

Balance and harmony in Scandinavian dialects

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Two vowel alternation patterns – vowel balance and vowel harmony – occurring in several central Scandinavian dialects are presented and analyzed. Vowel balance, which is conditioned by the weight of the root syllable, is shown to be made up of two separate processes, namely weakening in prosodically non-prominent syllables, which is a very wide-spread phenomenon in Germanic languages generally, and strengthening in prosodically relatively prominent syllables, clearly a Scandinavian innovation. Vowel harmony is shown to be superficially quite different in the two dialects discussed (Älvdalska, Elverum). The difference is proposed to follow from a general difference with regard to constraints on feature spreading, where one dialect disallows neutralizing harmony, while the other allows partial such harmony, namely with regard to vowel height. Part of the interest of the vowel alternations in balance dialects lies in the wide cross-dialectal variation. This sets the patterns apart from e.g. Germanic umlaut and Romance metaphony.*

1. Introduction

Several Swedish and Norwegian dialects in central Scandinavia exhibit vowel alternations, which historically are conditioned by word-prosodic properties. The two major patterns are known as vowel balance (Swedish *vokalbalans*) and vowel levelling/metaphony/harmony (Sw. *tilljämning*). I will use the terms 'balance' and 'harmony' throughout. I will discuss the balance and harmony patterns of two dialects, Älvdalska and Elverum, much as a presentation of the phenomena. The nature of the alternations and the extensive variation between dialects obviously invite much broader typological comparison.

Today the prosodic patterns which have occasioned the vowel alternations are present in only a few dialects. The crucial factor of relevance to balance and harmony is the weight contrast between heavy and light in stressed syllables. This contrast is now an archaic feature, as most Scandinavian (indeed Germanic) dialects have long since implemented the so called quantity shift¹. The outcome of the quantity shift in Scandinavia (except Denmark) is that the old three-way weight distinction (light, heavy, superheavy) in stressed syllables becomes neutralized (Torp 1982:32ff., Sandøy 1987:167ff., Riad 1992:ch. 5, 6). In modern Swedish and Norwegian, stressed syl-

lables are invariably heavy. Dialects that escape or postpone the quantity shift often develop harmony on top of the vowel pattern caused by balance, which historically would seem to have had a much wider geographic spread than harmony (Neuman 1918).

1.1. Vowel balance

Vowel balance regulates the quality of the second syllable vowel according to the weight of the root syllable. To illustrate, consider the unusually rich balance pattern of Älvdalska (Dalarna, western Sweden).

(1) Balance in Älvdalska ²				
light root syllable, L_{rt}		heavy root syllable, H_{rt}		alternation
a. ak-i	'hook'	stabb-e	'tree stump, stub'	i ~ e
b. flak-u	'flake, dat.sg.'	pæar-o	'potato, dat.sg.'	u ~ o
c. bik-æð	'pitched'	swiiv-øð	'soared'	æ ~ e
d. bik-ɔ	'to pitch'	swiiv-a	'to soar'	ɔ ~ a

The members of each word-pair belong to the same inflectional categories of the same paradigms. Generally speaking, vowels tend to exhibit a more reduced quality when they follow a heavy root (H_{rt} , for short) syllable than when they follow a light root (L_{rt}) syllable. For instance, the historically high vowels /i/ and /u/ in the forms above occur as high in L_{rt} s and mid in H_{rt} s. The low vowel /æ/ occurs as mid in H_{rt} s. The latter alternation is not common among dialects, as it presupposes the presence of an /æ/ phoneme, which is lacking in many dialects, in the relevant context. The low vowel /a/ remains *a* in H_{rt} s but changes to *ɔ* in L_{rt} s. Thus, from the historical perspective, the alternation here goes the opposite way, with a change in L_{rt} s rather than H_{rt} s. I will argue that this situation is also synchronically valid (section 2.4). The alternations summarized under the name of balance, then, are the result of the interaction of two different processes applying in prosodically distinct contexts. One process is the general Germanic reduction of unstressed syllables, which leads to apocope in many dialects (Sandøy 1997:88f., Riad 1992:177ff.). The other process is a Scandinavian innovation, which preserves or strengthens vowels in the second syllable of L_{rt} s (*a* > *ɔ*) and elsewhere. In other dialects, the *a* stays put in L_{rt} s but fronts to *æ* in H_{rt} s, that is participates in the reduction pattern (see (18)).

