Metathesis and Syllabification
in
West Greenlandic Eskimo

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1. Introduction

Consonant metathesis in West Greenlandic Eskimo (WGE) has attracted considerable attention in the literature (Pyle, 1970; Underhill, 1971; Sadock, 1972) In this paper I readdress this issue using the tools of non-linear phonology. Within the non-linear framework, the WGE metathesis process need not be stipulated as a rule, but is instead a result of a repair strategy. The constraints imposed on this repair strategy yield interesting insights into the nature of autosegmental attachment and syllable parsing, and also indicate an analogy to syntactic structural 'movement' that might ultimately prove relevant to attempts to characterize and formalize general structural conditions on movement rules throughout the grammar.

In the next section, I present the assumptions and theory within which the metathesis analysis is articulated. In section 3, earlier analyses of the WGE metathesis process are discussed. Section 4 consists of a presentation of the preliminary facts about WGE phonology and syllable structure that prove relevant in the analysis of metathesis. The evidence for metathesis is presented in section 5. In section 6, the analysis of WGE metathesis as a repair strategy is proposed and discussed, along with sample derivations.

2. Theoretical Framework

I assume an autosegmental analysis (Goldsmith, 1976) in which the planes of feature representation may be underspecified in accordance with the theory of underspecification developed by Archangeli (1984). I assume that the feature planes are connected directly or indirectly to a skeletal plane that will be represented as a sequence of 'x'’s. These contain no segmental information but merely represent timing units of some abstract phonological nature that correspond, although probably only roughly, to actual phonetic timing measures.

I accept the general syllable structure presented in (1).
Each of the terminal constituents may contain internal structure. I also assume that a structural headedness analogous to syntactic headedness applies to the structure of the syllable, taking the rhyme to be the head of the syllable, and the nucleus to be the head of the rhyme (Levin, 1985). In this way the syllable can be seen to be the maximal projection of the nucleus, with the rhyme assuming the status of an intermediate constituent in the projection of the syllable.

Syllable parsing involves the assignment of syllable structure to a sequence of segments. This will involve left to right processing of the input sequence. The internal structure of the WGE nucleus is quite complex and does not figure prominently in the discussion of consonant metathesis. For a detailed discussion of the WGE nucleus with respect to syllable parsing and various vowel length phenomena see Brunson (1985). Without loss of generality, I will assume that the internal constituency of the nucleus is pre-assigned, and focus the discussion of syllabification on structuring at the \( N'' \) and \( N' \) levels. I propose that languages can choose between (at least) two syllable parsing strategies. The most common (i.e. least marked) strategy involves projection of the maximal category (the syllable) from the nucleus, and incorporation\(^1\) working down the projection, first incorporating sisters of the rhyme (i.e. the onset), and finally incorporating sisters of the nucleus (i.e. the coda). This strategy is commonly accepted (Steriade, 1982) yet rarely made explicit. Intuitively it seems to violate structural cyclicity, however it is just the mechanism needed to force the maximization of onsets that is so commonly cited in the literature. A second, apparently rarer, strategy involves the cyclic incorporation of segments into the syllable structure. This is defined in terms of structural cyclicity and involves stepwise projection and incorporation up the structure of the syllable, starting at the rhyme and finishing with the maximal projection (i.e. the syllable). Contrasting this with the above strategy, we find that the resulting syllable structure displays maximization of cadas.

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\(^1\) Incorporation involves attachment of the sequence into the structure as a child of the currently active node. I assume throughout that incorporation is bounded by the language specific constraints on maximal branchingness of the
are needed to prevent an all-onset or all-coda prediction. The simplifications presented above will prove to be adequate to the syllable parsing for WGE since, as section 4.2 indicates, the maximal onset and coda in WGE are a single unit in length.

