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Markedness in Urban East Norwegian tonal accent

Gjert Kristoffersen

A new formal analysis of the tonal accent contrast in Urban East Norwegian (UEN) is developed in this paper, based on Optimality Theory. Contrary to the widespread assumption that the contrast is based on privativity, this paper represents a return to the position that the contrast derives from different timing of a common underlying melody. Surface privativity, i.e. the absence vs. the presence of an H that can be observed in the contrast between accent 1 and 2 in UEN is analysed as the result of marked (accent 1) vs. unmarked (accent 2) association of a common tonal input. The marked status of accent 1 follows from lexical pre-linking, protected by high-ranking faithfulness, which overrides (unmarked) association driven by the markedness constraints alone.

Keywords accent 1 & 2, lexical accent, markedness, Norwegian, tone

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1. INTRODUCTION

The surface tonal accent contrast found in most varieties of Norwegian and Swedish consists of a minimal contrast between two different melodies synchronized with primary stressed syllables. The two melodies are referred to as accent 1 and accent 2. The phonetic realization of the accentual contrast varies with dialect. In the terminology of Gårding (1977) we can distinguish between two main groups: dialects with two-peaked accent 2 (mainly East Norwegian, Central and West Swedish) and peripheral varieties (West and North Norwegian and South Swedish) with one-peaked accent 2. In the two-peaked varieties, such as Urban East Norwegian, which is the topic of this paper, the accent 2 melody consists of two high tones divided by a low tone, HLH. The initial H is aligned with the stressed syllable. Accent 1 is realized by the same melody minus the initial H, thus LH. Here the L is aligned with the stressed syllable. In domains where the number of syllables corresponds to the number of tones, we usually find a clear one-to-one correspondence between the two.

In the peripheral one-peaked varieties, spoken in most parts of West and North Norway in addition to South Swedish, accent 2 is claimed to be LHL, with L aligned with the stressed syllable. Accent 1 is HL, with H aligned with the stressed syllable.

Based on descriptive analyses along these lines, two claims have figured prominently in influential publications on Scandinavian tone in the last decade.

The first is that the difference between accent 1 and 2 is constituted by the presence of a lexical tone in accent 2 that is absent in accent 1 (Kristoffersen 2000:252f., Riad 2003:93). The second, which more or less follows from the first, is that accent 2 is the marked member of the pair, due to it being more structurally complex (see Bruce & Hermans (1999:623f.) for a discussion of this point).

The aim of the present paper is to develop a new analysis of the East Norwegian tonal accents within the framework of Optimality Theory (McCarthy 2002, Prince & Smolensky 2004). The analysis will be based on the assumption that the input melody itself is a stress-enhancing intonational tune, L*H. The accentual contrast emerges as a result of unmarked vs. marked association of this melody. Unmarked association, which renders accent 2 in polysyllabic words and accent 1 in monosyllabic words, can be seen as driven by a set of ranked markedness and association constraints. Marked association, which renders ACCENT 1 IN POLYSYLLABIC WORDS, is the result of lexical association of the L*, and a top-ranked faithfulness constraint that forbids delinking of tones linked in the input. It follows from this analysis that it is accent 1 in polysyllabic domains that is the marked accent, not accent 2.

That accent 1, contrary to what is held in earlier analyses, emerges as the marked member of the accentual pair, is in accordance with the analysis of the Scandinavian tonal accent proposed by Lahiri, Wetterlin & Jönsson-Steiner (2005). Their conclusion is based on different premises, however, and the analysis developed in this paper can therefore be seen as corroborating evidence in favour of the 'accent 1 as marked' hypothesis. While Lahiri et al. base their analysis on accent distribution and simplicity of analysis, my proposal is based on internal markedness that emerges from interaction between universal constraints and language-specific input–output faithfulness.

The paper is organized as follows: section 2 is a short introduction to the tonal accent systems of Norwegian and Swedish. In section 3, the domain of the accentual contrast is delimited, and the relevant data are presented. Section 4 reviews the two analytical approaches to the accentual contrast found in current literature. The markedness issue is introduced in section 5, while the new analysis is developed in section 6. Section 7 is devoted to questions pertaining to the Richness of the Base hypothesis. In section 8, the final grammar and ranking relationships are summed up, while in the final section 9 some morphological facts that appear problematic for the analysis are discussed.

2. TONE IN NORWEGIAN AND SWEDISH

Norwegian and Swedish represent languages where an intonational system related to those found in other Germanic languages combines with a (minimal) lexical tonal system similar to those found in e.g. African and East Asian languages.

Intonation in Germanic languages can have several pragmatic functions, of which information structuring (e.g. marking new vs. given information and sentence focus)

is perhaps the most important. According to the autosegmental-metrical theory of intonation, intonational tones are organized in so-called 'tunes' (Ladd 1996:8ff.). These will associate with metrically strong syllables and make the constituents that are headed by these syllables informationally prominent. A tune associated with a metrically strong syllable in this way is referred to as a pitch accent (Ladd 1996:45). In addition, we may find demarcative tones, or boundary tones, that signal the beginning or the end of prosodic constituents.

Norwegian and Swedish manifest a simpler intonational system than those found in e.g. English and Dutch. The only choice of tunes associated with metrical heads is between the accent 1 and accent 2 melody, no other tunes are possible. Despite this, East Norwegian fits nicely within the model outlined above, since all tonal events take place near metrically strong syllables or at boundaries. The relationship between the pitch accents and pragmatic prominence is rather indirect, however, at least in the two-peaked varieties of Norwegian and Swedish to which Urban East Norwegian belongs. Here, focus is marked by boosting the final H of the melody, which never aligns with primary stressed syllables, but depending on dialect instead aligns either with the final secondary stress, if there is one (Stockholm Swedish) or with the final syllable of the accent phrase (East Norwegian and West Swedish).[1] The intonational function of the pitch accents, be it accent 1 or 2, is less clear. They appear independently of focus, but destressing, e.g. in non-head compound members, causes the contrast to disappear. I referred to them as 'stress-enhancing' above, because their function seems more closely connected with realization of metrical stress than with intonation. In fact, there are cases where metrical stress shifts can be argued to result from tone shifts.[2]

What makes Norwegian and Swedish special among Germanic languages, along with a number of Central Franconian dialects spoken in Germany, the Netherlands and Belgium,[3] is that tone is used to distinguish lexical and morphological meaning. Although the functional importance is modest due to strong tendencies of complementary distribution governed by morphology, there are a number of minimal pairs in both Swedish and Norwegian, considerably more so in East Norwegian than in most other varieties due to widespread conflation of formerly distinct morphological endings caused by vowel reduction in unstressed syllables.[4] The most commonly cited East Norwegian minimal pair is [^{1}bœn.nɽ] *bønder* 'farmers' vs. [^{2}bœn.nɽ] *bønner* 'beans/prayers'.[5] Further examples are given below.

3. DOMAIN DELIMITATION AND DATA

3.1 The accent phrase

Following Kristoffersen (2000:190), I define the accent phrase (AP) as the basic domain within which the accent melodies are realized. An AP is any string of

AP Type	Accent 1	Accent 2
Monosyllabic (= unmarked accent 1)	[^{1}brɑn] *brann* 'fire'	
	[^{1}flɔm] *flom* 'flood'	
Monosyllabic stem + clitic (= unmarked accent 1)	[^{1}brɑn.ɳ] *brann=en* 'the fire'	
	[^{1}flɔm.mɳ] *flomm=en* 'the flood'	
Disyllabic word	[^{1}hœj.rə] *høyre* 'right hand side'	[^{2}brɑn.nɽ] *brann-er* 'fires'
	[^{1}ɔr.dɳ] *orden* 'order'	[^{2}flɔm.mɽ] *flomm-er* 'floods'
Trisyllabic word	[^{1}leː.vn.ɳə] *levenet* 'the noise'	[^{2}leː.vɳ.nə] *levende* 'alive'
	[^{1}ɔr.dɳ.nɽ] *ordener* 'orders'	[^{2}brɑn.ɳ.nə.] *brann-ene* 'the fires' [^{2}flɔm.mɳ.nə] *flom-mene* 'the floods'
Plurisyllabic compound	[^{1}brɑn.kɑ.tɑ.ˌstrʉː.fə] *brannkatastrofe* 'disaster caused by fire'	[^{2}flɔm.kɑ.tɑ.ˌstrʉː.fə] *flomkatastrofe* 'disaster caused by floods'

Table 1 Data.

syllables that starts with a primary stress, that is, the syllable to which the accentual contrast is anchored, and extends up to the next primary stress, or utterance end. All APs, except post-focal utterance-final ones, end in a high boundary tone, H%, realized on the pre-stress or utterance final syllable.[6]

Included in the AP is also any unstressed material, e.g. destressed lexical words, prepositions, etc. between the word headed by the accented syllable and the next accent. Material of this type cliticizes to the preceding head word. In an AP with cliticized material we can consequently distinguish between a grammatical word and clitics. This will prove important for one aspect of the analysis that follows in section 6.5.2 below.

3.2 Data

Urban East Norwegian is primarily spoken in Oslo and in other towns in the south-eastern part of Norway. We shall limit the analysis to single AP domains. Table 1 contains examples of the prosodic single-phrase types that will be analysed. The material is cross-categorized by accent and domain length counted in syllables.

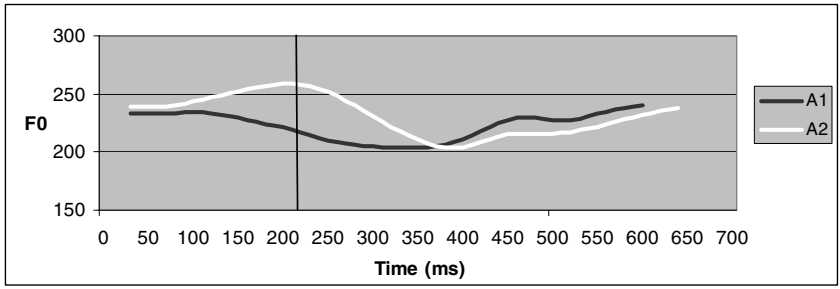


Figure 1. Tonal accent contrasts in UEN.