Vowel balance dates back to the 14th century at least, and used to occur in a large area in central mainland Scandinavia (Neuman

1918, Geijer 1921, Riad 1992; concerning Old Norwegian, cf. Borg 1973). Balance without concomitant harmony leaves few traces in the modern dialects. Standard Swedish retains an old balance distinction in the juncture of some compounds: *gatu-korsning* 'street crossing' (old L_{rt}) vs *kyrko-gård* 'church yard' (old H_{rt}). In dialects which have (had) harmony, the traces are much more pervasive.

1.2. Vowel harmony

Vowel harmony is a pattern restricted to words with a light root syllable (L_{rt} s). The assimilation of vowel properties can go in both directions, although regressive (leftward) spreading dominates in all dialects. To illustrate harmony, consider the pattern from Elverum (Hedmark, eastern Norway).

(2) Harmony in Elverum		vowels glosses	
L_{rt}			
a.	/bik-a/	bæke	'to pitch'
b.	/les-a/	læse	'to read'
c.	/dyl-ja/	dælje	'to hide'
d.	/pos-a/	pɔsɔ	'bag'
e.	/drup-a/	drɔpɔ	'drop'
f.	/rek-u/	ruku	'rake'
g.	/ev-ju/	ivju	'still, non-circulating water'
h.	/gat-u/	gutu	'street'
i.	/les-id/	lisi, lesi	'read, supine'
j.	/nykil/	nykyl	'key'

In this dialect we find vowel height harmony in all L_{rt} s. In (2a-e), the low second vowel causes lowness in the root vowel. In (2f-i) the high vowel of the second syllable causes raising of the root vowel. In (2f) backness also spreads to the root syllable. In (2d,e,j), rounding spreads progressively (rightward) from the root to the second syllable. Dialects vary quite a lot as to mode and extent of application of harmony. For instance, OSw *vita* 'to know' may show up as *væta*, *vytɔ* or *vætɔ*, each form displaying a different harmonic effect. Elverum represents a relatively rich system.

In many of the harmonic dialects, the quantity shift has now applied and the harmonic patterns have become fossilized. Thus, light root syllables get lengthened without the words losing their harmonic vocalism (e.g. *vætɔ* > *vætɔtɔ* 'to know', *vuku* > *vukku* 'week'). This often results in expanded phoneme inventories, as well as in allomorphy within paradigms, where the variation reflects the former

weight distinction. At some point, then, the pattern of alternation becomes allomorphic rather than phonological. Here we are interested in the productive phonological stage and I will give phonological descriptions of the two dialects discussed (Älvdalska and Elverum), although that involves some idealization of the dialect data. For instance, we ignore lexical influence from the standard language, and abstract away from later phonological changes that do not affect or participate in the balance and harmony patterns. The phonological patterns of balance and harmony are reasonably transparent, and therefore readily reconstructed because of the morphological fossilization.³

Vowel harmony has developed in a geographically coherent subset of the vowel balance dialects (cf. map in Haugen 1976:262). The geographic distribution as well as the vowels involved clearly establishes the empirical fact that harmony presupposes the presence of balance. Typically, vowel harmony spreads some feature of the vowel quality that balance either keeps or brings about in the second syllable. In the case of strengthening ($\alpha > \omega$), balance thus feeds harmony synchronically.

1.3. Level stress

The precise nature of the connection between balance and harmony is however not fully clear from the geographic distribution and the vocalic patterns alone. For instance, progressive harmony indicates some independence on the part of harmony. Why could not harmony apply in dialects without balance? The answer is bound to be connected to prosodic conditioning. Vowel harmony is limited to the two first syllables of words containing a light root syllable. It would thus seem to be the case that it is bound inside the metrical foot, the bimoraic trochee (McCarthy & Prince 1986, Hayes 1987).⁴ There is thus a prosodic domain to take into account, and in addition there is a particular prosodic pattern obtaining in forms with a light root syllable. This prosody is known as level stress (Sw. *jämviktsaccent*), reported in many dialect descriptions.⁵ Level stress is described as a prosody where both syllables are perceived as equally stressed, or where stress is 'spread out' over the two initial syllables. Sometimes stress is said to variably occur on the first or second syllable, in forms with a light root syllable (e.g. Geijer 1921:6).

