

PALATALIZATION AND ‘STRONG’ /i/ ACROSS INUIT DIALECTS*

Richard Compton and B. Elan Dresher
University of Toronto

Inuit dialects that show palatalization all distinguish between ‘strong *i*’ and ‘weak *i*’. This distinction descends from a contrast in the proto-language between */i/, which causes palatalization, and */ə/ (the ‘fourth vowel’), which does not. All Inuit dialects that have completely lost the contrast between these vowels also lack palatalization. This raises the question, why are there no /i a u/ dialects in which all *i* trigger palatalization? We propose that this typological gap is not accidental. According to the *Contrastivist Hypothesis*, only contrastive features can be active in the phonology. Contrastive features are determined by a *contrastive hierarchy*. We propose that the Inuit contrastive hierarchy is [low] > [labial] > [coronal]. It follows from these assumptions that *i* can trigger palatalization *only if* in contrast with a fourth vowel.

1. Introduction

Proto-Eskimo had four vowels, */i ə a u/ (Fortescue et al. 1994). They survive as distinct vowels in the Yupik branch of Eskimo but, apart from some sub-dialects of Alaskan Inupiaq, no surface /ə/ remains in the Inuit branch. In most Inuit dialects, this vowel merged with */i/. Original */i/ could cause palatalization of consonants, and some Inuit dialects show palatalization (or former palatalization) (Dorais 2003: 33). In these dialects it is traditional to distinguish between ‘strong *i*’, which descends from */i/ and causes palatalization, and ‘weak *i*’, which descends from */ə/ and does not. In some of these dialects the two types of *i* exhibit other kinds of distinct behaviour as well.

In the other Inuit dialects, which make up the majority, the original distinction between */i/ and */ə/ has been lost. It is interesting that none of these dialects show palatalization. We might have expected that there would be a few dialects in which palatalization is triggered by *every* surface *i*, but there are no such dialects. Rather, the presence of palatalization must co-occur with an underlying contrast between /i/ and a fourth vowel. Why is this so? The lack of palatalization in any of the three-vowel dialects is a striking fact that needs to be explained.

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We propose that the lack of palatalization in three-vowel dialects follows from certain assumptions about contrast and phonological activity. In brief, we argue that the contrastive status of a vowel /i/ in a four-vowel system is fundamentally different from its status in a three-vowel system.

In this talk we will first briefly introduce the theoretical principles that will be important in our analysis. We will then apply these principles to *i*-palatalization in Inuit dialects. We will show how our approach accounts for this gap in the typology.

2. The contrastive hierarchy and phonological activity: Proto-Eskimo

Consider the vowel system of Proto-Eskimo, which, following Fortescue et al. (1994), we assume to be as in (1).

- (1) Proto-Eskimo vowels (Fortescue et al. 1994)

i	u
	ə
	a

The four vowels in (1) can be characterized in terms of phonological features. Let us begin with the traditional assumption that features are binary. If we were to specify these vowels fully, we might have specifications as in (2). Here, [+coronal] is roughly equivalent to [+front] (or [–back]), and [labial] is equivalent to [round].

- (2) Full feature specifications of Proto-Eskimo vowels

	i	ə	a	u
[low]	–	–	+	–
[high]	+	–	–	+
[coronal]	+	–	–	–
[labial]	–	–	–	+

Inspection of these specifications reveals that not all of them are required in order to distinguish these vowels from each other. That is, some specifications are predictable. For example, if we know that /a/ is [+low], then we can predict that it is [–high]; given that /u/ is [+labial], we can deduce its other features; and so on. Put differently, not all features are *contrastive*: some are *redundant*.

We adopt the general approach of what has been called Modified Contrastive Specification (Dresher, Piggott and Rice 1994). This theory adopts what Hall (2007) has called the Contrastivist Hypothesis, which he states as in (3).

- (3) The Contrastivist Hypothesis (Hall 2007: 20)
 The phonological component of a language L operates only on those features which are necessary to distinguish the phonemes of L from one another.