Empty cells denote non-existent types. We see that, in APs that end in a stressed syllable and APs consisting of a monosyllabic stem plus one or more clitics, only accent 1 is possible. Only in polysyllabic grammatical words does the accentual contrast manifest itself. F0 contours of the minimal pair *levenet* vs. *levende* given in the trisyllabic row in Table 1 are shown in Figure 1.[7]

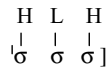
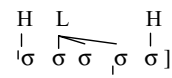
The contours include the unstressed syllable preceding the stress. The vertical bar shows the position of the onset of the stressed vowel. We see that from the common starting point in the pre-stress syllable F0 rise towards a peak near the onset of the stressed vowel in the accent 2 contour, while no such peak is discernible in accent 1. The troughs that manifest the low tones in both contours coincide with the final part of the stressed syllable in accent 1, and with the post-stress syllable in accent 2. Both contours rise towards the final H% in the final syllable. In the literature, these contours are interpreted as phonological HLH for accent 2 and LH for accent 1.

In longer domains the L spreads to all syllables except the initial stressed one in accent 2 and the final one in both accents (Kristoffersen 2000:247ff.). The initial H in accent 2 and final H in both accents do not spread. An overview of the surface realizations of the UEN tonal patterns represented in accordance with these principles is given in Table 2.

Irrespective of domain size, except in monosyllabic domains where accent 2 is not possible, the difference between the accents is an initial high tone in accent 2 that is absent in accent 1. Accent 1 is in other words identical with the final part of accent 2. The accent 2 initial H induces a timing difference with respect to the common L. In accent 1 the latter is associated with the stressed syllable, while in accent 2 it is relegated to the post-stress syllable.

3.3 A short note on stress in Norwegian

Beyond the statement that word stress falls on one of the three final syllables of the lexical stem, and that closed syllables within that window attract stress, stress

	Accent 1	Accent 2
Monosyllabic		
Disyllabic		
Trisyllabic		
More than three syllables[i]		

[i]Whether or not the L spreads to all intervening syllables is controversial. The alternative view is that L does not spread, leaving a string of tonally unspecified syllables between L and the final H. The phonetic result would be interpolation, i.e. an evenly rising tone from L to H. This is not the case with respect to UEN, however; long domains are invariably characterized by a fairly stable low trajectory up to the penultimate syllable, from which the F0 steeply rises towards the final H, cf. Kristoffersen (2000:247ff.).

Table 2 Overview of surface tonal patterns.

placement is in principle not predictable in Norwegian. It must therefore be lexically marked. Stressed syllables are always heavy, and in the absence of closed syllables, weight is implemented by either vowel length or consonant gemination, where the choice is not predictable (Kristoffersen 1999, 2000:chapter 6). Stem-initial Germanic stress has been retained in the Germanic part of the vocabulary, but given the fact that these stems are short, they can be subsumed under the general analysis based on final stress that also encompasses longer words of e.g. Latin origin. In compounds, primary stress is normally on the initial compound member, while all word stresses on subsequent compound members are demoted to secondary stress.

Given the unpredictability of word stress placement, stress is marked in the inputs used as data in this paper.

4. TWO COMPETING ANALYSES OF SCANDINAVIAN TONE

4.1 The privativity hypothesis

Due to the fact that the contrast between accent 1 and 2 is constituted by the presence of an initial high tone in accent 2 that is absent from accent 1, the analysis sketched in section 3.2 above can be referred to as the PRIVATIVITY HYPOTHESIS. The roots of this analysis can be traced back to at least Haugen (1967), who writes that ‘Accent I

[shall be equated with] STRESS alone, while Accent II will be regarded as stress plus a feature which we shall call TONE'.[8] Here, Haugen explicitly argues that there is a relationship based on privativity between accent 1 and accent 2, in that accent 2 has a (tonal) feature that is absent in accent 1. For Haugen, the mark that is used in his analysis to denote tone is an abstract feature that 'implies whatever phonetic characteristics are associated with the differences between Accent I and Accent II in any given dialect that maintains the distinction'. Further, accent 2 is the marked member of the contrast, due to its more 'restricted distribution, since it does not occur with monosyllables', and due to the fact that it is 'phonetically more complex'.[9]

By the early 1990s, the insight that accent 2 is more complex had been translated into autosegmental representations through the assumption that the accent 2 melody contains an initial, LEXICAL TONE that is lacking in accent 1; see e.g. Kristoffersen (1993, 2000:252f.), Lorentz (1995), Riad (2003). Except for the initial lexical tone of accent 2, accent 1 and accent 2 melodies are identical. Due to its more complex melody, accent 2 is usually held to be the marked member of the opposition, cf. the citation from Haugen (1967:188) above and discussion in Bruce & Hermans (1999:623).

4.2 The timing hypothesis

Opposed to the privativity hypothesis is the view that can be referred to as 'the timing hypothesis', first stated in Haugen & Joos' (1952) paper on East Norwegian tone and intonation. It was later developed in Gösta Bruce's groundbreaking doctoral dissertation (Bruce 1977). Within this view, accents 1 and 2 have identical melodies associated with the stressed syllable. The contrast emerges as a result of different timing of the melodies, encoded by marking the H and the L respectively with an asterisk, signalling precedence of association to the stressed syllable, or by pre-linking either H or L. H*L accordingly represents accent 2 while HL* represents accent 1. The most recent versions of this model are found in Gussenhoven & Bruce (1999:237) and Gussenhoven (2004:212 ff.). Both analyse the Stockholm contrast as constituted by a HL melody where the H is pre-linked to the metrical head in accent 2 while the L is pre-linked to the head in accent 1.

4.3 Choosing between timing and privativity

A problem connected with the timing hypothesis as a general phonological analysis of Scandinavian tone is that for most varieties it has been difficult to find solid phonetic evidence for identical melodies. No one has to date therefore proposed this approach as a possible foundation for an analysis that would cover all the tonal varieties of Norwegian and Swedish.

The privativity hypothesis seems at the outset to be a better candidate for a general account of Scandinavian tone. The established analysis of Stockholm just mentioned represents a problem, however, since the initial H tone in the accent 1 melody, which will coincide with the pre-stress syllable if one is available, is difficult to reconcile with an analysis based on privativity. But the interpretation of Stockholm data is not unequivocal. Engstrand (1995, 1997), based on experimental as well as spontaneous data, finds that the evidence for there being an initial H tone in accent 1 in Stockholm is not at all clear. To the extent that this is true, Stockholm would also be amenable to an analysis based on privativity, where the initial part of the accent 2 melody associated with the primary stressed syllable is HL for accent 2 and L only for accent 1. This makes Stockholm equal to UEN in this respect.

Most other varieties that have been studied from a phonological point of view, namely Bergen Norwegian (Lorentz 1995), Egersund (South West Norway) (Hognestad 1997), Sunnmøre (Northwestern Southern Norway) (Abrahamsen 2003) and UEN (Kristoffersen 1993, 2000), can be analysed as privative varieties. Indeed, the only researcher who has ventured a comprehensive comparative phonological analysis of Scandinavian tone, Tomas Riad (Riad 1996, 1998, 2003), bases his analysis on this assumption. In Riad (2003:92), he states that '[t]he opposition is always a privative one, where accent 2 contains a lexically specified tone and accent 1 lacks such a specification'.

4.4 Identical melodies: a challenge for the privativity hypothesis

Until recently, only Stockholm Swedish has been referred to as a variety with identical melodies. Since there is disagreement on whether this is in fact the case, see above, it is possible to classify Stockholm as well as privative, as in e.g. Riad (2003).

In three recent papers (Kristoffersen forthcoming a, b; 2006), however, I discuss data form three Norwegian dialects: Bergen, in West Norway, and Nord-Gudbrandsdal and Oppdal, in East Norway; they suggest that in these dialects the accentual melodies are identical, and that the tonal contrast accordingly is constituted by different timing.

The Bergen data discussed in Kristoffersen (forthcoming b) represent younger speakers, born in the early 1980s. At least for these speakers, different timing of a common HL melody constitutes the accentual contrast. In accent 1, the H coincides with the stressed syllable, and in accent 2 it is delayed and coincides with the post-stress syllable, at least when the accentual domain consists of three or more syllables. There is no clear evidence of the initial L in accent 2 assumed for Bergen in e.g. Lorentz (1995).

The Oppdal and Nord-Gudbrandsdal data are discussed in Kristoffersen (forthcoming a; 2006). They show a similar pattern, in that both accent 1 and 2 manifest HLH melodies in polysyllabic words, with different timing of the L as the factor

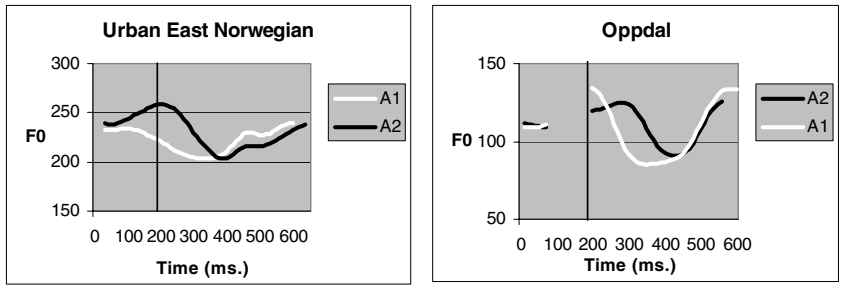


Figure 2. F0 contours of accent 1 and 2 in two East Norwegian dialects: Urban East Norwegian and Oppdal.

that distinguishes the accents. The difference between UEN and Oppdal is shown in Figure 2, where the vertical bar shows the onset of the stressed syllable. The contours include the rhyme of the unstressed syllable immediately preceding the stressed syllable.

Even if the onset consonant is voiceless in the Oppdal contours, we clearly see that there is an initial tonal peak in accent 1 that is absent in the UEN contours. Thus, these data strongly suggest that in Oppdal we are dealing with identical melodies at the phonological level. Therefore, analyses based on surface privativity cannot be applied to dialects such as Oppdal. To the extent that we want to maintain the established analyses of the privativity dialects such as UEN, where privativity is assumed at the input as well as the output level, we are forced to assume two radically different dialect groups, one where accent 2 is characterized by an initial lexical tone absent in accent 1 and one where the melodies are identical with respect to tonal make-up, leaving the contrast to different timing of at least one of the tones.

We can now further specify an important goal of the present paper. This is to develop an analysis of a prototypical privativity dialect, Urban East Norwegian, where the privativity emerges as a surface phenomenon that is not present in the input. At the input level, this analysis lies closer to the timing hypothesis, since the underlying melody assumed, L*H, is the same for the two accents. At the output level, the privativity effect arises from the conflict between a markedness constraint that promotes high tones on prosodic heads (accent 2), and a faithfulness constraint that protects pre-linked tones (accent 1).

To the extent that the basic features of this analysis is applicable to timing dialects as well, such as Oppdal and North Gudbrandsdal, it will pave the way for a unified analysis across the privativity/timing divide, at least with respect to the double peak varieties. This point lies outside the scope of this paper, but is addressed in Kristoffersen (forthcoming a).