There are a couple of competing hypotheses about what level stress is. In one interpretation, level stress is the realization of the lexical tonal pitch accent (cf. Meyer 1937, Kristoffersen 1990, 1991,

Nyström 1991, among others). Most Swedish and Norwegian dialects have a tone-accent distinction superimposed on stress, hence pitch accent. The tonal accents are known simply as accent 1 and accent 2, or as acute and grave (Gårding 1977). Accent 2 is the marked member of the opposition. All dialects which display traces of balance and harmony have (or have had) the tonal accent distinction. One analysis of level stress, then, is that it is the realization of accent 2 in L_1 forms. Lexical distribution and phonetic similarity (Meyer 1937, Kristoffersen 1990) would seem to support this. Stress-based analyses of level stress are however also viable (cf. Riad 1992:ch.4, Bye 1994, 1996, for recent proposals). The historical context of balance shortly before the implementation of the quantity shift, which has nothing to do with tone, would seem to support the stress hypothesis, as does the metrical, as opposed to tonal, ramifications for vowel harmony. However, the prosodic conditions will be largely left to the side here, and for present purposes, the important thing to bear in mind is that level stress, whatever its constitution, conditions balance and harmony.

With balance going back to the 14th century at least, harmony may have arisen any time after that. The harmonic patterns have developed out of the Old Swedish vowel system with its three post-tonic vowels /a, i, u/. In some dialects, balance and other rules have also produced ω and ϵ in post-tonic vowels, both of which may feed harmony, as they do in Älvdalska. With the quantity shift, the array of underlying vowels in post-tonic syllables further increases, as the harmonic vowel qualities fossilize and merge into new phonemes. Another major sound change among stressed vowels is the vowel shift, which raises all the back vowels, and fronts /u/ to /y/. The vowel shift seems to have had no systematic effect on vowel harmony, as harmony simply goes along with the vowels as they raise.

1.4. Aim

The empirical focus of the article is to clarify the range of data subjected to balance and harmony, and to lay bare what segmental and prosodic features may be involved in the alternations, within the scope of two dialects, spoken not very far from each other, in the Scandinavian heartland of balance and harmony. I will discuss Älvdalska in some detail (section 2) and Elverum somewhat more briefly (section 3).

I also try to formulate some of the issues that need to be understood about harmony and balance (section 4), much as a preliminary

to the larger investigation of the Scandinavian balance and harmony dialects required for a fuller analysis. Harmony in some northwestern Spanish dialects has been systematically investigated in this way by Hualde (1989), with interesting results. A striking finding of Hualde's was the rich variation as to prosodic conditioning and application of harmony, within a limited area. The Scandinavian balance dialects also exhibit great variation, not so much in their prosodic conditioning, but certainly with respect to what features are involved and how harmony interacts with other phonological constraints in the dialect. For instance, the two dialects compared here differ as to the "aggressiveness" of harmonic application. In Älvdalska, harmony is heavily circumscribed by conditions on specification and feature agreement between the vowels involved, while in Elverum height harmony is obligatory irrespective of the specifications of the two vowels in the harmony domain. This difference in application is characterizable as the difference between feature filling and feature changing harmony, under the model of vowel systems I will adopt. Thus, in Scandinavian balance and harmony – and *mutatis mutandi* Spanish metaphony – there are significant differences in the phonological coding of the original, prosodically conditioned, phonetic variation.

1.5. The dialects

The dialect of Älvdalen (Älvdalska) is one of those archaic dialects that still have the vowel alternations productively. I will give a fairly extensive presentation of its balance and harmony patterns in section 2. Älvdalska is spoken in Dalarna in Sweden, near the Norwegian border. The discussion of Älvdalska is empirically based primarily on the work of Lars Levander (1909, 1925-28, and OÖD, the dictionary of Upper Dala dialects), and on later studies by Gunnar Nysström (1982, 1991). I have also consulted a speaker of the dialect.

