Norwegian stress and quantity: The implications of loanwords*

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Abstract

Disyllabic Norwegian words characteristically have an initial syllable which is stressed and heavy and a final syllable which is unstressed and light, (Kristoffersen 2000). Adopting a moraic theory of syllabic representation, the weight of the initial syllable can be realized either with a bimoraic vowel or with a monomoraic vowel followed by a moraic consonant. Monosyllabic words also show variation in the length of the vowel and the coda consonant, (Behne, Czigler, and Sullivan 1998b,a).

Stress can be assigned to both the disyllabic and monosyllabic patterns by constructing a trochaic; the core patterns are equally well predicted by constructing such a foot at either the right or left edge of the word, and indeed both analyses have been advocated (Rice 2003; Kristoffersen 2003). The stress patterns of loanwords, however, reveal additional details about the assignment of stress, and sort out some unresolvable ambiguities arising when just considering the native

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vocabulary. These facts form the basis for advocating a right-edge oriented analysis of stress in Norwegian.

Of particular interest here are two patterns revealed in the disyllabic loans, both of which have final stress. Only one of these—words with final closed syllables—can be derived with the same grammar as the native vocabulary. The other pattern—words with stress on a final, open syllable—is incompatible with the native grammar. Lexically specified vowel length on the final syllable in the input is demonstrated to be an untenable solution, since the Richness of the Base hypothesis requires that inputs with long vowels in their final syllables be mapped by the grammar for the native vocabulary onto well-formed outputs, that is, onto forms with non-final stress. Two competing analyses are presented an evaluated, one with lexically specified stress and one in which the entire grammar is restructured in a way accounting for native and loanwords alike, albeit with some overgeneration, a point which is also discussed in the conclusion.

1 Introduction

Stress and quantity are closely related in Norwegian (Eliasson 1985; Fretheim 1969; Kristoffersen 1991, 1992, 1999, 2000, 2001, 2003; Lorentz 1996; Riad 1992; Rice 1999, 2003). For the present discussion of these facts, a moraic theory of the syllable is assumed (Hyman 1985; McCarthy and Prince 1986; Hayes 1989; Morén 1999). With this model, the relationship can be characterized as a two-way implication holding between weight and stress: heavy syllables must be stressed and stressed syllables must be heavy; light syllables must be unstressed and unstressed syllables must be light. Since two-way implications are more straightforwardly modelled in parallel theories than in derivational ones, we adopt Optimality Theory as the framework in which we develop an analysis of the issues presented below (Prince and Smolensky 1993; McCarthy and Prince 1993).

We begin in §2 with a presentation of the core facts of Norwegian, including a discussion of both disyllabic (§2.1) and monosyllabic (§2.2) words. The relationship between stress and quantity is also introduced. This is followed by an analysis of these data in §3 and §4. Ambiguities in the analysis of both the disyllabic and monosyllabic words are highlighted. Having established a grammar which correctly returns the native patterns, we turn to the patterns seen in loanwords. The data under consideration are presented in §5, where they are crucially divided into those with final closed syllables (§5.1) versus those with final open syllables (§5.2). The discussion in §6 considers more broadly the role of the loanwords in the phonology of Norwegian stress and quantity, and airs some broader questions regarding the treatment of loans.

The core observations motivating this discussion include the following. Loanwords display patterns not seen in the native vocabulary, and their analysis disambiguates some of the questions about syllabification and foot structure. Furthermore, an analysis of the loanword patterns, along with the hypothesis of the Richness of the Base distinguish some of the possibilities for treating exceptional stress patterns. Finally, a scenario regarding the trade-off between diacritic marking and restructuring the grammar can be constructed, shedding light on broader questions of the role of loanword patterns in constructing models of grammar.

2 Stress and quantity I: Native words

2.1 Disyllabic words

The prototypical disyllabic word in Norwegian has stress on its initial syllable. This syllable realizes one of two strategies for being heavy. Either it has a long vowel, or it is closed. In the latter case, the coda consonant can either be part of a geminate consonant also functioning as an onset to the second syllable, or it can be the first consonant in a consonant cluster, where the second consonant is the onset to the next syllable. The second syllable in these words consists of an onset and a schwa, and is unstressed.

Long vowels in the initial syllable are incompatible with coda consonants. That is, an initial syllable with a bimoraic vowel tolerates no coda consonants, while an initial syllable with a monomoraic vowel tolerates maximally one coda consonant.[1] To capture this generalization with a moraic representation of the syllable, the initial syllable in a disyllabic word is bimoraic and cannot

[1] I am aware of two possible exceptions to this generalization, the first of which is the Norwegian pronunciation of the place name *Bethlehem*, which is pronounced with a long vowel in the initial syllable. This leaves us in the situation of either syllabifying [tl] as the onset to the second syllable, as proposed by Kristoffersen (2000) or tolerating a non-word final syllable with both a long vowel and a coda consonant, as discussed by Rice (2001). The second exception is *arktis* 'arctic' which looks like a short vowel followed by the cluster [rk], since [kt] is not a possible onset cluster.

tolerate non-moraic consonants, nor can it tolerate morae which are doubly linked.

The result of the requirements and restrictions on the initial syllable is an abundance of pairs in which the stressed syllables differ only in their realization of quantity. Pairs illustrating a wide variety of vowel and consonant combinations are given in (1).

(1) *Complementary distribution of V- and C-length in disyllabic words*

tape	'to lose'	*tappe*	'to tap'
ripe	'to scratch'	*rippe (opp)*	'to drag (up)'
stripe	'stripe'	*strippe*	'to strip'
mate	'to feed'	*matte*	'mat'
hete	'heat'	*hette*	'hood'
føde	'to give birth'	*fødde*	'to feed, pret.'
glede	'to make glad'	*gledde*	'to make glad, pret.'
lade	'to load'	*ladde*	'to fill, pret.'
bane	'field, lane'	*banne*	'to swear'
rene	'clean'	*renne*	'gutter'
mine	'mine'	*minne*	'to remind'
bule	'bump, swelling'	*bulle*	'(papal) bull'
pile	'to move quickly'	*pille*	'to finger'
hele	'to heal'	*helle*	'to slant'
mure	'to make a wall'	*murre*	'ache'
hake	'chin'	*hakke*	'pick'
rake	'rake'	*rakke*	'dog'
reke	'shrimp'	*rekke*	'line'
breke	'bleat'	*brekke*	'big hill'
bleke	'to bleach'	*blekke*	'newspaper (slang)'
kube	'cube'	*kubbe*	'log'
same	'a Saami person'	*samme*	'same'
grime	'harness'	*grimme*	'ugly, pl.'
klase	'bunch of fruit or flowers'	*klasse*	'class'
buse	'to barge in'	*busse*	'kind of ship'
lise	'pain relief'	*lisse*	'shoe lace'
suge	'to suck'	*sugge*	'sow'
ruge	'to brood'	*rugge*	'to rock'

The core properties of an analysis of these data will place primary stress on the initial syllable and insure that this syllable is heavy. One strategy for achieving this result requires that stress be aligned with the left edge of the word and that stressed syllables be heavy. An equally successful strategy would require that stress be aligned with the right edge of the word, as long as the constraint achieving this is dominated by a constraint prohibiting final stress. The first of these two competing grammars would place stress on the initial syllable while the second places stress on the penultimate syllable. Obviously, the results are the same in the case of disyllabic words and the analyses can therefore only be distinguished by examining longer words, cf. Rice (1999). In longer words, most of which have been borrowed into the language, e.g. *bikíni*, stress is on the penult and we therefore adopt the right-edge based analysis.