3. Previous Analysis of WGE Metathesis

3.1. Pyle's Analysis

The following data are taken from Pyle, 1970\(^2\). The focus here is on the consonant alternation. Data set i) shows singular noun stems ending in a vowel with the plural formed by adding a /t/. Data set ii) shows noun stems with the singular ending in /q/. The plural forms here end in /t/, but the /q/ does not appear, and the immediately preceding consonant has become a geminate. Data set iii) shows noun stems ending in /q/, but, unlike ii), the plural does not involve a geminate.

<table>
<thead>
<tr>
<th>i)</th>
<th>singular</th>
<th>plural</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>illo(^3)</td>
<td>illut</td>
<td>house</td>
<td></td>
</tr>
<tr>
<td>iy(\gamma)</td>
<td>iy(\gamma)at</td>
<td>cooking pot</td>
<td></td>
</tr>
<tr>
<td>ike</td>
<td>ikit</td>
<td>wound</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ii)</th>
<th>singular</th>
<th>plural</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>ameq</td>
<td>ammit</td>
<td>skin</td>
<td></td>
</tr>
<tr>
<td>nanoq</td>
<td>nannut</td>
<td>bear</td>
<td></td>
</tr>
<tr>
<td>awataq</td>
<td>awattat</td>
<td>kayak</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>iii)</th>
<th>singular</th>
<th>plural</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>umiaq</td>
<td>umiat</td>
<td>boat</td>
<td></td>
</tr>
<tr>
<td>ukiok</td>
<td>ukuit</td>
<td>year</td>
<td></td>
</tr>
<tr>
<td>aataaq</td>
<td>aataat</td>
<td>saddle back</td>
<td></td>
</tr>
<tr>
<td>ikaaq</td>
<td>ikaat</td>
<td>scaffold</td>
<td></td>
</tr>
</tbody>
</table>

Pyle proposed the following rules to account for the consonant alternations in the above data.

\(^1\) I have standardized the notation here and throughout in keeping with Rischel (1974) and standard transcription practices.

\(^2\) Disregard, for now, the vowel alternations /o/ ~ /u/ and /e/ ~ /i/.
1) metathesis

\[ \begin{array}{cccc}
V_C & V & C & C \# \\
1 & 2 & 3 & 4 \\
\end{array} \rightarrow 1 3 2 4 \]

2) assimilation

The consonant moved by the metathesis rule (labeled 3 above), assimilates to the feature value of the consonant that it comes into contact with.

3) /q/-deletion

\[ q \rightarrow \emptyset / - [+\text{seg}] \]

This analysis involves the movement of the stem-final /q/, as in the data shown in 1i above, into contact with the preceding consonant where it assimilates totally with that consonant. Rule 3 is required to delete stem-final /q/s that do not occur in a form satisfying the structural description of metathesis.

These rules are illustrated in the following derivations:

<table>
<thead>
<tr>
<th></th>
<th>illu + t</th>
<th>amiq + t</th>
<th>umiaq + t</th>
</tr>
</thead>
<tbody>
<tr>
<td>metathesis</td>
<td>----</td>
<td>amqit</td>
<td>----</td>
</tr>
<tr>
<td>assimilation</td>
<td>----</td>
<td>ammit</td>
<td>----</td>
</tr>
<tr>
<td>/q/-deletion</td>
<td>----</td>
<td>----</td>
<td>umiat</td>
</tr>
<tr>
<td>/illut/</td>
<td>/ammit/</td>
<td>/umiat/</td>
<td></td>
</tr>
</tbody>
</table>

The segment /q/ is assumed to be part of the underlying representation of the noun stem based on its occurrence in the singular, and /q/ is used to trigger the metathesis rule (it is almost without exception\(^4\) the segment numbered 3 in the statement of the metathesis rule). /q/ is the segment that gets brought into contact with the preceding consonant in the stem and totally assimilated. If it fails to trigger the first two rules then it gets deleted by rule 3. This analysis raises two theoretical objections. Not only do we have a case of crucial ordering of rules but we also have absolute neutralization of the /q/ in the plural forms. The only arguments for positing /q/ in the underlying representation of the stem are:

1) it occurs in the singular.

