Disyllabicity in Nuuchahnulth[*]

Sunghwa Lee
University of Victoria

1.   Introduction

As a disyllable can be either bimoraic or trimoraic, a disyllabic unit unlike bimoracity is not always equivalent to foot structure in a quantity-sensitive language. The disyllable seems nonetheless to be a phonological unit, since morpho-prosodic size restrictions on the disyllable have been observed cross-linguistically (Inkelas & Orgun 1995; Inkelas & Zoll 2005; Itô 1990; Itô and Mester 1995; Kager 1996; McCarthy & Prince 1990; Organ & Inkelas 1992; Ussishkin 2000). The Southern Wakashan languages show phonological salience of the initial disyllable of each word compared to the third and later syllables (Wilson 1986, Werle 2001). Various studies notice this salience, but there have not been many works to determine what kind of unit it is and what its properties are. This study, therefore, has two purposes: First, I verify the salience of the initial disyllable in Nuuchahnulth, a Southern Wakashan language spoken along the Westcoast of Vancouver Island. I will do so by examining specific phonological processes such as stress assignment, lengthening of variable length vowels, and suffix-triggered vowel lengthening/ shortening. Second, I propose a metical structure of Nuuchahnulth based on the discussion of phonological salience of the first disyllabic unit.

Accounting for a metrical structure of Nuuchahnulth is challenging in that this language includes foot shapes such as (H l)$_F$[1] and (H h)$_F$, which are not assumed by many researchers (Hayes 1981, 1987, 1995; McCarthy and Prince 1986, 1990; Prince 1991). I discuss the need to reintroduce an uneven trochaic foot, i.e., (H l)$_F$. Furthermore, because primary stress in Nuuchahnulth is assigned restrictedly within the first disyllable and primary stress falls on the

first heavy syllable, following Crowhurst's (1991) foot inventory I propose that this heavy syllable sequence constitutes one foot (H h)$_F$. This study also presents an interesting aspect with respect to foot typologies. Unlike many languages, Nuuchahnulth attests two types of feet, trochees and iambs (Kim 2004). I examine languages which show two foot typologies in one language and conclude that it is in fact not that unusual to have both foot types in a single language.

This paper is organized as follows. In section 2, I discuss disyllabicity and provide background information about the Nuuchahnulth language. Section 3 describes phonological processes in Nuuchahnulth that occur exclusively within the first disyllable, such as stress assignment, variable length vowels, and vowel lengthening/shortening. In section 4, I discuss the metrical structure of Nuuchahnulth. Section 5 summarizes and concludes.

2.   Preliminaries

This section provides background information that is required for the following discussions in this paper, which includes concept of disyllabicity and basic linguistic information about the Nuuchahnulth language.

2.1   Disyllabicity

Many languages make reference to the initial disyllable with respect to morpho-prosodic sizes. Some languages are required to have minimally disyllabic words (Japanese word clippings: Itô, 1990; Axinnica Campa reduplication: McCarthy & Prince, 1993; German infinitives: Itô and Mester, 1995; Turkish stems: Orgun & Inkelas, 1992; Inkelas & Orgun, 1995; Ndebele imperatives: Inkelas & Zoll, 2005). Other languages such as Arabic and Modern Hebrew need to have maximally disyllabic words (Arabic canonical noun roots: McCarthy & Prince, 1990; Modern Hebrew verbal paradigm: Ussishkin, 2000).

While the disyllable of the above languages is a domain of the phonology-morphology interface, if it is the case that the phonology of a language makes continuous reference to the disyllable, then the disyllable would be a solely prosodic constituent of the language. The disyllable as a prosodic unit can be identical to a foot in a quantity-insensitive language. It can also be larger than a foot in the Prosodic Hierarchy (Selkirk 1984, Nespor and Vogel 1986) for a quantity-sensitive language, since the disyllable can comprise two feet. Guugu Yimidhirr is an example of a language that the disyllable is a phonological unit higher than a foot in prosodic hierarchy. Kager (1996) reports that the phonology of Guugu Yimidhirr requires an exact disyllable, providing evidence of processes occurring exclusively within the initial disyllable: long vowels; suffix-triggered vowel lengthening; rhythmic alternation that copies this domain. He proposes that the disyllable in Guugu Yimidhirr is a recursive prosodic word, higher than a foot in prosodic hierarchy.

