North Germanic Tonal Accent is Equipollent and Metrical: Evidence from Compounding

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1 Introduction

This paper aims to contribute to two ongoing debates in phonological theory. On one hand, it discusses the long-standing question of how so-called 'tonal accent' in North Germanic should be represented phonologically. With the empirical focus being the influence of compounding on accent assignment, our analysis furthermore addresses issues surrounding the phonology of compounds in general, and prosodic effects of compounding in particular.

North Germanic varieties with tonal accent show a pitch-based contrast between two accents that is restricted to stressed syllables. Descriptively, the opposition is commonly referred to as *Accent 1* vs. *Accent 2*. The phenomenon occurs in many varieties of Norwegian and Swedish, as well as in some varieties of Danish. Some examples from Central Swedish (CS) and Urban East Norwegian (UEN), which we will focus on in this paper for purposes of illustration, can be found in figure 1 (solid lines represent idealized realizations of Accent 1, dashed lines represent Accent 2).

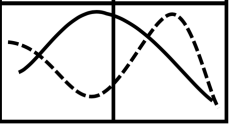
Syllables	σ	σ
UEN [1]tank-en 'the tank' (solid) [2]tanke-n 'the thought' (dashed)		
CS [1]and-en 'the duck' (solid) [2]ande-n 'the spirit' (dashed)		

Figure 1: Tonal Accent in Urban East Norwegian and Central Swedish

There is a long research tradition on the accents, and their distribution as well as emerging descriptive generalizations have been solidly established, certainly for the most intensively studied varieties. Starting with the seminal work by Bruce (1977), the accents have also received considerable attention in literature that aims to formalize the contrast; in spite of these intensive efforts, however, there still is considerable disagreement between scholars regarding central questions, including the fundamental issue of how to represent the opposition phonologically.

The mainstream view regarding the phonology of tonal accent in North Germanic (and related languages) is that at least one of the accents carries a lexical tone, but within this framework all logical representational possibilities have been proposed. On one hand, there are so-called privative approaches, where it has been claimed that Accent 2 has a lexical tone and that Accent 1 is unmarked (e.g. Riad 2013), but also that Accent 1 has a lexical tone and Accent 2 is unmarked (e.g. Lahiri et al. 2005). Furthermore, it has also been claimed that the opposition is equipollent, a term that is used in studies on tonal accent to indicate that not only

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Accent 1, but also Accent 2 has the potential for being lexically specified (e.g. Bruce 1977).[1] A more recent analytical approach to tonal accent revolves around the claim that the tonal surface contrasts reflect different types of metrical structures of the accents. For North Germanic, Morén-Duolljá (2013) argues that Accent 1 is a monosyllabic foot, and Accent 2 is a recursive disyllabic foot. In this approach tonal opposition emerges from different associations of the same intonational tones to these two types of feet.

Based on evidence from compound accent, arguably one of the most intricate accent-related analytical challenges in North Germanic (see §2 for data and generalizations), we show that both Accent 1 and Accent 2 can be phonologically active. This in turn, we argue, implies that the opposition between Accent 1 and Accent 2 must be equipollent, not privative. In the context of tonal accent, we argue that equipollence follows naturally from the assumption that the opposition is foot-based. After all, it is a widely established generalization that in languages with word stress, each lexical item must receive a stress (obligatoriness, e.g. Hyman 2009 for discussion), and this is certainly the case for North Germanic (ignoring post-lexical phenomena like destressing). In a foot-based approach to metrical representations, this implies that each lexical item will receive a foot. If, then, North Germanic tone-accent varieties can have two types of feet, each of these feet is necessarily a phonological object, so there is no principled reason to exclude the possibility that both foot types can be lexically stored, unless stipulated otherwise. Within Optimality Theory, this corresponds to the principle of Richness of the Base.

Elaborating on insights by Morén-Duolljá (2013), who does not analyze compound accentuation, our approach assumes a foot-based difference between Accent 1 and Accent 2; however, unlike Morén-Duolljá, we do not rely on recursive foot structure but instead assume, following Kager's (1993) foot typology, that feet in North Germanic can be built directly on moras (moraic trochee = Accent 1) or syllables (syllabic trochee = Accent 2). Our foot-based analysis is in line with recent work on tonal accent that calls into question the claim that all tonal contrasts within syllables must be due to the presence of lexical tone (as assumed in 'mainstream' prosodic typology; e.g. Hyman 2009). In doing so, our approach continues recent metrical work on, e.g., tonal accent in North Germanic (Morén-Duolljá 2013, Iosad 2016a,b), Franconian (e.g. Köhnlein 2011, 2016, Hermans 2012, Kehrein 2017), or Scottish Gaelic (Iosad 2015, Morrison 2019).

Due to reasons of space, we will not be able to discuss in this paper how we derive the tonal differences between Accent 1 and Accent 2, which we have to relegate to future work. Roughly, similar to other metrical work on tonal accent cited above, we assume that the underlying (intonational) melodies are identical for both accents but that the association of these purely post-lexical tones differs depending on whether an item is parsed with a moraic trochee (Accent 1) or with a syllabic trochee (Accent 2). Furthermore, tonal accent also shows its effects in processes like affixation or loanword accentuation. While we touch on some basic aspects in our overview of relevant data, our analysis focuses on compounding (as suggested by the title of our paper).

