

## 0. Introduction

The title of this paper does not immediately reflect the descriptive fact concerning the phenomenon called consonant alternation (henceforth CA<sup>1</sup>) in Nivkh.<sup>2</sup> Rather, it reveals a point of discussion that has long been neglected in the study of the Nivkh language, and which is nevertheless crucial to the proper understanding of the phenomenon.

It has long been thought that Nivkh CA consists of both hardening and spirantization between homorganic obstruents (Krejnovich 1937, Jakobson 1957, Panfilov 1962, Hattori 1962, Comrie 1981, Watanabe 1993, Gruzdeva 1997, among others). However, careful observation reveals that the two processes are not equivalent. Specifically, hardening is strictly bound to occur to transitive verbs, while no such restriction exists in spirantization. In the past, this curious asymmetry was either neglected (Jakobson 1957), or was taken to be evidence that CA is a syntactic phenomenon which has little to do with phonology, synchronically speaking (Krejnovich 1937: 61-64). In particular, the latter view has gained a number of proponents, and has grown to be the canonical one. Under such a syntactic view of CA, however, no attempt has been made to clarify the phonological nature of CA.

In this paper, I will argue the following two points.

- i) Nivkh CA should be analyzed as a phonological process (contra syntactic analysis, henceforth SA).
- ii) Nivkh CA consists only of spirantization (= lenition) and does not involve hardening (contra most previous works).

These points offer a markedly different perspective on CA. In contrast to SA, the view presented here maintains that CA is strictly *phonological* in nature. In support of this, I will show that CA is sensitive to various phonology, as syntagmatic cooccurrence restrictions, or pause insertions.

The second point provides an answer to the hardening-spirantization asymmetry, introduced above. The restricted nature of hardening could be explained if there were no hardening at all. In this article, I will suggest that what has been thought of as 'hardening' is a mere artifact of the grammar, hitherto accepted without sufficient discussion.

This paper is organized as follows. Section 1 provides a sketch of Nivkh phonology and CA. Section 2 points to some problems in previous works with special emphasis on SA. In section 3, a completely different approach to CA will be proposed. The discussion extends to section 4 where I argue that the transitive predicates have input other than the citation form. Section 5 concludes.

Two appendices are attached. Appendix I discusses residual problems. In 1.1, I discuss a case of phonological opacity involving a floating nasal, a phenomenon also discussed in Gruzdeva (1997). Section 1.2 discusses a syntactic construction called 'pleonastic expressions' (Krejnovich 1937) in the light of the proposal in this article. Appendix II lists the data of CA patterns recorded by the author during the fieldwork to the Sakhalin Island, Lower Amur region (the Russian Federation), and Shiraoui (Japan) in August to September and October 1999.

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<sup>1</sup> Depending on the author, CA may be defined so as to comprise various phonological processes. Since I focus on spirantization and hardening in this article, CA refers to these processes only.

<sup>2</sup> Nivkh: the language of the Nivkh people who live in the lower basin of the Amur river and the island of Sakhalin. The census in 1979 reports the population to be 4400 and counts 597 speakers (de Graaf 1993). The language is often classified to the Paleo-Siberian group, but this is mainly for geographical reasons and its affiliation to neighboring languages is still unknown. The language has four dialects and the major discrepancy is between the Amur dialect, spoken in the Amur area and west coast of north Sakhalin and the Sakhalin dialect spoken in the east coast. I will use the self-referent form 'Nivkh' to refer to the language, though the non-self-referent form 'Gilyak' is still widespread outside of the Russian Federation.

# 1. Outline of Nivkh phonology relevant to consonant alternation

## Segmental inventory

### 1.1 Consonants

aspirated plosives	(I)	p <sup>h</sup> t <sup>h</sup> c <sup>h</sup> k <sup>h</sup> q <sup>h</sup>	
nonaspirated plosives	(II)	p t c k q	
voiceless fricatives	(III)	f ʃ s x ʒ	
voiced fricatives	(IV)	v r z ɣ ʁ	
nasals		m n ɲ ŋ	
lateral		l	
glides	(w)	j	h

### 1.2 Vowels

i	ə	u
e	a	o

Several of the above segments deserve special mention. The labial fricatives *f* and *v* have very weak friction and sound impressionistically similar to the bilabial fricatives *ɸ*, *β*. In fact, there is no agreement in the literature whether these are bilabials (Krejnovich 1937, Austerlitz 1990, Hattori 1962, 1988) or labio-dentals (Panfilov 1962, Savel'eva and Taksami 1970, Gruzdeva 1997). I leave open the question whether this is due to dialectal variation or some (perceptual) inconsistency among researchers (see section 3 for further discussion). The rhotic *r* is classified here and elsewhere in the literature as a voiced fricative since it patterns as such in the CA system. Its voiceless counterpart *ʃ* is an apical trill containing portions without vocal cord vibration (Ladefoged and Maddieson 1996: 236) and it sounds as either [rʃ] or [ʃ]. The labio-velar glide *w* is put in brackets since it occurs only in the Sakhalin dialect. The *c* is a prepalatal plosive and *c<sup>h</sup>* its aspirated counterpart. The process of postsonorant voicing (section 3.3) may turn nonaspirated plosives to voiced plosives, in which case they will be transcribed in the following way, respectively: b, d, ʒ, g, ɣ.

The obstruents are classified into four groups, which are labeled from (I) to (IV). This classification is based on the CA pattern where segments of the same row alternate with those of another in a fixed way. In what follows, I will give a sketch of CA following the description in previous works. This will be revised extensively later in this paper.

CA is a process in which the obstruents change their value of continuity when they are placed in certain phonological and morphosyntactic contexts. To be specific, CA contains two processes: spirantization, in which plosives become homorganic fricatives, and hardening, in which fricatives become homorganic plosives. The manner of articulation is also relevant since CA is bound to occur between row (I)-(III) and (II)-(IV), i.e., aspirated plosives with voiceless fricatives and nonaspirated plosives with voiced fricatives.<sup>3 4</sup>

Spirantization: (I) [-cont, +asp] > (III) [+cont, -voi], (II) [-cont, -asp] > (IV) [+cont, +voi]

### 1.3 citation form

(I) > (III)	a.	t <sup>h</sup> om	macŋa [ʃ]om	'fat of a seal'
(II) > (IV)	b.	pəɲx	pe [v]əɲx	'bird soup'

Hardening: (III) [+cont, -voi] > (I) [-cont, +asp], (IV) [+cont, +voi] > (II) [-cont, -asp]

<sup>3</sup> The examples in this paper are from the following sources (Amur dialect), unless otherwise mentioned: Krejnovich (1937), Savel'eva and Taksami (1970), Gruzdeva (1997).

<sup>4</sup> Segments that have undergone CA are put in square brackets. Caveat: I leave segments that have undergone voicing (see below) but not CA from bracketing. Abbreviations are: ALL= allative, asp= aspiration, COM= comitative, cont= continuant, INF= infinitive, PL= plural, REF= reflexive, SG= singular, voi= voice.

## 1.4

(III) > (I)	a.	$\chi a^{\cdot 5}$	$cxəf [q^h]a^{\cdot}$	‘to shoot a bear’
(IV) > (II)	b.	$zosq^{\cdot}$	$əvɲ [ʒ]osq^{\cdot}$	‘to break an oar’

The phonological contexts of CA reveal complementary distribution. Spirantization occurs when a vowel, glide, or a plosive precedes a plosive.

## 1.5 preceding segment

a.	vowel	see 1.3ab above	
b.	glide	$k^hənraj [r̥]om$	‘fat of a duck’
c.		$k^hənraj [v]əɲx$	‘duck soup’
d.	plosive	$ət [r̥]om$	‘fat of a duck (sort)’
e.		$amsɐ [v]əɲx$	‘seal (sort) soup’

This is precisely the context in which hardening is blocked.

1.6	a.	vowel	$ɲə \chi a^{\cdot}$	‘to shoot an otter’
	b.	plosive	$ət \chi a^{\cdot}$	‘to shoot a (sort of) duck’

The remaining contexts, i.e., postfricative and postsonorant, provide a hardening context (1.7) but block spirantization (1.8).

