

Prosodic Structure and Sandhi Phenomena in the Saru Dialect of Ainu¹

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1. Introduction

A well-known fact about phonological processes applying between words is that they can be divided into two types with respect to sensitivity to syntax. The sensitive ones, dubbed *P-structure rules* in the literature (Selkirk 1986), apply only when the relevant segments fall under certain syntactic environments. A classic example of such a process is French Liaison, as is illustrated in the following examples.²

- (1) a. Il y a encore deux _ après-midi ‘There are still two afternoons’
b. Il y en a encore deux // après lui ‘There are still two of them after him’
(Nespor and Vogel, henceforth N&V 1986: 4)

In both (1a) and (1b), the structural description of the rule is met. Nevertheless, Liaison applies only to the former. This contrast is rooted in the difference of the syntactic structure between (1a) and (1b): in (1a), the Liaison context is located within a single syntactic phrase (modifier-head) whereas in (1b), it spans two phrases, an inappropriate domain for Liaison.

On the other hand, a number of phonological processes are blind to such syntactic structure. Flapping rule of American English belongs to this type. It is applicable even across the largest syntactic unit, the sentence.

- (2) Have a seat. I’ll be right back. > ...sea[r] I’ll...
(N&V 1986: 236)

Phonological rules of this type, called *Pure phonological rules* (Selkirk 1986) are insensitive to any syntactic information. A similar distinction has been proved to be valid for a number of postlexical phonological processes cross-linguistically (cf. several contributors to *Phonology Yearbook 4* and Inkelas and Zec 1990, among others), where Ainu is no exception, as will be discussed in the present work.

This paper examines the consonantal sandhi phenomena of Ainu and points out that a similar distinction can be observed in at least two sandhi processes centering on *n* and *r*, which we will term *n-alternation* and *r-alternation*, respectively. The two processes occur in virtually every dialect of the language and have been reported from the earliest stages of linguistic research (e.g. Pilsudski 1912, Kindaichi 1931). Despite this fact, little attention has been paid to their exact domain of application. A closer look at the distribution of the phenomena informs us, however, that they exhibit a significant contrast with respect to their domain. An examination of a corpus of the Saru dialect reveals that the *n*-alternation is sensitive to a certain syntactic boundary (and hence a *P*-structure rule), but the *r*-alternation is not (and hence is a *Pure* phonological rule).

¹ Ainu : an endangered language of Japan whose genetic affiliation with the neighboring languages is unknown. The Saru dialect refers to the dialect once spoken in the villages alongside the river of Saru, southwest Hokkaido.

² _ = application, // = blocking of Liaison and of any other phonological process in this paper.

Our next question, then is to what extent syntactic information is needed to set up the appropriate domain of n-alternation. Here the Ainu data follows the cross-linguistic tendency of prosodic phrasing, where only impoverished syntactic information is used by phonology (Selkirk 1984, 1986, N&V 1986, Hayes 1989, etc.); prosodic phrasing is sensitive to the phrasal rank but information such as category label (e.g. NP or VP) is irrelevant. In section 3.1, however, we point out that syntax alone is insufficient to predict the actual application of n-alternation. In the data, we often observe unexpected blocking of n-alternation in terms of syntactic structure, but instead ought to be explained by reasons as frequency.

Section 3.2 is devoted to the comparison of prosodic units observed for the n-alternation and those referred to in the versification of oral literature. We will point out that the prosodic units for n-alternation and versification show a certain degree of similarity. This further supports the claim that one and the same prosodic phrasing is responsible for phonological operations in general in a given language, a claim that we repeatedly find in the literature in the area of the syntax-phonology interface.