The paper is structured as follows: §2 provides an overview of relevant empirical data and generalizations. In §3, we discuss our basic representational assumptions and demonstrate how our analysis derives tonal accent assignment in compounds. §4 briefly compares our analysis to previous approaches and concludes the paper.

2 Data and Generalizations

2.1 *Tonal accent contrast and distribution* As explained in §1, *Accent 1* and *Accent 2* are cover terms for pitch contrasts which are realized differently across Scandinavian dialects, and in the present paper, we consider Central Swedish and Urban East Norwegian. Both accents are realized over syllables with primary stress, but they differ in their distribution: Unlike Accent 1, Accent 2 cannot occur on words with final stress, including monosyllabic words. Both accents can occur on a non-final syllable with primary stress. Examples from Urban East Norwegian are illustrated in (1). Note that we follow the Scandinavian linguistics tradition of using superscripts 1 and 2 to indicate the location of primary stress simultaneously with marking the choice between Accent 1 and Accent 2.

[1] This usage of the term equipollence somewhat differs from how it is used in feature theory, where equipollence typically refers to features being specified with two values, such as 'plus' and 'minus'.

(1) **Distribution**

	Monosyllabic words	Final stress	Non-final stress	
Accent 1	*[1]tank* 'tank'	*stu[1]dent* 'student'	*[1]vinter* 'winter',	*lo[1]kale* 'venue'
Accent 2	N.A.	N.A.	*[2]sommer* 'summer',	*an[2]tenne* 'antenna'

Most minimal pairs involve cases in which one or both members of the pair are inflected forms, such as the ones illustrated in (2).

(2) **Surface contrast**
- (a) Central Swedish *[1]and-en* 'the duck' *[2]ande-n* 'the spirit'
- (b) Urban East Norwegian *[1]tank-en* 'the tank' *[2]tanke-n* 'the thought'

Snider (2014) points out the importance of distinguishing between surface tonal contrast and underlying tonal contrast: "Anytime there is more than one morpheme present in the morphology of a word, the possibility exists that the surface pitch is derived" (2014, p. 729). In Central Swedish and Urban East Norwegian, there are very few minimal pairs that differ in tonal accent in with both members of the pair are *roots*. Examples are provided in (3).[2] Note that the Accent 1 member of the Norwegian pair seem to have fallen out of use and is replaced with the word *[1]skulder* 'shoulder'.

(3) **Contrast in roots** (limited)
- (a) Central Swedish *[1]regel* 'rule' *[2]regel* 'latch'
- (b) Urban East Norwegian *[1]aksel* 'shoulder' (obsolete) *[2]aksel* 'axle'

Instead, numerous minimal pairs result from various interactions between tonal accent and morphology. For example, while the neuter definite suffix *-et* [ə] does not affect the tonal accent of a noun, the segmentally homophonous infinitive suffix *-e* [ə] induces Accent 2 on monosyllabic roots, resulting in pairs of the type illustrated in (4) (the examples are from Urban East Norwegian).

(4) **Interactions between tonal accent and morphology** (UEN)

(a)	*[1]hopp-et*	'the jump'	*[2]hopp-e*	'to jump'
(b)	*[1]vann-et*	'the water'	*[2]vann-e*	'to water'
(c)	*[1]mål-et*	'the goal'	*[2]mål-e*	'to measure'

The next section gives an overview of the type of interaction between tonal accent and morphology that we focus on in the present study, namely the one found in compounds.

2.2 *Tonal accent in compounds* One of the parameters of variation in the Scandinavian dialect continuum comes from the distribution of tonal accent in compounds. In both Central Swedish and Urban East Norwegian, only the initial member of compounds has tonal accent; the accent is realized on the syllable with primary stress on the initial member, while any subsequent members lack tonal accent. Consider the examples in (5).

(5) **Tonal accent in compounds**
- (a) Central Swedish
  - *[1]båt* 'boat' + *ka[1]pell* 'cover' → *[2]båt-kapell* 'boat cover'
  - *[2]sommar* 'summer' + *[1]dag* 'day' → *[2]sommar-dag* 'summer day'
- (b) Urban East Norwegian
  - *[1]ball* 'prom' + *[1]sal* 'hall' → *[1]ball-sal* 'ballroom' (for large social dance)
  - *[1]ball* 'ball' + *[1]sal* 'hall' → *[2]ball-sal* 'ballroom' (for round objects)

In Central Swedish, "the accent of regular compounds is invariably accent 2" (Riad 2013: 127). The situation in Urban East Norwegian is more complicated. Compounds can receive either Accent 1 or Accent 2, and this appears to be a property of the initial member: For example, the items from the homophone pair *[1]ball* 'prom'

[2] Some scholars have argued that even these minimal pairs can be derived from independent segmental processes, such as vowel epenthesis (e.g. Lahiri et al. 2005, Morén-Duolljá 2013).

and *[1]ball* 'ball'[3] behave differently when they occur as the initial member of a compound. Compounds with 'prom' receive Accent 1 (*[1]ball-*), compounds with 'ball' receive Accent 2 (*[2]ball-*). When two homophones behave differently in compounds such as these two, minimal pairs such as the ones in (5b) above occur.