Put another way, the Contrastivist Hypothesis holds that only contrastive features are *active* in the phonology. By ‘active’ we mean that the feature can spread, or provoke harmony, or otherwise influence other segments in the phonology.

But how do we determine which features are contrastive? We assume that contrastive specifications are assigned by a procedure we call the Successive Division Algorithm (SDA) (Dresher 1998b, 2003a, 2003b). This algorithm derives from Roman Jakobson and his collaborators (Jakobson, Fant and Halle 1952, Cherry, Halle and Jakobson 1953, Jakobson and Halle 1956, Halle 1959). An informal statement of this algorithm is given in (4).

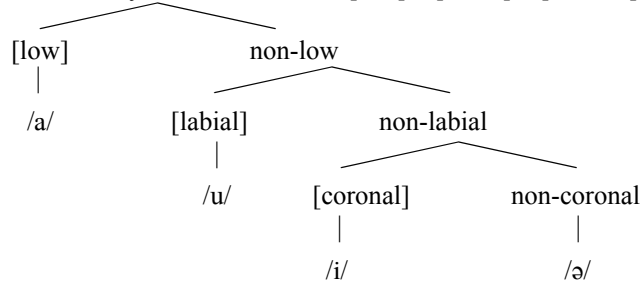
- (4) The Successive Division Algorithm
- a. Begin with *no* feature specifications: assume all sounds are allophones of a single undifferentiated phoneme.
 - b. If the set is found to consist of more than one contrasting member, select a feature and divide the set into as many subsets as the feature allows for.
 - c. Repeat step (b) in each subset: keep dividing up the inventory into sets, applying successive features in turn, until every set has only one member.

In this approach, features are *ordered* into a *contrastive hierarchy*. The ordering of the features and the SDA determine what the contrastive feature specifications are for an inventory. One possible feature ordering for the Proto-Eskimo vowel system is as follows. Following Jakobson and Halle (1956), the first division of a vowel system usually distinguishes vowels of high sonority, or lower vowels, from higher vowels of lower sonority. Concretely, we will choose the feature [low], which divides the vowel /a/ from the other vowels. Now that /a/ is uniquely specified, it receives no further contrastive features, as shown in (5).

The non-low vowels can be divided up in a number of ways. A common pattern is that the next division is based on a place feature. For reasons that will become clear later, we propose that [labial] is the next feature in the order. It divides the vowel /u/ from the other two vowels. Now /u/ is in contrast with every other vowel, and receives no further contrastive features.

We propose that the vowel phonemes /i/ and /ə/ are distinguished by the feature [coronal]. Now all the vowels have been distinguished, as shown in (5).

- (5) A contrastive hierarchy for Proto-Eskimo: [low] > [labial] > [coronal]



We assume further that the positive and negative poles of each feature are not equal, but that one value is *marked* and the other is *unmarked*. We assume that only the marked value of each feature is active in the phonology.

- (6) Markedness and phonological activity
Only *marked* feature values are active in the phonology.

For the features in (5), we assume that the marked values are the same as the name of the feature. Thus, we assume that features at the level of phonological operations are *underspecified* in two ways: (1) features that are not contrastive are not specified; and (2) unmarked contrastive feature values are not specified. Listing only the marked contrastive specifications, the Proto-Eskimo vowels now are specified as in (7), or, as a chart, in (8). In this system, /ə/ is the least marked vowel, in fact, totally unmarked for vowel features; the other vowels each have a marked feature.

- (7) Marked contrastive specifications of Proto-Eskimo vowels

	i	ə	a	u
[low]			+	
[coronal]	+			
[labial]				+

- (8) Contrastive marked specifications of Proto-Eskimo vowels

[coronal]		[labial]
i		u
	ə	

	a	[low]

3. Marked contrastive features in an underlying four-vowel system

Yupik dialects and the Diomedé subdialect of Bering Strait Inupiaq retain this four-vowel system. However, schwa does not have the same status as the other vowels: according to Kaplan (1990: 147), it ‘cannot occur long or in a cluster with another vowel’. The latter phenomenon is characteristic of unmarked elements: they tend to be targets of phonological processes, and they are not triggers (Rice 2007). In this case, schwa assimilates to neighboring vowels, and does not cause assimilation in other vowels.