---

\(^4\) In some cases the segment is /k/, however this is rare and most nouns ending in k do not undergo this rule even if the structural description is, strictly speaking, met.
2) --it can be used to 'predict' the occurrence of the assimilated consonant clusters in the plural forms.

These objections are entirely based on the linear framework and do not apply to the non-linear analysis that is developed in section 6.

3.2. Underhill's Analysis

Underhill (1971) argued against Pyle's treatment of consonants in WGE, proposing a gemination analysis to replace Pyle's metathesis and assimilation rules.

Underhill presented data in which the structural description of metathesis is not met, yet where gemination occurs. He also maintains that there are suffixes of similar shape, some of which trigger gemination and some of which do not. He hence argues for a lexically defined set of environments; that is, lexical affixes would have a feature, say [+geminating], that would trigger the gemination process.

Underhill's analysis involved many complex rules of segment and feature changing, as well as rules of metathesis. He assumed that the noun stems were (for the most part) /q/ final, and needed to delete this segment when the suffix triggered gemination. The complex analysis proposed by Underhill serves to illustrate quite clearly the inadequacy of a linear analysis for the WGE data.

4. Preliminaries

4.1. The WGE Stem-final /q/

In West Greenlandic Eskimo a large number of noun stems end in the segment /q/. These segments are the ones that, recalling Pyle's analysis, were moved and assimilated or deleted when affixes were attached to the stem.

The allophones /e/ and /o/ (of /i/ and /u/, respectively) are found either word finally or before a /q/. I propose that these segments receive a [- high] feature from association to the [- high] quality of the /q/ or from a [- high] autosegment associated with the end of the word. This feature may be contextual in that such an autosegment is situated word-finally and associates to the nearest segment, or there may be a rule that specifies the feature [- high] in the word-final environment. ⁶

Nouns in West Greenlandic Eskimo fall into two classes: those ending in vowels and those ending in /q/. I propose that /q/ is underlingly an unspecified timing unit. I propose furthermore that all nouns are followed by a noun class marker, the autosegment [- high]. When this feature associates with the empty timing unit, [q] is realized phonetically. This analysis has additional motivation from the vowel alternations noted above.

⁶ This follows directly from an underspecified analysis of WGE vowels, see Brunson (1985).
4.2. The WGE Syllable Structure

In West Greenlandic Eskimo there are no word-initial or word-final consonant clusters. Word internally there are maximally two-consonant clusters and these are predominantly (and some researchers on West Greenlandic claim exclusively) geminate clusters. Thus, the maximal syllable is CNC, with no branching of either the onset or coda. In terms of the headedness proposals of syllable structure, this can be generalized to a constraint preventing the branching of non-head constituents.

I make the following assumptions about syllable structure:

i) onsets are obligatory (Kaye and Lowenstamm, 1979)

ii) onsets may be null (represented by $\emptyset$)

iii) syllabification occurs from left to right, mimicking the seriality of speech.

Furthermore, there is a constraint specific to WGE:

iv) * branching non-head constituents

In order to illustrate syllabification, consider the following hypothetical situation (I assume that $N$ is lexically associated):

```
     N
   /   \\    /   \    /   \\
  x     x    x     x    x     x
```

In assigning the rest of the structure we first assign the $N'$ constituent, following the less common strategy suggested in section 2:

```
   N'
 /       \
 N       coda
 /       \\    /       \\
  x       x    x       x    x       x
```

After this the obligatory onsets are assigned as follows:

```
   N''
   /
 N'
 homeless \
 N      coda
 /       \\    /       \\
  x       x    x       x    x       x
```

A null onset must be assigned to the final syllable here due to assumption ii.
A further phenomena of relevance to the metathesis issue is the process of glide spreading. In general, a glide occurs between adjacent vowels when each projects to a separate syllable. Notice that the empty onset position defines a structural location for such an spreading rule.