Nuuchahnulth is another useful language to examine whether the initial

disyllable is a purely phonological unit; and if it is, what that unit is. Interestingly, even though Nuuchahnulth is a quantity-sensitive language, the initial disyllable, which is a purely phonological unit, can be equivalent to a foot. This is because stress is assigned only once on either syllable of the initial disyllable. Along with evidence of other phonological processes occurring in this domain, I propose that the initial disyllable in Nuuchahnulth is a phonological unit equivalent to a foot. In the remainder of this section, I provide morphological and phonological background information of Nuuchahnulth.

2.2   Background Information on Nuuchahnulth

Nuuchahnulth is a Southern Wakashan language spoken along the West coast of Vancouver Island. The data used in this study are drawn from various sources. The sources use either Ahousaht (central dialect) or Tseshaht (southern dialect). The former includes my field work with Mary Jane Dick in 2007, Kim (2003), and Nakayama (2001). The later includes the works of Sapir and Swadesh (1939, 1955) and Stonham (1999, 2004) who worked on the southern dialects, mostly Tseshaht.

Nuuchahnulth is rich in consonants like most other indigenous languages of the Northwest Coast. Most stops, affricates, and sonorants have their glottalized counterparts. In contrast, the vowel system is relatively simple. Three vowel qualities are phonemically distinctive: /i, u, a/. Vowel length is distinctive in Nuuchahnulth; each vowel has short and long pairs, which are considered to be underlying phonemes. The minimal pairs in (1) demonstrate the vowel length distinctiveness clearly.

(1)   yač̓   'dogfish'   ya:č̓   'warped, bent out' (Stonham 1999: 33)
       wa   'to coil'   wa: 'to say'
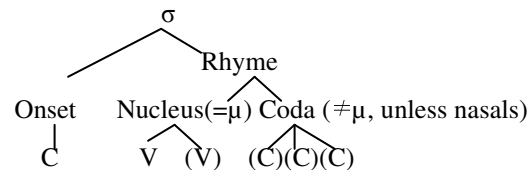   mas   'healed up'   ma:s   'baking on open fire'

In addition to the phonemic vowels, Nuuchahnulth has a 'variable length vowel', which can be realized as either long or short depending on syllable location: long within the first two syllables, and short elsewhere. I will discuss the variable length vowel in section 3.2.

2.2.1   Syllable Structure

A syllable in Nuuchahnulth must have one and only one onset consonant and a nucleus vowel. Unlike the onset which does not allow clusters, coda position allows up to three consonants in a row (Stonham 1999, 2004). While there is no constraint on what can occur in onsets, not all consonants can occur in coda position. None of the glottalized consonants or /h/ occurs in coda position. All vowels are moraic, but coda consonants do not have moraic status with the exception of nasals (Stonham 1999, 2004; Wilson 1986). Following the assumption of Wilson (1986) and Stonham (1994, 2004) that nasals are moraic,

I suggest that a syllable structure in Nuuchahnulth is as follows.

(2)   Syllable Structure

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                      σ
                     / \
                    /   Rhyme
                   /    /\
        Onset  Nucleus(=µ) Coda (≠µ, unless nasals)
          |      /\        /\
          C     V  (V)  (C)(C)(C)
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2.2.2   Word Formation

As a polysynthetic language, Nuuchahnulth words are formed by adding suffixes to a root. A root comes in the leftmost position except in the case of reduplication; in this case, reduplicants may precede the root. In terms of size, roots can be monosyllabic or multisyllabic as demonstrated in (3).