1.7	a.	fricative	$cxəf [q^h]a^{\cdot}$ (< $\chi a^{\cdot}$ )	‘to shoot a bear’
	b.		$lovr [c]osq^{\cdot}$ (< $zosq^{\cdot}$ )	‘to break a spoon’
	e.	sonorant	see 1.4b above	

1.8	a.	fricative	$cxəf t^h om$	‘bear fat’
	b.		$cxəf pəɲx$	‘bear soup’
	c.	sonorant	$k^h eɲ t^h i$	‘sun ray’
	d.		$rum dəf$	‘Rum(person)’s house’

Note here that segments following the target are irrelevant to CA: they neither trigger nor block nor undergo CA. CA occurs even when the target is followed by an obstruent.

1.9		$azme [f]r̥ə$ (< $p^h r̥ə$ )	‘man’s hut’
			(Sakhalin dialect, Hattori 1988: 1410)

The presumed generalization for the phonological context of CA is this: fricative after a vowel, glide or a plosive, and plosive after a fricative or a sonorant.<sup>6</sup> Whether this is accomplished by spirantization or hardening is a matter simply of the input value: spirantization when the input is a plosive and hardening when it is a fricative.

Let us now move to the morphosyntactic conditions of CA. CA targets a segment at the left edge of a *derived* morphosyntactic unit in the presence of a preceding segment within an XP, a syntactic maximal projection. A given morphosyntactic unit may be derived by various means, as illustrated below.

1.10	prefixation	a.	$p^h [r̥]u$ ( $p^h$ : REF + $t^h u$ : sledge)	‘one’s own sledge’
	postposition	b.	$t^h əx toχ$ ( $toχ$ : allative)	‘towards the top’

<sup>5</sup> Hyphen substitutes for verbal morphology omitted here.

<sup>6</sup> Many works have overlooked this generalization and have resulted in the impression that spirantization and hardening have independent structural goals. This is not so.

	c. tu [r]oχ		‘towards a lake’
	d. qan doχ		‘towards a dog’
reduplication	tək[ɾ]ək· (< tək)		‘to be silent’ (Hattori 1962: 107)
NP formation:	see 1.3, 1.5 above		
VP formation:	see 1.4, 1.7 above		

The condition implies at the same time that CA never targets segments in a nonderived environment, nor does it apply across an XP boundary, as shown in 1.11 and 1.12, respectively.

CA blocked in nonderived environment

1.11	a. utku	‘man’	*ut[y]u
	b. nəys	‘teeth’	*nəy[c <sup>h</sup> ]

No CA across an XP boundary (subject-predicate)

1.12	a. eɣlɲ ɾo·		‘The child holds (something)’
	= [NP <sub>eɣlɲ</sub> ] [VP <sub>ɾo·</sub> ]		(‘child’ is subject)

Contrast this with the example below which differs minimally from 1.12a. with respect to the application of CA.<sup>7</sup>

1.12	b. eɣlɲ [t <sup>h</sup> lo·		‘(Someone) holds the child’
	= [VP <sub>[NEɣlɲ][V t<sup>h</sup>o·]]</sub>		(‘child’ is object)

Here, CA applies since the noun is an object to the following predicate so that the two words form a VP.

Note also that CA does not occur when no segment precedes the (potential) target.

1.13	a. pəɲx	‘soup’	*[v]əɲx
	b. c <sup>h</sup> o [v]əɲx	‘fish soup’	*[s]o [v]əɲx

## 2. Problems with the previous approaches to CA

A number of problems arise with approaches that rely heavily on language-specific (morphosyntactic) stipulations to account for CA.

First, there is the curious asymmetry between spirantization and hardening, as introduced at the beginning of this paper. An important aspect of hardening is that it is restricted strictly to the initial fricative of a transitive verb. When the fricative is part of a noun, hardening does not occur even though both phonological and morphosyntactic requirements are met.

2.1	a. t <sup>h</sup> ulv vo	‘winter village’	*t <sup>h</sup> ulv [b]o
	b. tolv vo	‘summer village’	*tolv [b]o
	c. t <sup>h</sup> eɲ vaqi	‘coal box’	*t <sup>h</sup> eɲ [b]laqi
	d. tol rozf	‘sea bottom’	*tol [d]ozf

On the other hand, no such restriction is observed in spirantization. Spirantization is able to

<sup>7</sup> Under SA, it has often been claimed that CA complements the absence of case markers for subject and object in Nivkh, which makes it possible to disambiguate the sentences in 1.12 (Watanabe 1993: 189). Although CA may function in such a way, I believe it to be a mere side effect of Positional Faithfulness (see below) and CA. Being far from compulsory, CA cannot be identified as an alternative to case marking operations.

target transitive verbs with initial plosives,<sup>8</sup> as well as nouns.

- 2.2 a. *ji co [x]erqo· (< k<sup>h</sup>erqo·)* 'I caught fish'  
 1SG fish fish·catch  
 b. *ləyi [v]ota· (< pota·)* 'to make a stock of salmon'  
 salmon make a stock of

As mentioned above, this asymmetry has never deserved serious considerations in the past,<sup>9</sup> especially in SA, in which CA was stipulated simply to occur as spirantization in NP and hardening in VP. This is of course not true as the above examples tell. In addition, such a stipulation is extremely strong since it interleaves syntactic information as category label (as NP or VP) with prosodic phonology, which is a highly doubtful (or at least marked) state of affairs (Nespor and Vogel 1986, Selkirk 1986, etc.).

Secondly, SA cannot account for the fact that CA patterns may change when a pause interrupts the sequence of the relevant segments. The example below offers such a case.

- 2.3 *wat ... qoj ... [t<sup>h</sup>]ivra.* (citation form: *řivra*) 'To go down on an iron larch'  
 = [VP[NP[Nwat][Nqoj]][V t<sup>h</sup>ivra]]  
 iron larch go down

(Sakhalin dialect, Shternberg 1908. Cited from Krejnovich 1937: 15)

This example is an extract of oral literature recorded by Lev Shternberg by means of dictation. As Krejnovich (1937: 14-15) has pointed out that recording Nivkh oral literature this way never succeeds in providing an accurate description of the actual form performed. This is because dictation inevitably introduces pauses that break down CA environments (Jakobson 1957: 77). Of considerable interest to us, however, is the way in which the CA pattern alternates when broken down by pause-insertions. Let us look at this in more detail.

In the example above, each word stands morphosyntactically in a CA relationship with the following word: the NP [[iron] [larch]] and VP [[iron larch] [go down]]. In the former, spirantization is expected to occur in the normal case since the initial plosive of the head noun follows a plosive. With the presence of a pause, however, spirantization does not occur. On the other hand, nothing is expected to occur to the VP case since here the initial fricative of the verb follows a glide, constituting a blocking context for hardening. However, this is not the case and the fricative is unexpectedly hardened to a plosive. The latter case is problematic, especially for SA, since it suggests that pause-insertion does not simply undo the effects of CA, in which case all words would appear in their citation form. Instead, 2.3 demonstrates exactly the opposite pattern of what is expected in the usual CA case. Obviously, any attempt to explain CA as a syntactic operation faces serious problems: a) why is a purely phonological matter as pause-insertion able to affect syntactic operation and, b) why does CA change to this particular pattern. SA seems to be quite insufficient to provide satisfactory answers to these questions.

Thirdly, there is the question of the grouping of the structural requirement of CA: vowel, glide and plosive versus sonorant and fricative. Why is this grouping? None of the previous works offer satisfactory answer. This question is tough to answer under SA since it is totally unclear why and how such phonological conditions can be made sensitive to a syntactic operation. In the following sections, bearing in mind these points, I propose an entirely different approach to CA.

<sup>8</sup> Transitive verbs with initial plosives are few in number for reasons discussed in section 4.

<sup>9</sup> Except for Krejnovich (1937) who was aware of this asymmetry and left an explanation for this (with which I disagree and to which topic I return in footnote 16 below).

### 3. A phonological account of CA

#### 3.1 Spirantization as a context-free lenition process

This section discusses the spirantization part of CA and concludes that this can be best analyzed as a context-free lenition process. Let us first look at the phonological details of spirantization.