Recall from (1) above that all monosyllabic words have Accent 1. The existence of compounds in which the initial member is monosyllabic yet has Accent 2 (*[2]ball-sal*) would suggest that words of the type *[1]ball* 'ball' underlyingly have Accent 2, but that Accent 2 only gets to surface if there is an extra syllable available, such as when 'ball' occurs in a compound (*[2]ball-sal*). However, the mere presence of an extra syllable does not seem to be enough; for example, the definite form of 'ball' is *[1]ball-en*, with Accent 1. These facts illustrate that there is something special about the structure of compounds, and we will get back to this in §3.

A further complication is the distribution of *linking elements* in compounds. Linking elements are empty morphs (they do not contribute any meaning) that are used between the members of certain compounds, as illustrated with the compounds beginning with *fred* 'peace' provided in (6).

(6) **The linking element *-s*** (UEN)
- (a) *[1]fred-s-pris* 'peace prize'
- (b) *[1]fred-s-år* 'peace year'
- (c) *[1]fred-s-due* 'peace dove'
- (d) *[1]fred-s-arbeid* 'peace work'

Like in other Germanic languages–e.g. Dutch (Krott et al. 2001) and German (Krott et al. 2007)–the distribution of linking elements across compounds cannot be stated with any simple rules. The presence of a linking element in a compound is to a certain extent a property of the initial member, such that some words co-occur with a linking element in this particular context, while others do not. Consider the examples in (7)–(8).

(7) *[1]stat-s-mann* 'statesman'
[1]stat-s-kasse 'treasury'

(8) *[1]post-mann* 'mailman'
[1]post-kasse 'mailbox'

Compounds with *stat-* 'state' as their first member have *-s*, while compounds with *post-* 'mail' as their first member do not, and this applies regardless of what the second member is. The presence or absence of *-s* is not fully predictable from what the initial member is, though. Some words show variability, such that they co-occur with a linking element in some compounds, but not in others. Examples are illustrated in (9) and (10).

(9) *[1]liv-vakt* 'body guard (lit. life-guard)'
[1]liv-s-tid 'life time'

(10) *[2]land-bruk* 'agriculture (lit. land-use)'
[1]land-s-mann 'compatriot (lit. land-man)'

What is relevant for the present purposes, is that the Norwegian linking element *-s* affects compound accent. The examples in (9)–(10) show that when the linking element is absent, *[1]liv-* has Accent 1 in compounds, and *[2]land-* has Accent 2. When the linking element is present, both of these lexical items receive Accent 1: *[1]liv-s-*, *[1]land-s-*. Hence *-s* induces Accent 1 on the initial member. This is the majority pattern that is found with most compounds in which there is a linking element *-s*.[4] More examples are provided in (11).

(11) **Linking *-s* induces Accent 1**
- (a) *[2]dag-bok* 'diary (lit. day-book)'
  [1]dag-s-lys 'daylight'
- (b) *[2]skog-brann* 'forest fire'
  [1]skog-s-troll 'forest troll'

However, there are three counter-examples to the generalization that *-s* induces Accent 1, namely compounds in which the first member is *kveld* 'evening', *ovn* 'oven', or *loft* 'attic'. In these cases, there is a linking element *-s*, but the compounds have Accent 2. Examples are provided in (12).

[3] These are two different lexical items, as evidenced e.g. from the fact that they have different definite suffixes: Compare *[1]ball-et* 'the prom' and *[1]ball-en* 'the ball'.

[4] Note that the linking element only affects compound accent if it follows the syllable with primary stress. It does not affect compound accent if the initial member has non-final stress: *[2]arbeid* 'work' – *[2]arbeid-s-narkoman* 'workaholic'.

(12) **Counterexamples: Linking *-s* and Accent 2**

(a) *[2]kveld-s-mat* ‘supper’ (lit. evening-food)
(b) *[2]ovn-s-krok* ‘corner by the oven’
(c) *[2]loft-s-bod* ‘attic storeroom’

Note that these compounds do not seem to be of the variable kind with respect to the linking element: Compounds in *kveld-*, *ovn-*, or *loft-* without the linking *-s* are marginal. The authors know of one example, namely *[2]kveld-fiol* (plant sp.).

These examples demonstrate that the accent opposition cannot be privative. Our reasoning is as follows: If one takes a privative approach, one could describe pairs such as *[1]ball-sal* and *[2]ball-sal* by analyzing one of the lexical items *ball* ‘ball’ and *ball* ‘prom’ as being lexically specified for accent, while the other gets a default accent. However, one cannot determine which accent is default just by looking at this pair. When comparing *[2]land-bruk* and *[1]land-s-mann*, one could argue that Accent 1 needs to be the lexically specified member in the contrast, because the linking element *-s* comes with Accent 1. Accent 2 would then be the default accent, assigned to compounds unless the initial member is specified for Accent 1 or there is a linking *-s* present.