The vocalic expressions for balance and harmony in the dialects that have them are quite varied, a fact that immediately invites typological research. To give some idea of the harmonic variation, I will give a summary description of the quite different vowel patterns in the dialect of Elverum in Hedmark in eastern Norway (section 3). This dialect is further advanced in the quantity shift, but the core of the productive harmonic system is straightforwardly reconstructible.⁶ The discussion of Elverum is mainly based on the descriptions by Hogstad (1906) and Øverby (1974), and personal communication with Arve Borg, linguist and speaker of the dialect.

2. Älvdalska

2.1. Vowel system

The vowel system of Älvdalska contains the following eight phonemic vowel qualities.

- (3) i y u
 e ø o
 æ a

The phonemic analysis that I will propose for Älvdalska is given in (4).

(4) Vowel system of Älvdalska

place height	cor	(cor) lab	(lab) dor
high	i	y	u
	e	ø	o
low	æ		a

The dorsal vowels /u/ and /o/ are predictably rounded, as marked in the chart. The labial vowels /y/ and /ø/ are predictably coronal.⁷ I will assume that the vowel /a/ is characterized exclusively by its height/aperture, and thus that it lacks a place specification. This is well motivated by the attested alternations, under the hypothesis that balance and harmony are feature filling processes in Älvdalska.⁸ I will use the symbol *ɔ* for the output of vowel balance (strengthening) or vowel harmony on /a/, that is a low, back, rounded vowel.⁹ In the phonological description, I will assume that *ɔ* is the result of supplanting the vowel /a/ with the vocalic place feature [dorsal]. Rounding is then entailed.

2.1.1. A note on the feature system

I adopt the privative place features [coronal], [labial] and [dorsal] from Clements (1991). These three allow rather precise description of the vowel alternations. There is assimilation of each of the three features in vowel harmony, and no need for feature values to

express the variation. Using the traditional [back] and [rounded] would require either adding another privative feature [front] or the introduction of feature values. In the latter case [-rounded] would be predicted as a possibility in the harmony systems. Further empirical research is needed to establish whether there is delabelizing harmony.

2.2. Balance

In vowel balance, the vowel of the second syllable varies in quality according to the weight – light or heavy – of the first syllable, the root syllable. A 'light' syllable contains a short vowel (CV) and a 'heavy' syllable contains either a long vowel or a short syllable followed by a tautosyllabic consonant (CVV and CVC).¹⁰ Final consonants are extrametrical.¹¹ The balance pattern, as well as harmony, displays sensitivity to the domain of the metrical foot. In words with a light root syllable, the second syllable is inside the moraic trochee, while in words with a heavy root syllable, it is outside the moraic trochee. Apparently, the prosodic conditions are different inside and outside the primary stress foot. Below, the data from (1) is given with a slightly different organization. The etymological vowels are given in the central column under 'alternation', and their alternants to the right and to the left. I will argue that the mid column vowels are also underlying synchronically (section 2.4).

(5) Balance in Ålvdalska			
	L_{rt} (μ μ)	H_{rt} ($\mu\mu$) μ	alternation
a.	ak- $\bar{i}$	stabb-e	i ~ e
b.	flak-u	pæær-o	u ~ o
c.	bik-æø	swiiv-øð	æ ~ e
d.	bik-ø	swiiv-a	ø ~ a

Comparing the pairs of vowels, at least the first three display a phonetically peripheral vowel in the L_{rt} form and a non-peripheral in the H_{rt} form. The high i , u and the low $æ$ alternate with the mid e , o vowels. The alternation is due to reduction in prosodically relatively weak positions. Reduction in prosodically weak positions is widespread throughout the history of the Germanic languages and is in no way a specific characteristic of the balance dialects. In many dialects, within and outside the balance area, the non-peripheral alternant is further reduced and apocopated, e.g. $i > e > \emptyset$. In balance dia-

lects this leads to vowel-zero alternations between L_{rt} s and H_{rt} s (cf. (18) below). However, it is striking that the second mora of the moraic trochee is not a weak position at all in balance dialects, rather to the contrary. In the L_{rt} s of (5a-c), balance is indirect, in that it exempts some post-tonic vowels from weakening, namely those inside the primary stress foot.¹² Clearly, the second mora of the bimoraic foot enjoys special, and prominent, status.