The spirantization of Nivkh has a peculiar point that is not typical of spirantization crosslinguistically. In Nivkh, plosives spirantize even when adjacent to a plosive.

3.1 (= 1.5d)           ət [ɣ]om                           ‘fat of a duck (sort)’

As is known from the literature, the common context for spirantization involves adjacency to vowels, or at least to some segment with [+cont] feature value (cf. Kirchner 1998, and references therein). Roughly, spirantization context is proportional to the degree of jaw aperture of the flanking segments: the more open the jaw aperture of the flanking segments, the more likely for the flanked segments to spirantize (Kirchner 1998: 197). Hence plosives are more likely to spirantize when flanked by vowels than by glides, and by glides more than by liquids, and so on. This is also captured implicitly in an autosegmental approach to spirantization where the target segment receives [+cont] from its neighboring segments by means of feature spreading (e.g. Padgett 1995).

However, feature spreading is not viable for the Nivkh case since spirantization occurs even when following plosives, which are [-cont]. In fact, plosives may induce spirantization as much as vowels and glides do. This is problematic for any autosegmental approach since the trigger group does not constitute a natural class, hence there is no common feature value that can be spread from it. This casts doubt on the viability of the ‘trigger’ in the spirantization of Nivkh.<sup>10</sup>

Considering these facts, I propose to eliminate the trigger entirely. If there were no trigger, the [cont] of the preceding (or the following) segment would be irrelevant. Under such a view, Nivkh spirantization is captured as a context-free phonological process. Therefore in principle, spirantization can target any segment but is not allowed to do so due to various restrictions. It is thus crucial to explore the exact nature of these restrictions. Before moving to this, we must examine what the phonological nature of such context-free spirantization is.

Nivkh spirantization exhibits characteristics of *lenition*, defined as a phonetic imperative to minimize articulatory effort (Kirchner 1998: 4). This articulatory based view captures the generalization that (synchronic) spirantization processes always substitute less effortful segments for more effortful segments, but never vice versa. An insightful crosslinguistic observation made by Kirchner is that (unaffricated) plosives never lenite to strident fricatives, as *s* or *f* since strident fricatives require more articulatory effort than plosives (1998: 99). Lenition of plosives thus chooses nonstrident fricatives over strident ones for reasons of economy.<sup>11</sup>

In this respect, it is worth noting that the spirantization of Nivkh yields nonstrident fricatives, rather than strident ones. The results of experimental studies report repeatedly that the frication of Nivkh fricatives is extremely weak (Zinder and Matusevich 1937, Ruschakov 1981). This matches my own impression. During the sessions with my language consultants, I often felt that I heard a labio-velar approximant [w], which is reported not to be existent in the dialects of our consultants. Later on, I realized that this sound corresponds to the voiced labio-dental fricative [v] in the literature.

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<sup>10</sup> Blevins (1993) tries to obtain spirantization after plosives by underspecifying the plosives for continuancy and to fill this with [+cont] by a late feature-filling rule. Although she motivates such underspecification to the universal unmarkedness of plosives, this is a strong stipulation, which says nothing about the typological rarity of such a spirantization context. On the other hand, the present analysis does away with this problem by interpreting the whole process as being context-free.

<sup>11</sup> Such an articulatory-motivated lenition involves not only spirantization but also the processes of degemination or debuccalization. In fact, they seem to share certain properties, as sensitivity to speech rate, etc. (Kirchner 1998: 5). In general, lenition contexts expand in proportion to the increase of speech rate since the faster the speech, the more effortful the articulation thus more feasible to lenition processes (1998: 214-222). With this respect, it is interesting to ask whether such sensitivity to speech rate exists in the case of Nivkh. As far as I know, there is no report of this. For the time being, therefore, I assume the Nivkh spirantization to be an instance of ‘stabilized lenition’ (1998: chapter 9), in which case lenition occurs without reference to speech rate (but see section 4 for its correlation with pause-insertion.).

Note that the spirantization to *s* does not contradict Kirchner’s generalization since in Nivkh, spirantization to *s* is restricted to occur from the prepalatal plosive *c*, which is inherently somewhat fricated. Since plosives with friction (or affricates) require more effort than plain plosives, spirantization to a strident fricative from these sounds still counts as effort minimization (Kirchner 1998: 103-118).

The effort-based account of lenition can be formalized by the following harmonic ranking (partial) on the output of lenition processes (Kirchner 1998: 118),<sup>12</sup>

3.2 ...non-strident fricative  $\phi$  singleton plosive  $\phi$  strident fricative...

The above ranking directly translates into an Optimality-Theoretic (henceforth OT) constraint ranking below.

3.3 ...\*strident fricative  $\gg$  \*singleton plosive  $\gg$  \*nonstrident fricative...

The interleaving of the faithfulness constraint with these markedness constraints yields the desired result of spirantization (= lenition).

### 3.4 Hypothetical tableau of lenition

/ta/	*strident fricative	*plosive	IDENT·IO(cont)	*nonstrident fric
ta		*!		
$\theta$ a			*	*
sa	*!		*	

Equipped with this general lenition schema, we are now ready to discuss the antagonistic forces that prevent spirantization to occur in certain contexts. I start with the nonderived environment blocking effect and discuss how this can be incorporated into the OT framework. Section 3.3 deals with the phonological conditions blocking spirantization, an issue closely related to the hardening part of CA.

### 3.2 Nonderived environment blocking in CA

As mentioned in section 1, segments in nonderived environment are immune to CA, be it spirantization or hardening.

3.5      a.  $\text{ətək}$           ‘father’           $*\text{ə}[\text{ř}]ək$   
           b.  $\text{utku}$           ‘man’             $*\text{ut}[\text{y}]u$   
           c.  $\text{nəys}$         ‘teeth’          $*\text{nəy}[c^h]$

The phenomenon, known as nonderived environment blocking in the literature, has a history of research in the generative phonology tradition. Various proposals have been submitted to take this over in OT (e.g., Buckley 1995, Lubowicz 1998, Burzio in press, Pater to appear, etc.). In this section, I discuss the properties of nonderived environment effects of CA and propose that this can best be analyzed as a case of faithfulness to *feature transition*, along the lines discussed in Burzio (in press).

One crucial aspect of Nivkh CA is that its phonological context should be fed directly by the preceding morpho-unit, be it a prefix, attributive or a complement. To put in an other way, only segments at the left-edge of a given morpho-syntactic unit undergo CA.

<sup>12</sup> Not to be confused with the *perception*-based markedness scale in which case nonstrident fricatives are more marked than the strident ones.

3.6      məkək [f]oqi (< p<sup>h</sup>oqi)                      ‘air bladder of a dace’  
             dace air bladder

(Amur dialect, from own fieldnotes 1999)

When the context is not fed directly by a morphosyntactic operation, CA does not apply even in a derived environment: \*məkək [f]o[χ]i. Thus spirantization occurs only to the initial plosive of p<sup>h</sup>oqi ‘dace’ and not to the embedded q. The latter is not left peripheral so its (potential) CA context cannot be directly fed by the preceding morpho-unit. To sum up, the context needs to be *phonologically derived* by a morphosyntactic operation.<sup>13</sup>

A similar state of affairs can be observed in the assibilation of Finnish. The process spirantizes *t* to *s* when followed by a front-high vowel *i*, but only in derived environments (Burzio in press, cited from Kiparsky 1993).

3.7            a. halut·a ‘want·INF’                      b. halu[s]·i ‘want·PAST’  
                   c. tilat·a ‘order·INF’                      d. tila[s]·i ‘order·PAST’  
             but e. tila ‘room’                              f. äiti ‘mother’

Of importance is the form tila[s]·i (3.7d). Here, the initial *t* is a potential candidate for assibilation since it is followed by *i*, and finds itself in a derived environment. Nevertheless, assibilation fails to apply. This resembles the case of Nivkh məkək [f]oqi since in both cases the potential target is ignored by the process when the context is not created directly by morphosyntactic operations.