A problem with such an analysis is that it would inaccurately predict Accent 1 also in compounds involving *[2]kveld-s-*, *[2]loft-s-* and *[2]ovn-s-*. Compounds of this type cannot simply be discarded as exceptional, since the patterns are productive: These three nouns always receive Accent 2 in compounds, exemplified with *[2]kveld-s-* in (13).

(13) ***Kveld-s-* with Accent 2 is productive**

(a) *[2]kveld-s-sol* ‘evening sun’
(b) *[2]kveld-s-vakt* ‘evening shift’
(c) *[2]kveld-s-forestilling* ‘evening show’
(d) *[2]kveld-s-himmel* ‘evening sky’
(e) *[2]kveld-s-bønn* ‘evening prayer’

This means that Accent 2 also needs to have the potential to be lexically specified. We can schematize the logically possible combinations of compound accent and linking element patterns as shown in (14), which also indicates attested patterns.

(14) **Logically possible compound accent patterns**

	Without linking element:	With linking element:	Attested?
(a)	Accent 2 (*[2]dag-bok*)	Accent 1 (*[1]dag-s-lys*)	✓
(b)	Accent 1 (*[1]liv-vakt*)	Accent 1 (*[1]liv-s-tid*)	✓
(c)	Accent 2 (*[2]kveld-fiol*)	Accent 2 (*[2]kveld-s-mat*)	✓
(d)	Accent 1	Accent 2	–

Based on these patterns, we propose the following three possibilities for Accent specification: Being unspecified for Accent, as in (15a), being underlyingly Accent 1, as in (15b), and being underlyingly Accent 2, as in (15c). Monosyllabic words always receive Accent 1, compounds receive Accent 2 by default, and the linking element *-s* induces Accent 1.[5]

(15) **Accent specification**

(a)	/land/	*[1]land*	*[2]land-bruk*	*[1]land-s-mann*
(b)	/[1]liv/	*[1]liv*	*[1]liv-vakt*	*[1]liv-s-tid*
(c)	/[2]kveld/	*[1]kveld*	*[2]kveld-fiol*	*[2]kveld-s-mat*

Note that words that are unspecified for accent and receives the default compound Accent 2 can only be distinguished from words that are specified with Accent 2 in cases of conflict with the linking element *-s*. So for example, the word *ball* ‘ball’ (as in *[2]ball-sal*) never occurs with a linking element, and thus it is undetermined if it is underlyingly /ball/ (with default Accent 2 in compounds) or /[2]ball/.

[5] As mentioned above, compounds with *kveld-*, *ovn-* and *loft-* without the linking element (exemplified here with *[2]kveld-fiol*) constitute a marginal pattern. What is important for the present purposes is that to the extent that such compounds are possible, our analysis predicts Accent 2, not Accent 1.

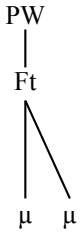
To summarize, tonal accent patterns in compounding illustrate that the accent opposition cannot be *privative*, since both Accent 1 and Accent 2 has the potential to be lexically specified. This means that the contrast is *equipollent*.

3 Metrical Analysis

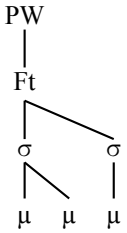
The compound data introduced in §2 present a set of intricate challenges for any analysis of tonal accent. Previous literature is in agreement that there is some kind of phonological pressure to assign Accent 2 to compounds. As discussed in §2, this generalization is exceptionless in Central Swedish but can be overridden in Urban East Norwegian, where some compounds receive Accent 1. In this section, we first cover some basic representational aspects and then address accentuation in simplex words with final stress (such as monosyllables) since this is relevant for understanding principles of compound accentuation. We then move on to compound accentuation in Central Swedish and Urban East Norwegian. As we indicated in §1, space constraints prevent us from formalizing the tonal realizations of the accents; in line with other metrical work on tonal accent, we derive the tonal contrasts from the association of post-lexical, intonational tones.

Beginning with our representational tenets, we assume that North Germanic stress systems are trochaic (in line with a wealth of previous literature, such as Kristoffersen 2000 or Riad 2013). In addition, building on central insights from Morén-Duolljá (2013), we claim that the varieties in question distinguish two types of trochaic feet. We claim that these are, on one hand, moraic trochees, which correspond to Accent 1, and, on the other hand, syllabic trochees, which correspond to Accent 2. To represent these two types of feet, we follow Kager's (1993) proposal that moraic trochees are built directly on moras, while syllabic trochees are built on syllables. Consider our representations in (16)–(17). (16) shows a binary moraic trochee built on moras; since stressed syllables in Central Swedish and Urban East Norwegian are always heavy (Kristoffersen 2000, Riad 2013), this implies that moraic trochees will always be realized in one heavy syllable. Syllables themselves are realized in a 'third dimension'; that is, they still exist but are skipped by foot construction. Moraic footing is thus a case of skipping a layer in the prosodic hierarchy, which is a violation of the Strict Layering Hypothesis (Selkirk 1984); see, e.g., Kager (1993) for theoretical and empirical justifications of moraic feet, as well as Itô & Mester (1992/2003) for the discussion of other types of evidence indicating that the the Strict Layering Hypothesis is violable.