4.5 Gussenhoven's analysis of the UEN accent contrast

As a point of departure for the proposal that follows in section 6 below, and also by way of contrast, I shall take Gussenhoven's (2004:217–223) Optimality Theory analysis of East Norwegian. As in the analysis presented here, Gussenhoven interprets the L*H portion common to both melodies as an intonational pitch accent. The analysis is based on the privativity assumption, in that the accentual difference derives from accent 2 words having a pre-linked H in their underlying representations. By this, Gussenhoven assumes privativity as a feature not only of the output, but also of the input.

When the L*H pitch accents are added to the representations, the L* can link directly to the stressed syllable when this is not already associated with a pre-linked H. This is controlled by the constraint T* → TBU. (Note that Gussenhoven considers only stressed syllables as TBUs (tone-bearing units), see discussion in section 6.3 below.) Higher ranking FAITH(Assoc) protects the pre-linked H from delinking. Therefore, the L*H% pitch accent cannot oust the pre-linked H from the stressed syllable in order to satisfy the lower ranking T* → TBU, and it is therefore inserted after the lexical H, forming the accent 2 HLH melody.

Gussenhoven's proposal is sketchy, leaving out a lot of detail, but it is certainly descriptively adequate as far as it goes. However, some weaknesses may be noted. First, the absence of accent 2 in monosyllabic domains must be stipulated and, hence, is unexplained. Secondly, in view of the universal tendency for high tones to be attracted to metrical heads, it seems strange that it is precisely a high tone that is pre-linked to the stressed syllable.

The alternative analysis that is presented in this paper has important features in common with Gussenhoven's. First, I assume one underlying melody, as already mentioned. Secondly, I assume that the accentual difference arises from lexical pre-linking of a tone, combined with a top-ranked constraint that prohibits delinking of pre-linked tones. The main difference between the two is that my analysis takes as its starting point the universal tendency just mentioned for high tones to be attracted to metrical heads. This leads to the hypothesis that it is low tones on metrical head that represents the marked option. Hence, accent 1, with its low tone on the stressed syllable, must be the marked member of the tonal contrast.

5. MARKEDNESS

The historical source of the accent opposition appears to be a complementary distribution of accentual melodies between monosyllabic and polysyllabic words (Oftedal 1952). During the late Middle Ages, the 'monosyllabic melody' then spread

	Accent 1	Accent 2
SIMPLEX WORDS		
Ending in schwa	(√)	√
Ending in full vowel	√	(√)
Ending in syllabic sonorant[i]	√	(√)
COMPLEX WORDS		
Inflection	(√)	√
Derivation	(√)	√
Compounds	(√)	√

[i]Except for non-nouns ending in /n/, all categories belonging to this type show a strong tendency in favour of accent 1 (Kristoffersen 2000:254f.).

Table 3. UEN accent distribution in polysyllabic words.

to polysyllabic domains, mainly due to the development of the suffixed, definite article and syllabification of word-final sonorants in non-harmonic rhymes such as in Old Norse *vápn* 'weapon', cf. modern UEN [ˈʊoːˌpn̩] *våpen*. This means that historically accent 1 was the marked accent, but only in polysyllabic words where it came to contrast with accent 2, the original accent in polysyllabic words.

5.1 Markedness based on structural complexity

As noted above, the motivation for assigning marked status to accent 2 on the basis of structural complexity emerges clearly from Table 2. The presence of the initial H makes accent 2 the more structurally complex pattern of the two.

5.2 Markedness based on distributional patterns

In addition, the distribution of accent 2 is more limited, in that it cannot occur in monosyllabic domains. As to polysyllabic domains, the distributional patterns are more complex. Table 3 is a summary of the main distributional patterns found in UEN, based on Kristoffersen (2000:chapter 9).

A √ indicates a majority pattern, while (√) indicates a minority pattern. We see that across all categories we find both accents.[10] There is skewedness between simplex and complex words, however. In complex words, the majority pattern is accent 2. But it must be noted that when stems are polysyllabic, the accent of the stem, with only a few exceptions, is retained. It is only with respect to monosyllabic stems that morphological category in itself is decisive. The only major exceptional pattern here is the definite singular suffixes, which induce accent 1 when added to a monosyllabic stem.

The converse seems to be the case with respect to simplex words, where two out of three categories show accent 1 as the dominant pattern. The support for the claim that accent 1 is the marked member on distributional grounds, is not so apparent here. This distribution has a diachronic explanation. Most words with non-final stress ending in full vowels are words borrowed into the language after the end of the Middle Ages, when indigenous words underwent vowel reduction in final, open, unstressed syllables. These loanwords have for the most part been assigned accent 1. Today, such words represent a substantial part of the lexicon. The fact that they have been assigned accent 1 has been used as an additional argument for accent 2 being marked, since loanword adaptation supposedly reveals unmarked patterns in a language.

While this may be true, e.g. in segmental adjustments, there are also clear examples of languages where loanwords, even of very ancient origin, constitute separate sub-phonologies. A well-known example is Japanese (Itô & Mester 1995). I therefore agree with Lahiri et al. (2005) in their claim that accent 1 in loanwords can be interpreted as a sign of their foreignness, which supports their view that accent 1 is the marked member of the contrast.

But loanword status in itself is not a sufficient condition for accent 1 to obtain, as phonological constraints may interfere. Accent 2 is normally restricted to the penultimate syllable, thus constituting a syllabic trochee at the end of a stem (Kristoffersen 2000:256f.). When this combines with a final schwa, which is also conducive to accent 2, we very often, but not consistently, get accent 2 in loanwords as well.[11]

Turning now to the other category with predominant accent 1, simplex words ending in a syllabic sonorant, the dominant pattern is hardly surprising. As mentioned earlier, this is one of the structural types that gave rise to the accent contrast in the first place. Due to elimination of disharmonic rhymes in monosyllabic words such as Old Norse *vápn*, see above, we would expect to find accent 1 associated with this structural type.

In conclusion, we note that while the patterning is not clear, there is a certain dominance of accent 2 in polysyllabic words, especially when loanword status and definite singular endings as clitics are taken into consideration. This suggests that, on this criterion, accent 1 should be seen as marked, at least with respect to polysyllabic words.

5.3 External and internal markedness criteria

A problem that emerges from this discussion of markedness parameters is that the choice of the decisive parameter, to a certain extent, seems arbitrary. While both structural complexity and distributional patterns may be valid foundations for a

markedness metric from a universal point of view, it is difficult to see what kind of argument could decide which of them should be given priority in cases of conflict. Part of the problem is that markedness is treated as a property that is external to the grammar, in the sense that it is assigned to one or more grammatical categories whose internal justification is quite independent of markedness considerations. The choice of one of them as the decisive markedness criterion cannot therefore be justified on grammar-internal grounds. Thus, we may refer to the choice between them as being based on grammar-external markedness considerations.

In Optimality Theory (OT) markedness considerations are part of the very foundations of the theory. The surface forms that constitute the output of an OT grammar are the result of an evaluation of different output candidates where universal markedness constraints interact with constraints that preserve faithfulness to the input in the selection of the grammatical output.

An important feature of the theory is the so-called Richness of the Base (ROTB) hypothesis, which says that within the confines of the necessity of preserving input contrasts, first and foremost those that differentiate meaning, the shape of input forms are irrelevant. The import is that output forms are not primarily a function of input forms. Instead, it is precisely the language-specific ranking of the universal markedness constraints and their interaction with faithfulness constraints in the given language that determines the shape of the output, irrespective of input form.

In this sense, markedness in a given language can be seen as a function of language-specific interaction between markedness and faithfulness constraints. While universal markedness is not something that is hard-wired into specific constraint rankings (McCarthy 2002:14f.), markedness constraints express patterns that recur in more than one language, while faithfulness constraints preserves language-specific features that are encoded in the input. Not all of these features are marked, of course, but it seems to be a sound interpretation of this relationship that those forms in a given language that best conform to the requirements imposed by the active markedness constraints are less marked in that language, while forms that are not so easily accounted for by the same constraints, and needs protection by higher-ranking faithfulness constraints in order to survive, can be regarded as marked. In this sense, markedness is internal because it emerges as a concomitant and integrated part of the grammar itself.

It is in this sense that markedness is used in this paper. By means of an OT analysis of UEN tone drawing on constraints or constraint types that have been used with success in analyses of other languages than Norwegian, and therefore constitute plausible candidates for universal status, I shall argue that accent 1 in polysyllabic words must be seen as the marked member because it defies analysis by markedness constraints alone.

Figure 3. Input representations of accent 1 and accent 2.

6. ANALYSIS

6.1 A summary

The most important features of the analysis are the following:

1. The input melody L*H% is the same for both accents and is to be interpreted as an intonational pitch accent in accordance with Gussenhoven (2004).
2. The surface difference between accent 1 and 2 is that the latter contains an initial, epenthetic H. Hence, privativity (presence vs. absence of initial H) is limited to the output of the grammar.
3. Monosyllabic accent 1 and polysyllabic accent 2 are derived by the same set of ranked markedness and association constraints.[12] These are the unmarked realizations of the pitch accent. The grammar therefore provides an explanation of the absence of accent 2 from monosyllabic domains.
4. Accent 1 in polysyllabic domains cannot be derived by these constraints alone. Polysyllabic accent 1 is accounted for by lexical pre-linking of the L*, which will block the unmarked distribution that characterizes polysyllabic accent 2. Hence, polysyllabic accent 1 is the marked member of the accentual contrast.

6.2 The input melody

As just stated, I shall assume one underlying (intonational) tune, L* H%, where the asterisk marks the L as the central tone that, subject to the relevant constraints, will be realized as near the stressed syllable as possible.[13]

Minimal pairs arise when one member of a pair of identical segmental strings is subject to pre-linking, and the other is not. Input representations of a (near) minimal pair, [[1]sʊim.ml̩] *svimmel* 'dizzy' vs. [[2]him.ml̩] *himmel* 'sky', is shown in Figure 3.

A possible conceptual weakness of the present analysis is that it assumes pre-linking of a tone belonging to an intonational tune, thereby combining elements from two sides of the phonology-intonation interface. If this interface is indirect and mediated by syntax, a more natural assumption would be that intonational tones

cannot be part of a word's lexical representation. But since it is quite possible that the tonal contrast in Scandinavian developed from exactly such a situation – 'fossilization' of a stress enhancing tone on the stressed syllable that would otherwise go to the following unstressed syllable by a process of peak delay or post-accenting (Elstad 1980; Lorentz 1981, 1984) – lexical L* cannot be excluded *a priori*. Rather, the lexical tone could be seen as taking priority over a complete tune added in the intonation, obliterating the floating intonational L* by the OCP principle. These questions will not be pursued further here, but must be part of a complete analysis.