(3)   a.   Monosyllabic roots   b.   Multisyllabic roots
           wik   'not, nothing'   namaak   'taboo'
           mi𝛌   'raining'   ǩaaʔin-   'crow'
           nas   'rope like thing'   n̓uw̓iˑqsu   'father'
           (Sapir and Swadesh 1939)

It is worth noticing that roots can be monosyllabic or multisyllabic, because this fact will lead us to the conclusion that the domains of phonology and morphology are not necessarily isomorphemic in Nuuchahnulth. The lack of phonology-morphology isomorphism can be found cross-linguistically (Alderete 2003; Czaykowska-Higgins 1988, 1998; Cohn 1989; Rice 1993 among others).

It is not very clear what the term 'words' means with respect to Nuuchahnulth. In Nuuchahnulth, roots usually cannot stand alone and are built with the addition of affixes. However, there are no clear boundaries between a word, a phrase, or a clause. For example, *čapac* 'canoe' is a noun which can be both a free and bound root. A phrase is built by affixing a lexical suffix *–'aˑp* 'buying' as illustrated in (4a). Furthermore, as can be seen in (4b), a clause can be built by adding a grammatical suffix *–s* '1st person pronominal'.

(4)   a.   čaapačap   b.   čapačuɫs
           čapac –'aˑp   čapac –'uuɫ -s
           canoe -buying   canoe   -owning -1st
           'buy a canoe.'   'I own a canoe.'
           (Nakayama 2001: 23)   (Nakayama 2001: 20)

For the purpose of stress assignment, the term 'words' in this study includes a phrase, a clause, and a single root if it can stand alone.

3. The Salience of Initial Disyllable

This section examines three phonological processes that occur restrictively within the first two syllables, which include stress assignment, behavior of variable length vowel, and vowel length adjustment, and discusses the salience of this unit.

3.1 Stress

Primary stress in Nuuchahnulth is a source of evidence that the first two syllables form some kind of constituent. Primary stress comes on the first syllable, but stress falls on the second syllable if the first syllable is light and the second syllable is heavy (Stonham 1999; Waldie 2003; Werle 2002; Wilson 1986). A heavy syllable includes a syllable with a long vowel or a nasal coda (CVV, CVN). The heavy syllable occurring on the third syllable or later does not get primary stress as can be seen below; rather primary stress falls on the first light syllable.

(5)　　H l　ˈẅaaʔaƛweʔinƛaa　‘they said it again’　　(Stonham2004: 267)
　　　　L l　ˈtanakmiičiʔaƛ　　‘turned into mosquitoes’　(Stonham 2004: 15)
　　　　H h　ˈḥiiỷiiḥ　　　　　‘be after blood’　　　(Stonham 2004: 15)
　　　　l H　ṅuˈẅiiqsakʔiʔaɫ　‘they…to their father’　(Stonham 2004:213)

Determining secondary stress is not an easy task, and there have been controversies on secondary stress (Stonham 1999, Waldie 2003, Werle 2002, Wilson 1986). Since the phonetic realization of secondary stress in Nuuchahnulth is uncertain, for the present study I do not consider the presence or absence of secondary stress. However, if it turns out that secondary stress does occur in Nuuchahnulth, this fact would not undermine the purpose of the current study. For my purposes, it is sufficient to focus on primary stress and the domain of the primary stress: The account of a foot structure of the initial disyllable will not be affected by secondary stress, because the secondary stress, if any, would occur on the third or later syllable.

3.2 Variable Length Vowels

Variable-length vowels (VLVs) provide the second type of evidence that the initial disyllable of Nuuchahnulth is salient and therefore might constitute a phonological unit. A VLV behaves differently depending on where it occurs in a word: it is realized as a long vowel in the first two syllables of words, but realized as a short vowel when it is in the third or later syllable of words. For example, a VLV such as that in–*naˑkʷ* in (6) is manifested long in the first two syllables of a word as in (6a), but short when it occurs in the third or later syllable of the word as shown in (6b and c).