1.1 Overview of the two processes

In this section, we present the data on n-alternation and r-alternation. Note that both are applicable between words, as well as between constituents inside a word (See 3a and 4a).³

(3) n-alternation

- | | | | |
|----|--|---|----------------------|
| a. | ror-un-so
place of honor-at-seat
'the seat at a place of honor in a house' | > | roru[y] so |
| b. | pon yuk
little deer
'little deer' | > | po[y] yuk |
| c. | yayan wakka
normal water
'normal water (in contrast with water from a hot spring)' | > | yaya[w] wakka |
| d. | ...an wa...
to be CON ⁴
'...exists and...' | > | a[m m]a |
| e. | ...an yakka...
to be CON | > | a[y] yakka ~ an akka |

³ We will use the conventional writing system of Ainu throughout this paper. The following correspondences should be noted: y = IPA [j], r = IPA [r]. Hyphens indicate morphological boundaries. Segments that have undergone alternation are bracketed.

⁴ Abbreviations: 2 = second person personal prefix, 4 = fourth person personal affix, indicating the first person in the oral literature, hence in the examples below. These personal affixes are separated with a double hyphen (=) in the text. COMP = complementizer, CON = conjunctive particle, COP = copula, EVID = evidential, FP = final particle, IMP = imperative, LOC = locative, NEG = negative, NOM = nominalizer, OBJ = object, PL = plural, PURP = purpose, TOP = topic. ~ indicates variation.

‘...even though...’

(4) r-alternation

- | | | | |
|----|--|---|-------------|
| a. | ar-rametok
real-bravery
‘a real bravery’ | > | a[n]rametok |
| b. | yar nima
bark tray
‘a tray made from bark’ | > | ya[n] nima |
| c. | asir cise
new house
‘a new house’ | > | asi[t] cise |
| d. | kusur ta
kusur LOC
‘at Kusur (place name)’ | > | kusu[t] ta |

There is no agreement in the literature on how to interpret these sandhi rules. Since no attempt has been made to give a unified account to these phenomena, it has been the norm to describe and interpret them as they are. Under such an approach, we find, for instance, both dissimilation (4a) and assimilation (4bcd) for *r*-alternation. A closer look at their phonological nature reveals, however, that the rules centering on *n* and *r* can be given a unified account, respectively. The rules centering on *n* are assimilatory in nature; the *n* assimilates to the following consonant no matter of its place of articulation. Its gliding to *y* or *w* is a special case which occurs when either *y*, *w*, or *s* (the [+continuant] consonants of the language) follows. So in principle, it does not differ from cases as *pon-pe* > *po[m] pe* ‘something small’ in which case the *n* assimilates to the following stop. In sum, the whole process (3a-e) can be understood as a regressive assimilation which targets both place and continuancy.⁵ The ‘mutual assimilation’ in (3d) is a special case, allowed only when the trigger *w* is part of the conjunctive particle *wa*. In other function words (3e), the trigger either causes gliding (*a[y] yakka*) or is deleted (*an akka*).

On the other hand, the rules centering on *r* assign a stricter condition on the trigger; they are strictly restricted to the coronals, namely *n*, *r*, *t* and *c*. As mentioned above, here the *r* either assimilates (4bcd) or dissimilates (4a). On the other hand, nothing happens when the *r* is followed by any other consonant, e.g. *korka* ‘but’, *sermak* ‘behind’, *arpa* ‘go’. The various outputs can be given a unified account if we regard this alternation as a result of a syntagmatic constraint prohibiting *r* + coronal sequences. Several sandhi patterns in other dialects exhibit that this constraint has a general character prevailing over the phonology of the language, e.g. *rs* > *ss* (Nothern dialects): *ar-suy* → *a[s]suy* ‘once’ *karkar-se* → *karka[s]se* ‘to roll’, and further observed in the Saru dialect are, *ry* > *r*: *kor-yar* → *korar* ‘to give’ (deletion of *y*), *a=kor yarpe* → *a=ko[y]yarpe* ‘my baby’ (gliding of *r*). These forms indicate that any *r* + coronal sequence is disfavored in the phonology of this language.

⁵ A feature-geometric approach following the model of Padgett (1991) is proposed by Shiraishi (1998).