6.3 The tone-bearing unit (TBU)

Two views exist with respect to what is the relevant tone-bearing unit in Scandinavian tone. In recent work by e.g. Lorentz (1995), Hognestad (1997), Abrahamsen (2003) and Kristoffersen (2000), the TBU is assumed to be the syllable or the mora, in line with the standard autosegmental view of tone that can be found in introductory texts such as Yip (2002:74).

According to the alternative view (Bruce 1977, Gussenhoven & Bruce 1999, Riad 2003, Gussenhoven 2004), only stressed syllables can bear association lines to tones in Norwegian and Swedish. While this directly accounts for the fact that the tonal contrast can only manifest itself at (primary) stressed syllables, it encompasses the claim that tones that are not associated with stressed syllables are timed independent of the unstressed syllables that follow the primary stressed syllable in a given accent phrase.

The evidence that this claim is based on, is presented in Bruce (1983, 1987). Here it is argued that the realization of the fall-rise of the Stockholm focal accent seems to be governed by fixed timing instead of synchronization with syllables. Although it is explicitly stated that the data are not incompatible with a syllable-by-syllable association of tone, Bruce's conclusion is that it is reasonable to assume that

> in a language like Swedish with its strong distinction between stressed and unstressed syllables . . . it is only stressed syllables or rhythmical group boundaries of, for example stress groups that are important coordination points for pitch gestures, while non-prominent individual syllables like the unstressed ones are not. (Bruce 1987:48)

In Kristoffersen (2003) the validity of this claim is questioned from two angles. While it nicely captures the close connection between intonation and lexical tone, it can account for neither the finer timing relations found within the stressed syllable in some East Norwegian dialects, nor for the results of a test run on data from the West Norwegian Bergen dialect discussed in Kristoffersen (2003).

The first point is further discussed in Kristoffersen (forthcoming a), where I argue that the difference between the Oppdal dialect on the one hand and UEN and

Nord-Gudbrandsdal (NGbr) on the other is that the mora is the TBU in Oppdal, while it is the syllable in UEN and NGbr. If we assume that the stressed syllable as a whole is the TBU, this difference cannot be accounted for.

The test based on the Bergen data reported in Kristoffersen (2003) concerns the potential status of unstressed syllables as TBUs. The distance between the initial L and the H of the commonly assumed LHL melody of a set of accent 2 words was measured. The initial L is the lexical tone that is associated with the stressed syllable. The following H should by Bruce's hypothesis show a more or less constant timing relationship with the L, while by the alternative hypothesis that the post-stress syllable is a TBU in its own right, we would expect the H peak to coincide with the syllable peak, i.e. the vowel. In order to test whether there is a difference, the temporal distance between the two vowels was varied by changing the number of (mainly voiced) consonants between the two vowels. It turned out that irrespective of segmental 'distance' between the vowels, the midpoint of the post-stress syllable was a better predictor than a constant timing factor.[14]

Based on this evidence, I shall assume that, depending on dialect, syllables or moras are the relevant TBUs independently of stress, at least for East Norwegian. The stressed syllable will be one of several TBUs (or contain two under a moraic analysis).[15] Its propensity to attract the central tones of the melody must therefore be accounted for in a different way.

In this paper I shall assume that the constraint that governs type of TBU in UEN is the one stated in (1). I shall also assume that it is undominated.

(1) TBU $= \sigma$

6.4 Unmarked accent 2

We shall start the discussion with unmarked inputs with no pre-linked tones, and continue with trisyllabic accent phrases where the number of TBUs matches the number of surface tones in accent 2, i.e. HLH. After we have established the constraints necessary to distinguish between accent 1 and 2 in tri- and disyllabic domains, we first proceed to larger domains, and then to monosyllabic accent phrases, introducing the relevant constraints along the way. Finally, marked polysyllabic accent 1 is accounted for.

6.4.1 Interaction between tone and metrical structure

Given the close relationship between tonal accent and stress in Norwegian and Swedish, we need constraints that govern the distribution of tones between metrical heads and non-heads. Here I appeal to a constraint family proposed in de Lacy (2002). The central claim in de Lacy's proposal is that high tones are attracted to metrical heads and avoid non-heads, while the converse is true for low tones. As it happens,

only the constraint banning low tones from metrical heads will prove necessary in the analysis. This is encoded in the first constraint shown in (2) (de Lacy 2002:2). Since tones are insensitive to secondary stress in UEN, the constraint must only ban low tones from primary stress, i.e. maximal heads. Given the fact that accent 1 is indeed characterized by a low tone on the stressed syllable, it emerges as the marked accent measured against this constraint.[16] We also need to invoke a constraint that prevents insertion of excess tones. A likely candidate here might be DEPT (Yip 2002:83), which militates against insertion of tones not present in the input. Another one, which will have the same effect as DEPT, and in addition will prevent generation of excess tonal structure in general, is *TONE (*T), see e.g. Yip (1999), which militates against any tonal structure in outputs. This will in other words penalize any tone that is part of the output, irrespective of input. It must be ranked below constraints that demands insertion of tones at specific positions. Where it is decisive, it will keep the number of tones at a minimum. One of the constraints that must be ranked above *TONE is the one banning low tones from metrical heads stated in (2). We shall return to the other constraints needed to that effect in the sections that follow.

(2) *HD_{MAX}/L: No low tones on maximal heads
*TONE: Tones are not part of the output

We start the analysis by subjecting trisyllabic candidates to the two constraints in (2). The reason that trisyllabic domains are chosen as the starting point is that the number of tones in the maximally expanded melody HLH and the number of TBUs match. Consequently, we don't have to deal at this point with constraints that regulate association patterns in inputs where there are too many or too few tones with respect to TBUs. Also, only candidates that represent canonical accent 1 (b) and canonical accent 2 (a) are evaluated. In this way we bring out the central claim of the analysis, that insertion of H on metrical heads takes precedence over *TONE whenever possible.

	L* H% ˈleː.ʊn̩.nə	*HD_{MAX} /L	*T
a) ☞	H L*H% ˈσ σ σ]		***
b)	L *H% ˈσ σ σ]	*!	**

Tableau 1. Interaction between tonal insertion and metrical structure.

As can be seen from Tableau 1, candidate (a), where an H is inserted on the stressed syllable such that a violation of *HD_{MAX}/L is avoided, emerges as winner.[17]

Having fewer violation marks with respect to *TONE does not help candidate (b). *TONE must in other words be ranked below *HD_{MAX}/L in order to get the right result.

6.4.2 Association constraints

Other candidates than those evaluated in Tableau 1 are of course possible, and must be evaluated against a richer set of constraints. It is for example easy to see that deletion of one or both input tones, or reversal of their input order will create candidates that fare better with respect to *HD_{MAX}/L than the two evaluated in Tableau 1.

We first turn to the constraints that govern association of the tones that make up the L*H% melody present in all outputs. At first glance, faithfulness constraints would seem to be required here. However, I shall claim that what is at stake here is structural wellformedness and not primarily faithfulness.

As already stated in section 2 above, intonational structure consists of pitch accents associated with metrical heads, and boundary tones associated with the left and right boundaries of prosodic constituents. This distribution in UEN is in principle independent of any property of the input, and should accordingly be captured by markedness constraints. These must be of two types, or 'families', those that regulate association of pitch accents, whose central tone is normally marked by a star, T*, and those that account for the distribution of boundary tones, T%.

The unmarked association of starred tones is with metrical heads, while the unmarked association of boundary tones is with the left or right boundary of a given prosodic constituent. In English, different intonational tunes with different meanings can associate with metrical heads. These contrasts must accordingly be stated as part of the input. In UEN, however, only one intonational tune is needed, viz. L*. Since only one tune is needed, this can in principle be encoded as part of the constraint that specifies the association of T*. I shall follow that line of attack here, noting for now that this in principle obviates the need for specifying L* as part of the input.[18] For clarity, I shall nevertheless continue to specify the melody L*H% as part of the input in the tableaux that follow, and return to the question of the nature of the input in section 7.

The same strategy will be followed with respect to the H% that demarcates the right edge of accent phrases. It can be specified as part of a constraint that accounts for the distribution of boundary tones.

I shall refer to the association constraints that require the presence of specific tones in the output as ASSOCIATE-T, which can be further subdivided into the two subtypes ASSOCIATE-T* and ASSOCIATE-T%.[19] Note that these are to be seen as neutral with respect to the provenance of the tones, that is, whether the tones are absent from or part of the input, and further whether they are linked to a TBU or floating if they are part of the input. They are in other words constraints that require certain structural properties to be present in the output regardless of the nature of the input.[20]

The fact that both L* and H% must be part of the output can now be captured by the two constraints stated in (3) below, which also account for their distribution. The first requires that an H% to be final in the accent phrase. It must be associated with the final TBU, and no other tone can follow it within a given accent phrase. It must in other words be both associated to and right-aligned with the rightmost TBU in the accent phrase. In principle, this should be stated by means of two constraints, in accordance with the distinction between alignment and association made in Gussenhoven (2004:150ff.) briefly discussed in note 19. The first would require association and the other right-alignment. I shall for practical purposes conflate them into the one stated in (3).[21] The second requires that an L* be linked to some TBU in the accent phrase.

(3) ASSOCIATE-H%; RT: H% is right-aligned with and associated to the rightmost TBU in the accent phrase.
ASSOCIATE-L*$_{AP}$: L* is associated to some TBU in the accent phrase

Let us now see how these constraints select the correct output form among a set of disyllabic candidates with trochaic structure, where the number of surface tones exceeds the number of available TBUs. One of the examples of this type given in Table 1 is the disyllabic indefinite plural noun [ˈflɔm.mɽ] *flomm-er* 'floods' (cf. Tableau 2). As can be seen from all the data in Table 2, the association constraints given in (3) are both unviolated in the examples given there, and must therefore be top-ranked. *HD$_{MAX}$/L can be ranked as equal with these constraints. Note that candidates with unspecified TBUs have been left out.[22] We shall return to this type below.

	L*H% ˈflɔm.mɽ	ASSOCIATE-H%;RT	ASSOCIATE-L*$_{AP}$	*HD$_{MAX}$ /L	*T
a) ☞	H L*H% ˈσ σ]				***
b)	L*H% ˈσ σ]			*!	**
c)	H L*H% ˈσ σ]			*!	***
d)	H% ˈσ σ]		*!		*
e)	H% L* ˈσ σ]	*!			**
f)	L* ˈσ σ]	*!		*	*

Tableau 2. Association of input tones.