(6) a. ʔun**aa**k² b. c̓apacn**a**k c. t̓aṅan**a**k
      ʔu –naˑkʷ c̓apac– naˑkʷ t̓aṅa– naˑkʷ
      it –have.. have a canoe' 'have a child'
      (Stonham & Yiu 2002: 329)

The examples in (7) demonstrate that a VLV occurring in a root is also affected by the first two syllable rule, when associated with double reduplication.

(7) a. y**aa**k.ši.ʔax̣̓.at b. ya.ya.y**a**k.suuḥ
      yaˑkʷ –šix̣ –ax̣ –'at RED -RED - yaˑkʷ -suuḥ
      sore-mom –temp –pass DIST –SUF –sore –at eye
      'became sore' 'sore-eyed '
      (Stonham & Yiu 2002: 330)

The examples above show that regardless of whether a VLV occurs in a root or a suffix, the vowel lengthens only within the first disyllable.

3.3 Vowel Lengthening and Shortening

Vowel lengthening is one of the dominant phonological processes in Nuuchahnulth. In fact, vowel lengthening and shortening in Nuuchahnulth are very unique and interesting in three ways. First, the vowel lengthening/ shortening is restricted to the first or second syllable vowels. Second, the vowel-length changes are triggered by certain suffixes. Third, the suffixes, in many cases, are likely to have a homophonous counterpart which does not trigger vowel lengthening/shortening (Lee in prep.). In what follows, I discuss only the first characteristic, which is closely related with the disyllable.

A noticeable fact with respect to vowel length adjustments is the domain in which this process occurs. Only vowels occurring within the initial disyllable are lengthened or shortened by certain suffixes; and vowels after the third syllable or later are not affected by such a process. In the following examples, a root, *ʔu-* is realized as a short vowel as in (8); depending on the vowel length-triggering suffix type, vowel lengthening can occur in the first syllable as in (9), in the second syllable as shown in (10), or in both first and second syllable as can be seen in (11).

(8) **ʔu**ʔumc̓uʔiš Kay nananiqsak (Fieldntoe: 65)
    ʔu-ʔumc̓u -ʔiˑš Kay nananiqsak
    It –serving -3ps Kay grandparents
    'Kay is serving (a meal) to grandparents.'

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[2] kʷ in 'naˑkʷ' in (8) and yaˑkʷ in (9) is delabialised. A labial consonant is delabialised when it occurs word finally as in (8) and when it is followed by a lexical suffix as in (9). On the other hand, delabialisation does not occur before a grammatical suffix.

(9)   ʔuuyukʔiš Kay   ƛiiħciip   (Fieldnote: 41)
           ʔu –yuk [L]   -ʔiˑš Kay ƛiiħciip
           it –at.the.head -3ps   Kay   flowers
           'Kay is wearing flowers on her head.'

(10)   ʔuʔuuyukʔiš Ken   (Fieldnote: 39)
           RED ʔu- yuk [R+L] -ʔiˑš
           RED it –cry   -3ps
           'Ken is crying.'

(11)   a.   ʔuuʔuukʷiɬʔiš Ken   (Fieldnote: 87)
                 RED-ʔu–čiɬ [RL+L] -ʔiˑš Ken
                 RED it-to.blame-3s   Ken
                 'Ken is blaming '

          b.   ʔaaʔaayačiɬʔiš   Ken   (Fieldnote:88)
                 RED -ʔaya –čiɬ [RL+L] -ʔiˑš   Ken
                 RED -many-to.blame   -3s   Ken
                 'Ken is blaming lots of people.'

I have illustrated various patterns of vowel-length changes above in terms of where the changes occur; however, I could not find any evidence that vowel lengthening/shortening occurs beyond the initial disyllable. For instance, in (11b) both the first two vowels undergo vowel lengthening, but the vowel in the third syllable, which belongs to a root, is not lengthened. It seems to be conclusive that the domain of vowel-length changes is within the first disyllable.