Regarding the specific properties of the stress foot, there are two possibilities. One would show a moraic trochee dominating exactly the initial syllable, which has in its bimoraicity the properties necessary for supporting such a foot. An alternative construction would have an uneven trochee with the initial heavy syllable as its head and the final light one as its non-head. The metrical theory advocated by Hayes (1995) precludes the possibility of an uneven HL trochee, although this option has been defended in the context of parametric approaches to foot typology, cf. Rice (1992). The moraic trochee is employed here to emphasize the parallels between the metrical structure of the disyllabic words and the monosyllabic ones. Give the moraic trochee, the final syllable of the disyllabic words will be left unfooted.

To highlight a basic difference between an optimality theoretical analysis of Norwegian stress and quantity and a derivation approach, I note here that the analysis proposed below will not use the (head of the) stress foot as a strategy for identifying a syllable to be lengthened nor will it use syllable quantity as a strategy for identifying syllables which must be the head of a foot. In a fashion typical of parallel analyses, the optimality theoretical analysis below assumes neither that weight precedes stress foot construction, nor the converse. In this way, the OT approach need not take a position regarding which of these mutually dependent properties should be considered basic and which should be derived, cf. Kristoffersen (1991, 2000).

2.2 Monosyllabic words

Norwegian is also rife with monosyllabic words. There are three possible shapes for such words. Either they are open syllables with a long vowel, or they have a long vowel followed by a short consonant, or they have a short vowel followed by a long consonant or a consonant cluster.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, Czigler, and Sullivan 1998b). Speakers are less attuned to contrasts in consonant length in word-final position. Nonetheless, the length difference is reliably present (Behne, Czigler, and Sullivan 1998a).

Just as we saw with the stressed syllables in the disyllabic words in (1), the monosyllabic words also show a complementary distribution of vowel and consonant length. In the orthographic representations given in (2), a vowel followed by a single consonants indicates a long vowel with a short consonant, while a vowel followed by an orthographic geminate indicates a short vowel followed by a long consonant.

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

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

Here again, an adequate analysis must put stress on the initial syllable, presumably a trivial task for monosyllabic words. The analysis must also insure that a vowel followed only by a singleton consonant is long, and that other vowels are not.

3 Constraints and rankings

The data seen in 2 can be analyzed with constraints well establish in the OT literature. In the present section, the relevant constraints are presented and arguments for various subrankings are made.

One of the strongest generalizations about the disyllabic data in (1) is that stress is not placed on the final syllable of the word. Prince and Smolensky (1993: 42) provide a constraint with precisely this function, as given in (3).

(3) NonFinality: The prosodic head of the word does not fall on the word-final syllable.

Prince and Smolensky define the prosodic head as the syllable bearing main stress and the constraint NonFinality is therefore understood to mean that the final syllable of the word does not bear main stress. This constraint might also be understood as a requirement for anti-alignment (or, non-coincidence) holding on the right edge of the word and the main-stressed syllable. In the analysis developed here, a monosyllabic word consisting of just an open syllable, e.g. *te* ‘tea’, will violate NonFinality. Implicit in our approach is the assumption of a more highly ranked constraint requiring words to bear stress, cf. Hammond’s (1984) discussion of prosodic rooting, or the related discussion in Prince and Smolensky (1993).

Analyses couched in optimality theory often achieve their results through a mediation of the tension between conflicting constraints. Although the location of stress in the disyllabic data presented in (1) can be predicted by a grammar with (3) as a highly ranked constraint, we nonetheless follow this core OT methodology by proposing that the alignment constraint in (4) is also active in this grammar. This constraint exerts a pressure for the main stress to be at the right edge of the word, in superficial conflict with (3).

(4) 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 and Smolensky 1993).

The alignment constraint in (4) would also seem to be in conflict with the well-established claim that stress in earlier stages of Germanic is initial, which would suggest the relative high ranking of an alignment constraint pushing the head of the prosodic word towards the left edge, cf. 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. That is, the difference between alignment constraints militating for right-edge alignment or left-edge alignment will have no empirical consequences. As noted, there are patterns in the loanwords that distinguish these analyses, and I therefore follow Rice (1999) in arguing that stress must be towards the right edge of the word.

NonFinality must dominate AlignRight in the grammar of Norwegian. This is clear from the simple tableau in (5) which shows the classical ranking argument, whereby candidate (a) satisfies the most highly ranked constraint while it violates the lower constraint, and candidate (b) violates the most highly ranked constraint and satisfies the lower ranked constraint. Given that candidate (a) represents the form actually found in the data, it is clear that the alternate ranking cannot be part of this grammar, cf. (5). (This simple tableau leaves aside the representation of quantity and footing, both of which will be presented in greater detail below.)

(5) *Tableau illustrating* NonFinality ≫ AlignRight

		hake	NF	AR
☞	a.	há.ke		*
	b.	ha.ké	*!	

AlignRight will itself be decisive only in words which are sufficiently long to have two potential stress bearers, both of which satisfy NonFinality. The loanword *bikini* would be such a case, when it's input has three monomoraic vowels, as seen in (6). Adopting the standard assumption that violation of AlignRight is gradiently assessed, candidate (b) incurs one violation, since one syllable intervenes between the stressed syllable and the right edge of the word. Candidate (a) however incurs two, since there are two syllables intervening between the stressed initial syllable and the right edge of the word. The second of the violations for candidate (a) is fatal. Candidate (c)—which satisfies AlignRight— is nonoptimal because it violates the crucially dominant constraint NonFinality.

(6) *Tableau illustrating the role of* ALIGNRIGHT

		bikini	NF	AR
	a.	bíkini		**!
☞	b.	bikíni		*
	c.	bikiní	*!	

In addition to the correct placement of stress, the grammar of Norwegian must also return the correct distribution of quantity. As noted above, there is a two-way implication between stress and quantity, such that bimoraic syllables must be stressed, and stressed syllables must be bimoraic. These requirements are unviolated on the surface, such that the constraints in (8) and (7) will be undominated in the grammar.