5. Evidence for Metathesis

There is a derivational suffix in WGE, \(-\beta ik\), that is added to verbs to form nouns meaning 'the time or place (of the indicated action)'. If the verb to which this form is being attached ends in a single consonant followed by a vowel, then there are two alternate forms (in apparently free variation). One possibility is to geminate the last consonant in the stem, the other is to geminate the /β/ of the suffix. These are illustrated in the following example:

eg. /tuqu/ 'die', /tuquβik/ or /tuquβik/ 'time or place of death'

The requisite environment for either form to be possible is for the stem to have the following type of sequence stem-finally:

ie. XVCV

where X is any sequence (subject to the constraints of the language). In such cases the two alternate forms would be:

\[
\begin{align*}
\text{XVCCVβik} \\
\text{or} \\
\text{XVCVββik}
\end{align*}
\]

We must also account for such paradigms as:

<table>
<thead>
<tr>
<th>singular</th>
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<th>gloss</th>
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</thead>
<tbody>
<tr>
<td>ameq</td>
<td>ammit</td>
<td>skin</td>
</tr>
<tr>
<td>taleq</td>
<td>tallit</td>
<td>arm</td>
</tr>
<tr>
<td>isiγaq</td>
<td>isiγat</td>
<td>foot</td>
</tr>
<tr>
<td>illo</td>
<td>illut</td>
<td>house</td>
</tr>
<tr>
<td>iγa</td>
<td>iγat</td>
<td>cooking pot</td>
</tr>
<tr>
<td>ike</td>
<td>ikit</td>
<td>wound</td>
</tr>
<tr>
<td>uββaq</td>
<td>uββat</td>
<td>fiord cod</td>
</tr>
<tr>
<td>umiaq</td>
<td>umiat</td>
<td>bost</td>
</tr>
<tr>
<td>ikaaq</td>
<td>ikaat</td>
<td>scaffold</td>
</tr>
</tbody>
</table>

In addition, we must account for Underhill's observations that there are suffixes of similar shape, some of which cause the gemination of the preceding consonant and some of which do not. These were the observations that forced him to maintain that gemination must be formulated to apply in grammatically defined sets of environments.
6. A Non-linear Analysis of WGE Metathesis

The first tool needed in accounting for the data presented in section 5 is the presence of consonantal but otherwise unspecified timing slots. This timing slot is part of the lexical representation of the morphemes and provides us with a way of answering Underhill’s objection that a strictly phonological statement of the environment of these processes is not possible. We have translated his need for a gemination diacritic on morphemes into a structural entity that accounts for the extra timing slot that shows up in the affected forms. This extra timing slot can be associated either with free morphemes (as with the /q/ noun declension) or with bound morphemes (as with the /-βk/ suffix). Under certain structural conditions these extra ‘x’ s cause the gemination of the preceding consonant. The structural conditions required for such to happen remain to be discussed.

The proposal to be assessed is a metathesis analysis where we have such derivations as the following — [- high] is the noun marker discussed in section 4.1:

\[
\begin{array}{cccc}
  x & x & x & x \\
  | & | & | & | \\
  a & m & i & t \\
\end{array}
\]

\[\rightarrow \text{(metathesis)} \]

\[
\begin{array}{cccc}
  x & x & x & x \\
  | & | & | & | \\
  a & m & i & t \\
\end{array}
\]

\[\rightarrow \text{(spreading)} \]

\[
\begin{array}{cccc}
  x & x & x & x \\
  | & | & & | \\
  a & m & i & t \\
\end{array}
\]

yielding /ammit/ where the [- high] word-final autosegment cannot get associated since it clashes with specified features of the /t/.

For the singular form /ameq/, we have:

\[
\begin{array}{cccc}
  x & x & x & x \\
  | & | & | \quad \quad \quad \quad [- \text{high}] \\
  a & m & i \\
\end{array}
\]

where the final ‘x’ is an unspecified timing unit that functions as a noun class marker. This associates to the [-high] word-final feature and gets realized as /q/. At some point in the derivation the [- high] feature spreads to the feature matrix of /i/ and ultimately results in its realization as /e/ rather than /i/,
giving us the correct form [ameq].