The influence of contrast and markedness can be seen in Inuit dialects that have palatalization of consonants. On the assumption that palatalization of a consonant by a vowel is triggered by a contrastive [coronal] feature, /i/ in (8) could trigger palatalization, but /ə/ could not.¹ In most Inuit dialects the vowel represented as */ə/ has merged at the surface with */i/. Some contemporary dialects, however, distinguish between two kinds of *i*: ‘strong’ *i*, which descends from */i/, and ‘weak’ *i*, from */ə/. In North Alaskan Inupiaq, strong *i* triggers palatalization of alveolar consonants, but weak *i* does not. Some examples from the North Slope Barrow dialect are given in (9): the suffixes in (a) have alveolar-initial consonants following a stem ending in *u*; the suffixes in (b) show palatalization of the suffix-initial consonant following strong *i*; and the forms in (c) show that palatalization does not occur after weak *i*.

- (9) Barrow Inupiaq palatalization after strong *i* (Kaplan 1981: 82)
- | | <i>Stem</i> | <i>Gloss</i> | <i>‘and a N’</i> | <i>‘N plural’</i> | <i>‘like a N’</i> |
|----|-------------|--------------|------------------|-------------------|-------------------|
| a. | iglu | ‘house’ | iglulu | iglunik | iglutun |
| b. | iki | ‘wound’ | ikiɬu | ikiɲik | ikisun |
| c. | ini | ‘place’ | inilu | ininik | initun |

Further, weak *i* undergoes a variety of assimilation and deletion processes that do not affect strong *i* or the other vowels *u* and *a*. For example, weak *i* changes to *a* before another vowel (10a), but strong *i* does not (10b).

- (10) Barrow Inupiaq weak and strong *i* before a vowel (Kaplan 1981: 82)
- | | | | | | | | |
|----|---------|---|--------|---|------|---|-----------------|
| a. | aɲuti | + | -u- | + | -tuq | → | aɲutauruq |
| | ‘man’ | | COPULA | | 3SG. | | ‘it is a man’ |
| b. | iki | + | -u- | + | -tuq | → | ikiuruq |
| | ‘wound’ | | COPULA | | 3SG. | | ‘it is a wound’ |

Following Underhill (1976) and Kaplan (1981), we suppose that dialects that distinguish between strong and weak *i* retain four underlying vowels, as in

¹ How palatalization works is the subject of some debate; see Kenstowicz 1994 and Hall (2007) for a review and references. All that is important here is that /i/ bears some contrastive feature that triggers palatalization.

the proto-language, with the same contrastive features as in (8). Though this analysis is ‘abstract’ with respect to the surface phonetics, the analysis is committed to specify the fourth vowel phoneme only as being not low, not labial, and not coronal (i.e., some non-low unrounded central vowel).

These contrastive marked values account for the fact that /i/ can trigger palatalization, as it has a relevant contrastive feature. The fourth vowel is the least marked, literally, and therefore cannot trigger palatalization, and is more susceptible to receive features from the context; according to Kaplan (1981), weak *i* alternates with *a* in various contexts, in some restricted contexts with *u*, and alternates with zero (syncopates) in other contexts.²

In our analysis the vowel /u/ has a marked contrastive feature [labial]. Evidence for such a specification comes from Central Siberian Yupik.³ This dialect has a series of labialized velars /k^w ɣ^w x^w ŋ^w/, in addition to the plain velars. Krauss (1975: 48) writes that ‘[t]he labialized velars arise etymologically or morphophonemically in probably every case (except certain instances of /x^w/ and in loans) from the vowel /u/ between a velar and another vowel, to which the /u/ then becomes assimilated, after leaving the velar labialized.’ Like palatalization, labialization can be taken as evidence that /u/ bears a phonologically active labial feature.