From these discussions, we conclude that the various rules above can be grouped into two groups (namely, n-alternation and r-alternation) and that such a classification is not an arbitrary one.

Despite their difference in their phonological nature, the two processes share characteristics typical of “postlexical rules”, e.g. they have no lexical exceptions, and are easily blocked by pause insertion. In addition, n-alternation may create a highly marked sequence *uw* (in rime): *a=esikaru[w] wenkasuno* ‘to long very much for ~’ (Tamura 1986: 12). This is possibly a violation of Structure Preservation since *uw* is an inadmissible sequence in the underlying form of the language. Furthermore, it is a well-known fact that both rules may extend to the speaker’s pronunciation of Japanese, e.g. *se[y]se* instead of Japanese *sense(i)* ‘teacher’ (Kindaichi 1931: 25). This is frequently observed in a code-mixing sentence, e.g. *uepeke[n] ni yoku yuu* ‘[something] appears frequently in *uepeker*’ (own field notes, 14 Sep. 1998), where the alternation of the last *r* of *uepeker* has a Japanese word *ni* as a trigger.

Apart from these properties, the two processes show significant differences in their distribution, as will be shown in what follows.

1.2 Method and source of examination

Our primary source of evidence is restricted to recordings of the Saru dialect, in particular Kayano (1974, 1998a, b, c) and Tamura (1984, 1985, 1986, 1988a, 1989, 1997). The distribution of the two sandhi processes in these recordings was checked by the author by means of impressionistic observation.

As a linguistic corpus, the content of these sources is not well balanced, in spite of the fact that in all 18 speakers are involved. A large part of the material consists of recitations of oral literature performed predominantly by women. Although we limited our source to those performed without a significant musical melody, it remains an assumption that the selected genre more or less reflects the natural speech of the language.

2. The discrepancy between r-alternation and n-alternation in prosodic domain

An interesting discrepancy appears when we look at the distribution of n-alternation and r-alternation in larger syntactic units. Compare the following examples, where the target and the trigger of the alternation rules span two sentences.

(5) n-alternation

- a. *inani un hoski arpa=an kor pirka kus hawas sekor yaynu=an // sino wen*
 which to first go 4 CONgoodPURP sounds COMP think 4 real bad

iruska poka nesi a=ki
 anger even very 4 do (KT⁶ Kayano 1998a: 110)

‘I could not decide where to go first. I was completely frustrated.’

- b. *e=motoho a=nukar wa an=an // yaun mosir un iwor kor kamuy a=ne wa...*
 2 origin 4 look CON to be 4 land country to field have spirit 4 be CON

⁶ Hereafter we will provide the initials of the speakers.

(KT Kayano 1998c: 58)

‘I am looking at your origin. I am the spirit governing this field in this country...’

- c. kanna ruyno ye yan // ye yan sekor
 once again say FP: IMP COMP (KKo Kayano 1998a: 74)

‘Say it again. Say it again’

(6) r-alternation⁷

- a. ne sinrici ka e=kopuspakar _ nokan uypehe ka opitta usa muni
 that root also 2 dig fine chips also all various garbage

 turano e=uhuyka.
 together2 burn (KKo Kayano 1974: 145)

‘You dig that root. Together with the fine chips you burn all of them’

- b. kotankonnispa sine matnepo kor _ nea matnepo ramutu uk tek hine...
 the village head one daughter have that daughter life pull out briefly CON
 (HF Tamura 1985: 60)

‘the village head had one daughter. [My brother] pulled out the life of that daughter...’

- c. nea niatus heyasi a=ninpa kor _ rapokke sinki=an hine...
 that pail towards a bank 4 drag CON then to be tired 4 CON
 (KT Kayano 1974: 99)

‘I dragged that pail to the bank and then became tired...’