We first look at candidates (d)–(f) in Tableau 2, which violate the association constraints defined in (3). We see that (e), where the order of the input tones is

reversed, and (d), where L* has been deleted, both satisfy *HD_{MAX}/L and have fewer violations of *TONE than the winner, and would thereby come out as winners in the absence of the higher ranked association constraints. A constraint that might have been invoked with respect to (e) is LINEARITY (McCarthy 2002:34, Yip 2002:83), which preserves the order of elements in the input. This constraint may well be relevant, but since (e) is eliminated by ASSOCIATE-H%; RT as well, LINEARITY will be left out of the analysis. In candidate (f) H% has been deleted, and it thereby founders on ASSOCIATE-H%; RT.[23]

Candidates (a) through (c) show that the grammar developed for trisyllabic inputs above can account for disyllabic inputs with initial stress as well. Again we see that (b), the minimally specified candidate with respect to tone, loses to the accent 2 candidate (a), due to its violation of *HD_{MAX}/L.

6.4.3 More association constraints: spreading vs. unspecified TBUs

Let us now proceed to longer domains where the number of TBUs exceeds the number of surface tones in the accent 2 melody. Since there are no grammatical words with more than three unstressed syllables following the stressed one, the relevant inputs will consist of compounds or clitic groups.

When there are more TBUs than input tones, either toneless TBUs must be allowed, or every TBU must have a tone associated with it, either by spreading or insertion. In UEN it is the latter state that obtains: Every TBU must be associated with a tone, as can be seen from Table 2 above. The constraint that requires this state of affairs is SPECIFYTONE (Yip 2002:83). Toneless TBUs seem possible outside accent phrases, however, most commonly in utterance-initial, anacrustic syllables. We therefore have to limit the scope of this constraint to accent phrases.

SPECIFY-T_{AP} can, as just mentioned, be met either by insertion of tones, or by spreading one or more of the tones making up the input melody. Tone insertion would therefore be one conceivable way of specifying the excess syllables, although it is militated against by *TONE. The OBLIGATORY CONTOUR PRINCIPLE (OCP) will limit this option further, since insertion must not lead to two identical, consecutive tones (Myers 1997). This constraint is clearly respected in all the surface forms cited in Table 2. The alternative, spreading of tones already in the input, is blocked if the constraint NOLONGTONE is sufficiently high-ranked (Myers 1997, Yip 2002:83). This may be further specified for different tones. As it seems to be a general feature of UEN that high tones do not spread, see again the data in Table 2, the relevant constraint is NOLONGH.[24]

The new constraints introduced into the analysis are summed up in (4).

(4) SPECIFY-T_{AP}: A TBU within an accent phrase must be associated with a tone
NOLONGH: A high tone may be associated with at most one TBU
OBLIGATORY CONTOUR PRINCIPLE TONE (OCP-T): Adjacent identical tones are prohibited

In Tableau 3, the relevant input example from Table 1, the compound [ˈflɔm.kɑ.tɑ.ˌstrʉː.fə] *flomkatastrofe* 'disaster caused by floods', is evaluated.[25]

L* H% ˈflɔm.kɑ.tɑ.ˌstrʉː.fə	SPECIFY-T_{AP}	OCP	NOLONG H	*HD_{MAX}/L	*T
a) ☞ H L* H% ˈσ σ σ ˌσ σ]					***
b) H L* H L H% ˈσ σ σ ˌσ σ]					****!*
c) L* H% ˈσ σ σ ˌσ σ]				*!	**
d) H L* H% ˈσ σ σ ˌσ σ]	**!				***
e) H L* L H H% ˈσ σ σ ˌσ σ]		*!			*****
f) H L* H% ˈσ σ σ ˌσ σ]			*!		***

Tableau 3. Long domains.

We see that the three final candidates all tie with the winner (a) with respect to *HD_{MAX}/L, but violate the top-ranked constraints added to the analysis in (4). Candidate (d) violates SPECIFY-T_{AP}. In candidate (e) tones have been inserted, an L on the third and an H on the fourth syllable in addition to the initial H, resulting in violations of the OCP-T in addition to multiple violations of *TONE. This candidate should be compared with candidate (b), where tones also have been inserted, but in a way that avoids violation of OCP-T. Here, the failure of the candidate is due to more violations of *TONE compared to the winner (a). Finally, candidate (f) fails because of its violation of NOLONGH.

Proceeding to the two remaining candidates, (a) and (c), which satisfy the three top-ranked constraints introduced in (3), we again see that our grammar is able to select the correct winner. Candidate (c) represents the ungrammatical accent 1 candidate, which fails due to its violation of *HD_{MAX}/L compared to (a), the accent 2 winner.

Summing up, the analysis this far has rendered the following grammar:

(5) ASSOCIATE-H%; RT, ASSOCIATE-L*$_{AP}$, SPECIFY-T$_{AP}$, OCP-T, NOLONGH, *HD$_{MAX}$/L >>
*TONE

6.5 Unmarked accent 1

Unmarked accent 1 is found in contexts where it cannot contrast with accent 2. As can be seen from Table 1, we find this type in two contexts, whose common feature is that the domain for tone association is monosyllabic. The most important environment is monosyllabic words. In addition, we find accent 1 only when a monosyllabic grammatical word is followed by a clitic, as in the def.sg. form [ˈflɔm.mn̩] *flom=en* 'the flood'.

6.5.1 Monosyllabic inputs

The basic hypothesis underlying this paper is that unmarked accent, be it accent 2 in polysyllabic words or accent 1 in monosyllabic words, should be accounted for by the same grammar. In Tableau 4 we see how the grammar constructed so far fares when subjected to a set of monosyllabic candidates. The example word is [ˈflɔm] *flom* 'flood', taken from Table 1. Except for *HD$_{MAX}$/L, candidates that violate the top-ranked constraints are not taken into account.[26] These include candidates where only one of the input tones surfaces, and where ASSOCIATE-H%; RT and ASSOCIATE-L*$_{AP}$ respectively are violated. Hence, only two candidates are evaluated, the accent 1 candidate and the accent 2 candidate with an epenthesized initial H.

	L*H% ˈflɔm	TOP-RANKED	*HD$_{MAX}$/L	*T
a) ☞	L*H% ˈσ]		*	**
b)	HL*H% ˈσ]		*	***!

Tableau 4. Evaluation of monosyllabic input.

Candidate (a) is the faithful candidate. Due to the fact that there is no unstressed syllable for L* to go to, it must be associated with the stressed syllable in both candidates. Since the stressed syllable in this case is also the final syllable, H% is linked to the stressed syllable as well. The result is a tie with respect to *HD$_{MAX}$/L, and therefore *TONE decides in favour of candidate (a), which has less tonal structure.

We now see that under the present analysis, the absence of accent 2 in monosyllabic words is no distributional accident, as it is in any grammar that relies on lexical marking of accent 2 by means of a pre-linked H, as in e.g. Kristoffersen (2000) and Gussenhoven (2004). Instead, it follows from the grammar: the absence of the initial H in monosyllabic domains is due to the fact that H-epenthesis does not add to a candidate's wellformedness when the input is monosyllabic. Thereby, the penalization of epenthesis caused by *TONE becomes decisive.

6.5.2 Disyllabic input with monosyllabic, grammatical word plus clitic

Before we discuss the disyllabic inputs that consist of monosyllabic, grammatical words plus clitic, we need to discuss what counts as a clitic in the present analysis. Contrary to the usual assumption made in analyses of Norwegian morphology, I assume along with Lahiri et al. (2005) that the endings signalling definite forms in nouns are clitics.

Historically, the suffixed definite articles are believed to have developed from freestanding articles modifying post-posed adjectives, as in Old Norse *ormr inn langi* 'snake the long' (= the long snake). During the Middle Ages the article gradually drifted into the prosodic domain of the noun, through the form *ormr-inn*, where both stem and article retain case marking, and *orminn*, into present day *ormen* 'the snake'. Hence, there is historical evidence that these endings at some point were clitics. In fact, the contrast between accent 1 and 2 itself to a considerable extent grew out of this process, since the cliticization of the definite articles as noted above didn't trigger accent 2, which before that time apparently characterized all polysyllabic words (Oftedal 1952).[27]

Defining the definite suffixed articles as clitics in modern Norwegian may seem to be an arbitrary and easy way out of the problem that the stem itself cannot be marked as accent 1 by means of non-violable pre-linking, see section 6.6 below, since adding other suffixes, e.g. plural, triggers accent 2. Pre-linking of the stem would force accent 1 throughout the paradigm, while we in fact find accent 2 everywhere except where the definite article alone is involved. Thus, modern Norwegian *brann-er* 'fires' predictably has accent 2, as can be seen from Table 1.

In addition to the above argument based on diachrony and distribution, it is also a fact that other, undisputed clitics do not induce accent 2. This is the case with respect to object clitic attached to verbs, which are in fact homophonous with the definite clitics (Kristoffersen 2000:334f.). When these are added to monosyllabic verb stems, the result is a disyllabic prosodic word with accent 1. An example is [^{1}ʂøːtɳ] *skjøt'n* 'shot him', which is homophonous with the def. sg. noun *skjøten* 'the joint', whose stem is monosyllabic *skjøt* 'a joint'.

Tableau 5 shows the evaluation of the input for def.sg. [ˈflɔm.mn̩] *flomm-en* 'the flood'. As can be seen from the tableau, we incorrectly derive accent 2 if L* is allowed to dock on the clitic, as in candidate (a). It is candidate (a) and (c)'s violations of *HD_{MAX}/L that incorrectly make the accent 2 candidate (b) the winner. Indeed, the tableau corresponds to the first three rows of Tableau 2, where unmarked accent 2 in disyllabic domains is generated. The only difference is the morphological structure of the input.

L* H% flɔm.mn̩ ˈσ]$_{\text{Gw}}$ σ]$_{\text{AP}}$	ASSOCIATE L*$_{\text{AP}}$	TOP-RANKED	*HD_{MAX}/L	*T
a) L* H% ˈσ] σ]			*!	**
b) H L* H% ˈσ] σ]				***
c) H L* H% ˈσ] σ]			*!	***

Tableau 5. Evaluation of disyllabic input with monosyllabic, grammatical word plus clitic.

In order to obtain candidate (a), the accent 1 form, as winner here, we need a constraint that requires L* to be associated with a TBU contained within the grammatical word. ASSOCIATE-L*$_{\text{AP}}$ cannot do the job, since clitics are contained within the accent phrase defined by this constraint. We therefore need another version of ASSOCIATE-L* which delimits the association to the grammatical word. This constraint is stated in (6).

