

The phonology of Norwegian

Topic 1: Stress and Quantity

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1 Course goals

The simple goal with this series of lectures is to present a few aspects of Norwegian phonology which raise interesting theoretical questions in generative phonology, and especially in optimality theory. Topics to be covered include the interaction of stress and syllable structure, pitch accent, one very specific topic in morphophonology of particularly contemporary relevance, and possibly an example of opacity in the segmental phonology of Norwegian.

2 Bibliographic comment

The best comprehensive introduction to Norwegian phonology is Kristoffersen (2000); with this book and its bibliography, you'll find your way to the most important resources on the topic. You could supplement Kristoffersen's book with the papers that come up when you search on ROA for 'Norwegian' and maybe have a look at *Nordlyd* now and then, www.ub.uit.no/munin/nordlyd/. There are at least three journals that irregularly publish on Norwegian phonology: *Nordic Journal of Linguistics*, *Norsk Lingvistisk Tidsskrift*, and *Maal og Minne*, the latter two primarily in the object of study. For the individual topics we take up, a list of relevant references will be provided. Papers by me are available at my homepage, www.hum.uit.no/a/rice.

3 What is Norwegian?

- (1) In which Kristoffersen's line is presented and more or less adopted ...

4 Stress and quantity: Disyllables

The mutual interdependency of stress and quantity is an old problem with many, many publications addressing various issues. The most important of these are cited in Kristoffersen (2000); the presentation here draws mostly on my own work on this topic, especially as found in Rice (1999, 2003, 2006). I hope to have time to comment on some aspects of Lunden (2006) as well.

- (2) *Initial generalizations*
- a. Assumption: A moraic theory of syllable structure (Hyman 1985; Hayes 1989; Morén 2001).
 - b. Stressed syllables have to be heavy, i.e. bimoraic.
 - (i) A stressed syllable can be open, with a long vowel.
 - (ii) A stressed syllable can be closed, with a short vowel.
 - (iii) (C)VVC is not a possible (nonfinal) syllable in Norwegian. (It's not possible finally either, as we will see.)
 - c. Heavy syllables have to be stressed.

4.1 Stress and quantity data

- (3) *Prototypical disyllabic words in Norwegian ...*
- a. have stress on the initial syllable,
 - b. have a second syllable which is open,
 - c. have an initial syllable which either has a long vowel or which is closed, either by the first consonant of a cluster, or by a geminate consonant.
- (4) *Complementary distribution of V- and C-length in disyllabic words*

| | | | |
|---------------|-------------------|--------------------|-----------------------|
| <i>tape</i> | 'to lose' | <i>tappe</i> | 'to tap' |
| <i>ripe</i> | 'to scratch' | <i>rippe (opp)</i> | 'to drag (up)' |
| <i>stripe</i> | 'stripe' | <i>strippe</i> | 'to strip' |
| <i>mate</i> | 'to feed' | <i>matte</i> | 'mat' |
| <i>hete</i> | 'heat' | <i>hette</i> | 'hood' |
| <i>føde</i> | 'to give birth' | <i>fødde</i> | 'to feed, pret.' |
| <i>glede</i> | 'to make glad' | <i>gledde</i> | 'to make glad, pret.' |
| <i>lade</i> | 'to load' | <i>ladde</i> | 'to fill, pret.' |
| <i>bane</i> | 'field, lane' | <i>banne</i> | 'to swear' |
| <i>rene</i> | 'clean' | <i>renne</i> | 'gutter' |
| <i>mine</i> | 'mine' | <i>minne</i> | 'to remind' |
| <i>bule</i> | 'bump, swelling' | <i>bulle</i> | '(papal) bull' |
| <i>pile</i> | 'to move quickly' | <i>pille</i> | 'to finger' |
| <i>hele</i> | 'to heal' | <i>helle</i> | 'to slant' |