- d. isepo kuari cironnup kuari a=eykoysanpa kor _ cironnup ka isepo ka a=rayke
 rabbit trap fox trap 4 imitate CON fox too rabbit too 4 kill
 (KKo Tamura 1988a: 12)

‘I imitated [my father’s] rabbit traps and fox traps and caught rabbits and foxes.’

- e. eci=kor mosir sekor eci=haweoka ka eaykap kunihi eci=ramu kor _
 2PL have country COMP 2PL say also impossibleNOM 2PL think CON

tane anakne somo uhekote itak=an kusu ne na
now TOP NEG each other talk 4 will COPFP (HS Tamura 1986: 46)

⁷ The astute reader would notice that the examples (c-e) of r-alternation all involve the conjunctive particle *kor* ‘and, while’. This is due to the unbalanced number of r-alternation contexts, i.e., the r-n context outranks the other three (r-c, r-t, r-r), and it is difficult to find an example without *kor* for the latter.

‘Keep in mind that you cannot insist that it is your country [if lots of people are gathering] and don’t talk about this any longer.’

In both (5) and (6), the structural description of the rules is met, and yet only r-alternation occurs. The apparent difference with the examples in (3) and (4), where no such discrepancy was observed, is their syntactic construction. In (5) and (6), the relevant segments belong to separate sentences, i.e. the target and trigger are separated by a sentence boundary. It should also be noted that the two words in question are not separated by a pause.

It is worth noting that the length of the sentence does not matter for the application of n-alternation. Consider the following.

- (7) oraun tumun soyo yan // soyo yan sekor...
 then dust bring outside FP:IMP COMP
 ‘then (she said) “bring the dust outside”’ (KKo Kayano 1974: 7)

Here the verb + final particle sequence is repeated, creating an n-alternation context which spans relatively short sentences. Nevertheless, n-alternation does not apply. This example suggests that n-alternation is blocked whenever there is a sentence boundary, regardless of the length of the sentence.

All these examples inform us that the n-alternation is sensitive to sentence boundaries. On the other hand, no such restriction is observed for the r-alternation, which applies whenever the relevant segments are temporarily adjacent, no matter what syntactic boundary intervenes. Unlike the n-alternation, the r-alternation is totally blind to such syntactic information.

From this observation, we conclude that the n-alternation should be classified as a P-structure rule and r-alternation as a Pure phonological rule, following the terminology of Selkirk (1986). Although both are postlexical in nature, they behave differently with respect to sensitivity to syntactic information and hence deserve different labeling.

3. The domain of n-alternation

Of particular interest is the distribution of the n-alternation, which shows sensitivity to syntactic information such as sentence boundaries. In what follows, we will examine the syntactic context of n-alternation in more detail and show that the other blocking contexts for n-alternation more or less involve large syntactic boundaries comparable to sentence boundaries.

We will start with contexts in which n-alternation is constantly observed. These include word internal contexts and idiomatic expressions.

- (8) a. pon _ ya-un-pe
 young-land-live-man
 (name of a hero)
- b. sasun _ sir
 to have descendants-NOM
 (part of an idiom)

The next context in which n-alternation is observed frequently is between a prehead modifier (demonstratives, numerals, adjectival verbs⁸) and its head noun, though n-alternation in this context is subject to a certain degree of optionality (see section 3.1).

- (9) a. tan _ ya ta
this land LOC
'at this land'
- b. iwan _ suy
six times
'six times (a sacred number of the language denoting 'many')'
- c. pon _ suma
little stone
'little stone'

The n-alternation may also apply between words belonging to different syntactic phrases, as is illustrated in the following examples.

(10) adjunct + verb

[_{pp}i= etoko un] _ [_{vp}supa kor]...
4OBJ before at cook- ing (KT Kayano 1974: 33)
'[she] has been cooking before my (return)'

(11) indirect object + verb

[_{NP}nea pon menoko], [_{pp}a=hokuhu eun] _ [_{vp}ye]
that young lady 4 husband to say (HF Tamura 1985: 20)
'that young lady said to my husband'

(12) direct object + verb

[_{NP}tumun] _ [_{vp}soyo yan]
garbage putoutside FP: IMP (KKo Kayano 1974: 7)
'put the garbage outside!'