(7) STRESS-TO-WEIGHT: A stressed syllable must not be monomoraic.

(8) WEIGHT-TO-STRESS: A bimoraic syllable must bear stress.

Also important to the correct distribution of quantity is the familiar constraint FOOTBINARITY, which requires that feet be binary at the level of the syllable or the mora. Candidates with a monosyllabic, trimoraic foot will be punished by this constraint.

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

The three constraints controlling the distribution of quantity will be unviolated on the surface and are therefore ranked highest in the fragment of the grammar proposed here. Furthermore, no evidence will be adduced regarding the ranking of NONFINALITY relative to these three constraints, such that our tableaux will show the constraints in (10) as being unranked by separating them with dashed lines.

(10) *Four highly ranked constraints, with no relative dominance*

a. STRESS-TO-WEIGHT, (7)
b. WEIGHT-TO-STRESS, (8)
c. FOOTBINARITY, (9)
d. NONFINALITY, (3)

Given the argument in (5) that NonFinality dominates AlignRight, the tableau below will represent all the constraints in (10) as dominating AlignRight without further argumentation.

The final two constraints included in this analysis address the status of moraic coda consonants. With NoCoda included by hypothesis as part of the universal inventory of constraints, the fact that Norwegian can have stressed syllables with coda consonants must be the result of a competing constraint. In the analysis here, an output in which the stressed syllable has a coda will be optimal when the consonant is moraic in the input. In other words, the effects of NoCoda are overridden by a faithfulness constraint which will punish a correspondence relation in which the input member of the pair is moraic while the output member is not. This will be a Max constraint, and to emphasize that the reassociation of morae is not to go unpunished (lest all stressed syllables be open with long vowels), we dispatch one of Morén's (1999) MaxLink constraints for this part of the analysis.

(11) NoCoda: A syllable does not have a coda (Prince and Smolensky 1993: 93) .

(12) MaxLink-(μ)[seg]: For two corresponding segments, if S_1 is associated to a mora, then S_2 is associated to a mora (Morén 1999).

As noted, MaxLink must dominate NoCoda to allow an input with a moraic consonant to surface with a coda. A simple tableaux illustrating this ranking is given in (13)

(13) *Tableau illustrating* MaxLink-(μ)[seg] $\gg$ NoCoda

		ha$_\mu$k$_\mu$e$_\mu$	MaxL$_\mu$	NoCoda
☞	a.	(há$_\mu$k$_\mu$.)ke$_\mu$		*
	b.	(há$_{\mu\mu}$.)ke$_\mu$	*!	

The ranking demonstrated here has the effect of preserving a moraic consonant as moraic, even at the cost of having a coda. The input in this tableau has a moraic consonant, a situation which is preserved only in candidate (a). This consonant is syllabified as a coda in the first syllable, which leads to a violation of NoCoda. Were the ranking of these two constraints reversed, the syllabification of the consonant as a coda will always disqualify such a candidate from being optimal, since there will be a competitor like candidate (b), in which the consonant is no longer associated with the mora it was linked to in the input. Candidate (b) is otherwise well-formed, since its initial syllable is stressed and heavy, as represented with the bimoraic vowel in that syllable.

While we have seen that MaxLink must dominate NoCoda to preserve the link between an input consonant and a mora, there are nonetheless circumstances in which such links are broken. For example, a disyllabic input in which the word final vowel is bimoraic—an option which is considered given the assumption of the richness of the base. Since there are no native disyllabic words with final stress, such an input must also map onto an optimal output with initial stress. And, to conform to the requirements of Weight-to-Stress, that final vowel will lose its mora, even though this entails a violation of MaxLink. From this, we conclude that NonFinality dominates MaxLink, as illustrated in the simplified tableau in (14). (This simplified tableau sets aside a number of easily imagined candidates and the other constraints of the grammar; these simplifications are removed in our discussion below.)

(14) *Tableau illustrating* NonFinality $\gg$ MaxLink-(μ)[seg]

		ha$_\mu$ke$_{\mu\mu}$	NF	MaxL$_\mu$
☞	a.	(há$_{\mu\mu}$.)ke$_\mu$		*
	b.	ha$_\mu$.(ké$_{\mu\mu}$)	*!	

FootBinarity can also compel a violation of MaxLink. This can be seen in tableaux with an input showing a bimoraic vowel followed by a moraic consonant. FootBinarity will require that one of the three morae not be present in the output. While it is logically possible that any of the three could be absent in the output, the effects of low-ranked NoCoda will always prefer a candidate in which the mora has been removed from the consonant rather than the vowel, in a typical *emergence of the unmarked* effect. Again, many relevant candidates and constraints are set aside in the following simplified tableau, which merely illustrates the flavor of the ranking argument given here.

(15) *Tableau illustrating* FootBinarity $\gg$ MaxLink-(μ)[seg]

		$\text{ha}_{\mu\mu}\text{k}_{\mu}\text{e}_{\mu}$	FB	MAXL$_{\mu}$
☞	a.	$(\text{há}_{\mu\mu}.)\text{ke}_{\mu}$		*
	b.	$(\text{há}_{\mu\mu}\text{k}_{\mu}).\text{ke}_{\mu}$	*!	

The seven constraints proposed for this analysis are arranged hierarchically with four crucial rankings, as summarized in (16).

(16) *Summary of crucial constraint rankings*

a. NONFINALITY ≫ ALIGNRIGHT, (5)
b. MAXLINK-(μ)[SEG] ≫ NOCODA, (13)
c. NONFINALITY ≫ MAXLINK-(μ)[SEG], (14)
d. FOOTBINARITY ≫ MAXLINK-(μ)[SEG], (15)

Given the previously asserted high ranking of STRESS-TO-WEIGHT and WEIGHT-TO-STRESS and the noncrucial relationships between those constraints and FOOTBINARITY and NONFINALITY, the overall hierarchy of crucial and noncrucial rankings is as in (17). Note that ALIGNRIGHT only has a crucial relation to NONFINALITY; it is represented here as lowest ranked, both to satisfy that requirement and in part because it is not relevant until we consider the loanwords below.

(17) *Overall constraint ranking, including noncrucial rankings*

SW, WS, FB, NF ≫ MAXLINK ≫ NOCODA, ALIGNRIGHT

As we will see below, this ranking represents a fragment of a grammar which returns optimal candidates showing the distribution of stress and quantity seen in Norwegian. We follow the classical strategy of optimality theory, making no restrictions on the input, a hypothesis familiar under the label *the richness of the base*. As a practical demonstration of this hypothesis, we might take any of the candidate outputs and manipulate it freely, and the grammar will return an optimal candidate which is well-formed in Norwegian.