What we need now is a constrained environment that will help explain under what circumstances we have movement of this unspecified ‘x’. That is, we need not only to account for the movement that occurs, but also to restrict the process sufficiently so that all the cases where movement does not occur are blocked. We need to be able to state such an environment, preferably in a manner that sheds some light on why we have movement of unspecified ‘x’’s at all.

I will present evidence that metathesis is invoked as a repair strategy to fix up a violation of well-formedness conditions of syllable structure. This is in keeping with the analysis of epenthesis proposed by Piggott and Singh (1984) where they argue that epenthesis is a consequence of syllable structure properties rather than a primitive of phonological theory.

The process of metathesis in West Greenlandic Eskimo is highly constrained, obeying the following:

i) movement from coda position to onset in the same syllable

ii) movement when affiliation brings a second consonant into position to be syllabified into the coda (and thereby violating the syllable structure well formedness condition that codas are non-branching).

iii) movement can occur only over a single non-branching nucleus.

iv) movement is only allowed for totally unspecified timing slots. This could be seen as the linking to specified matrices anchoring the timing slot and preventing metathesis.

Metathesis here is a mechanism that blocks the surface realization of sequences that are unparsable according to clearly defined syllable structure constraints. A linear statement of this process would be unworkable without incorporating elaborate contexts and environments that duplicate the statements of syllable parsing. By considering the structural environment in the domain of the syllable, we can avoid the shortcomings of the linear analyses and provide an elegant statement and explanation of the metathesis process.

Let us now consider some of the various structures that trigger metathesis and some of the structures that provide evidence for when metathesis is not permitted.

Consider the pair /ameq/-singular:/ammit/-plural. For /ameq/ we have the following representation:
(parsing rhymes)

( parsing obligatory onsets)

This gets realized as [ameq] after the [- high] autosegment associates into the final syllable.

For /ammit/, I propose the following representation:
(parsing rhymes)

\[
\begin{array}{c}
N' \quad \text{coda} \\
\downarrow \\
x \\
\downarrow \\
a \\
\end{array} \
\begin{array}{c}
N' \quad \text{coda} \\
\downarrow \\
x \\
\downarrow \\
am \\
\end{array}
\]

where the `x` is incorporated as a coda. There is now a problem for syllable parsing since branching codas are not allowed, but `/t/` is not yet syllabified. For now let's ignore this problematic `/t/` and continue assigning structure.

(parsing obligatory onsets)

\[
\begin{array}{c}
N'' \quad O \quad N' \\
\downarrow \\
x \\
\downarrow \\
a \\
\end{array} \
\begin{array}{c}
N'' \quad O \quad N' \\
\downarrow \\
x \\
\downarrow \\
am \\
\end{array}
\]

What I propose is that now the metathesis process is invoked, moving the unassociated `x` into the position defined by the empty onset. This is illustrated in the following:

\[
\begin{array}{c}
N'' \quad O \quad N' \\
\downarrow \\
x \quad x[\text{[i]}] \quad x \\
\downarrow \\
am \quad m \\
\end{array} \
\begin{array}{c}
N'' \quad O \quad N' \\
\downarrow \\
x \quad x \quad e[i][6] \quad x \\
\downarrow \\
im \quad t \\
\end{array}
\]

The structural position defined by the moved `x` can now be filled by the previously unsyllabified `/t/`, yielding a grammatical parse according to the

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6 I do not imply any theoretical relevance should be given to this trace, it is merely used to show more clearly the nature of the movement that has taken place.
constraints on the syllable inventory of WGE. Spreading occurs, providing the unassociated 'x' with segmental features as in the following:

\[
\begin{array}{c}
\text{N''} \\
/ O \quad \text{N'} \\
/ \quad \text{N} \quad \text{coda} \\
/ \quad \text{Ø} \quad x \\
/ \quad a \\
\end{array}
\quad
\begin{array}{c}
\text{N''} \\
/ O \quad \text{N'} \\
/ \quad \text{N} \quad \text{coda} \\
/ \quad x[i] \\
/ \quad (e[i]) \\
/ \quad i \\
\end{array}
\]

\[
\begin{array}{c}
/ \quad x \\
/ \quad m \\
/ \quad i \\
/ \quad t \\
\end{array}
\quad
\begin{array}{c}
- \text{high} \\
\end{array}
\]

yielding /ammit/ as desired.