Concerning the $\text{ø} \sim a$ alternation in (5d), I would claim that this contrast is like the others, that is one of phonetic peripherality, but that it is attained in the front/back dimension (section 2.4), and importantly, by a vowel change in the L_{rt} context rather than in the H_{rt} context. The vowel thus changes from its etymological quality a to ø . This is the typical strengthening effect, occurring in many balance dialects (Geijer 1921:5f., 10ff., Bergfors 1961). As will become clear, the alternation is also synchronic in Ålvdalska. In the position outside of the bimoraic foot, the etymological quality a is retained. This change, $a > \text{ø}$, then, is one of strengthening rather than reduction.

The first fact to recall in this argument is that the L_{rt} context is one of prosodic prominence rather than one of prosodic weakness. The other three alternations clearly indicate that it is the position inside the foot which is more prominent than the position outside the foot. Therefore, if there is a change $a > \text{ø}$ in the L_{rt} context, the context where weakening of i , u , $æ$ is blocked, then it is likely to be due to anti-weakening, that is strengthening. The patterning of the vowel a in balance contexts across Scandinavia further supports this assumption. Just like the other vowels, the vowel a can also be the target of reduction (in H_{rt} s), in which case it usually occurs as æ , sometimes as e , sometimes as $\emptyset$. What this typological fact tells us is that the variation between strong and reduced variants of $/a/$ is in the front/back dimension, generally, where the stronger alternant is more back than the reduced alternant.

Another argument for assuming that ø is a stronger variant of a comes from the behaviour of long a : in root syllables. The development of long a : $> o$: in the context of a stressed syllable of nearly all Scandinavian dialects indicates that this is a change that takes place under stress/prominence.

The rounding of the backed low vowel can be understood either as redundant rounding of back vowels or as rounding in its own right. In Ålvdalska we get a more elegant analysis under the first assumption, since there is good reason not to assume that $/a/$ is already [dorsal]. In other dialects, rounding appears to be the phonological coding of balance.

In conclusion, these facts warrant the analysis of $a > \circ$ in L_{rt} s as a case of strengthening/peripheration. In the absence of an uncontroversial explanation for the prosodic conditioning, I will use 'weakening' and 'strengthening' as cover terms for the processes that give rise to the alternations among vowels.

We thus have an asymmetry in the effects of balance, one causing change inside the foot, the other causing change outside the foot. A given dialect need not have both of these processes, a fact which leads us to deconstruct the traditional notion of vowel balance (cf. Kock 1921:42f., Brøndum-Nielsen 1927:71ff., Hesselman 1948:53:ch.5, Wessén 1969:45ff.) into two separate phenomena, strengthening (as in 5d) and weakening (as in 5a-c, cf. Riad 1992:171f.). The synchronic analysis of balance will heed this asymmetry since it has reflexes in the distribution of e.g. exceptions to balance (section 2.2.4 below.).

Let us now go through data sets that exhibit balance. The underlying vowel and the qualitative alternation is given at the top of each set. In some alternations, the status of the second syllable as open or closed affects the operation of balance. Contrasts are given where found.

(6) /i/ [i] ~ [e]		
L_{rt}		H_{rt}
open σ	ak-i 'hook'	stabb-e 'tree stump, stub'
	rot-i 'wretch'	bokk-e 'slope'
	er-i 'hare'	kees-e 'rennet'
closed σ	nup-ið 'pinch, sup'	bund-eð 'bind, sup.'
	smið-im 'smith, def.dat.sg.'	gaffi-em 'fork, def.dat.sg.'
	smið-ir 'smith, pl.'	gaffi-er 'fork, pl.'
	er-il 'forge'	
/i/ [y] ~ [e]		
	tydyl 'goat's tether'	pynd3el 'bundle'
	d3yryl 'soft resin'	dymbel 'treenail, dowel'

The $y \sim e$ alternation is the result of progressive harmony applying to i (/tydyl/ > tydy/). In light roots, the y in the second syllable may either not alternate in inflected forms (tydylem def.dat.), or alternate with zero (cf. 2.2.1 below). In heavy roots, the corresponding e appears always to alternate with zero (dymbler pl.).