(16) **Accent 1 (moraic trochee)**



(17) **Accent 2 (syllabic trochee)**



With regard to simplex words, the arguably most basic generalization that needs to be captured is the fact that words with final stress, such as monosyllabic items, cannot receive Accent 2 but always surface with Accent 1. This, we argue, follows straightforwardly from our foot-based approach; all that is required is to refer to the principle of binarity: Accent 1 in final stressed syllables is permitted since two moras are sufficient to build a binary moraic trochee (recall that Central Swedish and Urban East Norwegian stressed syllables are always heavy). Conversely, a syllabic trochee requires a sequence of two syllables to be binary, and a word-final stressed syllable thus lacks the necessary dependent syllable for a binary syllabic foot. Notably, as far as we can see, only a foot-based approach, where binarity requirements are central, has the potential to offer a principled representational analysis of this restriction, while it has to be stipulated in approaches based on lexical tone or the use of diacritic accent markers (see §4 for some further discussion).

Implementing these patterns into Optimality Theory, what we need is a simple constraint requiring binarity. For now, we refer to it as FtBin (18) but note that this constraint will be slightly modified below in light of the Norwegian compounding data.

(18) FtBin (to be modified): Assign one violation mark for every foot that is not binary.

FtBin needs to outrank a constraint preserving foot heads; that way a syllabic foot, which would lead to Accent 2, cannot surface on a word with final stress. We define the relevant constraint, Hd-Match (Ft), in (19) (e.g. McCarthy 1995, Köhnlein 2016, Morrison 2019). Hd-Match (Ft) is violated when a foot head (on a mora or a syllable, respectively) is not realized, but it does not evaluate the dependents of any underlying foot; binarity is regulated by constraints such as FtBin.

(19) Hd-Match (Ft): Assign one violation mark for every foot head at some level in the underlying representation that is not a foot head at the same level in the surface representation.

In OT tableaux, we provide underlying trochaic foot templates in the input as foot nodes that are linked to moras (Ft—μ = moraic trochee) or syllables (Ft—σ= syllabic trochee). In surface representations, footing is indicated with round brackets, followed by a subscript indicating whether the foot is moraic or syllabic; the number of moras or syllables in the subscript indicates whether the foot is unary (one mora/syllable) or binary (two moras/syllables). For the purposes of this paper, we represent underlying feet as being stored together with the respective segmental information in one lexical entry and assume that they are associated during computation.[6]

Based on the Urban East Norwegian item *kveld*, we now illustrate in (20) how the ranking FtBin » Hd-Match (Ft) eliminates underlying Accent 2, i.e., syllabic trochees, on words with final stress. In (20), Candidate (20a) wins since its binary moraic foot (indicated with two mora subscripts, leading to Accent 1) satisfies highly ranked FtBin, even if that means that the underlying syllabic trochee cannot be realized on the surface. The losing candidate (20b), on the other hand, preserves the syllabic head on the surface, which is indicated with a one-syllable subscript. While this satisfies Head-Match-Ft, it fatally violates high-ranked FtBin since the foot lacks a second syllable as a dependent.

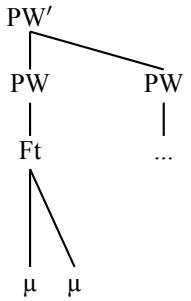
(20)

kveld, Ft—σ	FtBin	Hd-Match (Ft)
a. ☞ $(\text{kveld})_{\mu\mu}$		*!
b. $(\text{kveld})_{\sigma}$	*!	

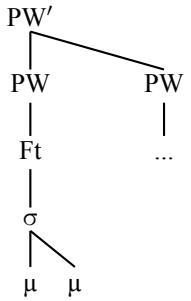
Moving on to compounding, we use the Central Swedish data as a point of departure; as all compounds in Swedish receive Accent 2, it can serve as a basis for the analysis of Urban East Norwegian, where accent specifications introduced by certain types of initial members or linking elements can affect accentuation. We represent compounding as the formation of a recursive prosodic word (e.g. Itô & Mester 2009); however, this choice is not of immediate relevance for our analysis, and we believe that alternative ways to represent this layer of the prosodic hierarchy are also compatible with our analysis (e.g. Vogel 2009). The representational structure of compounds with Accent 1 and Accent 2 are shown in (21) and (22), respectively. Since the metrical structure of second members does not affect accentuation, we will not make specific claims about their metrical structure here but disregard them in our representations. In OT tableaux, we will likewise disregard the metrical structure of second members but focus solely on the structure of the initial member, which determines compound accentuation.