| | | | |
|--------------|-----------------------------|---------------|---------------------|
| <i>mure</i> | ‘to make a wall’ | <i>murre</i> | ‘ache’ |
| <i>hake</i> | ‘chin’ | <i>hakke</i> | ‘pick’ |
| <i>rake</i> | ‘rake’ | <i>rakke</i> | ‘dog’ |
| <i>reke</i> | ‘shrimp’ | <i>rekke</i> | ‘line’ |
| <i>breke</i> | ‘bleat’ | <i>brekke</i> | ‘big hill’ |
| <i>bleke</i> | ‘to bleach’ | <i>blekke</i> | ‘newspaper (slang)’ |
| <i>kube</i> | ‘cube’ | <i>kubbe</i> | ‘log’ |
| <i>same</i> | ‘a Saami person’ | <i>samme</i> | ‘same’ |
| <i>grime</i> | ‘harness’ | <i>grimme</i> | ‘ugly, pl.’ |
| <i>klase</i> | ‘bunch of fruit or flowers’ | <i>klasse</i> | ‘class’ |
| <i>buse</i> | ‘to barge in’ | <i>busse</i> | ‘kind of ship’ |
| <i>lise</i> | ‘pain relief’ | <i>lisse</i> | ‘shoe lace’ |
| <i>suge</i> | ‘to suck’ | <i>sugge</i> | ‘sow’ |
| <i>ruge</i> | ‘to brood’ | <i>rugge</i> | ‘to rock’ |

- (5) *A grammar delivering exactly these forms as grammatical must ...*
- place stress on the initial syllable, and
 - insure that the stressed syllable is heavy.

4.2 The pre-OT conundrum

- (6) *Underlying representations*
- The division of labor between the grammar and the lexicon correlates with the distinction between predictable and unpredictable information.
 - Weight in stressed syllables is predictable, and should therefore be supplied by the grammar, and should therefore not be present in the lexical representation of the underlying representation.
 - But whether weight manifests itself as V-length or C-length is unpredictable, and it must therefore be present.
 - Can two different surface forms have the same underlying representation? For example, can *hake*—with the shape CVVCV—and *hakke*—with the shape CVCCV—both have as their underlying representation a shape /CVCV/?
 - Is it enough to have *either* V-length or C-length in underlying representations? Which one should we choose? Cf. Kristoffersen (1999) for relevant discussion.
- (7) A surface oriented theory such as OT changes our perspective on this problem. Our job is to identify a grammar which—given any input—yields a set of structures which have the surface-observable properties, namely initial stress and quantity, realized either as V-length or C-length. The question as to which of these is underlying and which is derived is irrelevant. The two-way dependency between stress and quantity (which is especially obvious

in longer words to be discussed below) doesn't lead us to a 'chicken-or-egg' problem; stress is dependent on quantity and quantity is dependent on stress, and our task is to capture this relationship *non-derivationally*.

(8) What is the Rich Base?

4.3 Analysis of prototypical disyllables

(9) The disyllabic data could be analyzed with either moraic trochees or syllabic ones. Following the conventions of metrical theory (Hayes 1995), I use moraic trochees because of the quantity sensitivity of the system. (On the nonexistence of (HL) trochees, cf. Prince (1990); on their existence, see Rice (1992).)

4.3.1 Constraints

(10) NONFINALITY: The prosodic head of the word does not fall on the word final syllable (Prince & Smolensky 1993:42).

Prince & Smolensky define the prosodic head as the syllable bearing main stress. The constraint is therefore understood here to mean that the right edge of the stressed syllable does not coincide with the right edge of the word.

(11) ALIGN(HPrWd, R, PrWd,R): For every head of a prosodic word (syllable bearing main stress), there is a prosodic word such that the right edge of the head of the prosodic word coincides with the right edge of the prosodic word (Prince & Smolensky 1993).¹

(12) NOCODA: A syllable does not have a coda. (Prince & Smolensky 1993:93)

(13) FOOTBINARITY: A foot is binary at the level of the syllable or the mora (Prince & Smolensky 1993).

(14) MAXLINK-(μ)[seg]: For two corresponding segments, if S_1 is associated to a mora, then S_2 is associated to a mora (Morén 2001).

