of the Table 3 since /iu/ behaves differently than eight rising diphthongs, as they called in the Hawaiian Dictionary, 1986. As Tables 3 and 4 show, the distribution of these EIGHT rising diphthongs depends on the place within the disyllabic base words: are they in the first or in the second syllable and also they depend on the length of the vowel of the other syllable: is it the long one (patterns N 7 and 4) or is it a short one (patterns N 6 and 5). But the diphthong /iu/, as was shown above, depends on the presence (in monosyllabic words) and the quality of consonants: are they voiceless obstruents or voiced sonorants. To differentiate between the EIGHT rising diphthongs and the diphthong /iu/, the diphthong /iu/ might be called the NINTH diphthong, as it is called in one place of the article by A.J Schutz, 1981 : “A Reanalysis of the Hawaiian Vowel System”.

To sum up, the Hawaiian sound system, which has only 8 consonants, contains a very intricate and complex system of relationships between these consonants and short and long vowels and diphthongs within the first and second syllables of base words. It shows the crucial importance of the presence or absence of an initial consonant, and the quality of this consonant: is it a voiced sonorant or voiceless obstruent, and whether it is [+grave] or [-grave], in case of C and C consonants of disyllabic base words. Most significantly, this study reveals the interdependence of consonants and vowels (short, long and diphthongs) within the Hawaiian sound system. This interdependence plays a decisive role in the quite refined and complex distribution of consonants and vowels in monosyllabic and disyllabic base words of this Polynesian language.