In this section, I have shown that the domain of stress assignment, lengthening of various length vowel, and the vowel lengthening/shortening in Nuuchahnulth is restricted to the initial disyllable. Based on the discussions so far, now I move on to consider the metrical structure of Nuuchahnulth.

4.   Disyllabicity in Nuuchahnulth: a Foot or something else?

Due to the phonological salience of the initial disyllable in Nuuchahnulth as examined above, researchers have claimed that the first two syllables include a domain, namely a foot (Kim 2004, Stonham 1999, 2004, Werle 2002, Wilson 1986). However, no agreement has been made in terms of foot typology and foot shapes. In the following section, I will discuss issues associated with the metrical structure of Nuuchahnulth and of languages in general, and propose, on the basis of this discussion, that in Nuuchahnulth the initial disyllable does in fact constitute a foot.

4.1   All Possible Shapes of the Initial Disyllable of Nuuchahnulth

The shapes for the first two syllables in Nuuchahnulth are vast, in the sense that

they show most possible combinations of L and H sequences: {L l, l H, H l, H h}. Based on a very preliminary investigation of 996 words from the first seven texts in Sapir and Swadesh (1939), the following table illustrates the distribution of initial disyllabic shapes found in Nuuchahnulth. All the shapes examined are after applying vowel-length adjustment and/or reduplication if applicable.

Table 1. Distribution of disyllable shapes

Disyllable shapes	Numbers	Percentages
LL	371	37.2
HL	264	26.5
HH	98	9.8
LH	263	26.4
Total	996	99.9

The distribution of the initial disyllabic shapes in table 1 illustrates that the LL is the most prevalent shape and that the HH is the least prevalent shape. The HL and the LH are almost evenly distributed in Nuuchahnulth.

4.2   Metrical Structure of Nuuchahnulth

Examining phonological processes occurring within the disyllable in Nuuchahnulth strongly suggest that this domain constitutes a phonological unit; and I propose that this unit is a foot. Given the template pool discussed in 4.1 {L l, l H, H l, H h}, there are a few puzzles that should be unraveled in order to successfully argue for this proposal: (i) are (H l)$_F$ (an uneven trochaic foot) and (ii) (H h)$_F$ (a two heavy syllable foot) legitimate foot shapes within metrical theory?, and (iii) can two different foot types, i.e., iambs and trochees co-exist in a single language? Even though (H l)$_F$ and (H h)$_F$ shaped feet are not optimally constructed, there have been studies which report languages that do have these foot shapes. In addition, languages that attest both iambs and trochees are not very unusual. In this section, I address these issues.

4.2.1   Uneven Trochee vs. Even Trochee

Earlier metrical theory included the uneven trochee (H l)$_F$ as a prosodic shape (Hayes 1981, Halle & Vergnaud 1987). Later, Hayes (1985) observes a significant asymmetry between iambic and trochaic rhythm, and he proposes a foot inventory which reflects this asymmetry (Hayes 1987, 1995). Furthermore, Kager (1994) proposes primitive foot shapes that include neither (H l)$_F$ nor (l H)$_F$. However, there have been studies that report languages with stress systems that require an uneven trochaic foot analysis (Crowhurst 1991, Kager 1996, van der Hulst and Klamer 1996). In (12), I provide a summary of foot inventories that are claimed by researchers.