This derivation describes the general process of metathesis in West Greenlandic. Now let's look at the range of forms that do not invoke metathesis.

First consider the forms /iγa/-singular:/iγat/-plural. For these forms the solution is immediately obvious. The noun stem in the singular does not end in /q/, hence we have no reason to incorporate it into the noun class that receives the extra timing slot on the stem. Without this extra timing slot, there is nothing to trigger metathesis for the plural form. We do not get the geminate form for this plural, which is exactly as predicted.

Now consider the forms /uβqa/-singular:/uβqa/-plural. For /uβqa/ we have the following representation:

\[
\begin{array}{c}
\text{N} \\
/ x \\
/ x \\
/ x \\
/ x \\
/ u \quad \beta \quad a \\
\end{array}
\quad
\begin{array}{c}
\text{N} \\
/ x \\
/ x \\
/ x \\
/ x \\
/ u \quad \beta \quad a \\
\end{array}
\]

\[
\begin{array}{c}
\end{array}
\quad
\begin{array}{c}
\end{array}
\quad
\begin{array}{c}
- \text{high} \\
\end{array}
\]

→ (parsing rhymes)
→ (parsing obligatory onsets)

\[
\begin{array}{c}
\Phi \\
\downarrow \\
N \\
\downarrow \\
x \\
\downarrow \\
u \\
\hline
N' \\
\downarrow \\
x \\
\downarrow \\
\beta \\
\hline
\hline
N'' \\
\downarrow \\
x \\
\downarrow \\
\hline
N' \\
\downarrow \\
x \\
\downarrow \\
a \\
\hline
\hline
\hline
\hline
\text{[-high]}
\end{array}
\]

which is realized as /uββaq/ when the [- high] autosegment spreads into the last syllable.

Contrast this derivation with the following derivation of the plural form /uββat/:

\[
\begin{array}{c}
N \\
\downarrow \\
x \\
\downarrow \\
x \\
\downarrow \\
\beta \\
\hline
N \\
\downarrow \\
x \\
\downarrow \\
x \\
\downarrow \\
x \\
\hline
\hline
\hline
\hline
\hline
\text{[- high]}
\end{array}
\]

→ (parsing rhymes)

\[
\begin{array}{c}
N \\
\downarrow \\
x \\
\downarrow \\
x \\
\downarrow \\
\beta \\
\hline
N' \\
\downarrow \\
x \\
\downarrow \\
x \\
\downarrow \\
x \\
\hline
N' \\
\downarrow \\
x \\
\downarrow \\
x \\
\downarrow \\
a \\
\hline
\hline
\hline
\hline
\text{[-high]}
\end{array}
\]

Again, as in the form for /ammit/ we have a problem parsing the rhyme of the final syllable. As before, we incorporate the 'x' into the structure and continue assigning structure:
As with the form for /ammit/ we have an unassociated 'x' in the rhyme and a syllabification problem. The chief difference here is that the onset is already filled by an 'x'. Since we cannot have branching onsets in this language, we cannot move the 'x' to the onset position. In this case the feature specification of the coda consonant is received from the /t/, and the constraint on non-branching codas forces the resolution to the problem through the deletion of a timing unit.

The WGE data indicates that various strategies are employed to save potentially problematic data from the syllabification constraints. Structure preservation is traditionally viewed as a constraint that operates on lexical rules preventing such rules from introducing structure not present in the lexicon (Kiparsky, 1982). Accepting that syllable structure is not pre-defined in the lexicon, syllable parsing is a structure building process assigning constituency to a phonological sequence.