It is thus necessary to distinguish between derived contexts that are directly fed by morphosyntactic operations and those which are not. In OT terms, this can be achieved by making the two contexts subject to different faithfulness constraints. Following the analysis of Burzio (in press), I assume a faithfulness constraint which refers to the *transition of feature values* between segments within a morpheme. By ranking such a constraint above faithfulness constraint that targets feature values of individual segments, the desired distinction between the two contexts can be obtained. In the Finnish assibilation case, the constraints can be formulated as follows (after Burzio, in press).<sup>14</sup>

3.8      FAITH constraint referring to the transition of continuancy value of *TI* within a morpheme: IDENT·IO *TI*(cont)  
             FAITH constraint referring to continuancy value of individual segments: IDENT·IO *T*(cont)

Sandwiching the assibilation-inducing markedness constraint (\**TI*: ‘no *ti* in the output’) with the above two faithfulness constraints yields the correct output.

3.9

/tilat·i/	IDENT·IO <i>TI</i>	* <i>TI</i>	IDENT·IO <i>T</i>
tilati		**!	
☞ tila[s]i		*	*
[s]ila[s]i	*!		**

The Nivkh case can be dealt with in a similar way. The faithfulness constraint referring to feature transition now targets the continuancy transition of a plosive and its preceding segment.

<sup>13</sup> This contrasts with another case of nonderived environment blocking where morphological operations do not alter the environment in any phonologically relevant way. This is the case with vowel shortening of English where it is sufficient to say that the context be *morphologically* derived, e.g., n[æ]tur·al, t[æ]bul·ar. See Burzio (in press) for discussion.

<sup>14</sup> Burzio ultimately replaces the Input·Output correspondence with Output·Output correspondence relation, a point which I do not discuss here.



Parallel with the Finnish case, this constraint dominates both the phonological markedness constraint and the faithfulness constraint of individual segments.<sup>15</sup>

3.10 FAITH constraint referring to feature transitions: IDENT·IO XP (cont)  
(where P = plosive, X = any segment)

FAITH constraint referring to individual segments: IDENT·IO P (cont)

Markedness constraint: LAZY (= \*plosive)

3.11 IDENT·IO XP (cont) >> LAZY >> IDENT·IO P (cont)

3.12  $c^h o$  [v]əɲx ‘fish soup’ (= halu[s]·i)

/c <sup>h</sup> o pəɲx/	IDENT·IO XP	LAZY	IDENT·IO P
c <sup>h</sup> o pəɲx		**!	
☞ c <sup>h</sup> o [v]əɲx		*	*

3.13 utku ‘man’ (= äiti)

/utku/	IDENT·IO XP	LAZY	IDENT·IO P
☞ utku		**	
ut[ɥ]u	*!	*	*

3.14 məkək [f]oqi ‘air bladder of a dace’ (= tila[s]·i)

/məkək p <sup>h</sup> oqi/	IDENT·IO XP	LAZY	IDENT·IO P
məkək p <sup>h</sup> oqi		****!	
☞ məkək [f]oqi		***	*
məkək [f]o[ɣ]i	*!	**	

It is crucial that the second candidate in the last tableau does not incur a violation of IDENT·IO XP. This is because the transition  $k-p^h$  is not existent in the lexicon (i.e., heteromorphic cluster) while the transition  $o-q$  of  $p^h oqi$  is.

### 3.3 Hardening and blocking of spirantization as OCP effects

In this section, I discuss the phonological context of CA, captured by the generalization that fricative and sonorant be followed by a plosive. Spirantization and hardening seems to ‘conspire’ here to achieve this one and the same result. The examples are repeated from section 1.

Hardening following a fricative or sonorant

- 3.15 a. cxəf [q<sup>h</sup>]a· (< ɣa·) ‘to shoot a bear’  
b. əvɲ [ʒ]osq· (< zosq·) ‘to break an oar’

Spirantization blocked following a fricative or sonorant

- 3.16 a. cxəf t<sup>h</sup>om ‘bear fat’  
b. k<sup>h</sup>əɲ t<sup>h</sup>i ‘sun ray’

The phonological nature of these effects is ostensible once we capture them in terms of syntagmatic cooccurrence restrictions. Let us begin with the postfricative context.

It is crosslinguistically well known that adjacent fricatives are disliked as a result of morphological

<sup>15</sup> In order to restrict the application of spirantization within the corresponding obstruent series, I assume that IDENT·IO (spread glottis) is undominated, preventing spirantization as  $p^h > v$  or  $p > f$  (where the obstruent series (I), (III) = + spread glottis, and (II), (IV) = · spread glottis, following Blevins (1993)).

or phonological operations.

Polish: spirantization blocked when it results in a sequence of fricatives (Lubowicz 1998: 8)

- 3.17            *dronj̣+ek > dron[ʒ]ek*                            ‘pole(diminutive)’  
                   *róžj̣+ek > róžj̣ek*    \**róžž+ek*                    ‘brain (diminutive)’

j̣ = postalveolar affricate, ʒ = postalveolar fricative

Grimm’s law: no spirantization of *t* to *θ* when *s* precedes: star (English)

English: the sporadically observed hardening of *θ* to *t* when it follows a fricative (Boersma 1998: 434): *siks[t]* ‘sixth’, *twɛlf[t]* ‘twelfth’.

The problem with such adjacent fricatives is perceptual in nature. Boersma (1998: 434) claims that the noises of adjacent fricatives are often very similar and difficult to distinguish one from the other, resulting in the loss of auditory cues.<sup>16</sup> I formalize this perceptually motivated dissimilation as an Obligatory Contour Principle constraint of the following form.<sup>17</sup>

- 3.18            OCP (fric): No adjacent fricatives

Ranking OCP above the faithfulness constraint that targets [cont] features of fricatives, i.e., IDENT-IO F[ricative] (cont), yields the desired conspiracy effect of spirantization and hardening.

- 3.19

IDENT-IO XP(cont), OCP >> IDENT-IO F (cont), LAZY >> IDENT-IO P (cont)

- 3.20    Blocking of spirantization: *cɛxf pəɲx* ‘bear soup’

<i>/cɛxf pəɲx/</i>	IDENT-IO XP	OCP	IDENT-IO F	LAZY	IDENT-IO P
<i>ɸ cɛxf pəɲx</i>				**	
<i>cɛxf [v]əɲx</i>		*!		*	*

- 3.21    Inducement of hardening: *lovr zosq-* ‘break a spoon’

<i>/lovr zosq-/</i>	IDENT-IO XP	OCP	IDENT-IO F	LAZY	IDENT-IO P
<i>lovr zosq-</i>		*!		*	
<i>ɸ lovr [c]osq-</i>			*	**	

<sup>16</sup> Professor Hiroshi Nakagawa has pointed out to me the possibility that spirantization after plosives might be a case of dissimilation as well. Although I am aware of languages which tend to avoid both [-cont] and [+cont] sequences (Arabic, Russian, etc. Cf. Padgett 1995), such cases seem to differ from the Nivkh case in that a) they do not always require strict adjacency, and b) they are restrictions on the structural make-up of the morphemes. From these facts, and in the absence of a phonetically grounded avoidance of adjacent plosives (contra the fricative case), I hold that the present analysis is correct.

Similarly, Krejnovich tries to unify spirantization after plosives and hardening after fricatives by claiming that Nivkh does not allow for adjacent identical segments, but that this holds only when semantically significant segments are involved (1937: 63). This analysis, however, has the following deficiencies. Firstly, by unifying spirantization and hardening of these contexts together, it abandons the idea that unification is convincing within all contexts of spirantization and hardening, respectively. As a consequence, it has to seek for another motivation for spirantization after vowels and glides, and hardening after sonorants, though they are indistinguishable from the ‘dissimilation’ case, phonologically speaking. Secondly, it is not clear in what sense the initial fricative of nouns, which never undergo hardening, is semantically *not* significant.

<sup>17</sup> I am simplifying the analysis of Boersma who asserts that OCP of this type should be captured as a violation of faithfulness constraint (1998: 427). Since this simplification does no harm to my lines of argument (but may do so to the basic understandings of the OCP, which I ignore here), I formalize the OCP constraint in a simple fashion for both postfricative and postsonorant contexts (see below).