(15) Why are these constraints used?

(16) Could other constraints be used to analyze these data? Which ones?

¹It is well-established that stress in earlier stages of Germanic is initial, suggesting the relative high ranking of an alignment constraint pushing the head of the prosodic word towards the left edge (Riad 1992). With words of one or two syllables, the difference between building a trochee at the left edge vs. building one at the right edge cannot be discerned. With the loanwords, however, I argue that stress must be towards the right edge of the word, cf. Rice (1999).

4.3.2 Rankings

- (17) MAXLINK-(μ)[seg] \gg NoCODA²
 (18) NONFINALITY \gg ALIGNR
 (19) FOOTBINARITY \gg MAXLINK-(μ)[seg]
 (20) NONFINALITY \gg MAXLINK-(μ)[seg]
 (21) What is the argument for each of these rankings?
 (22)

| |
|---|
| What incorrect result would follow from the ‘other’ rankings? |
|---|

4.3.3 Tableaux

- (23) A disyllabic input with a final open syllable will surface with stress on the initial syllable, and with a lengthened vowel if the intervocalic consonant in the input is not specified as moraic.

| | ha _{μ} ke _{μ} | StW | WtS | FtBn | NonF | MAXL _{μ} | NoCoda | AR |
|------|--|-----|-----|------|------|----------------------------------|--------|----|
| a. | (há _{μ} ·)ke _{μ} | *! | | * | | | | * |
| b. | (ha _{μ} ·ké _{μ}) | *! | | | * | | | |
| c. | (há _{μ} ·ke _{μ}) | *! | | | * | | | * |
| d. | (há _{μ} k _{μ} ·)ke _{$\mu\mu$} | | *! | | | | * | * |
| e. | ha _{μ} k _{μ} ·(ké _{$\mu\mu$}) | | *! | | * | | * | |
| f. | (há _{$\mu\mu$} k _{μ} ·)ke _{μ} | | | *! | | | * | * |
| g. | (há _{μ} k _{μ} ·)ke _{μ} | | | | | | *! | * |
| h. | (há _{$\mu\mu$} ·)(kè _{$\mu\mu$}) | | | | *! | | | * |
| ☞ i. | (há _{$\mu\mu$} ·)ke _{μ} | | | | | | | * |

- (24) *Explication of (23)*
- If the stressed syllable is monomoraic – as in candidates (a), (b), and (c) – the candidate fatally violates STRESS-TO-WEIGHT.
 - If there is a bimoraic syllable which is not stressed – as in candidates (d) and (e) – the candidate fatally violates WEIGHT-TO-STRESS.
 - If there is a monomoraic or trimoraic foot – as in candidates (a) and (f) – the candidate (fatally) violates FOOTBINARITY.
 - If a foot coincides with the right edge of the word – as in candidates (b), (c), (e) and (h) – the candidate (fatally) violates NONFINAL.

²This ranking has the effect of preserving a moraic consonant as moraic, even at the cost of having a coda. Using Morén’s formalism is crucial here, since the possibility of changing the association of a mora (e.g. from a consonant to a vowel) would allow MAX in the traditional sense to be satisfied, while NOCODA also is satisfied. The effect of this in Norwegian would be that stressed syllables always have long vowels and never are closed by geminates.

- (25) Since markedness constraints are evaluated independent of the input, a tableau with any configuration in the input (e.g. w.r.t. linked morae) will therefore have identical markedness violations. There is only one faithfulness constraint in this (fragment of the) grammar – MAXL(μ). This means that candidates incurring fatal violations “above” MAXL(μ) will never be optimal. When MAXL(μ) fails to distinguish candidates (g) and (i), then (i) will be optimal. When MAXL(μ) does distinguish candidates (g) and (i) in favor of (g), then (g)’s violation of NoCODA becomes irrelevant to its selection as optimal. This grammar thereby tolerates the hypothesis of the Richness of the Base and delivers one of two well-formed outputs ((g) or (i)), regardless of the input.
- (26) A disyllabic input with a final open syllable will surface with stress on the initial syllable, and with a geminate consonant if the intervocalic consonant in the input is specified as moraic (and the initial vowel is not specified as bimoraic in the input).