4 Analysis of native patterns

An analysis of stress and quantity in Norwegian is to be evaluated on its success in identifying the set of possible constructions, and its concomitant success in keeping forms which are ungrammatical in the language from being returned as optimal in any tableau. This section presents several tableaux which illustrate the success of the grammar proposed in §3. First, we illustrate the grammar's evaluation of disyllabic forms, followed by its evaulation of monosyllabic forms. All of the tableaux illustrating the disyllables have exactly the same set of candidate outputs. Furthermore, six of the seven constraints are markedness constraints; this means that the variation in the inputs is irrelevant to the evaluation of these constraints with the result that the violations are identical in all tableaux for all of the markedness constraints. The tableaux therefore vary in exactly two ways: the inputs are different, and the violations of the faithfulness constraint MaxLink are different.

Example (18) gives a tableau in which the input is disyllabic and has a final open syllable. In this particular case, the input shows no prosodification, neither foot structure nor syllable structure. Each of the vowels is associated with one mora in the input, while the intervocalic consonant is not. The grammar maps this input onto a disyllabic form with stress on the initial syllable, and with a lengthened vowel also in that syllable.

(18) *Optimizing* $C\acute{V}_{\mu\mu}.CV_{\mu}$

	$\text{ha}_{\mu}\text{ke}_{\mu}$	SW	WS	FB	NF	MaxL$_{\mu}$	NoCoda	AR
	a. $(\text{há}_{\mu}.)\text{ke}_{\mu}$	*!		*				*
	b. $(\text{ha}_{\mu}.\text{ké}_{\mu})$	*!			*			
	c. $(\text{há}_{\mu}.\text{ke}_{\mu})$	*!						*
	d. $(\text{há}_{\mu}\text{k}_{\mu}.)\text{ke}_{\mu\mu}$		*!				*	*
	e. $\text{ha}_{\mu}\text{k}_{\mu}.(\text{ké}_{\mu\mu})$		*!		*		*	
	f. $(\text{há}_{\mu\mu}\text{k}_{\mu}.)\text{ke}_{\mu}$			*!			*	*
	g. $(\text{há}_{\mu}\text{k}_{\mu}.)\text{ke}_{\mu}$						*!	*
☞	h. $(\text{há}_{\mu\mu}.)\text{ke}_{\mu}$							*

Stress-to-Weight requires that stressed syllables be heavy. Since the stressed syllables in candidates (a-c) are not heavy, they violate this constraint. Candidates (d) and (e) have heavy syllables which are not stressed, and they thereby fatally violate Weight-to-Stress. If there is a monomoraic or trimoraic foot—as in candidates (a) and (f)—the candidate violates Foot-Binarity, which is marked as fatal for candidate (f). If the syllable bearing primary stress coincides with the right edge of the word—as in candidates

(b) and (e)—the candidate violates NonFinal.[2]

Candidates (g) and (h) are the only two candidates satisfying all of the highly ranked markedness constraints. In this tableau, both (g) and (h) satisfy the faithfulness constraint MaxLink, and they both violate the low-ranked AlignRight. The only constraint distinguishing these two candidates is NoCoda, which is violated by candidate (g) while it is satisfied by candidate (h). Candidate (h) is therefore selected as optimal.

The next tableau to consider has an input in which the intervocalic consonant is linked to a mora. As we see in (19), the grammar we have proposed in (17) returns as optimal a candidate with an intervocalic geminate. However, the selection of candidate (g) as optimal depends in part on the fact that the first vowel in the input is not linked to two moras, as we will see in (20). In other words, a moraic consonant in the input is not enough alone to guarantee the optimization of candidate (g). Note that intervocalic geminates are represented as [C_μ.C] in the candidate outputs, which is intended to correspond to the notion of a doubly-linked consonant, forming both a moraic coda for the first syllable and an onset for the second.

(19) *Optimizing* $C\acute{V}_\mu C_\mu.CV_\mu$

		$\text{ha}_\mu\text{k}_\mu\text{e}_\mu$	SW	WS	FB	NF	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$_{\mu\mu}$.)ke$_\mu$					*!		*

The violations of the four highly ranked constraints in (19) are the same as in (18), such that only candidates (g) and (h) fail to incur a violation by the point at which MaxLink is relevant. In (19), (g) and (h) are distinguished by

[2]Since Stress-to-Weight and FootBinarity are unranked with respect to one another, there is no clear notion by which one violation or the other for candidate (a) can be said to be fatal. The same can be said of candidate (b) and its violations of Stress-to-Weight and NonFinality. We mark the leftmost violation as fatal here simply to facilitate the reader's processing of the tableau.

the faithfulness constraint, since the correspondence relation between /k_μ/ in the input and [k] in the output in [h] shows a relevant difference, namely the loss of the linkage to a mora. The violation of the lower ranked NoCoda by candidate (g) is irrelevant to the selection of the optimal candidate here, since all other candidates incur fatal violations of more highly ranked constraints.

Candidates (g) and (h) are the only two which will ever be optimal given this grammar. Because markedness constraints are evaluated independent of the input, a tableau with any configuration in the input will therefore have identical markedness violations, given that the candidate set is identical for all tableau (which follows logically from the hypothesis of *freedom of analysis*, which allows Gen to freely manipulate the structure of the input (Prince and Smolensky 1993)).

In this particular analysis, all candidates except (g) and (h) are eliminated "above" MaxLink. When MaxLink fails to distinguish (g) and (h) then (h) will be optimal, since (g) will be eliminated by NoCoda. MaxLink will fail to distinguish (g) from (h) when both candidates satisfy MaxLink—as in (18)—or when both candidates violate MaxLink—as in (20).

(20) *Optimal violation of* MaxLink

		$ha_{\mu\mu}k_\mu e_\mu$	SW	WS	FB	NF	MaxL$_\mu$	NoCoda	AR
	a.	$(h\acute{a}_\mu.)ke_\mu$	*!		*		**		*
	b.	$(ha_\mu.k\acute{e}_\mu)$	*!			*	**		
	c.	$(h\acute{a}_\mu.ke_\mu)$	*!			*	*		*
	d.	$(h\acute{a}_\mu k_\mu.)ke_{\mu\mu}$		*!			*	*	*
	e.	$ha_\mu k_\mu.(k\acute{e}_{\mu\mu})$		*!		*	*	*	
	f.	$(h\acute{a}_{\mu\mu}k_\mu.)ke_\mu$			*!			*	*
	g.	$(h\acute{a}_\mu k_\mu.)ke_\mu$					*	*!	*
☞	h.	$(h\acute{a}_{\mu\mu}.)ke_\mu$					*		*

In this tableau, candidates (a-f) are eliminated by their violation of relatively high ranked markedness constraints; (g) and (h) are left undistinguished by MaxLink, although in this case, they are undistinguished because they both violate it. Since (g) has a coda consonant and thereby violates NoCoda, it loses out to (h), which is optimal.

Based on the data given in (1), we know that disyllabic words in Norwegian show little variation in their prosody. Stress is always initial, the initial syllable is always heavy, and the final syllable is always unstressed and light.