(12)　Foot inventory

(i)　　Hayes 1980; Halle and Vergnaud 1987; Prince 1991; Kager 1996; van der Hulst and Klamer 1996

a.	Uneven Trochee	H	b.	Iambs	H
		L l			1 L
		H l			1 H

(ii)　　Hayes 1987, 1995; McCarthy and Prince 1986, 1990

a.	Syllabic trochee	σ σ			
b.	Moraic Trochees:	H	c.	Iambs	H
		L l			1 L
		--			1 H

(iii)　　Kager 1994

a.	Moraic Trochee	H	b.	Moraic Iamb	H
		L l			1 L

(iv)　　Hammond 1990; Crowhurst 1991

a.	Uneven Trochee	H	b.	Iambs	H
		L l			1 L
		H l			1 H
		H h			

　　　In a study of Kambera roots, van der Hulst and Klamer (1996) claim that an uneven trochaic foot should be reintroduced. They argue that the size of Kambera roots can be accounted for in a simple way under a metrical theory that allows the uneven trochaic foot rather than the moraic trochaic foot. Words in Kambera are minimally bimoraic units (i.e., H and L l), and the possible types of Kambera roots include bimoraic units (e.g., (C)V(C)V and (C)VV) and trimoraic (bisyllabic) units (e.g., (C)VV(C)V). However, the (C)V(C)VV type of trimoraic root is not attested in Kambera roots. Thus, it is not adequate to define the maximal root size as a disyllable, because disyllabic roots also include (C)V(C)VV. Therefore, van der Hulst and Klamer suggest that the uneven trochee is a simpler and more adequate prosodic category with which to define the foot shapes of Kambera roots.

　　　van der Hulst and Klamer categorize language specific foot templates into basically either iambs or trochees. In addition to this dichotomy, van der Hulst and Klamer characterize the metrical structure of a language by identifying what kind of less optimal feet the language allows. They assume a foot to be optimal when the head of the foot is more prominent than its dependent. Therefore, they consider the H and the LL less optimal in that the H does not have a dependent at all and the LL has the same weight. van der Hulst and Klamer analyze Kambera as a language having an uneven trochee with less optimal feet H and LL. They claim that allowing the uneven trochee as a prosodic category makes the analysis more straightforward.

To support their claim that the uneven trochaic foot should be reintroduced, van der Hulst and Klamer discuss Hayes' (1995) foot inventory, which excludes an uneven trochee. In right-to-left direction, an uneven trochee and a moraic trochee behave in a similar way as can be seen in (13). On the other hand, in a left-to-right language, two systems result in different patterns at the left edge as shown in (14).

(13)   Right-to-left direction
        a.   Uneven trochee   (H) (L l) (H l) (L l) (H l)]
        b.   Moraic trochee   (H) (L l) (H) l (L l) (H) l]

(14)   Left-to-right direction
        a.   Uneven trochee   (H l) l (H l) (L l) (H l)]
        b.   Moraic trochee   (H) (L l) (H) l (L l) (H) l]

Admitting that the moraic trochee beats the uneven trochee empirically in Cairene Arabic, Palestinian Arabic, and Cahuilla (Hayes 1995), van der Hulst and Klamer, however, present MadiMadi and Bani-Hassan Bedouin as opposite examples. Primary stress in MadiMadi, an Australian language of New South Wales falls on an initial heavy syllable when followed by a light syllable. In the case of two light syllables following, secondary stress occurs on the second light syllable (uneven trochee) rather than the first light syllable (moraic trochee). The following examples are drawn originally from Hercus (1986).

(15)   ˈbun di ˈla ɵa ˈwai wu ˈlaŋ
        (H   l) (L   l) (H   l)   (H)

The example in (15) can be accounted for using 'weak local parsing' that Hayes (1995) proposes to deal with a rhythmic pattern of Bani-Hassan Bedouin that behaves just like the stress pattern of MadiMadi. 'Weak local parsing' suggests that when there are odd numbers of light syllables, a light syllable should skip to be parsed each time a foot has been assigned (i.e., [(h) l (l l)..). Applying a weak local parsing to the word in (15) will result in (H) l (L l) (H) l (H), of which the pattern at least demonstrates the same alignments at the both edges as the analysis of van der Hulst and Klamer Hercus shows. However, as van der Hulst and Klamer point out, this proposal cannot be confirmed empirically due to the lack of a sequence of five light syllables. With a lack of independent evidence to support the weak local parsing, van der Hulst and Klamer argue that the uneven trochee is a better solution. They conclude that the prosodic structure of roots in Kambera and in many other languages is best explained with the uneven trochee and that therefore it is too early to conclude that the uneven trochee should be excluded as a prosodic primitive.