| | ha $_{\mu}$ k $_{\mu}$ e $_{\mu}$ | StW | WtS | FtBn | NonF | MAXL $_{\mu}$ | NoCoda | AR |
|------|---|-----|-----|------|------|---------------|--------|----|
| a. | (há $_{\mu}$.)ke $_{\mu}$ | *! | | * | | * | | * |
| b. | (ha $_{\mu}$.ké $_{\mu}$) | *! | | | * | * | | |
| c. | (há $_{\mu}$.ke $_{\mu}$) | *! | | | * | * | | * |
| d. | (há $_{\mu}$ k $_{\mu}$.)ke $_{\mu\mu}$ | | *! | | | | * | * |
| e. | ha $_{\mu}$ k $_{\mu}$.(ké $_{\mu\mu}$) | | *! | | * | | * | |
| f. | (há $_{\mu\mu}$ k $_{\mu}$.)ke $_{\mu}$ | | | *! | | | * | * |
| ☞ g. | (há $_{\mu}$ k $_{\mu}$.)ke $_{\mu}$ | | | | | | * | * |
| h. | (há $_{\mu\mu}$.)(ké $_{\mu\mu}$) | | | | *! | * | | * |
| i. | (há $_{\mu\mu}$.)ke $_{\mu}$ | | | | | *! | | * |

5 Stress and quantity: Monosyllables

- (27) *Initial generalizations*
- A monosyllabic word in Norwegian must be heavy, i.e. bimoraic.
 - The surface forms give the impression that Norwegian allows super-heavy syllables in word-final position, i.e. long vowels followed by a consonant, or a short vowel followed by two consonants. Super-heaviness is not a requirement, however, given the possibility of CV: words.
 - The claim that the vowels in these pairs of monosyllabic words vary in length is uncontroversial. In addition to being particularly salient impressionistically, research has shown that it is precisely the variation in vowel length which cues speaker judgments for word identification (Behne et al. 1998b). Speakers are less attuned to contrasts in consonant length in word-final position. Nonetheless, the length difference is

reliably present (Behne et al. 1998a).

5.1 Monosyllabic data

(28) *Complementary distribution of V- and C-length in monosyllabic words*

| | | | |
|--------------|---------------------|---------------|-------------------------|
| <i>hat</i> | ‘hatred’ | <i>hatt</i> | ‘hat’ |
| <i>tak</i> | ‘ceiling’ | <i>takk</i> | ‘thanks’ |
| <i>rap</i> | ‘burp’ | <i>rapp</i> | ‘kind of grass’ |
| <i>råd</i> | ‘advice’ | <i>rådd</i> | ‘advise, part.’ |
| <i>vis</i> | ‘manner’ | <i>viss</i> | ‘certain’ |
| <i>vad</i> | ‘ford (in a river)’ | <i>vadd</i> | ‘to wade, part.’ |
| <i>stek</i> | ‘steak’ | <i>stekk</i> | ‘to clip wings, imp.’ |
| <i>skjøt</i> | ‘joint’ | <i>skjøtt</i> | ‘to splice, pret.’ |
| <i>pur</i> | ‘pure’ | <i>purr</i> | ‘to remind, imp.’ |
| <i>lut</i> | ‘lut’ | <i>lutt</i> | ‘lute’ |
| <i>eg</i> | ‘I’ | <i>egg</i> | ‘egg’ |
| <i>ren</i> | ‘clean’ | <i>renn</i> | ‘ski competition’ |
| <i>stab</i> | ‘staff’ | <i>stabb</i> | ‘to walk heavily, imp.’ |
| <i>steg</i> | ‘step’ | <i>stegg</i> | ‘male quail’ |

(29) *A grammar which delivers exactly these options ...*

- a. place stress on the lone syllable,
- b. insure that a vowel followed only by a singleton (i.e. non-moraic) C is long, and that other vowels are not.