(11) Central Siberian Yupik labialization before /u/ (Krause 1975: 48)

The labialized velars in (a) arise etymologically or morphophonemically from the sequences in (b):

a.	k ^w	ɣ ^w	x ^w	ŋ ^w
b.	ku	ɣu	xu	ŋu

To sum up, we have seen that in a four-vowel inventory such as that of Proto-Eskimo and some of its descendants, the vowels /a/, /u/, and /i/ all bear a contrastive feature, and the fourth vowel, schwa, is unmarked. This analysis accounts for the asymmetries between schwa and the other vowels. Moreover, there is evidence that the vowels /i/ and /u/ each have a marked feature that is phonologically active, [coronal] and [labial], respectively. We assume that /a/ has a marked feature [low]. Finally, we assume that this analysis holds equally for vowel systems in which the fourth vowel is merged at the surface with other vowels, as long as there is evidence for four underlying vowels. An advantage of this approach over previous ‘abstract’ analyses is that we do not have to specify the fourth vowel any further than it’s being non-low, non-labial, and non-coronal, that is, some sort of central vowel.

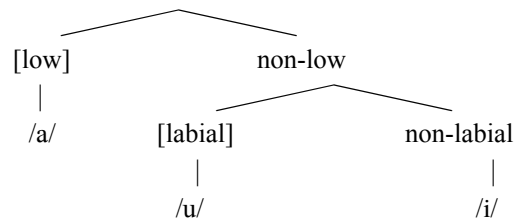
² See Archangeli and Pulleyblank (1994: 73–84) for an analysis that is similar in spirit, but proceeding from different theoretical assumptions.

³ We assume that the situation in Alutiiq (Pacific Yupik) is similar.

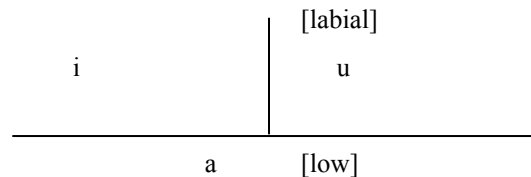
4. Marked contrastive features in a three-vowel system

In many Inuit dialects, there is no longer any distinction between strong and weak *i*. That is, the two phonemes have merged completely, resulting in a three-vowel system, not just at the surface, but also in lexical representations. The loss of the fourth vowel results also in a loss of contrasts, and this has consequences for the contrastive specification of the remaining vowels. If we stick with the contrastive hierarchy in (5), the first feature is [low], which, as before, distinguishes /a/ from the other vowels. The next feature is again [labial], which applies to /u/. But now we are finished, because all three vowels are in contrast. The loss of the fourth vowel means that the feature [coronal] is not required for any contrastive function. As a result the vowel /i/ now becomes the unmarked vowel with no contrastive [coronal] feature.

- (12) A contrastive hierarchy for /i a u/ dialects: [low] > [labial] > [coronal]



- (13) Marked contrastive specifications: [low] > [labial] > [coronal]



If the feature hierarchy for Inuit languages is as in (13), then this theory makes a prediction about palatalization in Inuit dialects (14).

- (14) Prediction about palatalization in Inuit dialects
- If palatalization of consonants by /i/ is triggered by a contrastive feature [coronal] on /i/, and
 - if the contrastive hierarchy in Inuit is [low] > [labial] > [coronal],
 - it follows that palatalization should occur only in dialects that have four underlying vowels, and not in dialects with only three underlying vowels (no contrast between strong and weak *i*).

This prediction appears to be correct, as we shall show in the next section.