In non-linear phonology there are several types of lexical structure. Timing, that is the skeletal timing tier, is one such lexical structure. If we interpret structure preservation as a heuristic in syllable parsing, we can begin to explain why metathesis is invoked rather than deletion. The relevant heuristic for WGE syllable parsing involves the preservation of phonological timing, with relative linear order of timing slots taking a secondary status. What this suggests about the nature of phonological representations in WGE is that skeletal timing slots are virtually unordered -- relative linear order is defined on the segmental matrices. Only indirectly, through autosegmental association, is an order imposed upon the timing tier. In this way, segmental association anchors the timing units, preventing the metathesis process and forcing deletion to occur.

We must now address such forms as /amiaq/-singular:/amiat/-plural. For the singular form we have the following representation:
Recall from section 4.2 that we have a process of glide spreading that occurs intervocally when adjacent vowels fall in separate syllables. The null onset provides just such a position for this spreading, and we have the resultant form:
The glide receives its feature specification by means of spreading from the neighbouring vowels. We do not have a geminate in this case since there is no consonantal matrix to provide the timing slot with segmental features. The resulting form is [amijaq].

For the plural form /amiat/ we have the following derivation:

\[
\begin{array}{c}
\text{N} \\
\text{N} \\
\text{N} \\
\hline
\text{x} \ 	ext{x} \ 	ext{t} \\
\hline
\text{a} \ 	ext{m} \ 	ext{i} \ 	ext{a} \\
\hline
\end{array}
\] [-high]

→ (parsing rhymes)

\[
\begin{array}{c}
\text{N'} \\
\text{N'} \\
\text{N'} \\
\hline
\text{N} \text{coda} \\
\text{N} \text{coda} \\
\hline
\text{x} \ 	ext{x} \ 	ext{x} \ 	ext{x} \ 	ext{x} \\
\hline
\text{a} \ 	ext{m} \ 	ext{i} \ 	ext{a} \\
\hline
\end{array}
\] [- high]

and once again we have a problem for syllabification in the word-final rhyme. We continue, as before, assigning structure:
→ (parsing obligatory onsets)

At this point it would seem possible to move the ‘x’ into onset position. There are two possible analyses here -- both consistent with the resulting form. One analysis would involve inserting the glide intervocally between the /i/ and the /a/, and thereby filling the slot that would have been filled by the ‘x’. Since branching onsets are not allowed, we can’t move the ‘x’ and hence it does not get realized in the same manner as for /uβat/. A second analysis would have the unspecified ‘x’ move into onset position, where, due to the intervocalic nature of this position, it would ultimately be realized as a glide through the filling in of appropriate default values that are filled in sensitive to the structural position of the segment. Since movement of the ‘x’ is constrained to be within the syllable, there is no way that a geminate could occur here and under the current analysis we would not expect a form such as */ammiat/. I have no empirical evidence to decide between these two analyses.

A further situation that must be accounted for is illustrated by the forms /ikaaq/-singular;/ikaat/-plural.

The singular form is derived as follows:

N

x x x x

[i a] [- high]
→ (parsing rhymes)

which gets realized as /ikaaq/ when the [- high] autosegment is appropriately attached. For the plural form /ikaat/ we have the following representation:

→ (parsing rhymes)

At this point we must, once again, continue assigning structure in spite of the
problematic segment.

→ (parsing obligatory onsets)

At this point one would expect that the unassociated ‘x’ move to the onset position. What is different in this case is that there is a branching nucleus and the movement would have to be over two timing slots. I see no other way to block the movement of the ‘x’ here than to stipulate that ‘x’'s can only move over one other timing ‘x’. This would be stated as a locality constraint on movement.