(7) /u/ [u] ~ [o]		
L_{rt}		H_{rt}
open σ	flak-u 'flake, dat.sg.'	pæær-o 'potato, dat.sg.'
	flug-u 'fly, dat.sg.'	kull-o 'girl, dat.sg.'
	blik-u 'blaze, dat.sg.'	swisk-o 'prune, dat.sg.'
closed σ	flak-ur 'flake, def.pl.nom.'	pæær-ur 'potato, def.pl.nom.'
	smið-um 'smith, dat.pl.'	gaffi-um 'fork, dat.pl.'
	spar-um 'save, 1p.pres.pl.'	kast-um 'throw, 1p.pres.pl.'

As seen, /u/ in the second syllable of a H_{rt} gets lowered to [o] in open syllables (kullo), but not in closed syllables (gafflum).

(8) /æ/ [æ] ~ [e]		
L_{rt}		H_{rt}
open σ	stæk-ær-am 'staker, def.dat.'	skradd-er-am 'tailor, def.dat.'
	kuðl-ær-ær 'charcoal burner, def.nom.pl.'	bææg-er-ær 'baker, def.nom.pl.'
	snær-æra 'faster'	stutt-era 'shorter'
closed σ	bik-æð 'pitched'	swiiv-eð 'soared'
	blot-æð 'thawed'	broon-eð 'melted'
	bæk-ær 'bakes'	kast-er 'throws'
	stæk-ær 'staker'	skradd-er 'tailor'

I have found no disyllabic forms that end with ær in an open syllable. The reason is that the $\text{æ} \sim e$ alternation is historically related to an $a \sim \text{æ}$ alternation (which also occurs in other dialects). All the instances of a in open second and final syllables have shifted to æ as in (9) below.

In some forms, we find the ending [-ær] in unstressed positions, following heavy roots (estær 'the horses, def.pl.nom.') and in the third syllable of L_{rt} s and H_{rt} s (kuðlærær 'charcoal burner, def.nom.pl.', bæægærær 'baker, def.nom.pl.'). The simplest analysis of these forms is to assume they are underlying /-ar/ subject to a rule $a > \text{æ}$ before tautosyllabic r , in unstressed position. A rule similar to this is historically responsible for much of the now synchronic $\text{æ} \sim e$ alternation in some of the Dala dialects (Bergfors 1961:140ff.). Following a light root syllable, an ending [-ær] necessarily implies underlying /-ær/, e.g. stækær 'staker', since underlying /-ar/ surfaces as [-or] under balance: n3v3r 'auger, drill'.

(9)	/a/	[ɔ] ~ [a]	
open σ	L _{rt}	wit-ɔ 'to know'	H _{rt}
		sol-ɔ 'swallow'	nig-a 'to curtsy'
		bles-ɔ 'white-face'	bland-a 'to mix'
closed σ		bik-ɔð 'pitch, sup.'	kess-a 'children's ski'
		ɔk-ɔn 'hook, def.acc.sg.'	bland-að 'mix, sup.'
		ɔk-ɔm 'hook, def.dat.sg.'	stabb-an 'stub, def.acc.pl.'
		gɔmɔl 'old'	stabb-am 'stub, def.dat.pl.'
			gamblas 'to age'

The general pattern exemplified in (6) to (9) has some exceptions. The exceptions are not random, however, but relate to the weakening pattern. For instance, the *i-e* alternation is inhibited in the 2 person plural *-ir*, and in some adjectives ending in *-in*.¹³

(10)	spär-ir	'save, 2p.pres.pl.'	kast-ir	'throw, 2p.pres.pl.'
	mikin	'plentiful; much'	armin	'sad'
	galin	'crazy'	duncin	'musty, damp; rotten'

The absence of weakening of *i* in the H_{rt} forms indicates that balance is not a fully productive pattern anymore. As mentioned, there is also a general limit on weakening of *u>o*, along the open/closed second syllable distinction. There are no exceptions to strengthening, however, since no forms like hypothetical **baka*, **wita*, **bikað* occur, where balance by strengthening would be inhibited. This is another indication of a synchronic asymmetry between the strengthening alternation of *ɔ~a* and the weakening alternations (5a-c).