5. Dialects with palatalization

Six to ten dialects (depending on how one counts) show at least some palatalization, and all these dialects maintain a distinction between strong and weak *i*. That is, in each dialect only some *i* trigger palatalization ('strong' *i*), whereas other surface *i* are not followed by a palatalized consonant ('weak' *i*). Therefore, learners of these dialects must distinguish the two types of *i*. Since palatalization, on our assumptions, shows the presence of a contrastive feature [coronal], we propose that speakers construct grammars in which palatalization is caused by an /i/ that is contrastively [coronal], whereas non-palatalizing *i* is represented as a vowel that differs from /i/ in not possessing a contrastive [coronal] feature, that is, the fourth vowel as discussed above.

The dialects listed in (15) show some palatalization, according to the survey by Dorais (2003).

- (15) Inuit dialects with palatalization (Dorais 2003: 166)
- a. North Alaskan Iñupiaq: Malimiutun, North Slope, Uummarmiutun
 - b. Western Canadian Inuktun: Natsilingmiutut
 - c. Eastern Canadian Inuktitut: North Baffin, Southeast Baffin
 - d. Greenlandic: Thule, West Greenlandic, East Greenlandic

a. North Alaskan Iñupiaq: Malimiutun, North Slope, Uummarmiutun

We showed above some examples from the North Slope Barrow dialect. Palatalization affects the coronal consonants /t n l/. Notably, only some surface *i* trigger palatalization (strong *i*). Weak *i*, besides failing to trigger palatalization, has distinctive patterning, as discussed above (10). Therefore, speakers have a lot of evidence that the two kinds of *i* are phonologically distinct entities.

b. Western Canadian Inuktun: Natsilingmiutut

Unlike North Alaskan Iñupiaq, where palatalization is widespread in the language, in Natsilingmiutut it is a marginal phenomenon. According to Dorais (2003: 62), "a few speakers pronounce *s* or *ch*, instead of *t*, in a few morphemes containing a strong *i* (such as *-nngitchuq*, 'does not')." It could well be that these few examples may not be due to a synchronic rule of palatalization; the 'palatalized' consonants may be lexicalized, and there may no longer be any underlying contrast between strong and weak *i*. That is, Natsilingmiutut may now be a three-vowel dialect with no palatalization. What is important about this dialect is that the traces of palatalization appear to be remnants of an earlier stage with more robust synchronic palatalization.⁴ If so, it is clear that there was a distinction between strong and weak *i*, as predicted.

⁴ Other explanations are possible. The palatalized forms may be due to influence from dialects which had palatalization.

c. Eastern Canadian Inuktitut: North Baffin, Southeast Baffin

According to Dorais (2003: 96), “North Baffin is the only Canadian dialect to palatalize **t** (i.e. change it to **s**) after a strong **i** (although traces of this phenomenon also exist in the Natsilingmiutut and Southwest Baffin speech forms).” Compare the forms in (16).

- (16) Strong and weak *i* in North Baffin (Dorais 2003: 96)
- | | | | |
|----|----------------------------------|----------------|-------------------------|
| a. | Strong <i>i</i> : <u>i</u> siyak | ‘foot’ | (cf. *itəyək, CED: 146) |
| b. | Weak <i>i</i> : <u>i</u> timak | ‘palm of hand’ | (cf. *ətəmay, CED: 118) |

It appears that palatalization is declining in North Baffin. In terms of the segments affected, palatalization only affects *t*, but even with *t* there are many restrictions as to where palatalization may occur. For example, Dorais observes that the palatalization of geminate *tt* to *tch* was more common in the 1970s, but occurs now only with some very old speakers. Moreover, many *i* that derive from proto */i/ no longer cause palatalization.

In Southeast Baffin palatalization is less frequent than in North Baffin; in Southwest Baffin it does not occur at all.