5.2 Analysis of monosyllables

(30) How do monosyllables differ from stressed syllables in disyllabic words?

(31) There are of course also monosyllabic words which have short vowels and end in a cluster, e.g. *veps*, *melk*, *film*, If this weren't an edge effect, then we would expect to find disyllabic words of the shape CVCC.CV, but we don't. Similarly, we don't find non-final tautosyllabic V:C sequences, e.g. CV:C.CV. Because of this, the analysis of these strings in the monosyllabic words should be 'special' in some way which would not be available word-internally.

(32) In the case of final VC_iC_j or V:C, we would want to treat the final syllable as being outside of the syllable containing VC_i or the long vowel. There are two candidate strategies for doing this. We could either leave that final consonant unsyllabified and adjoin it directly to a higher level of prosodic structure (e.g. the prosodic word), somehow licensing a violation of strict layering (Selkirk

1984) at the word edge. Another option is to think of the final consonant as being syllabified, just not in that same syllable. In this case, we might think of this as a word-final onset, cf. Harris and Gussman (2003); Scheer (2005); this is also related to the notion of *catalexis*, cf. Kiparsky (1992); Kager (1995).

- (33) A challenge remains for the analysis of words like *hatt*. In particular, one could treat these as a word-final sequence of a short vowel and a moraic consonant, syllabified together in the lone stressed syllable. And, indeed, $V+C_\mu$ sequences do occur word-internally. But, when they do, the C_μ is doubly linked—both to a mora and to the subsequent syllable, in which it functions as an onset. If this is a representational option offered up by Gen, we might want to consider this representation also in word-final position. For related discussion, see inter alia Broselow (1995), Ringen and Vago (2002), Davis (2003), and Curtis (2003).
- (34) An interesting perq of having prosodic material subsequent to the stressed syllable is seen in the analysis below, in which the extra material ‘protects’ the stressed syllable from a violation of NONFINAL. In other words, if Gen offers this option, it is optimal.

5.2.1 Constraints

- (35) They’re the same . . . or else we’re really in trouble.

5.2.2 Rankings

- (36) These are also the same in this analysis, which is one important way in which the present approach differs from that of Kristoffersen (1999). Kristoffersen advocates the use of co-phonologies, whereby PHONO1 yields forms with long vowels while PHONO2 delivers short vowels and closed syllables; the co-phonologies differ with the ranking of *V: (a markedness constraint banning long vowels) and NOCODA.

5.2.3 Tableaux

- (37) For the surface monosyllables, the optimal output will have a long vowel when the input consonant is not moraic.

| | $ha_\mu t$ | StW | WtS | FtBn | NonF | MAXL $_\mu$ | NoCoda | AR |
|------|--------------------------|-----|-----|------|------|-------------|--------|----|
| a. | (.há $_\mu$ t $_\mu$.) | | | | *! | * | * | |
| b. | (.há $_{\mu\mu}$ t.) | | | | *! | | * | |
| ☞ c. | (.há $_{\mu\mu}$.)t | | | | | | | * |
| d. | (.há $_\mu$ t $_\mu$.)t | | | | | | *! | * |

- (38) NONFINAL is violated when a foot coincides with the right edge of the word. This is avoided only by making a final consonant extrasyllabic, e.g. as an onset (either alone, or as an onset to an empty – or catalectic – syllable).
- (39) When the input has a monomoraic vowel and a moraic consonant, the vowel in the optimal candidate will be short.³

| | ha _μ t _μ | StW | WtS | FtBn | NonF | MAXL _μ | NoCoda | AR |
|----|---|-----|-----|------|------|-------------------|--------|----|
| a. | (.há _μ t _μ .) | | | | *! | | * | |
| b. | (.há _{μμ} t.) | | | | *! | * | * | |
| c. | (.há _{μμ} .)t | | | | | *! | | * |
| ☞ | d. (.há _μ t _μ .)t | | | | | | * | * |

6 Other patterns

- (40) Loanwords show shapes and stress patterns not seen in the native vocabulary. The requirement that the stressed syllable be bimoraic is preserved. However, disyllabic words can end with consonants, and these words can have either final or penultimate stress. Both of these options are returned by the grammar, as in §6.1. Borrowings with final open syllables can also have either final stress or penultimate stress. These options are not both delivered unproblematically by the same grammar, as in §6.2.