Another example of a language which requires the uneven trochee comes from the Guugu Yimidhirr study of Kager (1996). He proposes that the initial disyllable in Guugu Yimidhirr is a recursive prosodic word, larger than a foot.

The possible shapes of the initial disyllable include {L l, H l, H H, l H}. This template pool is identical to that of Nuuchahnulth; but unlike Nuuchahnulth, stress in Guugu Yimidhirr falls on every heavy syllable, and this stress assignment results in two separate feet for the case of two heavy syllables, i.e., (H)$_F$(H)$_F$. Consequently, the disyllabic domain must be larger than a foot. Because this initial disyllable in Guugu Yimidhirr is a prosodic word, a foot cannot be constructed across this domain. For example, feet in a three-syllable word such as H l H must not be built as *[H (l)$_{PW}$ H)$_F$, but is built as [(H l)$_F$]$_{PW}$ H, due to the prosodic salience of the first disyllable. In a similar vein, the light syllable within the prosodic word must be footed. For example, with respect to a (l H)$_F$, the light syllable in the first syllable in Guugu Yimidhirr cannot be treated as extrametrical, because the disyllabicity shows a strong phonological bound and the syllables within this domain must be footed. In that way, Kager (1996) needs to recognize both (H l)$_F$ and (l H)$_F$ which he did not in Kager (1994).

I have shown the languages which demonstrate the need to reintroduce the uneven trochee; and I suggest that Nuuchahnulth is another language that requires the uneven trochee as a prosodic category for a more straightforward account of prosodic structure. Similar to Guugu Yimidhirr, Nuuchahnulth requires an uneven trochee to account for the metrical structure due to a phonological domain restricted in the first two syllables: The disyllable need to be footed, and the foot cannot be constructed across this disyllabic domain. In other words, the light syllable in the second syllable must be footed to build a (H l)$_F$. Therefore, an uneven trochee as a primitive foot is essential for the Nuuchahnulth metrical structure.

4.2.2 Two Heavy Syllable Foot

In the metrical theory of Crowhurst (1991), unlike most researchers (Hayes 1987, 1995; McCarthy and Prince, 1986, 1990; Prince 1991), Crowhurst recognizes (H h)$_F$ as well as (H l)$_F$ as a primitive foot, following Hammond (1990) who analyzes the stress pattern in verbs of Lenakel, an Austronesian language. Her justification of this two heavy-syllable foot shape is exemplified from the analysis of Hammond (1990)[3]. In order to account for the stress pattern of words which contain sequences of underlyingly long vowels in (16), Hammond and Crowhurst allow for the existence of a heavy trochaic foot (H h)$_F$.

(16)   a.   r-ĭs-edyáaw-aan   'he didn't arrive'
          b.   r-ĭs-edyàaw-yaav-áan   'he didn't arrive in the north'

With the heavy trochaic foot, the feet are constructed as (r-ĭs-ed)$_F$(yáaw-aan)$_F$ for (16a) and (r-ĭs-ed)$_F$ (yàaw-yaav)$_F$ (áan)$_F$ for (16b). Within the framework of

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[3] Following analyses of Lenakel and Eastern Ostyak are described from Crowhurst (1991) because of limitation of access to Hammond (1990) and Perez (1990).

Hayes' metrical theory, the foot structure of (16b) can be constructed as illustrated in (17).

(17)　　a.　　(H)F (l H)F h (H)F
　　　　b.　　(H)F l (H)F h (H)F

In either construction, the heavy unstressed syllable is not parsed into a foot.