The postsonorant context can be analyzed in a similar fashion. Again, the effects of spirantization and hardening conspire to avoid sonorant-fricative sequences.<sup>18</sup> The key to such avoidance can be found in the distribution of sonorants and fricatives; in Nivkh, fricatives appear as voiced when following a sonorant.<sup>19</sup>

- 3.22     a. conyr                    ‘head’  
           b. upyr                    ‘star’  
           c. kalʁala·                ‘bright’

Because of this voicing effect, spirantization in this context leads to a loss of voicing contrast resulting in the neutralization of the two obstruent series. The phenomenon can thus be interpreted as an avoidance of such neutralization.

There are reasons to believe that plosives are better candidates than fricatives to survive postsonorant voicing (= neutralization). While [voice] is contrastive for fricatives, it is not for plosives. Recall that plosives make use of aspiration contrasts primarily. It has often been reported that the use of aspiration is an effective means to resist voicing from a neighboring nasal (cf. Pater to appear: footnote 3, Hayes and Stivers in progress: 32). In languages where voicing is contrastive for plosives, the voicelessness is often *enhanced* in postnasal positions by means of aspiration. Since voicing does not contribute to contrast the plosives in Nivkh, unaspirated plosives are free to voice when following a sonorant, in as much as fricatives in the same context are. This is what we observe in the examples below.<sup>20</sup>

- 3.23            a.(=1.8d)                rum dəf    (< təf)                    ‘Rum’s house’  
                   b.(=1.4b)                əvɲ [ʒ]osq· (< zosq·)                ‘break an oar’

Formally, the postsonorant case can be dealt with a syntagmatic constraint similar to the postfricative case. However, I will omit this from the discussion below since the phenomenon more or less parallels that of the fricative case discussed above.

### 3.5 Positional faithfulness

The final antagonistic factor to context-free spirantization involves an issue related to the domain of CA. Recall that CA never applies across XP boundaries.

- 3.24a.(=1.12b)        eɣɭɲ [tʰ]o·                                ‘(Someone) holds the child’  
                               = [VP[NEɣɭɲ][v tʰo·]]                                (‘child’ is object)
- but,
- b.(= 1.12a)        eɣɭɲ ʁo·                                        ‘The child holds (something)’  
                               = [NPEɣɭɲ] [VPʁo·]                                        (‘child’ is subject)

<sup>18</sup> This avoidance of sonorant-fricative sequences is subject to dialectal variation. Hattori (1962) reports that in the Sakhalin dialect, sonorant-fricative sequences are widely tolerated. Under the present analysis, such dialectal difference can be obtained by ranking LAZY above OCP (sonorant).

<sup>19</sup> Except at word (PPH?) final positions where all obstruents are subject to a certain degree of devoicing effects: *kins~kinz* ‘evil spirit’, *pəɲx* ‘soup’ *toɭf* ‘summer’ etc.

<sup>20</sup> The present analysis reflects the often made claim that voicing and spirantization in Nivkh are unrelated phenomena (see especially Blevins 1993: 16 for discussion). Here I will point to their difference in domain of application: voicing may apply across a relative clause-head boundary (i) while spirantization may not (ii).

- i) tʰulf pal·uin hum bəi ɲa·ɣu (< pəi) ‘birds which pass the winter in forests’  
     winter forest·at live fly animals·PL
- ii) ni lət təf                    ‘a self-made house’  
     1SG make house     \* ni lət [r]əf                    (Krejnovich 1933: 16)

I assume this contrast to be due to a faithfulness constraint that targets elements at prosodically strong positions, following the idea of Beckman (1995). Referred to as Positional Faithfulness, this constraint distinguishes elements at prosodically strong positions, such as onset or head-foot, from those which are not. Assuming that a syntactic maximal projection (XP) maps to a Phonological Phrase (PPh) within the Prosodic hierarchy, Positional Faithfulness is expected to target the initial segment of PPh under the premise that such position is prosodically strong. By ranking Positional Faithfulness above the markedness constraint, the segment at the left edge of a morphosyntactic unit (that is itself left peripheral within an XP) escapes CA.

3.25 *eyln řo-* ‘The child holds (something)’

$[_{NPheyln}[_{VP} \check{r}o-]]$	Positional Faithfulness (PPh)	OCP (sonorant)
$\textcircled{e} [_{PPh}eyln] [_{PPh} \check{r}o-]$		*
$[_{PPh}eyln] [_{PPh} [t^h]o-]$	*!	

Note also that Positional Faithfulness correctly prevents left peripheral segments without any preceding segments from alternation.<sup>21</sup>

3.26	a.(= 1.13a)	$[_{PPh}pəjx]$	‘soup’	* [v]əjx
	b.(=1.13b)	$[_{PPh}c^h o \quad [v]əjx]$	‘fish soup’	*[s]o [v]əjx

### 3.6 Summary

In the previous sections, I have discussed the nature of CA with reference to its ultimate structural goal, i.e., fricatives after vowel, glide and plosive, and plosives after fricative and sonorant. To account for this distribution, I have proposed a context-free spirantization that is restricted by various syntagmatic constraints, as well as positional faithfulness effects. The rather strong spirantization process is thus partially weakened when it comes in conflict with certain local demands.

In the next section, I will discuss the adequacy of this ranking, and suggest that it is incorrect in as much as SA is incorrect. Recall from the discussion in section 2 that spirantization and hardening are asymmetric: they do not exhibit equal distribution. Crucially, initial fricatives of nouns *never* undergo hardening. The following list illustrates the point.

3.27

syntactic category	initial segment	type of CA	examples
noun	plosive	spirantization	1.3, 1.5
noun	fricative	<b>does not apply</b>	2.1
transitive verb	plosive	spirantization	2.2
transitive verb	fricative	hardening	1.4, 1.7

This spirantization-hardening asymmetry has not been taken into account in the ranking of 3.19, in much the same way as it was not in SA. Consequently, this ranking wrongly predicts that hardening may affect the initial fricatives of nouns.

3.28 *tolv vo* ‘summer village’ ( $\textcircled{e}$ = intended winner,  $\textcircled{w}$ = wrong winner)

/ tolv vo /	IDENT·IO XP	OCP	IDENT·IO F	LAZY	IDENT·IO P
$\textcircled{e}$ tolv vo		*!		*	
$\textcircled{w}$ tolv [b]o			*	**	

<sup>21</sup> There are exceptions to the generalization that plosives at the left edge of any morpho-unit are target to CA. Certain verbal suffixes exhibit alternation only in agreement with the subject (person/number). In such a case, the syntactic constraints dominate the phonological ones, as proposed by Golston (1995).

The same problem arises with the postsonorant context. In the next section, the ranking will be revised so as to reflect the spirantization-hardening asymmetry correctly.

#### 4. Reconsidering the citation form of transitive verbs

The tacit presumption prevailing over the discussions above is that the input to CA is the citation form, i.e., the form that appears in an isolated utterance. In accordance with this presumption, the observed CA for transitive verbs has been identified as hardening since these transitive verbs are fricative-initial in their citation forms. However, this presumption is not without problems. Consider the following example, repeated here from section 2.

4.1 (=2.3) *wat ... qoj ... [tʰ]ivra*. (citation form *řivra*) ‘To go down on an iron larch’

= [VP[NP[Nwat][Nqoj]][V tʰivra]]  
     iron larch go down

In the example above, the CA contexts are interrupted by pauses and does not exhibit ordinary CA pattern, which ought to be *wat [u]oj řivra*, as Krejnovich insists (1937: 15). This example indicates that CA pattern may be affected by pause insertion. I assume that pause insertion introduces strong prosodic boundaries: boundaries of prosodically high units (possibly the Intonational Phrase, Boersma 1998: 428). Since the domain of CA has been assumed to be PPh (section 3.5), pause insertion inserts a boundary of a prosodic unit higher than PPh, hence necessarily starting a new PPh. Therefore, it is expected that each word in the above example starts a new CA domain. This means that the left-peripheral segment of each word ought to surface in its input form, due to Positional Faithfulness (section 3.5). In other words, such a restructuring of PPh is expected to undo the effects of CA. Indeed, this seems to be the case with *qoj* ‘larch’. Here *qoj* is plosive-initial, a form entirely consistent to its citation form. This is exactly what we expect if *qoj* has indeed initiated a new CA domain.