The grammar developed above and illustrated through the tableau here select exactly two candidate outputs as well-formed, and these are the two that are found in the language. The analysis must also be demonstrated for the monosyllabic words from (2), and we turn now to that challenge.

The analysis of the foot structure for the monosyllabic words presented in (2) depends nontrivially on the syllable structure assigned to these forms, and specifically the syllabification of word-final consonants, whether it is a geminate or not. Optimality theory, of course, is not a theory of structure and is therefore compatible with any of the myriad theories of syllable and foot structure to be found in the literature. While our purposes here do not include a thorough consideration of the typology of word-final consonants, the matter cannot be ignored. We therefore identify the crucial issues and propose a structure capturing the necessary properties. Here, the necessary properties regard the quantity of the stressed syllable, such that we must distinguish those words which have a long vowel followed by a short consonant from those which have a short vowel followed by a long consonant.

Using a moraic theory of the syllable, the distinction between short and long vowels is of course represented as the difference between a monomoraic and a bimoraic vowel. One simple strategy for distinguishing the subsequent consonants would be to represent a long one as moraic and a short one as non-moraic. Hence, a word like *hatt* 'hat' with a short vowel and a long consonant would be represented as [.ha$_\mu$t$_\mu$.]. A nonmoraic consonant after a long vowel would lead to a representation of a word like *hat* 'hate' as [.ha$_{\mu\mu}$t.]. And, indeed, the grammar we have developed here will return these two forms as optimal. A candidate with a short vowel and a moraic consonant will be optimal when the input has a moraic consonant, as in (21), and a candidate with a long vowel and a nonmoraic consonant will be optimal with the input has a bimoraic vowel and a nonmoraic consonant, as in (22). In each case, the candidates are distinguished by the lone faithfulness constraint, MaxLink.

(21) *Input with a short vowel and moraic consonant*

		ha$_\mu$t$_\mu$	SW	WS	FB	NF	MaxL$_\mu$	NoCoda	AR
☞	a.	(.há$_\mu$t$_\mu$.)				*		*	
	b.	(.há$_{\mu\mu}$t.)				*	*!	*	

(22) *Input with a long vowel and nonmoraic consonant*

		$ha_{\mu\mu}t$	SW	WS	FB	NF	MAXL$_\mu$	NoCoda	AR
	a.	(.$há_\mu t_\mu$.)				*	*!	*	
☞	b.	(.$há_{\mu\mu}$t.)				*		*	

Although the grammar we have proposed returns the correct set of well-formed outputs for Norwegian monosyllables, the structure of the optimal candidate in (22) is unsatisfactory. Recall that the initial stressed syllables in disyllabic words are either open syllables with a long vowel or closed ones with a short vowel. Non-final stressed syllables cannot have both a long vowel and a coda consonant. This must be captured by restrictions on the syllable structures allowed by Norwegian, such that a stressed syllable is exactly bimoraic and has no room for any additional material. Word final syllables are by hypothesis posited to have the same syllable structure as non-final ones, i.e. if a final syllable can be VVC, then it would be a mystery that a nonfinal one cannot have this shape. We claim instead that the structure of candidate (b) in (22) is actually infelicitous in the language. Instead, the a word-final non-moraic consonant must be represented as extra-syllabic.

The literature includes several proposals regarding the possibility of extra-syllabic word-final consonants. Words may have a final appendix, cf. Selkirk (1982), or a final catalectic syllable, cf. Kiparsky (1992), Kager [catalexis article], or a final licensed onset, cf. Kaye (1990), Scheer (2005), Harris and Gussman (2003). For our purposes here, the specific model is not important. Rather, we are content here with some representation in which a word-final nonmoraic consonant is extrasyllabic – whether the consonant is in an appendix or is an onset to an otherwise empty syllable or simply an onset constituent has no impact on the details of this analysis. This is represented in the tableaux below by placing the syllable boundary before the final consonant. We furthermore assume that feet are built directly on syllables, and that the word-final nonmoraic consonant is therefore not part of the foot. The foot boundary (right parenthesis) is therefore placed before the consonant. This structure appears as candidate (c) in (23) and (24).

(23) *Input with a short vowel and moraic consonant, with possible extra-syllabicity*

		$ha_{\mu}t_{\mu}$	SW	WS	FB	NF	MaxL$_{\mu}$	NoCoda	AR
	a.	(.há$_{\mu}$t$_{\mu}$.)				*!		*	
	b.	(.há$_{\mu\mu}$t.)				*!	*	*	
☞	c.	(.há$_{\mu\mu}$.)t					*		*

Candidate (a) in (23) is the only candidate which respects the requirements of MaxLink, which in (21) this was sufficient for its victory. With the addition of candidate (c), however, the picture becomes more complicated. The extrasyllabic [t] in candidate (c) leads to this candidate's satisfaction of NonFinality. Recall that we can conceptualize NonFinality as a nonalignment requirement, whereby the right edge of the syllable bearing main stress cannot be aligned with the right edge of the word. The extrasyllabic consonant in candidate (c) intervenes between the syllable bearing main stress and the right edge of the word, such that nonalignment is achieved and NonFinality is therefore satisfied. Since candidates (a) and (b) violate NonFinality, the violation which candidate (c) incurs of the crucially lower ranked MaxLink is irrelevant, and candidate (c) emerges as optimal. Note that the nonalignment of the stressed syllable with the word edge earns candidates (c) a violation of AlignRight.

Perhaps less surprisingly, candidate (c) will also be optimal for an input in which the consonant is nonmoraic and the vowel is bimoraic, as seen in (24).

(24) *Input with a long vowel and nonmoraic consonant, with possible extrasyllabicity*

		$ha_{\mu\mu}t$	SW	WS	FB	NF	MaxL$_{\mu}$	NoCoda	AR
	a.	(.há$_{\mu}$t$_{\mu}$.)				*!	*	*	
	b.	(.há$_{\mu\mu}$t.)				*!		*	
☞	c.	(.há$_{\mu\mu}$.)t							*

Again, the success of candidate (c) with respect to NonFinality is decisive and it thereby emerges as optimal, the violation of lower ranked constraints notwithstanding.

Because candidate (c) is optimal in both (23) and (24), our analysis currently fails to deliver one of the well-formed outputs of the language, namely a candidate with a short vowel and a long consonant. Both of these tableaux return a representation for the word *hat* 'hate'; neither returns *hatt* 'hat'.

This is clearly a problem for the analysis; what must be different to give *hatt* a chance? For an input with a moraic consonant, a candidate output which preserves that status will satisfy MaxLink while candidate outputs which have nonmoraic consonants will violate the faithfulness constraint. For this to be decisive, there must be a candidate which does as well as candidate (c) on the four undominated constraints.