(6) ASSOCIATE-L*$_{\text{GRWD}}$: L* is associated to some TBU within the grammatical word that heads the accent phrase

On the assumption that this constraint is top-ranked as well, we derive the correct output, as shown in Tableau 6. It must be ranked above *HD_{MAX}/L, since the opposite ranking would make (b) incorrectly emerge as winner. This means that *HD_{MAX}/L must be demoted from the top-ranked group of constraints. Note that ASSOCIATE-L*$_{\text{GRWD}}$ cannot supplant ASSOCIATE-L*$_{\text{AP}}$, since grammatical words are not always contained within accent phrases. Whenever a grammatical word has non-initial stress, such as in e.g. *pro'gram*, 'program', the pre-stress part /pro./ will be part of the grammatical word, but outside the accent phrase beginning with /'gram/. Therefore, association of L* with /pro/ will satisfy ASSOCIATE-L*$_{\text{GRWD}}$, but not ASSOCIATE-L*$_{\text{AP}}$, which is only satisfied if L* is associated with the AP initial head, viz. /gram/. (See also discussion in section 3.1 and 3.3 above.)

Before we turn to the final category, marked accent 1, we sum up the grammar developed so far.

L* H% flǝm.mn̩ ˈσ]Gw σ]AP	ASSOCIATE-L*GRWd	TOP-RANKED	ASSOCIATE-L*AP	*HDMAX/L	*T
a) ☞ L* H% ˈσ] σ]				*	**
b) H L* H% ˈσ] σ]	*!				***
c) H L* H% ˈσ] σ]				*	***!

Tableau 6. Evaluation of disyllabic input with monosyllabic, grammatical word plus clitic revised.

(7) ASSOCIATE-H%; RT, ASSOCIATE-L*AP, ASSOCIATE-L*GRWd, SPECIFY-TAP, OCP-T, NOLONGH >>
*HDMAX/L >>
*TONE

This grammar is identical to one given in (5) above, which summed up the section on accent 2, except that ASSOCIATE-L*GRWd has been introduced into the analysis and *HDMAX/L has been demoted. This change has no detrimental effect with respect to the analysis of accent 2, as the reader can verify for herself.

6.6 Marked accent 1

The grammar that we have developed above derives accent 1 in domains where no unstressed syllable follows the stressed one within the grammatical word, and accent 2 elsewhere. We now turn to the marked type, accent 1 in domains consisting of at least one unstressed syllable following the stressed one. As mentioned at the outset of the analysis, I assume that this type results from lexical association of L* to the stressed syllable, as shown in the input of Tableau 7, where the example from

L* H% ˈhœj.rə	MAXLINK-L*	TOP-RANKED	*HDMAX/L	*T
a) ☞ L* H% ˈσ σ]			*	**
b) H L* H% ˈσ σ]	*!			***
c) H L* H% ˈσ σ]			*	***!

Tableau 7. Marked accent 1 in polysyllabic domains.

Table 1 is [ˈhœj.ɾə] *høyre* 'right hand side'. In order to obtain the correct result we need a top-ranked faithfulness constraint that will penalize every candidate where an association line between a TBU and L* present in the input has been deleted. This is stated in (8).

(8) MAXLINK-L*: No removal of association lines to L*

In Tableau 7 we see that the accent 2 candidate (b) violates this constraint. Both other candidates violate *HD_{MAX}/L. Candidate (a), i.e. accent 1, emerges as the winner on account of its fewer violations of *TONE.

We have now accounted for all the data categories in Table 1. Before we close this section, we shall summarize the grammar developed, and the ranking relationships that can be established between constraints. With the addition of MAXLINK-L*, the grammar is given in (9). All the constraints are motivated in the sense that they have been shown to play a role in analyses of tone in other languages (see, for example, Myers 1997, Yip 2002:82–84), most of which are not genetically related to the Scandinavian languages. The only language-specific addition is the specification of association patterns for the two input tones beyond their distribution conditioned by metrical structure.

(9) MAXLINK-L*, ASSOCIATE-H%; RT, ASSOCIATE-L*_{AP}, ASSOCIATE-L*_{GRWd}, SPECIFY-T_{AP}, OCP-T, NOLONGH >>
*HD_{MAX}/L >>
*TONE

7. CONSEQUENCES OF THE RICHNESS OF THE BASE HYPOTHESIS

According to the Richness of the Base hypothesis (McCarthy 2002:70; Prince & Smolensky 2004:205), an OT grammar should be constructed in a such way that the result of the evaluation should be an output that is empirically valid irrespective of the structure of the input. It is, in other words, the constraints and the constraint ranking that solely distinguish between grammatical and ungrammatical forms. In this section, I shall argue that the grammar in (9) meets this criterion with the addition of one constraint and one minor change with respect to ranking.

I shall distinguish between the following three types of inputs that differ from those assumed in the analysis above:

1. Inputs with additional, floating tones
2. Inputs with L* pre-linked to other syllables than the stressed one.
3. Inputs with no tones at all except the pre-linked tone in marked accent forms

Let us first look at inputs with additional, floating tones. With the exception of the initial H of accent 2, such tones must not surface. Since *Tone is neutral between insertion and deletion, it will remove unnecessary tones whether they are inserted by GEN or part of the input. This means that the grammar will derive the correct winner also in cases where the input contains more tones than those found in the output.

By way of example, let us first look at inputs with additional tones between L* and H%, such as L*HLH%. As can be seen from Tableau 8, the faithful candidate where all the input tones are preserved in the output, looses on account of more violations of *TONE.

	L*H L H% ˈσ σ σ σ]	TOP-RANKED	*HD$_{MAX}$ /L	*T
a) ☞	H L* H% ˈσ σ σ σ σ]			***
b)	L* H% ˈσ σ σ σ σ]		*!	**
c)	L*H L H% ˈσ σ σ σ σ]		*!	****
d)	H L*H L H% ˈσ σ σ σ σ]			****!*

Tableau 8. Evaluation of input with excess medial tones.

Candidates with tones inserted before the L*H% melody are also possible. First, an H preceding the L*H% melody must be able to associate to the stressed syllable in all accent 2 contexts, but must be eliminated in accent 1 contexts. As can be seen from Tableau 9, the grammar generates the correct output form, in that the extra H in the input leads to a fatal extra violation mark on *TONE when both candidates violate *HD$_{MAX}$/L.

	H L*H% ˈflɔm	TOP-RANKED	*HD$_{MAX}$ /L	*T
a)	L*H% ˈσ]		*	**
b)	HL*H% ˈσ]		*	***!

Tableau 9. Monosyllabic input with HL*H%.

Additional input tones, such as in **L**HL*H%**L**, are also conceivable. The final L would be eliminated by the requirement already in the grammar that H% be final in

the domain.[28] The L preceding HL*H% would be eliminated by it having to associate with the stressed syllable. The ensuing violation of *HDMax/L will make it lose to the accent 2 candidate (a) where the initial L has been eliminated. This is shown in Tableau 10.

	L H L*H% σ σ σ σ]	TOP RANKED	*HD$_{MAX}$ /L	*T
a) ☞	H L* H% 'σ σ σ σ]			***
c)	L* H% 'σ σ σ σ]		*!	**
c)	L H L*H% 'σ σ σ σ]		*!	****
d)	L H L* H% 'σ σ σ σ]		*!	****

Tableau 10. Evaluation of input with excess initial tones.

We now turn to the type with tones pre-linked to syllables other than the stressed one. Let us first look at what happens when a hypothetical input contains an L* linked to the post-stress syllable. In Tableau 11 we see that the well-formed accent 2 candidate (a) wins, due to the fact that L* is associated to the post-stress syllable. An input of this type will therefore result in an output that is indistinguishable from any other accent 2 output. This means that inputs with L* pre-linked within the confines of the trochee defined by the stressed plus a following unstressed syllable will result in grammatical outputs.

	L*H% 'σ σ]	TOP-RANKED	MAX LINK-L*	*HD$_{MAX}$ /L	*T
a) ☞	H L*H% 'σ σ]				***
b)	H L*H% 'σ σ]		*!	*	***
c)	L*H% 'σ σ]		*!	*	**

Tableau 11. Accent 2 as a result of pre-linking L* to the post-stress syllable.

What, then, about longer inputs where L* is pre-linked to a syllable outside this trochee? Recall that spreading of L is not fatally penalized by the grammar. Candidates where L* has spread to the post-stress syllable will satisfy SPECIFY-T$_{AP}$

	L *H% 'σ σ σ σ σ]	TOP-RANKED	MAX LINK-L*	*HD$_{MAX}$ /L	*T
a) ☞	H L *H% 'σ σ σ σ σ]				***
b)	L *H% 'σ σ σ σ σ]			*!	**

Tableau 12. Accent 2 as a result of pre-linking L* to a syllable outside the 'stress trochee'.

and, at the same time, be a well-formed accent 2 form with H inserted on the stressed syllable, as shown by the evaluation of the hypothetical five-syllable input in Tableau 12.

A problem arises when the pre-linked tone is found on the final syllable, however. This is where H% will be associated by ASSOCIATE-H%; RT, and outputs that respect this constraint as well as the ban against delinking pre-linked tones, will have an ungrammatical LH contour on the final syllable. Such a contour is not ungrammatical in general; we find it under duress due to tonal crowding both in monosyllabic accent 1 and disyllabic accent 2 outputs, as can be seen from the relevant data in Table 2. The basic insight here is that tone spreading and tone contours are incompatible. Contours are in other words only tolerated when necessary. Presence of a long L* is a sign that such a situation does not hold, since the contour then can be dissolved at the expense of spreading. This insight, which can be derived from the classic autosegmental association convention (see e.g. Goldsmith 1990:11ff.), can be stated as a top-ranked local conjunction, NOLONGT&NOCONTOUR (NLT&NOC).[29] Along with ASSOCIATE-H%; RT it must dominate MAXLINK-L*, since satisfaction of these two constraints must imply a violation of the latter when the input contains an L* pre-linked to the final syllable. This implies demotion of MAXLINK-L* from its top-rank position in (9) above. An example evaluation is given in Tableau 13.

Finally, toneless inputs can also be dealt with by the grammar, as already noted in section 6.4.2. Given the fact that *TONE is ranked below ASSOCIATE-L* and ASSOCIATE-H%; RT, these two will force insertion of L* and H%, while another, initial H will be inserted where appropriate in order to satisfy *HD$_{MAX}$/L, which is also ranked above *TONE. Tableau 14 shows the derivation of accent 1 in a monosyllabic input, while Tableau 15 shows how accent 2 emerges if the input is disyllabic with initial stress.[30]

In this section, I have shown that also when the Richness of the Base hypothesis is taken into consideration, the grammar generates the correct outputs, irrespective of the structure of the inputs. The only effect of testing the grammar against a wider array of input types, is the addition of one constraint, NOLONGT&NOCONTOUR, and the demotion of MAXLINK-L* from the top-ranked group.