Now observe *[tʰ]ivra* ‘to go down’. In parallel with *qoj*, we expect it to surface in its citation form *řivra*. Unfortunately, this is not the case. Instead, it surfaces in its hardened form *[tʰ]ivra*, in spite of the fact that it has initiated a new CA domain. How can this be justified?

In order to answer this question, let us consider the historic development of the citation form of transitive verbs. According to Jakobson (1957), transitive verbs, obligatorily in the early stages of the language, accompanied an indefinite object prefix *i-* in the absence of an overt object. This prefix had the function of providing the covert object with a) an arbitrary reading meaning someone/something, or b) reference to an understood topic, which ought to be explicit in the course of discourse. Later, this prefix was deleted in the phonological context /\_CV (Jakobson 1957: 88-89).<sup>22</sup>

4.2 early Nivkh    contemporary Nivkh  
 a. *i-zu-*        >    *zu-*                    ‘to wash something/someone’  
 b. *i-lət-*       >    *lət-*                    ‘to do something’

In the remainder of the contexts, the prefix has escaped deletion.<sup>23</sup>

4.3 a *i-xlu-*       >    *iyly-*                    ‘to fear something’

<sup>22</sup> Transitive verbs with initial plosives are few in number since they were formed after this process (Krejnovich 1937: 70, Jakobson 1957: 91). A handful of these verbs resist spirantization: *haq q'al-* ‘change a cap’, *lit.* cap change (Panfilov 1965: 45). Similarly, certain fricative-initial verbs seem to have been formed after the *i*-deletion process as well since they never undergo hardening: *pi cuz vau-* ‘I bite meat’, *lit.* I meat bite (Panfilov 1965: 45).

<sup>23</sup> The retained *i*-preceding consonant clusters may further alternate with *e*, due to vowel harmony.

b. *i-əs-* > *jəs-* ‘to call someone’

The reason for the resistance to deletion in these contexts should be clear. In 4.3a, the loss of *i-* will lead to a consonant cluster and in 4.3b, to an onsetless syllable. The prefix is thus preserved when its loss would yield a phonologically marked structure.<sup>24</sup>

As a result of this incomplete *i-*deletion, there appeared two types of *i-*prefixed transitive verbs; those that have dropped the *i-* (4.2) and those that have retained it (4.3). Now, this *i-*prefixed form equals the citation form since the latter has an object with an arbitrary reading ‘DO + something/someone’. However, the prefix is only visible in verbs which have escaped *i-*deletion for prosodic reasons. In all other forms, the citation form cannot be distinguished formally from the form without *i-*; i.e., the form that appears with an overt object. Let us term the latter form the ‘bare form’, to contrast with the *i-*prefixed form. Thus for such *i-*deleted verbs, it is not immediately clear whether the verb is in the *i-*prefixed form or the bare form, in the absence of an overt object.

On the other hand, such disambiguity does not exist in the case of *i-*retained verbs since here the *i-* appears in a complementary fashion with the overt object.<sup>25</sup>

4.4	<i>i-</i> prefixed form	bare form <sup>26</sup>	
a.	<i>iyɾə-</i>	<i>p<sup>h</sup>ɟafk xɾə-</i> (< <i>k<sup>h</sup>rə-</i> )	‘to accompany one’s own friend’
b.	<i>irp-</i>	<i>mif t<sup>h</sup>iv-</i>	‘to sit down on the ground’

The complementary distribution of the two forms is still strictly observed in the contemporary language; the *i-*prefixed form when the object is covert and the bare form when the object is overt. It is then a short step to assume that the relevant correspondence also exists in verbs which have lost the *i-*, even though this is not visible.

Let us extend this assumption for a moment. Since the citation form is the *i-*prefixed form, it corresponds to the fricative-initial forms in verbs that have undergone *i-*deletion. The bare form, then, is the form without the *i-*. So the question is what the shape of the latter for the *i-*deleted verb is.

My analysis deviates from Jakobson’s in the following way. Although Jakobson assumes the fricative-initial form to be the input to *i-*prefixation (see 4.2, 4.3), there is no reason to believe this *a priori*. Recall that prefixes are able to trigger spirantization in much the same way as free-standing morphemes. If we were to assume that the initial fricatives of transitive verbs are derived by spirantization due to *i-*prefixation, nothing prevents us from positing a plosive-initial form for the input to *i-*prefixation.<sup>27</sup>

In support of this hypothesis, Nivkh has the tendency to initiate words with a plosive.<sup>28</sup> This is obvious in the old borrowings from the Tungus languages (Krejnovich 1937: 53-54).<sup>29</sup>

<sup>24</sup> This generalization is, however, not explicit in Jakobson’s argument.

<sup>25</sup> In certain cases, however, overt object may cooccur with the *i-*. See section 1.2 (appendix I) below on this point.

<sup>26</sup> The two forms may exhibit certain degree of deviation from each other due to the phonological demands that each form may undergo independently. Hence, the medial dorsal fricative in *iyɾə-* appear as voiced while the one in *xɾə-* is voiceless.

<sup>27</sup> A possible counterexample to this assumption is the fact that the third person prefix *i-* in the contemporary language does not trigger spirantization: *i-dux* (< *tux*) ‘his axe’, *i-t<sup>h</sup>u* ‘his sledge’, *i-da-* (< *za-*) ‘(someone) hit him’. Apparently, this behavior of the *i-* signals the presence of a floating nasal (see section 1.1 appendix I below). Jakobson is not explicit on whether all instances of *i-* in the contemporary language should be identified with the indefinite use of *i-* in the pre-Nivkh (1957: 86-88). Since the identification of the two prefixes faces the serious problem of how to explain their different behavior with respect to the floating nasal, I hold that these two are different morphemes.

<sup>28</sup> This phonotactic explains the rarity of fricative initial nouns in the vocabulary. Plosive initial nouns are predominant in Nivkh, and fricative initial ones only marginal (borrowings, taboo-words. Austerlitz 1956: 263).

<sup>29</sup> The correspondence is not compulsory since there are forms with fricatives in both languages, considered to be late borrowings (Krejnovich 1937: 54): *seata* (Nanai) vs. *seta* (Nivkh) ‘sugar’, *xaosan* (Nanai) vs. *χaulus* (Nivkh) ‘paper’, etc.

4.5	Tungus (Nanai)	Nivkh	
	saman	c <sup>h</sup> am	‘shaman’
	xala	q <sup>h</sup> al	‘clan’
	sokto·	c <sup>h</sup> oxc·	‘to get drunk’

By extending this phonotactics to the transitive verbs, we arrive at the conclusion that the input to *i*-prefixation ought to be plosive-initial. Since *i*-prefixation creates a spirantization context, the plosives of these transitive verbs underwent spirantization. Later on, when not prevented for prosodic reasons, the *i*-dropped in some of these verbs.<sup>30</sup>

Following the above discussion, I will posit the following corresponding forms for the *i*-deleted (fricative initial) transitive verbs, in parallel with the *i*-retained verbs.

4.6	<i>i</i> -prefixed form	bare form	
	a. $\gamma$ a·	q <sup>h</sup> a·	‘to shoot’
	b. zosq·	cosq·	‘to break’

The present analysis deviates from SA considerably. Crucially, the fricative-initial transitives (= *i*-deleted verbs) have as their input to transitive constructions with overt objects the plosive initial form, and not the fricative initial one, which is the citation form. This parallels the case of *i*-retained verb, where the bare form, and not the *i*-prefixed form (= citation form), is the input to transitive constructions with overt objects.