Recall the representation of the intervocalic geminates in disyllabic words. There, we assume that the consonant in question is doubly-linked. On the left, it is linked to a mora, which in turn is linked to a syllable, such that it serves as a coda for that syllable. On the right, it is linked to a syllable, and functions as an onset. This representation is one of the standards in moraic theory, and receives extensive motivation in McCarthy and Prince (1986). An alternate proposal which maintains a segmental perspective on geminate structures is advance by Selkirk (1990). Discussion of the relative merits of these models can be found in Broselow (1995), Ringen and Vago (2002), Davis (2002), and Curtis (2003), among others.

The solution to the challenge of candidate (c) in the preceding tableaux can be met by assuming that word-final geminates have the same representation as word-medial ones, i.e. that geminates share the property of being doubly-linked, regardless of their position in the word. If we again are allowed to suspend all but the most relevant details, we propose that word-final geminates are not only moraic, but that they also are linked to the same constituent as the word-final nonmoraic consonants, whatever that may be (a final appendix or onset being two of the options discussed above).

As a final consideration of the monosyllabic words, we now add a candidate with a final moraic consonant, which is doubly linked. This will be represented as in candidate (d) in the following tableaux.

(25) *Input with a short vowel and moraic consonant, with doubly linked final geminates*

	$\mathrm{ha}_\mu\mathrm{t}_\mu$	SW	WS	FB	NF	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						*	*

Candidate (d) is optimal in (25) because the doubly linked consonant yields a representation which conforms to the requirements of NonFinality while the candidate furthermore satisfies the requirements of MaxLink. Having added a candidate with this structure to the list of candidate outputs, we now see that inputs with moraic consonants will map onto optimal outputs with short vowels and moraic consonants.

(26) *Input with a long vowel and nonmoraic consonant, with doubly linked final geminates*

	ha$_{\mu\mu}$t	SW	WS	FB	NF	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					*!	*	*

Candidate (d) is not optimal here because the loss of the mora on the vowel leads the candidate to violate MaxLink. Candidate (c) will also be optimal in a tableau with an input having a monomoraic vowel and a nonmoraic consonant, as in (27). In that tableau, candidate (d) does not violate MaxLink, but it is nonetheless worse than candidate (c) on NoCoda, showing parallels with the disyllabic forms, cf. (18).

(27) *Input with a long vowel and nonmoraic consonant, with doubly linked final geminates*

	ha$_{\mu}$t	SW	WS	FB	NF	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						*!	*

With the representational developments motivated here, the structure of monosyllables parallels that of disyllables. The grammar presented in (17) takes the rich base as its input and with the representational possibilities motivated by the discussion above, this grammar returns exactly the patterns seen in (1) and (2). A constraint which explicitly compels double linking is unnecessary. The nature of the generator function includes what Prince and Smolensky (1993) call *freedom of analysis*, which will return candidates such as (c) and (d) in the tableaux above. Note that a more restrictive theory of Gen, which more assertively limits the function to a different set of primitives and structures than assumed here is unproblematic, as long as those structures allow for word-final consonants to be parsed as something other than codas.

5 Stress and quantity II: Loanwords

The picture of Norwegian presented above is incomplete for the contemporary language. In this section, a richer set of data are presented, and the grammar developed above is tested against the distribution of stress and quantity seen in these loanwords. The core requirement that the stressed syllable be bimoraic is preserved. However, disyllabic words will be shown to allow final closed syllables, in contrast with the data in (1), and these words can have either final or penultimate stress. Both of these options are returned by the grammar established above, given the stated assumptions of the theory, as demonstrated in §5.1.

After considering the data with final closed syllables, we turn in5.2 to the final set of data to be considered, namely disyllabic words with stress on final open syllables. These data are problematic for the grammar under consideration. We briefly consider one solution invoking diacritic marking along the lines seen elsewhere in the literature for the treatment of recalcitrant loanword patterns.

However, we note in the final section of the paper that there is yet another alternative for treating these seemingly deviant patterns, namely a restructuring of the grammar. We suggest a restructuring which allows us to predict all of the patterns seen here, and present this in the context of a discussion of the impact which loanword patterns—even if attested by relatively few exemplars—may have on the grammar of a language.

5.1 Final closed syllables

The first set of data to be considered is presented in (28), where the pattern deviates from the data in (1) only by having a final consonant. The words still are disyllabic, they still have initial stress, the initial syllable must be heavy, and that requirement can be implemented in the by now well-established ways.

(28) Disyllabic words with word-final consonants and penultimate stress: *éddik*, ‘vinegar’; *sénep*, ‘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’

This pattern can be derived with the same grammar used in §4. If the final word-final consonant is nonmoraic in the input, the optimal output will have initial stress, either with a closed initial syllable, as in (29), or with a long vowel, as in (30).

(29) *Stress on an initial closed syllable ina word with a final closed syllable*

		$e_\mu d_\mu i_\mu k$	SW	WS	FB	NF	MaxL$_\mu$	NoCoda	AR
☞	a.	$(\acute{e}_\mu d_\mu.)di_\mu k.$						**	*
	b.	$e_\mu d_\mu(.d\acute{i}_\mu k.)$	*!	*	*	*		**	
	c.	$e_\mu d_\mu(.d\acute{i}_\mu k_\mu.)$		*!		*		**	
	d.	$e_\mu d_\mu(.d\acute{i}_\mu k_\mu.)k$		*!				**	*

We limit ourselves in (29) to candidates which respect MaxLink by preserving the moraicity of the intervocalic [d]. Since candidate (a) satisfies all of the highly ranked markedness constraints, too, then there is no motivation to consider a candidate which violates MaxLink. All attempts to move the stress further to the right result in a violation of markedness, and (a) thereby emerges as optimal. An entirely parallel tableau emerges for an input with a long vowel, as in (30).

(30) *Stress on an initial open syllable in a word with a final geminate*

		$ko_{\mu\mu}ko_\mu s$	SW	WS	FB	NF	MaxL$_\mu$	NoCoda	AR
☞	a.	$(k\acute{o}_{\mu\mu}.)ko_\mu s.$						*	*
	b.	$ko_{\mu\mu}(.k\acute{o}_\mu s.)$	*!	*	*	*		*	
	c.	$ko_{\mu\mu}(.k\acute{o}_\mu s_\mu.)$		*!		*		*	
	d.	$ko_{\mu\mu}(.k\acute{o}_\mu s_\mu.)s$		*!				*	*

The candidates in (30) are again limited to those which respect MaxLink by preserving the bimoraic status of the initial vowel. Given the nonmoraic status of the final consonant, the optimal candidate will be as (a), with the stress on the initial syllable of the disyllabic form. To this point, the possibility of a closed final syllable compels no modification of the grammar motivated in §3.