6.1 Final closed syllables

- (41) Disyllabic words with word-final consonants and penultimate stress: *éddik*, ‘vinegar’; *séneþ*, ‘mustard’; *bíson*, ‘bison’; *kókos*, ‘coconut’; *álbum*, ‘album’; *átlas*, ‘atlas’; *bálsam*, ‘balsam’; *bámbus*, ‘bamboo’; *básis*, ‘foundation’; *bónus*, ‘bonus’; *dóktor*, ‘doctor’; *fáktor*, ‘factor’; *fénrik*, ‘second-lieutenant’; *fókus*, ‘focus’; *grátis*, ‘free’; *hállik*, ‘pimp’; *húmor*, ‘humor’; *kétsjup*, ‘ketchup’; *kóbolt*, ‘cobolt’; *kónsul*, ‘consul’; *krókus*, ‘crocus’
- (42) Disyllabic words with word-final consonants and final stress: *trafíkk*, ‘traffic’; *parýkk*, ‘wig’; *fagótt*, ‘bassoon’; *agúrkk*, ‘cucumber’; *hospítis*, ‘hospice’; *korreks*, ‘correction’; *tomát*; *natúr*, ‘nature’; *kondóm*; *París*
- (43) Words with final consonant clusters which have stress on a non-final syllable: *klimaks*, *boraks*, *larynks*, *advent*, *aþeks*, *appendiks*, *asfalt*, *biceps*, *boraks*, *farynks*, *Føniks*, *harpiks*, *haubits*, *kobolt*, etc.

³Here again the difference between MAX(μ) and MAXLINK(μ) becomes clear: The former would allow ‘migration’ of a mora on the consonant in the input, such that it could surface on the vowel under the pressure of NOCODA, leading to the optimization of candidate (c).

(44) These patterns can be derived. Initial stress follows from an input with a moraic consonant or a bimoraic penultimate vowel. Final stress follows from an input with a final moraic consonant.

(45) A tableau in which *éddik* is optimal

| | $e_\mu d_\mu i_\mu k$ | StW | WtS | FtBn | NonF | MAXL $_\mu$ | NoCoda | AR |
|---|---|-----|-----|------|------|-------------|--------|----|
| ☞ | a. $(\acute{e}_\mu d_\mu \cdot) di_\mu k$ | | | | | | ** | * |
| | b. $(\acute{e}_\mu d_\mu \cdot) di_\mu k$ | | | *! | * | | ** | |
| | c. $e_\mu (\cdot d\acute{i}_\mu k_\mu)$ | | | | *! | * | * | |
| | d. $e_\mu (\cdot d\acute{i}_\mu k_\mu)k$ | | | | | *! | * | * |

(46) A tableau in which *trafik* is optimal

| | $tra_\mu fi_\mu k_\mu$ | StW | WtS | FtBn | NonF | MAXL $_\mu$ | NoCoda | AR |
|---|---|-----|-----|------|------|-------------|--------|----|
| | a. $(tr\acute{a}_\mu f_\mu \cdot) fi_\mu k$ | | | | | *! | ** | * |
| | b. $(tr\acute{a}_\mu f_\mu \cdot) fi_\mu k$ | | | | | *! | * | ** |
| | c. $(tr\acute{a}_{\mu\mu} \cdot) fi_\mu k$ | | | | | *! | * | * |
| | d. $(tr\acute{a}_{\mu\mu} \cdot) fi_\mu k$ | | | | | *! | | ** |
| | e. $tra_\mu (\acute{f}i_{\mu\mu} k \cdot)$ | | | | *! | * | * | |
| | f. $tra_\mu (\acute{f}i_{\mu\mu} \cdot)k$ | | | | | *! | | * |
| | g. $tra_\mu (\acute{f}i_\mu k_\mu \cdot)$ | | | | *! | | * | |
| ☞ | h. $tra_\mu (\acute{f}i_\mu k_\mu \cdot)k$ | | | | | | * | * |