[6] At least with regard to the lexical items discussed here, it does not make an empirical difference whether the foot is underlyingly linked to segmental structure, or not. Our tableaux also do not explicitly model the default assignment of foot structure but rather assume it, since this is not the focus of our analysis. This could be explicitly modeled with a high-ranked constraint requiring that each item will be footed, such as GrWd=PRWD (Kager 1999), plus a set of Dep constraints that create relevant phonological objects (syllables, feet, etc.) and the links between them and segmental structure.

(21) **Compound Accent 1**



(22) **Compound Accent 2**



To formalize obligatory Accent 2 in Central Swedish compounds, we propose that compounds in the language have to respect the principle of Exhaustivity (Selkirk 1996); specifically, in the case at hand, feet built directly on moras, i.e., moraic trochees, are dispreferred since foot construction skips the syllable level. The corresponding constraint Exh-Ft (PW′) is defined in (23):

(23) Exh-Ft (PW′): Assign one violation mark for every foot in a recursive prosodic word (compound) that skips a layer in the prosodic hierarchy (= no moraic trochees in compounds).

Essentially, Exh-Ft (PW′) enforces a templatic restriction imposed by compounding, which is comparable to other compound-specific phonological properties attested across languages. While Vogel (2009) provides a general overview of relevant patterns, we note two cases of related phenomena found in different varieties of closely related Danish: Both Itô & Mester (2015) and Iosad (2016a) observe metrical restrictions on prosodic words upon compounding that influence the realization of so-called 'stød'; stød is a glottalic accent that is etymologically related to tonal accent and shares many of its distributional properties. Itô & Mester discuss in what way the length of individual members of compounds influences the distribution of stød in Standard Danish compounds and show that different compounding templates can successfully capture the patterns. Iosad analyzes so-called short-vowel stød in certain dialects of Danish. He notes that certain types of words always surface with stød in the second member of compounds, which leads him to propose that "compounding involves the imposition of a particular prosodic template" (Iosad 2016a, 251). While the templatic restrictions in question are not identical to what we propose for Central Swedish and Urban East Norwegian, they demonstrate how the metrical structure of individual prosodic words can be affected by compound formation.

Returning to our formalization, the additional constraint Exh (PW′) suffices to capture the Swedish facts: Ranking Exh (PW′) above FtBin correctly derives Accent 2 in all compounds. This is shown in the following two tableaux. First we demonstrate in (24) for the compound *[2]båt-kapell* 'boat cover' how our constraints derive compound Accent 2 in items where the first member is unspecified for foot structure. In this tableau, Candidate (24a) with a unary syllabic trochee (= Accent 2) wins since it satisfies high-ranked Exh-Ft (PW′), which outranks FtBin; Candidate (24b) with a moraic trochee is out since it violates Exh-Ft (PW′), even though it satisfies lower-ranked FtBin.

(24)

båt + kapell	Exh-Ft (PW′)	FtBin	*Head-Match (Ft)
a. ☞ [(båt)$_{\sigma}$-kapell]$_{PW'}$		*	
b. [(båt)$_{\mu\mu}$-kapell]$_{PW'}$	*!		

This ranking also selects the correct candidate for inputs with underlying moraic trochees (which would lead to Accent 1 if they were to surface). This is demonstrated in (25), based on a hypothetical input of two monosyllabic prosodic words (*pip* and *pap*) with an underlying moraic trochee stored with the initial member *pip*. Again, Candidate (25a) with a monosyllabic syllabic trochee (= Accent 2) is the winner since it satisfies Exh (PW′), even though it violates both FtBin and Hd-Match (Ft); Candidate (25b) satisfies these two lower-ranked constraints but fatally violates Exh (PW′) since its binary moraic trochee skips a layer in the prosodic hierarchy.

(25)

pip, Ft—μ + pap	Exh-Ft (PW′)	FtBin	*Head-Match (Ft)
a. ☞ $[(\text{pip})_{\sigma}\text{-pap}]_{\text{PW}'}$		*	*
b. $[(\text{pip})_{\mu\mu}\text{-pap}]_{\text{PW}'}$	*!		

This analysis is sufficient to model the Central Swedish compounding facts in question; the Urban East Norwegian situation, however, is somewhat more complicated. It is widely accepted that, similar to Swedish, Urban East Norwegian has a tendency to assign compounds Accent 2; yet this preference can be overridden by lexical properties of certain initial members that trigger Accent 1 in compounds. As we have shown in §2, Accent 1 in compounds can be triggered by certain lexical items such as *liv* 'life' (as in *[1]liv-vakt* 'body guard') but is also a property of the linking element *-s* (as in *[1]land-s-mann* 'compatriot' vs. *[2]land-bruk* 'agriculture'). Another complication arises when the Accent 1 inducing linking element *-s* is combined with certain lexical morphemes that override Accent 1 associated with the linking element, thus leading to Accent 2 in compounds. To capture these multi-layered patterns of dominance, the analysis must be slightly modified.