There are disyllabic words ending in consonants which have stress on the final syllable. Examples of words of this type are given in (31). If the words end orthographically in two consonants (either a geminate or a cluster), the vowel in the final syllable is short. If they end orthographically in one consonant, then the vowel of the final syllable is long.

(31) Disyllabic words with word-final consonants and final stress:
trafíkk, ‘traffic’; *parýkk*, ‘wig’; *fagótt*, ‘bassoon’; *agúrk*, ‘cucumber’; *hospíts*, ‘hospice’; *korréks*,‘correction’; *tomát*, ‘tomato’; *natúr*, ‘nature’; *kondóm*, ‘condom’; *París*, ‘Paris’

The grammar predicts the existence of such words, since final stress will be optimal when the word-final consonant is moraic in the input and the intervocalic one is not, cf. (32).

(32) *Stress on a final closed syllable in a disyllabic word*

		$\text{tra}_\mu\text{fi}_\mu\text{k}_\mu$	SW	WS	FB	NF	MaxL$_\mu$	NoCoda	AR
	a.	$(\text{trá}_\mu\text{f}_\mu.)\text{fi}_\mu\text{k}.$					*!	**	*
	b.	$(\text{trá}_\mu\text{f}_\mu.)\text{fi}_\mu.\text{k}$					*!	*	**
	c.	$(\text{trá}_{\mu\mu}.)\text{fi}_\mu\text{k}.$					*!	*	*
	d.	$(\text{trá}_{\mu\mu}.)\text{fi}_\mu.\text{k}$					*!		**
	e.	$(\text{trá}_{\mu\mu}.)\text{fi}_\mu\text{k}_\mu.$		*!			*		**
	f.	$\text{tra}_\mu.(\text{fí}_{\mu\mu}\text{k}.)$				*!	*	*	
	g.	$\text{tra}_\mu.(\text{fí}_{\mu\mu}.)\text{k}$					*!		*
	h.	$\text{tra}_\mu.(\text{fí}_\mu\text{k}_\mu.)$				*!		*	
☞	i.	$\text{tra}_\mu.(\text{fí}_\mu\text{k}_\mu.)\text{k}$						*	*

Any attempt to put the stress on the initial syllable, as in candidates (a-e), will lead to a violation of MaxLink if the mora of the final consonant is sacrificed, or to a violation of Weight-to-Stress if it is not. When stress appears on the final syllable, the best strategy will be to preserve the mora on the [k], and in (h) and (i), and then to have the mora doubly linked to avoid the violation of NONFINALITY, such that candidate (i) is optimal.

As we have seen in (29) and (32) a disyllabic word with a final consonant may have initial or final stress, depending on whether the final consonant is moraic in the input. This would of course mean that a word which might be written *edikk* could exist, as well as a work which might be written *traffik*, i.e. words segmentally like *eddik* and *trafikk*, but which have stress on the 'other' syllable. And, indeed, these would be possible words of Norwegian, is as clear from the existence of both patterns. The job of the grammar is not to predict that *eddik* exists as a word in the language while *edikk* does not; it is rather to predict that both *could* exist.

To conclude our discussion of words with final consonants, we note that there are some data which end in clusters, as in (33).

(33) Words with final consonant clusters which have stress on a non-final syllable: *klimaks, boraks, larynks, advent, apeks, appendiks, asfalt, biceps, boraks, farynks, Føniks, harpiks, haubits, kobolt,*

The grammar also predicts the possibility of these patterns, as shown in (34). Initial stress will be optimal when the final consonants are not moraic in the input and the initial vowel is bimoraic. The unstressed final syllable in these cases must be monomoraic, such that the first consonant of the cluster is a nonmoraic coda while the second one has the status of the final consonants in the monosyllabic words with long vowel, cf. (27).

(34) *Stress on an initial open syllable in a word with a final cluster*

		$\text{bo}_{\mu\mu}\text{raks}$	SW	WS	FB	NF	MAXL_{μ}	NoCoda	AR
☞	a.	$(\text{bó}_{\mu\mu}.)\text{ra}_{\mu}\text{k.s}$						*	**
	b.	$\text{bo}_{\mu\mu}(\text{rá}_{\mu}\text{k}_{\mu}.)\text{s}$		*!				*	*
	c.	$\text{bo}_{\mu}(\text{rá}_{\mu}\text{k}_{\mu}.)\text{s}$					*!	*	*

Candidate (b) preserves the bimoraic status of the initial vowel, but does not foot it, and is eliminated from further consideration by this violation of WEIGHT-TO-STRESS. Candidate (c) lacks one of the morae on the intial vowel in the input, and is eliminated by MAXLINK. The optimal candidate is candidate (a), which foots the intial bimoraic syllable, and leaves the final consonants nonmoraic.

5.2 Stress on final open syllables

Words that are borrowed with stress on final open syllables are found in Norwegian with their stress preserved in the source language position. Relevant data include those in (35) (given accents are in the orthography). Glosses are not given since they are identical with the Norwegian forms, modulo slight differences in some orthographic conventions.

(35) Words with final open syllables which have final stress:
orkidé, obo, agora, akribi, allé, armé, buffet, debut, depot, diskret, filet, gelé, geni, ironi, kafé, kopi, kupé, meny, nivå.

The grammar of Norwegian as proposed above cannot return stress on a final open syllable, as noted by Kristoffersen (2003). The violation of NON-FINALITY will always lead us to prefer penultimate stress – which is indeed the correct result not only for the words in (1), but also for loans which have final open syllables but penultimate stress, as in *bikíni*, as discussed in Rice (1999). There is no final consonant available which—if extrasyllabic—could 'buffer' the superficially final stress, and a candidate with nonfinal stress will always win, given this grammar.

The noun *orkidé* has final stress. Yet when we submit to the grammar an input—even one with a bimoraic final vowel—it is mapped onto an optimal output with penultimate stress. This is illustrated with a tableau in (36).[3]

(36) *Tableau for* orkidé*, incorrectly yielding penultimate stress*

		$o_\mu rki_\mu de_{\mu\mu}$	SW	WS	FB	NF	MAXL$_\mu$	NoCoda	AR
	a.	$o_\mu rki_\mu(dé_{\mu\mu})$				*!			
☞	b.	$o_\mu r(kí_{\mu\mu})de_\mu$					*		*

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, as seen for example in 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).

[3]Note that the hand indicated the optimal candidate in (36) should be facing leftward, indicating that while the grammar selects this form as optimal, it is in fact not well-formed in the language.

Adopting the approach with diacritic marking, we consider another tableau for *orkidé*, where there now is a diacritic accent on the final vowel. The constraint F($\dot{\text{v}}$) requiring that this accent be faithfully realized must dominate NonFinality. Such a tableau is seen in (37).