2.2.1. Ghosts and epenthetic vowels

Many words, both H_{rt}s and L_{rt}s, display a vowel-zero alternation, where the presence or absence of the vowel is predictable from syllable structure. The vowel quality is often one and the same (*e*), indicating regular epenthesis. Sometimes, however, the vowel quality is not predictable, which means that the vowel taking part in the vowel-zero alternation in fact has lexical feature specifications. Such vowels are sometimes called ghost vowels (Zoll 1993). Ghost vowels thus have featural content like ordinary vowels, but crucially lack a root node, the node that organizes featural content into a segment. When syllable structure demands it, ghost vowels get a root node, just like truly epenthetic vowels. Therefore, the distribution of ghosts and epenthetic vowels is the same. The interest of the distinction between ghost and epenthetic vowel in the present context lies in

their different behaviour with respect to balance and harmony, in that the epenthetic vowel appears to be immune to both balance and harmony, while ghosts participate fully.

Ghosts

Let us first look at the ghost vowels. They come in at least three different underlying qualities in Älvdalska: /a, u, i/.¹⁴ A ghost vowel is here represented as a bullet hole when it fails to surface (*evil/ev•lær* 'hay stick/s'). They display the characteristic balance alternation.

(11)	/i/	[i] ~ [e]	
	L _{rt}	ketil	H _{rt}
		fetil	gaffel
		skecil	'kettle'
		kevil	'strap'
		evil	'shank'
		imil	'round stick'
		duvin	'hay stick'
		loöin	'heaven'
			'uneasy'
			'covered with hair'
			witter
			swemmen
			'winter'
			'sleep'
			ii•gen
			muuen
			'introvert'
			'ripe'

Zero alternants: L_{rt}, plurals: *ket•ler*, *fet•ler*, *skek•ler*, *kev•ler*, *ev•ler*; *duv•ner*, *lod•ner* (>[lon:er]); def.dat.sg.: *imb•lem*. H_{rt}, plurals: *gaf•ler*, *wit•rer*; def.dat.sg.: *swem•nem*.¹⁵

There is also a group of ghost vowel words which display a balance alternation between *y* and *e*. These forms will be analyzed as instances of the *i-e* balance alternation, with harmony causing the *i>y* change. One reason to see *y* as a composite product of balance (height) and harmony (rounding) is the fact that the H_{rt} correspondent vowel is *e* (not *ø*). We return to conditions on harmony below.

(12)	/i/	[y] ~ [e]	
	L _{rt}	dypyl	H _{rt}
		yvyl	pyndel
		tuær-dyvyl	dymbel
		nytyl	'bundle'
		krytyl	'treenail, dowel'
			'plane'
			'dung-beetle'
			'key'
			'crooked twig'

L_{rt}, plurals: *dyp•ler*, *yv•ler*, *tuær-dyv•ler*, *nyk•ler*, *kryk•ler*.
H_{rt}, plurals: *pyng•ler*, *dymb•ler*.¹⁶

Let plurals; *nagler*, *navler*; *fugler*; def.dat.sg.: *agram*, *bladrun*, *kweglun*; pret. *weðred*.

- okkul¹⁸
aksul

These forms are superficially similar to forms containing the ghost vowel *i* seen in (11) and (12). However, they generally have a different etymology. The OSw forms of *nagel* and *navel*, for instance are *nagle* and *navle* (Nyström 1982:57). The apocope rules of Älvdalska have lead to loss of final *-e*, yielding *nagl* with a syllabic *l*, and subsequent epenthesis. The standard language and other dialects often still retain the OSw shape of some of these words (*haure* 'oats', *humle* 'hops', *navle* 'navel' vs *navel* 'navel', *nagel* 'nail'). This indicates that final *e* of *nagle* has been apocopated fairly late, with ensuing synchronic epenthesis (*nagel*). By contrast, (*-ila* suffixed) forms like *ketil* and *timil* have had their second vowel in place since Proto-Nordic days, at least. Apocope also occurs synchronically within the paradigms (notably in dat.sg.indef. and acc.pl.indef.) of ghost vowel words. Thus, nom.sg. *ketil* has the dative sg. form *kettel*, without vowel balance. Both forms have accent 2/level stress. The suggestion would be that the dative form is /ketl/ (or historicizing /kettle/), with synchronic epenthesis of *e*.