First of all, since lexical specifications can override the templatic Accent 2 restriction in compounds, this implies that Hd-Match (Ft), which preserves foot heads, must outrank Exh-Ft (PW′), the constraint enforcing Accent 2 in compounds. While this aspect of the Urban East Norwegian analysis is straightforward, correctly ranking FtBin, as defined in (18) above, is problematic. Specifically, it is impossible to rank FtBin in a way that correctly derives the patterns in question. If we were to place it at the top of the hierarchy, leading to FtBin » Hd-Match (Ft) » Exh-Ft (PW′), Accent 2 would incorrectly be blocked in word-final stressed syllables in compounds, similar to monomorphemic words. If, however, FtBin were to be be placed below Hd-Match (Ft), the analysis would incorrectly predict that lexically specified Accent 2 should be allowed to surface in monomorphemic words with final stress. To successfully resolve this issue, we propose to replace the constraint requiring binarity in our analysis, at least for Urban East Norwegian. Specifically, we propose that in the case at hand, binarity can be satisfied by any kind of binary rhythmic grouping at some level of the prosodic word, which is either word stress (i.e., head-dependent relations at the 'traditional' foot level) or compound stress (i.e., head-dependent relations between different prosodic words in a compound). We define the relevant constraint, which we regard as an instance of word-binarity constraints along the lines of Itô & Mester (1992/2003), in (26).

(26) WdBin: Assign one violation mark for every word that is not binary at some level of rhythmic grouping.

With WdBin replacing FtBin, we have all ingredients necessary to analyze the Urban East Norwegian compounding facts. For monomorphemic words, the evaluation in (20) for the input /[2]kveld/ with a lexically stored syllabic trochee still holds in the exact same way, as shown in (27); that is, *[2]kveld* with a syllabic trochee violates undominated WdBin in the same way as it violates FtBin.

(27)

kveld, Ft—σ	WdBin	Hd-Match (Ft)
a. ☞ $(\text{kveld})_{\mu\mu}$		*!
b. $(\text{kveld})_{\sigma}$	*!	

In compounding, however, Exh-(PW′) exerts its influence; as its ranking in the hierarchy becomes evident from interactions with lexical accent specifications, we address these first. Since underlying feet can override the preference for compound Accent 2, this means that the Exh (PW′) must be ranked below Hd-Match (Ft), leading to WdBin » Hd-Match (Ft) » Exh (PW′). In cases where either the initial member of a compound or the linking element *-s* are underlying specified with a moraic trochee (leading to Accent 1 on the surface) and there are no competing syllabic feet in the input, this ranking ensures that the moraic trochee is preserved. This is shown in (28) for the compound *[1]land-s-mann* 'compatriot (lit. land-man)'. (28a), the winning candidate, surfaces with a moraic trochee (= Accent 1), which satisfies high-ranked Hd-Match (Ft) and only violates lower-ranked Exh (PW′); (28b) satisfies Exh (PW′) but fatally violates Hd-Match (Ft) since it does not realize the moraic trochee specified in the underlying form. That is, the foot head in this candidate is linked to a syllable, unlike the foot specified in the input, which is linked to a mora. Both candidates, as well as all other compounds, satisfy WdBin since compounds are binary at the level of the prosodic word.

(28)

/land/ + -s, Ft—μ + /mann/	WdBin	Hd-Match (Ft)	Exh (PW′)
a. ☞ [(lands)$_{\mu\mu}$-mann]$_{PW'}$			*
b. [(lands)$_{\sigma}$-mann]$_{PW'}$		*!	

Now we discuss forms where underlying moraic and syllabic trochees compete for realization. We illustrate this on the basis of *[2]kveldsmat*. Recall that *kveld* is one of a set of 'special' lexical items that surface with Accent 2 in compounds even though they contain the linking element *-s*, which typically induces Accent 1. We take this as evidence that lexical specifications with syllabic trochees (Accent 2) can override lexical specifications with moraic trochees (Accent 1). This would seem to imply that both accents can be lexically specified, which in turn follows straightforwardly from our foot-based, metrical approach. The constraints we have developed so far provide a solution to the question why lexical Accent 2 will be the 'winner' when competing with Accent 1 for realization as a compound accent: Both feet are protected by Hd-Match (Ft) but only one foot can surface. As shown in (29) for *[2]kveld-s-mat* 'evening meal', low-ranked Exh (PW′) is the tie breaker in such cases since a compound with a syllabic trochee (Accent 2, Candidate 29a) satisfies the constraint, while a compound with Accent 1 (moraic trochee, candidate 29b) violates it.

(29)

/kveld/, Ft—σ + -s, Ft—μ + /mat/	WdBin	Hd-Match (Ft)	Exh (PW′)
a. ☞ [(kvelds)$_{\sigma}$-mat]$_{PW'}$		*	
b. [(kvelds)$_{\mu\mu}$-mat]$_{PW'}$		*	*!

Lastly, the established constraint ranking also successfully captures compound Accent 2 in items without lexical specification on the first member. In such cases, Hd-Match (Ft) is vacuously satisfied, and Exh (PW′) selects the winner. This is demonstrated in (30) for the compound *[2]land-bruk* 'agriculture (lit. land-use)': Candidate (30a) wins since a syllabic trochee (Accent 2) satisfies Exh (PW′), unlike the losing candidate (30b) with a moraic trochee (Accent 1).