　　　　Another language that requires a foot comprising two heavy syllable is Eastern Ostyak, a Siberian language. This language exhibits very similar pattern to Nuuchahnulth with respect to stress assignment and foot templates. The template pool consists of {LL, HL, HH, LH}. Primary stress falls on the first syllable unless the first syllable is light and the second syllable is heavy, which is an exactly identical pattern to the primary stress of Nuuchahnulth. Primary stress is assigned on the first heavy syllable within the first disyllable; if the first heavy syllable occurs outside of this disyllable domain, the heavy syllable does not get primary stress. Both Perez (1990) and Crowhurst (1991) recognize the first disyllable window effect. Non-iterative footing is primarily applied in this disyllabic domain and iterative disyllabic trochaic feet are built to the right of primary stress. This suggests that the first disyllable in Eastern Ostyak also constitute a phonological unit as that of Nuuchahnulth do.

　　　　I have shown that heavy-syllable foot can be built in some conditions. Considering the phonological salience based on phonological processes applying restrictively to the disyllable as discussed above, it is convincing that the initial disyllable in Nuuchahnulth is a phonological unit. A foot cannot be built across this domain, nor can a heavy syllable be unfooted. Therefore, the metrical structure of Nuuchahnulth can be accounted for in a simpler way by allowing a two heavy syllable-foot.

4.2.3　Iambs and/or trochees?

I have suggested that the initial disyllable of Nuuchahnulth is a foot involving the shapes, (L l)F, (H l)F, (H h) F, and (l H)F. This template pool implies that the Nuuchahnulth language contains both iambs and trochees in its words. It is usually assumed that a single language has either iambic feet or trochaic feet in its metrical structure. This assumption is true in many cases; but as Kim (2004) points out, it does not mean that there is no language which has both systems in a single prosodic structure. I review Guahibo in Kondo (2001) and also present a few languages that are reported to have both foot typologies.

　　　　In the study on the Guahibo language spoken in the Eastern Llanos of Colombia and in southwestern Venezuela, Kondo (2001) describes stress rules as trochees and/or iambs. Kondo considers trochees to be the default and iambs are lexically assigned feet. The following data illustrate how the two contrastive patterns occur in the mono-morphemic words in Guahibo.

(18) a. Trochees
ˌtaxuˈtaxupa 'easy to break(egg)'
ˌpaluˈpaluma 'rabbit'
ˌyamiˈyamiwa 'it is curly'

b. Iambs
toˌxotoˈxopa 'easy to break (gourd)'
paˌsupaˈsupa 'easy to bend'
cuˌlemaˈyuwa 'turle sp.'

Kondo reports that the iambic and trochaic feet in Guahibo are similar in duration, intensity, and magnitude. The examples above illustrate how stress is assigned on five-syllable words with all light syllables. Kondo also demonstrates di-, tri-, and four-syllable words that pattern with both iambic and trochaic feet. The analysis assumes that the final syllable in odd syllabic words is extrametrical, and primary stress occurs on the rightmost foot after assigning extrametricality.

In addition to Guahibo, we have already seen that Eastern Ostyak and Guugu Yimidhirr also exhibit both prosodic rhythms. Languages such as S. Miwok and Akkadian (Kager, 1994; van der Hulst and Klamer, 1996) and Yidin (Hayes 1995) are reported to attest both types of rhythms. Given the languages discussed above, it is less likely to be very unique for Nuuchahnulth to have both iambs and trochees in the language.

7.   Conclusions and Further Study

In this study I have proposed a metrical structure of Nuuchahnulth by examining disyllabicity. I have suggested that the initial disyllable in Nuuchahnulth is a purely phonological unit and equivalent to a foot. The foot shapes of Nuuchahnulth are unique in that the (H h)$_F$ and (H l)$_F$ are attested. This is because of stress pattern and the phonological salience of the first disyllable. I have proposed that the uneven trochee (H l)$_F$ should be rehabilitated in metrical theory and that a two-heavy-syllable foot (H h)$_F$ is not usual but necessary to account for the Nuuchahnulth metrical structure. I have also shown that iambs and trochees may co-exist in a single language.

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