	ˈσ σ σ σ σ] L*	ASSOCIATE-H%; RT	NLT & NOC	MAXLINK-L*	*HDMAX/L	*T
a) ☞	H L*H% ˈσ σ σ σ σ]			*		***
b)	H L*H% ˈσ σ σ σ σ]		*!			***
c)	L*H% ˈσ σ σ σ σ]			*	*!	**
d)	H L* ˈσ σ σ σ σ]	*!				**

Tableau 13. Derivation of input with pre-linked L* on final syllable.

ˈflɔm	ASSOCIATE-H%; RT	ASSOCIATE-L*AP	*HDMAX/L	*T
a) ☞ L*H% ˈσ]			*	**
b) HL*H% ˈσ]			*	***!
c) L* ˈσ]	*!			*
d) H% ˈσ]		*!		*
e) ˈσ]	*!	*		

Tableau 14. Derivation of toneless monosyllabic input.

If we go by the principle of Lexicon Optimization (Prince & Smolensky 2004:225), the input forms assumed in the analysis in section 6 can all the same be seen as more plausible than those we have entertained in the present section, with the possible exception of HL*H%, which represents the canonical accent 2 melody. One might at least argue that the optimal lexical forms should include the initial H in all accent 2 forms where morphological composition is not the source of the accent, such as in the plural forms given in Table 1. The analysis in section 6 strikes a balance between full lexicon optimization and freedom of input by offering an analysis where the structural relationship between the accents is highlighted.

'flɔm.mɾ	ASSOCIATE-H%; RT	ASSOCIATE-L*$_{AP}$	*HD$_{MAX}$/L	*T
a) ☞ H L*H% 'σ σ]				***
b) L*H% 'σ σ]			*!	**
c) H L*H% 'σ σ]			*!	***
d) H% 'σ σ]		*!		*
e) L* 'σ σ]	*!		*	*
f) σ σ]	*!	*		

Tableau 15. Derivation of toneless disyllabic input.

8. FINAL GRAMMAR AND RANKING RELATIONSHIPS

With the ranking established in the preceding section, the final grammar is given in (10).

(10) ASSOCIATE-H%; RT, ASSOCIATE-L*$_{AP}$, ASSOCIATE-L*$_{GRWd}$, SPECIFY-T$_{AP}$, OCP-T, NOLONGH, NOLONGT&NOCONTOUR >>
MAXLINK-L* >>
*HD$_{MAX}$/L >>
*TONE

The ranking relationships that can be established are shown in Figure 4.

The ranking between AssociateH%-Rt and NLT&NoC with respect to *MaxLink-L* is established by Tableau 13. The ranking of the two ASSOCIATE constraints above *TONE emerges from Tableau 2, and the ranking between *HD$_{MAX}$/L and *TONE emerges from Tableau 1. The ranking of *MAXLINK-L* and ASSOCIATE-L* above *HD$_{MAX}$/L is established by Tableaux 6 and 7, respectively

9. SOME PROBLEMS CAUSED BY MORPHOLOGICAL ALTERNATIONS

In section 6.5.2 we excluded accent 2 in definite (singular) forms by assuming that the definite suffix is a clitic. The implied expectation is that all INFLECTIONAL suffixes that add a syllable to a monosyllabic stem will trigger accent 2. There are, however,

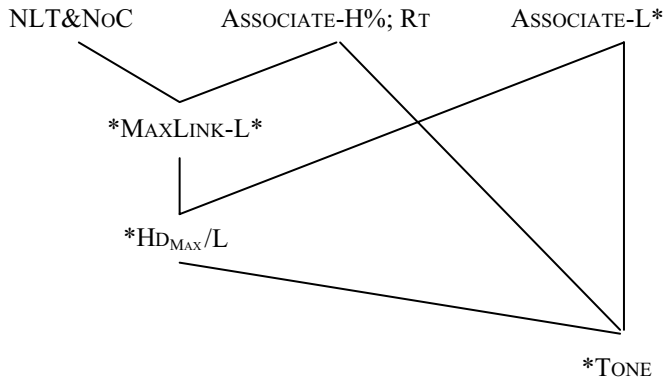


Figure 4. Constraint rankings.

	Inifinitive	Present tense	Preterit	Participle
Regular	[^{2}mɑ:.lə] *male* 'to paint'	[^{2}mɑ:.lɽ]	[^{2}mɑ:.ltə]	[^{1}mɑ:lt]
Irregular	[^{2}mɑ:.lə] *male* 'to purr'	[^{1}mɑ:.lɽ]	[^{1}mu:l]	[^{1}mɑ:lt]

Table 4. Accent in verb inflection.

some minor patterns where suffixation of undisputed morphological suffixes results in accent 1. Within the present approach, such cases are problematic to the extent that accent 2 emerges in at least one of the other forms belonging to the morphological paradigm defining the word, since pre-linking an L to the stem would result in accent 1 across the board. A similar problem is that we find examples of monosyllabic stems that trigger accent 1 when inserted as first member of a compound, again against expected accent 2.

These exceptions are also discussed in Lahiri et al. (2005) within the framework of Lexical Phonology (LP). They require different solutions within the present framework, since OT can only emulate traditional rule ordering by indirect means, and since the standard version of OT does not subscribe to what is often referred to as the serialism that lies at the heart of LP, i.e. the division of phonological grammars into different analytical strata, each with its potentially different sub-grammar.

9.1 Accent 1 induced by morphology

Most present-tense forms of irregular ablaut verbs show accent 1, against accent 2 in present-tense forms of most regular verbs. Two examples are given in Table 4. We see that in the present tense there is a difference with respect to accent that corresponds to a difference between ablaut versus suffix in the preterits.

Lahiri et al. (2005) account for accent 1 in irregular verbs by assuming that the underlying form of accent 1 inducing present-tense suffix is /-r/, while the unmarked

shape is /-er/. Adding /-r/ to a monosyllabic, consonant-final stem does not in itself create a syllable; the disyllabic form is created by epenthesis due to the marked coda structure created by the suffixation. While modelling the historical origin of the pattern, this solution presupposes that accent assignment takes place before the final round of syllabification triggered by the suffixation. This ordering, although perfectly feasible within the framework of Lexical Phonology, all the same lacks independent evidence, since on the surface, there is no segmental phonetic difference between the two suffixes. The only difference is the accent itself.

Since we are dealing with irregular verbs whose preterits are formed by ablaut, the present tense forms are members of patterns that are exceptional in other ways. I believe that a better solution would be to mark accent 1 preterits as exceptions in the lexicon by means of separate listings of the non-predictable forms. As part of irregular verb paradigms, they represent lexemes whose morphology must be subject to lexical specification anyway, and listing present-tense forms with linked L* is, therefore, not a great cost.[31]

Let us now turn to a similar class of exceptions in nouns, a subclass where plurals as well have accent 1, so that all inflected forms of the noun in fact receive accent 1. These nouns are also irregular in that they show umlaut alternation between singular and plural. Since the accent 1 plurals in this case belong to a class of nouns that is exceptional in other ways, the best solution here as well would simply be to mark them as exceptions in the lexicon. For example, the fact that the plural of *strand* 'beach' is *strender* with umlaut cannot be deduced by a general principle; it is instead a property of the lexeme. *Strender* must therefore be listed as a separate form in the lexicon, and there is no substantial additional cost involved in adding a pre-linked L to the stressed syllable.

This again differs from the solution opted for by Lahiri et al. (2005). They choose to encode both umlaut and (abstract) accent in the indefinite plural allomorph. Within the present framework, this is not possible, as it would entail a floating L as part of the suffix instead of pre-linked L on the stem. The fact that nouns such as *strand* show accent 1 across the board might, on the other hand, lead us to posit a pre-linked L* as part of the lexeme.

This solution runs into problems when compounds are taken into consideration, because the stem *strand*, for example, triggers accent 2 when occurring as first member of a compound, as e.g. *strandklær* 'beachwear'. If *strand* is supplied with a pre-linked L* in the lexicon, accent 2 in compounds would be underivable.

In fact, this lack of correspondence between behaviour in inflection and in compounding also goes the other way. Some monosyllabic stems consistently trigger accent 1 in compounds. One example is *brann* 'fire', where we find accent 1 in *brannkatastrofe* 'disaster caused by fire', as shown in Table 1, along with all other compounds with *brann* as first member. The plural of *brann* is *branner*, however, with accent 2.

Clearly, the analysis developed so far does not allow us to capture accent 1 in compounds with monosyllabic stem such as *brannkatastrofe*. The lexeme *brann* cannot be lexically pre-linked with L*, since that would block accent 2 in the plural. This is nevertheless the solution chosen by Lahiri et al. (2005), who assign such stems lexical accent 1. This solution is problematic in light of examples like *brann*, where plurals surface with accent 2. They are aware of this problem, but argue that 'the set of words marked with accent 1 that do have a plural with accent 2 is very small' (p. 89).

In my opinion, this begs the question. Even if it were a fact that many of these monosyllabic stems are neuters (or masculine mass nouns) that consequently do not have an overt plural marking in Norwegian, the pattern with accent 2 in plurals and accent 1 in compounds is consistent and predictable: any monosyllabic stem that induces accent 1 in compounds and that does take a syllabic plural ending, such as brann, have accent 2 plurals.[32]

More devastating for the analysis of Lahiri et al., however, is the fact that this pattern is NOT rare within the class of stems that take accent 1. In a database I have constructed, consisting of 986 compounds, each with a different monosyllabic initial member, there are 548 entries where the first member consistently induces either accent 1 or 2, and where the first member is a noun.[33] 219 of these, or 40%, consistently induce accent 1. The rest either induce accent 2 or exhibit variable accent. Of the 219 nouns which induce accent 1, 127, or 58%, have plurals with accent 2, while the rest lack overt plural marking. Such a proportion cannot be considered 'very small', and therefore cannot be disregarded in a comprehensive analysis of compound tone in East Norwegian.

In my opinion, we should, therefore, accept the basic idea behind the analysis of compound tone proposed in Kristoffersen (1992, 2000:263ff.). The analysis of tone in these works belongs to the privativity type, where accent 2 is analysed as the result of there being a floating H present either on lexemes or on suffixes that induce accent 2. Since monosyllabic words always surface with accent 1 on their own, accent-2-inducing behaviour in compounds cannot be accounted for by assuming an H as part of a unique lexical representation. The solution is, instead, to assume as part of the lexical entry a so-called compound stem with a floating H in addition to the unmarked stem for those lexemes which induce accent 2. The motivation for this solution was that such stems would be necessary anyway in order to account for the unpredictable presence of linking phonemes on some stems. Therefore, it would come at no great cost to include an additional class of compound stems where the stem contains an unpredictable H rather than an unpredictable segmental addition, *-e-* or *-s-* (see note 33 for examples).