Let us discuss further the consequences of this hypothesis. Since the input to transitive construction is the plosive-initial form, they can be dealt with in an identical fashion with the plosive-initial nouns. This means that within the transitive construction, the type of CA that transitive verbs undergo is spirantization, not hardening, as was previously assumed. Now recall that the transitive verbs were the only syntactic units that undergo hardening in Nivkh. Since the present analysis does eliminate hardening of transitive verbs, nowhere in the language is hardening any longer required. In other words, the present analysis casts serious doubt on the viability of hardening as a phonological process in Nivkh. Recall that fricative-initial nouns never undergo hardening in any context (2.1). This can be explained if there were no hardening existent in the language at all. In fact, such fricatives are faithfully parsed even though they incur a violation of OCP. The crucial point then is that OCP cannot force hardening, contra the previously assumed constraint ranking 3.19. The present assumption generalizes this in the following way: OCP violation can be avoided if and only if the input form is plosive-initial, which is true for both nouns and transitives. In this sense, the OCP is static in nature. To put this in derivational terms, it may block the application of a phonological process, which may otherwise result in an OCP violating structure. However, OCP cannot trigger repair strategies to avoid OCP violation. In OT terms, this means that IDENT-IO F (cont) should be ranked higher than OCP. The constraints 3.19 should then be reranked as follows:

#### 4.7

IDENT-IO XP (cont), IDENT-IO F (cont) >> OCP >> LAZY >> IDENT-IO P (cont)

Under this revised ranking, plosive-initial transitive verbs undergo spirantization, in much the same way as plosive-initial nouns (4.9).

<sup>30</sup> This creates a case of phonological opacity (Kiparsky 1973), the trigger being removed from the surface (non-surface-apparent opacity, cf. McCarthy 1998).

4.8 object noun + transitive verb: inducement of spirantization

*ŋə ɣaː* ‘shoot an otter’

/ŋə q <sup>h</sup> aː/	IDENT-IO XP	IDENT-F	OCP	LAZY	IDENT-IO P
ŋə q <sup>h</sup> aː				*!	
☞ ŋə [ɣ]aː					*

4.9 noun + plosive initial noun: inducement of spirantization

*c<sup>h</sup>o [v]əɲx* ‘fish soup’

/c <sup>h</sup> o pəɲx/	IDENT-IO XP	IDENT-F	OCP	LAZY	IDENT-IO P
c <sup>h</sup> o pəɲx				**!	
☞ c <sup>h</sup> o [v]əɲx				*	*

On the other hand, what has been previously thought of as hardening can now be recaptured as a blocking of spirantization in order to avoid OCP violation, again in parallel with the plosive-initial nouns (4.11).

4.10 object noun + transitive verb: blocking of spirantization to avoid OCP violation

*lovr cosqː* ‘break a spoon’

/lovr cosqː/	IDENT-IO XP	IDENT-F	OCP	LAZY	IDENT-IO P
☞ lovr cosqː				**	
lovr [z]osq			*!	*	*

4.11 noun + plosive-initial noun: blocking of spirantization to avoid OCP violation

*cxəf pəɲx* ‘bear soup’

/cxəf pəɲx/	IDENT-IO XP	IDENT-F	OCP	LAZY	IDENT-IO P
☞ cxəf pəɲx				**	
cxəf [v]əɲx			*!	*	*

Since the language has no hardening process (repair strategy), there is no way for fricative-initial nouns to escape OCP violation.

4.12 noun + fricative-initial noun: violation of OCP

*tolv vo* ‘summer village’

/tolv vo/	IDENT-IO XP	IDENT-F	OCP	LAZY	IDENT-IO P
☞ tolv vo			*	*	
tolv [b]o		*!		**	

The answer to the issue of noun-transitive verb asymmetry should now be clear. Phonologically speaking, there is no such asymmetry. Transitive verbs undergo spirantization in as much as the nouns do. Although transitive verbs may pretend as if they underwent hardening, this is an artifact of the stipulation that the citation form equals the bare form in *i*-deleted verbs (but not in *i*-retained verbs). This stipulation is no longer viable for the reasons discussed above, especially with respect to the behavior of *i*-retained transitives. The privileged status of transitive verb as the only undergoer of hardening thus disappears. Its special behavior might have contributed to the existence of a derived counterpart, the *i*-prefixed form, which appears in the absence of an overt object. Transitive verbs differ in this respect from nouns which lack such a counterpart.<sup>31</sup>

The problem of the case of pause-insertion follows. Recall that the expected CA pattern after

<sup>31</sup> A handful of nouns exhibit similar derivation: *təf* ‘house’ vs. *rəf* ‘a little house erected in the cemetery for the deceased kinsman after the cremation of his body.’ (Jakobson 1957: 91) The derived form, however, deviates semantically, to a considerable extent, from the original form, and apparently constitutes a different lexical entry.



pause-insertion is the underlying form of each word, after Positional Faithfulness. Now, since the fricative-initial verbs take plosive-initial forms in the bare form, the CA pattern in 4.1 is exactly what we expect once Positional Faithfulness comes into play.

Another consequence of the current analysis is that it allows for a parallel treatment of *i*-retained verbs and *i*-deleted verbs. The whole line-up of the corresponding forms is illustrated below.

#### 4.13

	<i>i</i> prefixed form	bare form
<i>i</i> deleted transitive verbs	fricative initial	plosive initial
<i>i</i> retained transitive verbs	<i>i</i> initial	plosive initial

Since each column is filled, we can maintain that the distribution of the *i*prefixed form and the bare form are identical for both the *i*-deleted and *i*-retained verbs. On the other hand, there is no way for SA to provide such a unified account. Consequently, it has to accept the unbalanced paradigm that the *i*-retained verbs have two allomorphs while the *i*-deleted verbs have only one. As a matter of fact, no attempt has been made in the past to seek a unified account covering both *i*-deleted and *i*-retained verbs. The current analysis enables us to capture the crucial generalization that both *i*-deleted and *i*-retained verbs have the same distribution of allomorphs. Nothing special has to be said, or stipulated in order to account for the different behavior of them in the phonology *per se*, since this follows naturally from the difference in their make-up in the lexicon.

The present proposal that Nivkh transitive structures have input other than the citation form is not a novel one. Antecedents sharing this position include Kenstowicz & Kisserberth (1979), Rushchakov (1981), Kaisse (1985), and Blevins (1993). Interestingly, Lev Shternberg, the pioneer of the Nivkh study, assumed plosive-initial forms to be the input to transitive structures, as well (Shternberg 1908). On the other hand, the opposite claim, which leads directly to the basic tenets of SA, was made by Krejnovich (1937).<sup>32</sup> In his extensive article (1937), Krejnovich delivered a fierce attack on Shternberg's conclusion that Nivkh CA is an articulatory motivated phenomenon. Although the present analysis differs from Shternberg's in the details, it is worth noting that it shares the crucial view that CA is an articulation-based phenomenon (namely, lenition). Unfortunately, the antecedents of the present analysis and SA never had the opportunity to develop an extensive discussion on this topic despite the fact that they differ dramatically in their basic understandings of CA.

## 5. Conclusion

In this paper, I have proposed a strictly phonological view of CA in contrast to the often-made claim that CA is a syntactically motivated process. The phonological view enables us to capture some crucial generalizations on the nature of CA: i) the ultimate structural goal of CA: fricatives after vowels, glide and plosives, and plosives after fricatives and sonorants, ii) the identification of spirantization as an instance of lenition, which is a highly articulatory motivated process, iii) the different nature of spirantization and hardening, dubbed noun-transitive asymmetry, which ended up in the abolition of the latter, iv) the parallel treatment of *i*-deleted and *i*-retained transitive verbs. The critical defect of SA is that it fails to capture these generalizations.

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<sup>32</sup> Krejnovich goes so far to insist that CA provides evidence for an 'incorporated' structure. In contrast, Panfilov insists that CA is a sandhi phenomenon that has nothing to do with incorporation. I believe Panfilov to be correct as he points out that CA can occur even in the presence of a postposition marking comitative or plurals: p<sup>h</sup>inə-gu [b]o· (<vo·) 'to take one's own things', lit. own things take (where the PL suffix *gu* has a floating nasal, see section 1.1 appendix I). See Kaneko 1999 for a comprehensive summary of this discussion.





From the literature, we obtain two different ideas on the interpretation of *i*-prefixed forms.<sup>33</sup> Blevins proposed that the fricative-initial forms of transitives (= *i*-prefixed forms) are specified for a morphological feature [+unspecified object], in which case the transitivity of the verb is absorbed (1993: 13). This allows the *i*-prefixed verbs to behave syntactically as intransitives but still as transitives semantically. In fact, our analysis so far can be understood as an extension of this Blevins' idea, the *i*-retained transitives interpreted as the morphological realization of such a feature. This approach would not have been problematic if there were no pleonastic cases. Unfortunately, the examples above demonstrate that the [+unspecified object] verb can still take a specified object as an argument.