(13) subject + verb

[_{NP}[_Nkeman] _ [_{vp}yupke] p] [_{vp}an wa]
starvation hard NOM to be CON (HF Tamura 1984: 48)
'There was a hard starvation'

(14) adjunct + adverb

[_{pp}Iskar etoko un] _ [_{ADV}suy][_{vp}arpa wa]
upper stream to again go CON (HS Kayano 1974: 214)

⁸ 'Adjectival verbs' refer to prehead intransitive verbs modifying the following head noun. Ainu has no adjectives (morphologically speaking).

‘[he] went again to the upper stream of Iskar river’

The overall rate of alternation in this context (10)-(14), however, is not as high as the former two contexts (8)-(9), even within the same speaker. The number of applications of n-alternation inside and outside a phrase boundary is compared below for three speakers.⁹ It should also be noted that these three speakers show the most frequent application of n-alternation across phrase boundaries within our primary source.¹⁰

speaker	inside XP		outside XP	
	n-alternation contexts	number of applications	n-alternation contexts	number of applications
KT	5	4	9	3
HS	15	13	5	1
HF	13	10	8	4

For some speakers, n-alternation never applies across a phrasal boundary.

(15) adjunct + verb

[_{pp}a=uni un] // [_{vp}san = an]
 4 house to go down 4 (KM Kayano 1998a: 38)
 ‘I went downwards to my house’

(16) subject + verb

[_{pp}rorunpuyar pok un][_{NP}tun] // [_{NP}sike] [_{vp}osura]
 window beneath to two person baggage throw
 (NK Tamura 1989: 38)
 ‘The two (men) threw their baggage beneath the window’

So it seems fair to say that n-alternation across a phrase boundary (as in (11)-(17)) is not preferred. It is thus a “marked” context, observed sporadically in the speech of some speakers, whereas the inside-phrase context is “unmarked”, observed for all speakers.

Interestingly, n-alternation was absent from the following contexts as well.

(17) quotation + complimentizer (*sekor*)

[_s[_{NP}i= otkē humi] [_{vp}itasasa=an] // sekor] [_{vp}hawean kor]
 4OBJ stab feeling hurt 4 COMP say -ing
 (HS Tamura 1984: 20)
 ‘Saying “It hurts where you have stabbed me”’

⁹ Of the 18 speakers, 7 show n-alternation across a phrase boundary and 5 do not. The rest lack data of the context under discussion.

¹⁰ Note: identical expressions within a single speaker are counted as a single context. If there is variation, it is counted as a case of application.

- (18) VP + evidential nominalizer (*siri*)¹¹
 [NP[ADV_{opitta}][VP_{ray=an}] // *siri*] [ne]
 all die 4 NOM:EVID COP (KT Kayano 1974: 36)
 ‘We were (almost) all dead’

- (19) relative clause + head noun¹²
 [NP[_Pani][VP_{kampinuye=an}] // [N_{sumi}]]
 with write 4 ink (Tamura 1984: 74)
 ‘The ink with which we write’

The non-application of n-alternation in these contexts is comparable to that with the sentences in (5) in their stability. Throughout our primary source, not a single case of n-alternation has been observed in these contexts.¹³ Here the n-alternation does not occur even though the relevant segments are temporarily adjacent. It seems therefore fair to say that these boundaries fall within the sentence boundary type, which constitutes absolute blocking contexts for n-alternation. Within the domain delimited by these boundaries, n-alternation is allowed to occur for some speakers, though with certain degree of optionality that is further sensitive to phrasal boundaries.