(37) *Tableau for* orkidé*, correctly yielding final stress with faithfulness to diacritic accent*

		$o_\mu rki_\mu d\dot{e}_\mu$	F($\dot{\text{v}}$)	SW	WS	FB	NF	MaxL$_\mu$	NoCoda	AR
☞	a.	$o_\mu rki_\mu (d\acute{e}_{\mu\mu})$					*			
	b.	$o_\mu r(k\acute{i}_{\mu\mu})de_\mu$	*!					*		*

The words with final open syllables and final stress in (35) are the only loanword data which challenge the grammar developed on the basis of the native vocabulary. We have demonstrated in (37) how an ad hoc treatment of these data might be achieved. In the conclusion below, we entertain another possible approach.

6 Restructuring the grammar: Discussion and conclusions

An analysis of loanwords which marks deviant patterns with a diacritic is an analysis in which the loanwords are literally marked as being ill-formed for the language, or at the very least as grammatical only by brute force. While this may be a suitable strategy for a word or two which maintain a foreign flavor, it is intuitively unappealing for the Norwegian data to which it is applied above. Most of these words have no taste of foreignness to the native speaker. Words like *allé* or *armé* or *meny* or *nivå* or almost any of the words in (35) are everyday words, surely encountered by language learners from the onset of their exposure to the language. For this reason, it seems that a synchronic grammar of Norwegian should productively account for the data in (35) just as methodically as in accounts for the data in (1) and (2), the history of the words as loans notwithstanding.

An alternative to the diacritic solution is to reconsider the grammar in light of the data presented in §5. To make the question concrete, we might ask what would have to be different in the grammar to give the correct result for *orkidé* in (36). Recall that candidate (a) in that tableau was eliminated because the grammar rewards the elimination of moras from the final syllable of the input, if that allows stress to be placed such that NonFinality is respected. The restructuring that would be necessary to select candidate (a) as optimal is therefore one in which NonFinality is demoted, at least to a position below MaxLink, cf. (38).

(38) *Tableau for* orkidé*, with* MaxLink ≫ NonFinality

		$o_\mu rki_\mu de_{\mu\mu}$	SW	WS	FB	MaxL$_\mu$	NF	NoCoda	AR
☞	a.	$o_\mu rki_\mu$(dé$_{\mu\mu}$)					*		
	b.	o_μr(kí$_{\mu\mu}$)de_μ				*!			*

With the proposed reranking of constraints, a candidate with stress on a final open syllable may possibly be optimal. This will happen in exactly the situation in which the input has a bimoraic final vowel. Any candidate output which does not preserve both of these morae will violate MaxLink and therefore be inferior to a candidate which does preserve them both.

The proposal here is that loanwords introduce patterns in which NonFinality is violated in order to preserve final stress. While there are on the order of 30–50 such words in Norwegian, the number is surely not as important as the status of these words. When they are perceived as Norwegian words, the grammar of Norwegian should return them as well-formed, rather than dealing with them in the lexicon with a diacritic accent. In other words, our proposal here is that the loanword pattern triggers a restructuring of the grammar. Specifically, with a new ranking MaxL$_\mu$ ≫ NonFinality, an input with a bimoraic vowel at the right edge will surface with final stress, as demonstrated in (38).

A restructuring can only be proposed if the restructured grammar is able to achieve the results both of the previous grammar and model the patterns forced with diacritic marking. If we suggest that the synchronic grammar of Norwegian is in fact the ranking seen in (38), we must confirm that the native patterns are still available. The grammar from §3 dealt with the richness of the base by taking an input like $ha_\mu ke_{\mu\mu}$ with a bimoraic final vowel and mapping it onto an optimal candidate with a monomoraic final syllable, *há*$_{\mu\mu}$*ke*$_\mu$, cf. (14). With this restructuring, that input will now map onto a form with final stress. But this means nothing more than that *haké* is a possible word, and this would indeed seem to be the only possible conclusion one could reach, given the existence of *allé* and the other words with stress on final open syllables.

The remaining question, then, is whether *háke* can still be derived, and this is of course possible, given an input with a bimoraic initial vowel. This is demonstrated with the tableau in (39).

(39) *Optimal $C\acute{V}_{\mu\mu}CV_{\mu}$ with the restructured grammar*

		$\text{ha}_{\mu\mu}\text{ke}_{\mu}$	SW	WS	FB	MaxL$_\mu$	NF	NoCoda	AR
	a.	$\text{ha}_{\mu}(.\text{ké}_{\mu\mu})$				*!	*		
	b.	$\text{ha}_{\mu\mu}(.\text{ké}_{\mu\mu})$		*!			*		
☞	c.	$(\text{há}_{\mu\mu}.)\text{ke}_{\mu}$							*

In this restructured grammar, we continue with the methodology of considering inputs which look unlike surface forms, according to the hypothesis of the richness of the base. One such example is given in (40) to illustrate this point. Here, the vowels in the input are both bimoraic. Unlike the analysis in (39), the optimal form in this case will not have final stress.

(40)

		$\text{ha}_{\mu\mu}\text{ke}_{\mu\mu}$	SW	WS	FB	MaxL$_\mu$	NF	NoCoda	AR
	a.	$\text{ha}_{\mu}(.\text{ké}_{\mu\mu})$				*	*!		
	b.	$\text{ha}_{\mu\mu}(.\text{ké}_{\mu\mu})$		*!			*		
	c.	$(\text{há}_{\mu\mu}.)\text{ke}_{\mu\mu}$		*!					*
☞	d.	$(\text{há}_{\mu\mu}.)\text{ke}_{\mu}$				*			*

Candidates (b) and (c) preserve the moraic structure of the input with the cost of fatal Weight-to-Stress violations. This leaves a competition between candidates (a) and (d), both of which incur a single violation of MaxLink. The newly demoted NonFinality now has the opportunity to assert itself, and the candidate with initial stress is selected as optimal.

For the monosyllabic words in (2), teh restructured grammar will also deliver the correct results, with stress on the only available syllable.

Because the restructured grammar we are considering in this section allows us to predict the well-formed structures for the entire language and—as we have just seen—because it conntinues to map a variety of members of the rich base onto well-formed outputs, we take this to be the correct analysis, and make our final proposal about the grammar of Norwegian in (41).

(41) *Overall constraint ranking for Norwegian, accounting for native words and loanwords*

SW, WS, FB ≫ MaxLink ≫ NF ≫ NoCoda, AlignRight

When words are borrowed into a language and the patterns in these words cannot be predicted by the grammar, a natural analytical strategy is to posit lexical entries with diacritic markings. Our point here has been to note that the alternative of restructuring must be considered, even if the set of words showing the deviant pattern is relatively small. By restructuring the grammar, we generate a set of well-formed outputs covering both the original set of native words and the patterns revealed by the loans. The presence of new patterns first brought in by loans has been grammaticalized; their influence has been so pervasive that these patterns are no longer deviations simply to be listed, but instead the very motivation for a new grammar.

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