- (17) Palatalization in South Baffin (Dorais 2003: 97)
- | | | | |
|----|------------------|----|------------------|
| a. | Southeast Baffin | b. | Southwest Baffin |
| | ak <u>i</u> siq | | ak <u>i</u> ti |
| | ‘pillow’ | | |
| | <u>i</u> siyak | | <u>i</u> tiyak |
| | ‘foot’ | | |

d. Greenlandic: Thule, West Greenlandic, East Greenlandic

All three Greenlandic dialects palatalize *t* to *s* after strong *i*. In Thule, all *s* become *h*, including *s* that is the product of palatalization. The word for ‘foot’ is shown in the three dialects (18).

- (18) Palatalization in ‘foot’ in Greenlandic (Dorais 2003: 139)
- | | | |
|----|------------------|----------------|
| a. | West Greenlandic | <u>i</u> siyak |
| b. | East Greenlandic | <u>i</u> siyak |
| c. | Thule | <u>i</u> hiyak |

As in the other dialects that have palatalization, Greenlandic dialects maintain a distinction between strong and weak *i*.

6. Dialects without palatalization

The dialects listed in (19) have no palatalization.

- (19) Inuit dialects with no palatalization (Dorais 2003: 166)
- a. North Alaskan Inupiaq: Bering Strait, Qawiaraq
 - b. Western Canadian Inuktun: Siglitun, Inuinnaqtun
 - c. Eastern Canadian Inuktitut: Kivalliq, Aivilik, Southwest Baffin
 - d. Eastern Canadian Inuktitut: Nunavik, Labrador

These dialects also apparently display no other diagnostics for distinguishing between the two proto-vowels that merged to /i/. Thus, in all these dialects there are only three underlying vowels, /i a u/.

7. The gap in the typology

We have seen that there are three types of Inuit dialects, shown in (20).

- (20) Typology of Inuit dialects
- a. Four vowels, without palatalization: Diomedes Bering Strait Inupiaq
 - b. Four vowels, with palatalization: see (15)
 - c. Three vowels, without palatalization: see (19)
 - d. Three vowels, with palatalization: NOT ATTESTED

The dialects of type (20b) (= (15)) maintain a distinction between palatalizing /i/ and a non-palatalizing fourth vowel even though the phonetic motivation for distinguishing between types of *i* is gone. This perseveration of a distinction in the absence of its phonetic motivation (21a) is a common historical pattern.

- (21) Diachronic developments from original dialect with palatalization:

Original dialect	*/it/ > is	*/ət/ > ət
a. Maintain four vowels:	/it/ > is	/Vt/ > it
b. Lose palatalization:	/it/ > is > it	/Vt/ > /it/ > it
c. Extend palatalization:	/it/ > is	/Vt/ > /it/ > is

The dialects of type (20c) (= (19)) show no palatalization. It may be that some of these dialects never had palatalization at all, but it is unlikely that none of them did. We cited evidence that palatalization has been declining in North and South Baffin. It is reasonable to assume that some of the dialects of type (20c) descend from a dialect that had palatalization after **i*. Evidently, once **i* and **ə* were no longer distinct, speakers of these dialects opted for a ‘concrete’ solution to the problem of distinguishing which vowels caused palatalization and which did not by simply doing away with palatalization altogether, thus simplifying the phonology (21b). This, too, is a common historical development when an original contrast is lost.

Why, however, do we find no examples of the opposite merger (21c): given a dialect where /i/ causes palatalization, we might expect it to continue

doing so, and extend this process to ‘new’ *i* that arise from **ə*. Assuming that palatalization after *i* has phonetic motivation, it is all the more striking that not a single dialect opted for what might appear to be the optimal solution to the merger of the vowels: maintain palatalization (after *i*), *and* simplify the grammar by treating all surface *i* the same. By the same token, why has no three-vowel dialect *innovated* palatalization?

We have argued that we can explain why type (20d) is missing if we assume that only *contrastive* features are phonologically active, and that /i/ in the three-vowel Inuit systems has no contrastive [coronal] feature. Further, it has no marked vowel features at all. As such, it is unable to trigger palatalization. Thus, this contrastive approach to phonological patterning explains a conspicuous gap in the typology of Inuit dialects.

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