(30)

/land/ + /bruk/	WdBin	Hd-Match (Ft)	Exh (PW′)
a. ☞ [(land)$_{\sigma}$-bruk]$_{PW'}$			
b. [(land)$_{\mu\mu}$-bruk]$_{PW'}$			*!

One possible conceptual challenge for metrical analyses of tonal accent may arise from the issue that evidence of foot structure being active in a language has sometimes been thought of to require independent segmental correlates, that is, relevant phonological processes that make reference to the foot as a metrical constituent (such as vowel reduction or consonant lenition). While such independent evidence is readily available in comparable tone-accent systems such as Franconian (e.g. Köhnlein 2016) or Scottish Gaelic (e.g. Iosad 2015, Morrison 2019), the situation is less clear for North Germanic. There are certain possibly relevant interactions between the quality of post-tonic vowels and tonal accent that we cannot address in this paper (e.g. Kristoffersen 2000: §9.3 for Urban East Norwegian); however, from a more conceptual perspective, we are not convinced that the presence of relevant interactions between feet and segmental structure is indispensable to postulate a foot-based analysis of tonal accent. Rather, appealing to feet provides a principled way of capturing the distributional facts, which would have to be stipulated in a tonal approach. We elaborate on this point in the next section.

4 Comparison and Conclusion

Throughout this paper, we hope to have provided a principled metrical analysis of compound accentuation in Central Swedish and Urban East Norwegian. To reiterate, a central tenet of our approach is the – we believe, well-founded – claim that both Accent 1 and Accent 2 can be lexically specified, which follows from an approach where tonal accent derives from two types of feet, syllabic trochees (leading to Accent 2) and moraic trochees (leading to Accent 1). That is, the obligatoriness of feet in languages with stress systems predicts that each item will need to be footed on the surface, and since both types of feet are phonological objects, there is nothing that keeps them from being lexically stored.

As briefly indicated in §2, the fact that both Accent 1 and Accent 2 can affect the surface structure of the accents in unpredictable ways is much harder to capture in available privative approaches to tonal accent, which assume that one of the accents is stored with a lexical tone while the other is lexically toneless. For instance, Riad's (e.g. 2013) approach where Accent 2 is lexically marked faces challenges when confronted with the fact that Urban East Norwegian compounds can receive unpredictable Accent 1. It should be noted, however, that Riad only explicitly analyzes Swedish facts; we believe, however, that the relationship between the varieties in question is so close that this calls for a unified analysis. Indeed, this is one of the arguments put forward in Lahiri et al. (2005); the authors argue that certain patterns in Swedish and, crucially, compound accentuation in Norwegian indicate that Accent 1 – not Accent 2 – is the accent that needs to be lexically specified; Accent 2, on the other hand, is only assigned post-lexically in their approach. Specifically, Lahiri et al.'s analysis of compounding accent in Norwegian states that compounds surface with Accent 1 if the first member is lexically specified, and that Accent 2 is assigned otherwise (p. 87). A question that we think remains unanswered, however, is how Accent 2 can be assigned in compounds if, as they claim, it has no representational status (recall that 'Accent 2' is a descriptive cover term, not a phonological entity).

Furthermore, one of the predictions of their privative analysis is that "[l]exical accent 1 always dominates" (Lahiri et al. 2005, p. 89). As discussed in this paper, the idea of a general Accent 1 dominance is at odds with the behavior of a set of lexical items such as *[2]kveld-s-*. This issue is not addressed in Lahiri et al. (2005), but Wetterlin (2006: footnote 63), which follows the same analytical approach, notes the pattern and argues that relevant items "are perhaps no longer seen as compounds" (see also Wetterlin and Lahiri 2012, footnote 16). Since, however, the patterns are general and, at least as far as we can see, productive, it appears problematic to simply discard them as exceptional. When discussing the role of "exceptions" in phonological grammars, Hout states that "the apparent breakdown of the system introduced by exceptions is in actuality a reflection of that system" (Hout 2019, p. 11). In a similar vein, we argue that compounds of the type *[2]kveld-s-mat* and *[2]loft-s-bod* should be moved from footnotes to the center stage, as they illustrate how the accent opposition truly functions: That is, they show that the accent contrast is *equipollent*, not *privative*.

Lastly, as mentioned in §3, the fact that words with final stress always have Accent 1 in isolation is hard to model in a principled way in any privative tonal (or diacritic) approach. For instance, if one marks Accent 2 with a lexical tone, why would it need a second syllable to surface in non-compound words? Similarly, if Accent 1 is specified with a lexical tone, why would there be a requirement that all words with final stress need to surface with said tone? That is, no matter which accent is regarded as marked, the absence of Accent 2 in words with final stress needs to be stipulated in privative approaches. All of the problematic issues for privative analyses discussed in this paper, however, can be straightforwardly modeled in a foot-based, metrical approach to North Germanic tonal accent.

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