Since accent 2 emerges as the marked member of the contrast, it is of course impossible to accommodate this proposal within the analysis developed in this paper. But the idea that marked accent 1 in compounds – which indeed represents the

minority pattern by the percentages presented above – is due to the presence of a special compound stem as part of the lexical entry can be retained. All that is needed in order to incorporate the idea into the present analysis is to assume separate compound stems with a pre-linked L* in lexemes such as *brann*, rather than stems with floating Hs, as in Kristoffersen (1992, 2000). Whenever *brann* makes up the initial member of a compound, the compound stem is activated instead of the 'main' entry as it were. In this way, the fact is formalized that accent in compounds with monosyllabic first member is NOT predictable from any other feature of the grammar such as inflection class.

9.2 Accent 2 in words derived from disyllabic, accent 1 stems

The converse problem arises in the class of disyllabic adjectives with syllabic sonorant as head of the second, unstressed syllable. Examples include [^{1}eː.dl̩] *edel* 'noble' and [^{1}svɑŋ.ŋʃ] *svanger* 'pregnant'. The addition of the agreement suffix /-e/, which may denote definiteness, plural, or both, results in [^{2}eː.dlə] and [^{2}svɑŋ.rə], respectively, with accent 2. Lahiri et al. (2005) account for these alternations by assuming the sonorant in the stem as non-syllabic in the underlying form. Accent assignment ordered before the final round of syllabification will result in accent 1 in the non-suffixed forms, in parallel with the analysis they offer for the difference in accent assignment in present tense between regular and irregular verbs discussed above.

A similar solution is problematic within OT, for reasons already explained. Special (and controversial) features of OT must be invoked, such as output–output correspondence (McCarthy 2002:175f.) with the non-syllabic sonorant in the indefinite forms as the regulating feature, or more controversially, a solution based on Sympathy (McCarthy 2000), where the monosyllabic candidate (with accent 1 due to its monosyllabic status, but with non-harmonic rhyme that will make it loose to candidates with more harmonious syllable structure) would be the sympathetic form. Alternatively, one might want to explore the possibilities connected with cyclic OT modelled on Lexical Phonology (see e.g. McCarthy (2002:170ff.) for discussion and references).

I limit myself to highlighting this problem, and noting that, although controversial, there seems to be ways to solve it. There are also other problems, which we cannot go into here. They can be inferred from Kristoffersen (2000:chapter 9), where the underlying assumption is that accent 2 is marked.

These problems aside, what emerges as a welcome result of the analysis proposed in this paper is that the marked accent is also the most grammatically restricted. It occurs with fewer morphological categories than accent 2 – even if we include definiteness in the morphology instead of syntax – and accent 1 often represents minor, exceptional patterns. This also holds with respect to unpredictable tone in

compounds, where accent 1 in compounds with a monosyllabic initial member is rarer than accent 2.

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NOTES

1. More detailed analyses of East Norwegian intonation can be found in Fretheim & Nilsen (1989), Nilsen (1989) and Kristoffersen (2000:chapter 10). The accent phrase is defined in the next section.
2. The phenomena in question are the so-called level stress found in dialects where light, stressed syllables have been preserved from Old Scandinavian, and shift of primary stress from initial to final compound member in some Norwegian and Swedish dialects. Both take place only in accent 2 domains, and can be argued to result from displacement of the second tone of the accent 2 melody, more specifically, the L* in East Norwegian. See Kristoffersen (1990, 1991), Riad (1992:chapter 4) and Bye (1996) for accounts of level stress. Stress movement in compounds is poorly documented in recent theoretically-informed literature, but a recent discussion is found in Abrahamsen (1998).
3. See e.g. Gussenhoven (2004:chapter 12).
4. Lists of minimal pairs in Norwegian can be found in Jensen (1958) and Leira (1998). A list of Swedish minimal pairs is published in Elert (1981:59ff.).
5. The superscripted numbers denote primary stress and accent type.
6. Gussenhoven (2004:220) takes issue with the AP-analysis outlined here because no independent evidence for it functioning as a prosodic constituent is presented in the sources where it is introduced (Fretheim & Nilsen 1991, Kristoffersen 2000). A thorough discussion of this question lies outside the scope of the present paper.
7. The contours represent the average over two realizations of each word as spoken by a female speaker (born 1982) from Oslo in the carrier sentence *Jeg sa* ___ *nå* 'I said ___ now'.
8. A short precursor of this analysis can be found in Haugen (1963:160).
9. All citations are from p. 188. Emphasis is Haugen's.

10. It must be emphasized that any distribution is only predictable in a statistical sense, very few, if any, exception-free rules can be stated.
11. One example is [ɑ.pu.^{2}kuː.pə] *apokope* 'apocope'. Incidentally, this word may also have stress on the antepenult. Since stress is no longer penultimate, the result is accent 1, [ɑ.^{1}puː.ku.pə].
12. In what follows, I assume readers' familiarity with the basic architecture of OT.
13. As will be finally shown in section 7 below, the input tones will turn out to be predictable, and therefore not a NECESSARY part of the input.
14. In Kristoffersen (forthcomming b) it is argued that the evidence for there being an initial, phonological L in the accent 2 melody in Bergen is rather weak. This does not vitiate the argument; however, the timing of the H still seems to be governed by the post-stress syllable and not by the stressed one.
15. A reviewer asks whether the distinction between mora and syllable as TBU, given the fundamental distinction between the two in stress systems, implies an equally fundamental distinction in analysis of tone. I take the implication of the question to be that if this is in fact the case, overcoming the privativity/timing distinction may come at a price, viz. an equally 'undesirable' division between 'mora dialects' and 'syllable dialects'. Or, put differently: Is unity of input melody across dialects more desirable than unity of TBU? I have no ready answer to this, but would like to point out that within the present context there is no trade-off between the two. Oppdal, as analysed in Kristoffersen (forthcoming a), clearly requires a moraic analysis. A moraic analysis might be feasible for UEN, but I see no obvious analytical gains in such a move and, more importantly, a moraic or syllabic analysis will not decide the question whether privativity is basic or derived in UEN.
16. A reviewer asks how these constraints would fare with respect to dialects where T* = H, and where accent 2 implies the counterintuitive displacement of this H from the stressed syllable to the next, cf. the discussion of the Bergen dialect in section 6.3 above. Although the analysis remains to be worked out, the dominating constraint here might be one that requires delayed realization of H*. This appears to be a common and phonetically well motivated process universally, see e.g. Yip (2002:8ff.) and Gussenhoven (2004:72), and would cause the H* to be realized on the post-stress syllable if it dominates *NON-HD/H. Marked accent 1 could then be accounted for in the same way as in UEN, by pre-linking of H* to the head, combined with a top-ranked faithfulness constraint that prohibits delinking.
17. For clarity, I insert a transcription of the relevant example from Table 1 in the input cell, with the syllabic heads highlighted in bold.
18. Thanks to Bruce Morén for pointing this out to me.
19. Association constraints are closely related to alignment constraints in that they synchronize elements belonging to different structural levels. I follow Gussenhoven (2004:150) in distinguishing between alignment and association. Alignment of a tone with a certain constituent does not imply association, since floating tones may, in principle, be subject to alignment. Alignment is therefore not sufficient for enforcing association.
20. ASSOCIATE-T must not be confounded with the *ASSOCIATE and *DISASSOCIATE of Yip (2002: 83). These are faithfulness constraints that regulate insertion and deletion of association lines, and are therefore part of the DEP and MAX families respectively.
21. Note that I assume, contra Gussenhoven and others, that boundary tones associate to TBUs, and not to boundaries in the phonology (Gussenhoven 2004:124). The decisive argument

motivating this move comes from the East Norwegian dialect of Oppdal (Kristoffersen forthcoming a) and will have to stand as a postulate in this paper.

22. For this reason the candidate with a toneless stressed syllable and L*H% linked to the unstressed syllable is left out. As soon as we introduce SPECIFY-T into the analysis as top-ranked in the following section, this candidate is dealt with. SPECIFY-T requires all TBUs to be associated with a tone.
23. Recall that H% must be aligned with the right edge of the accent phrase, so that any tone inserted after H% will lead to a fatal violation of ASSOCIATE-H%; RT.
24. A reviewer asks if the implied constraint NOLONGL is universally ranked with respect to NOLONGH. There is of course no way this question can be answered empirically based on a single variety such as UEN, but I can see no theoretical reason why this should be so.
25. For space-saving reasons, candidates that violate ASSOCIATE-H%; RT and ASSOCIATE L* have been omitted from the evaluation.
26. Here and in the tableaux that follow, I merge into one column the top-ranked constraints that are not relevant with respect to the evaluation of the candidates included in the given tableau.
27. Accent 1 in def.sg. only emerges when the stem is monosyllabic. A disyllabic stem such as [^{2}brɑn.nə] *brande* 'giant', with unmarked accent 2, will retain the accent in def.sg. forms. Note also that the accent 1 effect only emerges when there is no overt plural marking. As soon as plurality is marked along we definiteness, the surface form has accent 2. A potential problem for the analysis is that in definite plurals, the two categories are fused into one ending in UEN, so that it is not possible to identify an inflectional plural morph followed by a definite clitic morph in the surface structure. Since the presence of plural triggers accent 2, the obvious solution is to assume that plural as an inflectional category incorporates the definite so that the result counts as an inflectional ending.
28. In post-focal, utterance-final APs, where the final H% is absent, it will be eliminated by its adjacency with the utterance-final boundary L not included in the present analysis.
29. On local conjunctions, see e.g. (McCarthy 2002:18).
30. For space-saving reasons, only the two association constraints from the top-ranked group in (9) have been included in the tableaux.
31. A reviewer reminds me that there are also some regular verbs that have accent 1 present tense. Against the overwhelming majority with accent 2, this clearly represents another irregularity, which should be dealt with in the same way as the ablaut verbs, i.e. with the irregular present-tense form stated in the lexicon with a pre-linked L*.
32. The only exception I am aware of is *stang* 'pole', which belongs to the exceptional umlaut class along with *strand* discussed above.
33. Compounds with so-called 'linking phonemes' between the two members, either *-e-* or *-s-* (Kristoffersen 2000:265) such as *fisk-e-suppe* 'fish soup' and *dåp-s-handling* 'act of baptizing' are not included in the 548 entries considered.

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