(47) A tableau in which *bóraks* is optimal


| | $bo_{\mu\mu} raks$ | StW | WtS | FtBn | NonF | MAXL $_\mu$ | NoCoda | AR |
|---|---|-----|-----|------|------|-------------|--------|----|
| ☞ | a. $(bo_{\mu\mu} \cdot) ra_\mu k \cdot s$ | | | | | | * | ** |
| | b. $bo_{\mu\mu} (ra_\mu k_\mu \cdot) s$ | | *! | | | | * | * |
| | c. $bo_\mu (ra_\mu k_\mu \cdot) s$ | | | | | *! | * | * |

6.2 Stress on final open syllables

(48) Words that are borrowed with stress on final open syllables are found in Norwegian. Relevant data include (given accents are in the orthography): *orkidé, obo, agora, akribi, allé, armé, buffet, debut, depot, diskret, filet, gelé, geni, ironi, kafé, kopi, kupé, meny, nivå*.


(49) The grammar of Norwegian as proposed above cannot return stress on a final open syllable (Kristoffersen 2003). The violation of NONFINALITY will always lead us to prefer penultimate stress – which is indeed the correct result for words which have final open syllables but penultimate stress, as in *bikíni*. There is no final consonant available which – if extrasyllabic – could ‘buffer’ the superficially final stress.

(50) Tableau for *orkidé*

| | $o_{\mu}rki_{\mu}de_{\mu\mu}$ | StW | WtS | FtBn | NonF | MAXL $_{\mu}$ | NoCoda | AR |
|--|---|-----|-----|------|------|---------------|--------|----|
| a. | $o_{\mu}rki_{\mu}(d\acute{e}_{\mu\mu})$ | | | | *! | | | |
|  b. | $o_{\mu}r(ki_{\mu\mu})de_{\mu}$ | | | | | * | | * |

(51) For this grammar to return stress on a final open syllable, *ad hoc* intervention is required. This could take the form of marking accent diacritically (e.g. Hammond 1999), with a relatively high ranked constraint requiring faithfulness to the accent. Or it could involve specifying a head in the input, and then having a constraint like MAX-HEAD, cf. McCarthy 1995, Alderete 1996.

(52) Another tableau for *orkidé*, now with diacritic accent on the final syllable, and a constraint requiring faithful realization of that accent, FAITH(\acute{v}).

| | $o_{\mu}rki_{\mu}d\acute{e}_{\mu}$ | FAITH(\acute{v}) | StW | WtS | FtBn | NonF | MAXL $_{\mu}$ | NoCoda | AR |
|--|---|----------------------|-----|-----|------|------|---------------|--------|----|
|  a. | $o_{\mu}rki_{\mu}(d\acute{e}_{\mu\mu})$ | | | | | * | | | |
| b. | $o_{\mu}r(ki_{\mu\mu})de_{\mu}$ | *! | | | | | * | | * |

7 Or ...

(53) The alternative to diacritic accent is restructuring the grammar.

(54) If the loanwords introduce patterns in which NONFINALITY is violated in order to preserve final stress, the grammar might change. Specifically, with a new ranking MAXL $_{\mu}$ \gg NONFINALITY, an input with a bimoraic vowel at the right edge with surface with final stress (as would be with reranking in (50)). Of course, this also gives hypothetical *haké* instead of either *hákke* or *háke* (with short and long stressed vowels). But given the existence of *armé*, *ha.ké* should be possible.

(55) The data can be described either through the use of specified structure that has to be respected, or through a restructuring of the grammar. How much data is necessary to compel restructuring? Is 30 words enough?

(56) Work out the analysis of the earlier data with this new ranking.

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