3.1 Frequency

In this section, we will consider “optionality” which was used somewhat informally in our discussion above. In fact, optionality should not be underestimated since n-alternation shows a certain degree of variability in its application in many contexts,¹⁴ with the exception of the inside-word context (8). This is even true for speakers with the widest range of n-alternation (i.e. speakers which exhibit n-alternation across phrasal boundaries). The following examples show failure of n-alternation in a modifier-head context in the speech of such speakers (again, no pause intervenes).

- (20) a. *tan* // *Yupet* *un*
 this at
 ‘at this Yupet’ (NT Kayano 1998b: 56)
- b. *tapan* // *sisam* *mosir*
 this Japanese land
 ‘this land of the Japanese’ (HF Tamura 1984: 32)

Optionality, however, does not seem to be a simple matter of chance. Tamura (1988b: 63) points out that n-alternation is blocked when the word string is pronounced with “analytic consciousness”.

¹¹ The evidential nominalizer can be regarded as a subcase of relative clause construction as *siri* derives from the noun meaning ‘appearance, state’.

¹² Postpositional stranding as seen in this example is a common strategy for relative clause construction in Ainu.

¹³ Examples of relative clause constructions containing relevant segments for n-alternation are, however, quite rare in our primary source.

¹⁴ This applies to the conjunctive particles *yakne*, *yakka* and *yakun* as well. We still have no answer why these function words show unstable application of n-alternation for some speakers, being inconsistent with the prediction of most literature on phrasal phonology (e.g. Selkirk 1995).

From our own observation, it seems that words (or strings of words) of frequent usage tend to be more subject to alternation than those of low frequency. For instance, one speaker (KT) showed variation in her pronunciation of *pon sinrici* ‘little root’ (*pon* _ *sinrici* ~ *pon* // *sinrici*), whereas there was no variation in *pon seta* ‘little dog’ and *pon su* ‘little pot’ (both constantly with *po[y]*). Although we have not yet succeeded in uncovering all factors that play a role in this variation, it is quite possible that several factors are at work within the possible prosodic domain of n-alternation.

3.2 Comparison with the prosodic phrasing in oral literature

The unmarked domain of n-alternation discussed so far exhibit an interesting isomorphism between constituents observed in the versification of oral literature, in particular, with that of a genre called *Yukar*. This is a desirable result if the principles of prosodic phrasing provides prosodic constituents not only for segmental phonology (as sandhi phenomena) but for phonological operations of the language in general, including versification. In this section, we will compare the prosodic units discussed so far with those of *Yukar*. The analysis on the versification of *Yukar* adopted here heavily depends on the study of Okuda (1988), who investigated the phrasing pattern observed in *Yukar* of a single speaker in the Shizunai district.¹⁵

According to Okuda (1988), the versification of *Yukar* reveals a certain patterning with respect to the assignment of syntactic units (the verse) to the rhythm pattern in its recitation. The former, called *rhythmic unit* by Okuda, consists of a free morpheme followed by a bound morpheme (note that Ainu is a postposition language). The rhythm of *Yukar* is created by a hit of a stick (*repni*) to the edge of a fireplace, which itself consists of two beats. With respect to the sequence of this metrical unit consisting of two beats, the following regularity is observed.

- (21) a) The left edge of a rhythmic unit should be aligned with the left edge of a metrical unit, i.e. the first beat.¹⁶

- b) The right edge of a rhythmic unit should be placed somewhere between the second beat and the first beat of the next metrical unit.

(Okuda 1988: 40, slightly modified by the author)

Accordingly, (22a) exhibits an appropriate alignment, since the left edge of a free morpheme (adverb) is assigned the first beat. On the other hand, (22b) is an example of improper alignment, since the right edge of the rhythmic unit is put on the first beat, thus violating generalization b).

- (22) a. || |
 {poron no} ‘many’
- b.* || | ||
 {po ron no}

¹⁵ The Shizunai district lies about 30km to the southeast of the Saru district and its dialect differs slightly from that of Saru. A comprehensive description of the Shizunai dialect has been published in 1986 by Kirsten Refsing.