We still need to test the present theory on the alternate forms with the suffix /-βik/. Can we account for the variation that exists with these forms? Consider the form:

→ (parsing rhymes)

→ (parsing obligatory onsets)
Notice here that in a left-to-right parse, the structural description of the metathesis process is satisfied before the final syllable is totally processed. If metathesis is triggered immediately, then the following representation arises:

in which the unattached ‘x’ receives the feature specification of the preceding consonant yielding /tuquβik/. If the rule had not been triggered (it is optional and not forced here to fix up a violation of well-formedness conditions), then the parsing of the syllables would have proceeded to incorporate the β in the onset of the following syllable as in the following:

giving the alternate realization /tuquβik/.

We have found that a single structural statement of metathesis invoked as a repair strategy within the domain of syllable structure can account for the metathesis and gemination facts in West Greenlandic. We have seen that those situations where the repair strategy cannot be invoked can be accounted for in
terms of the general and independently motivated constraints on syllable structure in the language. The only stipulation aside from the syllable parsing strategies and syllable well formedness conditions is that the movement has a locality constraint that prevents it from occurring over two timing slots.

The general statement of metathesis is the following:

\[
\begin{array}{c}
\text{O} \\
\uparrow \\
\text{N}'' \\
\uparrow \\
\text{N}' \\
\uparrow \\
\text{N} \\
\uparrow \\
\emptyset \\
\end{array}
\rightarrow
\begin{array}{c}
\text{O} \\
\uparrow \\
\text{N}'' \\
\uparrow \\
\text{N}' \\
\uparrow \\
\text{N} \\
\uparrow \\
\text{coda} \\
\end{array}
\]

where, in the structural description of the rule, \( N \) is not branching, \( O \) contains the null element and the coda 'x' is unassociated to feature planes. The null element provides a natural structural position into which to move the unassociated 'x'.

This analysis has an analogue in syntax where such structures as:

\[
X''
\rightarrow
X'
\rightarrow
X
\rightarrow
X
\rightarrow
\begin{array}{c}
\text{specifier} \\
\uparrow \\
X \\
\uparrow \\
\text{complement} \\
\end{array}
\]

occur. This is a clear analogy to the headedness proposals about the syllable where the rhyme and nucleus are successive heads of the maximal syllable projection as illustrated in the following:

\[
\begin{array}{c}
\text{N''} = \sigma \\
\uparrow \\
\text{onset} \\
\uparrow \\
\text{N' = rhyme} \\
\uparrow \\
\text{N = nucleus} \\
\uparrow \\
\text{coda} \\
\end{array}
\]

It is a well established fact in X-bar syntax that there is a tendency for movement from the complement to the specifier position of a phrase. This is exactly what happens, if we accept the structural analogy, when the unassociated 'x' moves to onset position. There are locality constraints on movement in syntactic structures, for instance, subadjacency prevents movement over more than one bounding node. Again the analogy holds for the syllable structure movement locality constraint which allows movement over no more than one
timing unit\textsuperscript{7}. Berwick and Weinberg's (1984) acquisition arguments about recoverability and learnability (ie. grammars don't count) apply as readily to the syllable structure locality constraint as they do to the syntactic structure locality constraints.

7. Conclusions

The metathesis process presented above, which is invoked as a repair strategy during syllabification, allows us to account for a fairly wide range of WGE data involving metathesis and gemination. By allowing unspecified timing slots to occur within the appropriate lexical entries, we can predict the resulting forms with a small number of principles that are all fairly well-motivated. The suggested syllable parsing strategies not only correctly account for forms that do not involve metathesis, but they also clearly show the violation and structural description that results in the metathesis repair strategy. Otherwise motivated processes such as glide spreading interact with the metathesis process to yield correct predictions. With a minimum of stipulations we are able to cover the data presented in section 5. Even the required stipulations prove to have extra motivation either within the phonology or through analogy to other structural domains.

8. Acknowledgements

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9. References


Kaye, J. and J. Lowenstamm. ‘Syllable Structure and Markedness Theory’.

\textsuperscript{7} In the case of syllable structure locality, the focus is on the timing units (ie. the leaf nodes) rather than on pro-