An alternative approach can be found in the work of Jakobson. Jakobson insists that the *i*- of the *i*-prefixed verbs is no longer active from both the semantic and syntactic point of view (1957: 89). Instead, its *raison d'être* is totally phonological; Jakobson regards the *i*- of the contemporary Nivkh as a mere prothetic vowel (to avoid initial consonant clusters, see section 4). This implies that transitive verbs should be treated as such in any circumstance, contra Blevins' proposal. Since the *i*- no longer absorbs the transitivity of the verb, pleonastic expressions no longer pose problems. The head-complement relation of the moved object and the predicate in pleonastic expressions can be maintained. The *i*- does not do any harm to the argument structure of the predicate so the latter is free to appear in the *i*-prefixed form. If we extend this idea to the *i*-deleted transitives as well, their behavior in pleonastic expressions can be explained.

The real difference between the *i*-prefixed form and the bare form is not whether the object is unspecified or not. Rather, the crucial difference is that the bare form obligatorily requires an overt object, *standing immediately to its left*, while in all other cases the verb should appear in the *i*-prefixed form. The former thus strictly subcategorizes for an overt object in a strictly left-adjacent position,<sup>34</sup> possibly the governing position. On the other hand, the *i*-prefixed form subcategorizes for an empty category, be it a *pro* (which allows either for arbitrary reading or a specific entity apparent from the discourse), or a trace of a moved NP. This is a strong condition on the distribution of Nivkh transitive verbs, to which I know of no exception.

To make a complete formal account of the observation above is beyond the scope of this paper. However, it is worth noting that the principles governing the distribution of the *i*-prefixed form and the bare form of transitive verbs is of syntactic nature. This anticipates a grammatical model in which phonological and syntactic principles interact in an interesting way.

## Appendix II: The collected CA data

The list below is from a questionnaire on CA, recorded during interviews with four consultants (all female). The forms in the list are translated from Russian by the consultants. The questionnaire is far from complete; it contains only NPs and some of the columns are unfilled, mostly due to the interviewer's lack of knowledge.

<sup>33</sup> Though these were not necessarily developed with the pleonastic case in sight.

<sup>34</sup> What counts as being 'strictly adjacent' is a delicate matter. When a postposition (i) or an adverb (ii) intervenes between the object and the verb, they are no longer seen as being adjacent and the verb appears in the *i*-prefixed form.

i) olʏoŋ c<sup>h</sup>ŋər·ko, cus·ko, c<sup>h</sup>o·ʏo, lep·ʏo siʒhagin sək in· (Krejnovich 1933: 33)

hog grass·COM meat·COM fish·COM bread·COM whatever all eat (bare form *ni*)

'The hog eats all, grass, meat, fish, bread, whatever.'

ii) keŋ mackilk so·ʏu bark pi· 'The whale eats only small fish'

whale little fish·PL only eat (1933: 25)

On the other hand, the near synonym comitatives *-ko* and *-hara* exhibit different behavior with this respect: only the former cooccurs with the bare form (iii). In contrast, *-hara* cooccurs with the *i*-prefixed form, suggesting that the NP has moved outside of VP(iv).

iii) təj mifpuk·xo als·ko pi· 'Or, (squirrels) eat mushrooms and berries.'

and mushroom·COM berry·COM eat (1933: 21)

(iv) Hoʏor Vasilij laqr·ku·hara keq nəp·hara imʏə·

then squirrel·PL·COM fox·one·COM give (bare form *k<sup>h</sup>im*)

'Then Vasilij gave (the merchant) squirrels and one fox.' (1933: 34)

V. K. Age: 70 (1929-)  
 Place of residence: Nekrasovka, North Sakhalin  
 Place of birth: Langvo  
 Date and place of recording: August 28, 1999 Nekrasovka

preceding element	example	gloss
vowel	ləyi [r]om	salm fat
	c <sup>h</sup> o [v]əjɪx	fish soup
plosive	məkək [f]oqi	airbladder of a dace
	galik [r]əf	house of Galina (person)
fricative	cxəf t <sup>h</sup> om	bear fat
	laŋɹ t <sup>h</sup> om	seal fat
nasal	p <sup>h</sup> əkən dəf	one's own brother's house
floating nasal	əya t <sup>h</sup> om	cow fat (butter)
	əya bəjɪx	cow soup

The CA pattern of this speaker is entirely consistent with that reported by Krejnovich (1937). Note also that the words containing the floating nasals behave in an opaque way (see section 1.1 appendix I).

S. P. Age 57 (1942-)  
 Place of residence: Nekrasovka, North Sakhalin  
 Place of birth: Ten'gi  
 Date and place of recording: August 27, 1999 Nekrasovka

vowel	c <sup>h</sup> o [v]əjɪx	fish soup
plosive	galik [r]əf~dəf	house of Galina (person)
fricative	cxəf [r]om	bear fat
	laŋɹ [r]om	seal fat
	cxəf [v]əjɪx~bəjɪx	bear soup
nasal	ɲəj [v]əjɪx~bəjɪx	our soup
	əkən dəf	brother's house
	keŋ t <sup>h</sup> om	whale fat
floating nasal	horla [v]əjɪx~bəjɪx	delicious soup
	əya [z]us	bear meat
	əya t <sup>h</sup> om	cow fat (butter)

The CA pattern of this speaker deviates from that of other speakers in an interesting way. Firstly, the effect of both fricative and sonorant OCP is reduced to a certain degree: *cxəf [r]om*, *laŋɹ [r]om*, and for the sonorant OCP: *keŋ t<sup>h</sup>om*, but also *ɲəj [v]əjɪx ~bəjɪx*. Secondly, the floating nasal has only a weak effect and the data tends towards a transparent CA pattern (see section 1.1 appendix I): *əya [z]us*. Thirdly, voicing may occasionally substitute for spirantization: *galik [r]əf~dəf*. The consultant told me that CA signals the word to be in the second position within a phrase. For this purpose, either spirantization or voicing will do. If this change of CA pattern is widely observed (possibly in the younger generation), it might be an indication that LAZY is climbing up the constraint ranking.

T. K. Age 63 (1936-)  
 Place of residence: Aleevka, Lower Amur region  
 Date and place of recording: September 1, 1999 Aleevka

vowel	c <sup>h</sup> o [ř]om	fish fat
	c <sup>h</sup> o [v]əɲx	fish soup
plosive	p <sup>h</sup> ařk [ř]om	fat of sturgeon
	məkək [v]əɲx	soup of dace
	p <sup>h</sup> ařk [v]əɲx	soup of sturgeon
fricative	laɲř t <sup>h</sup> om	seal fat
	cɣəf cus	bear meat
nasal		
floating nasal	urla t <sup>h</sup> om	good fat
	eɣa t <sup>h</sup> om	cow fat (butter)
	eɣa cus~žus	cow meat

This consultant, like V.K. exhibits a classic pattern of CA, consistent with Krejnovich (1937). The floating nasal is maintained as well.

L. K. Age 60 (1939-)

Place of residence: Nogliki, North Sakhalin

Date and place of recording: October 8, 1999 Shiraoui, Japan

vowel	c <sup>h</sup> o [v]əɲx	fish soup
plosive	həjk [ř]om	fat of a hare
	həjk [v]əɲx	hare soup
	galik [r]əf	Galina's house
fricative	laɲř t <sup>h</sup> om	seal fat
	cɣəf cus	bear soup
nasal	ɲəkən dəf	my brother's house
floating nasal	urla t <sup>h</sup> om	good fat
	horla pəɲx	delicious soup
	eɣa [ř]om	cow fat
	eɣa žus	cow meat
	loci [r]əf	Russian house

The CA pattern of this consultant is, to a great deal, consistent with the classic Krejnovich pattern. The only deviance is the floating nasal. Here, some forms show transparent CA pattern: *eɣa [ř]om*, *loci [r]əf*. However, *eɣa žus* suggests that there is variation within the same lexical item. Worth noting is the fact that the CA pattern of her younger sister tend towards a more transparent pattern: *urla [ř]om*, 'good fat', *horla [v]əɲx*, 'delicious soup'.

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