¹⁶ Okuda’s original principle contains an alternative: the left edge of the rhythmic unit can also be placed somewhere within the latter half of the second beat. Since this is irrelevant for our discussion, it is ignored here.

(where || denotes the first and | the second beat. The rhythmic unit is contained in curled brackets)

(Okuda 1988: 42-43)

The next question, then, is which syntactic unit may initiate this rhythmic unit (and which may not). As mentioned above, Okuda attributes to free morphemes: noun, verb, conjunction, interjection, adverb, etc. On the other hand, bound morphemes (postpositions, particles) can enter the rhythmic unit only by cliticizing to free morphemes (1988: 37-39).

Of interest to us is the structural similarity of this rhythmic unit with the unmarked domain of n-alternation. Similar to the latter, Okuda's rhythmic unit does not require fully-fledged syntactic information (such as category labels), as the division of free versus bound morpheme indicates. This is exactly what we expect if the prosodic phrasing makes use only of impoverished syntactic information. In addition, modifiers seem to form a single rhythmic unit with its head, even though in that case the left edge of the latter does not align with the first beat, in violation of generalization a).

- (23) || | || |
 {poro sin to ko} 'a big chest'
 big chest

(Okuda 1988: 54)

Here the left edge of *sintoko* 'chest' is not aligned with the first beat even though this can initiate a new rhythmic unit since *sintoko* itself is a free morpheme (noun). This extraordinary alignment can be accounted for if we regard the whole modifier-head phrase as forming a single rhythmic unit. Now, recall that such a modifier-head phrase was a common n-alternation domain. This 'coincidence' further supports our claim that the same prosodic unit is provided for versification of *Yukar* as well as for segmental rules such as n-alternation.

On the other hand, it is also true that Okuda's rhythmic unit and the domain of n-alternation do not show a perfect match. A major discrepancy between them is the phrasing of the evidential nominalizer *siri* (see 18). According to Okuda, *siri* is usually phrased with the preceding free morpheme (predicate verb), while this was never an n-alternation context in our data. However, it seems also to be true that *siri* does provide an n-alternation context for this speaker (Okuda p.c.), in which case this particular phrasing does not contradict our hypothesis.

Another disparity can be seen in the phrasing concerning relative clauses. The investigation of relative clause constructions in versification reveals that the verb in the relative clause (which is necessarily the final constituent within the relative clause) is phrased with the following head noun.

- (29) || | || | || | || |
 {a=kor totto} {kor casi or ta} 'at my mother's castle'
 4 have mother have castle at

Since a free morpheme *casi* is left-aligned with the second beat, the rhythmic unit should be interpreted as initiated by the preceding *kor* (otherwise there is a violation of generalization a)). Recall, however, that the relative clause-head noun sequence

context never provides an n-alternation context (19). However, it should also be noted that the total number of relative clause constructions is small in our primary source of research.

Although the details of the domain for n-alternation and Okuda's rhythmic unit are not isomorphic to each other, it remains a fact that they exhibit a certain degree of similarity, which we consider a worthwhile topic for future research.

4. Conclusion

Since the domain of application for n-alternation and r-alternation are relatively large, their different behavior with respect to syntactic information as sentence boundary has been overlooked in the literature. In fact, the two sandhi rules differ significantly when we consider their sensitivity to certain syntactic boundaries. The present work has brought this difference to light and provided grounds to the current classification of sandhi rules into two groups centering on *n* and *r*.

The fact that not a single case of n-alternation has been found across a sentence boundary suggests that this constitutes an edge of a certain prosodic domain, active in the grammar of the speakers. Whether there are other phonological operations which share the same prosodic unit needs to be worked out.

It is not, however, sufficient to say that syntax alone decides the phrasing process since the actual application of sandhi processes varies a great deal, even within the same syntactic context. In fact, the phrasing seems to be highly dependent on (non-) linguistic information other than that provided by the syntax of the language. It still needs to be investigated what factors play a role in the actual phrasing processes, and in what priority.

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