- L_{rt} 'hammer'
 comor 'auger, drill'
 ncovr 'summer',
 somor

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- H_{rt}
 umbel
 stuppen
 knjuuækel
 ander
 lauder

1agel	'hail'	*agil
1styvel	'boot'	*styvyl
1weðer	'weather, nom.'	*weðir

L₄, plurals: *fugler*, *bibler*, *fjædrer*; def.sg.: *agleð*, *styleð*, *weðreð*.

tion that the vowels are truly epenthetic. The few light root forms with accent 1 there are in this dialect are all of this kind.

2.2.3. Weakening and strengthening

The epenthetic (and accent 1) data sets show that vowel balance apparently cannot *shift* a mid vowel *e* to either high *i* or low *æ*, i.e. to the qualities that front vowels usually have in the balance context. Balance alternations in these qualities (and *u*) are invariably attained by weakening in H_{rs} vs no weakening in L_{rs} . In the case of the vowel *a*, balance regularly shifts it to *ɔ* in the L_{rs} context, and retains *a* in the H_{rs} context. Beyond the epenthetic vowels and the accent 1 forms – both of which could form natural sets of exceptions to a balance rule – *all* vowels in the second syllable of light root forms obey balance within the domain of the initial foot. Exceptions to vowel balance only occur in the position after a heavy syllable, i.e. in positions outside of the bimoraic foot (cf. (10)). This reflects the asymmetry mentioned, between the separate processes that instantiate balance. In this section I shall try to further clarify the nature of this asymmetry.

Weakening targets vowels in unstressed syllables, e.g. following the initial foot. As mentioned, the status of that syllable as open or closed may limit the application of weakening. In Älvdalska, only the vowel /*u*/ is regularly sensitive to the open/closed distinction in the weakening context.

(17)	vowel	L_{rs}		H_{rs}	
		open/closed	closed	open	open
	/u/	u	u	u	o
	/i/	i	e	e	e
	/æ/	æ	a	a	a
	/a/	ɔ	a	a	a

In other dialects the other vowels may also be sensitive to the open/closed distinction, as we shall see.

In the case of strengthening, the etymological/underlying vowel changes in the complementary environment, i.e. inside the bimoraic initial foot. Strengthening, in the dialects that have it, only affects the vowel *a*, which changes into *ɔ* (in Älvdalska). There is no sensitivity whatsoever to the status of the second syllable as open or closed. The following small typology is adapted from Riad (1992:209) and

exhibits balance patterns involving the vowel /*a*/. It illustrates how weakening (*a*~*æ*/Ø) can be sensitive to open/closed while strengthening (*a*~*ɔ*) is not.

(18)	Dialect	L_{rs}		H_{rs}	
		open/closed	closed	open	open
	Nordmøre, Trondheim, most Swedish dialects in Finland	a	a	a	Ø
	Medelpad, eastern Jämtland, Ångermanland	a	æ	æ	Ø
	Parts of Västerbotten	a	æ	æ	Ø
	Älvdalen (eastern Dala river valley)	ɔ	a	a	a
	Inner Trondheim, northern Hedmark	ɔ	a	a	Ø/æ
	Northeastern Telemark	ɔ	a	a	æ
	Houtskär (Finland)	ɔ	a	a	Ø
	Nås (western Dala river valley)	æ	a	a	e

In all dialects which have the strengthening rule (*a*~*ɔ*), that rule respects the distinction between light and heavy root syllables, only. The weakening rule, however, may be sensitive to the open/closed distinction in the second syllable of H_{rs} (but not in L_{rs}). The last three dialect types in (18) have both weakening and strengthening of /*a*/, but in separate contexts.

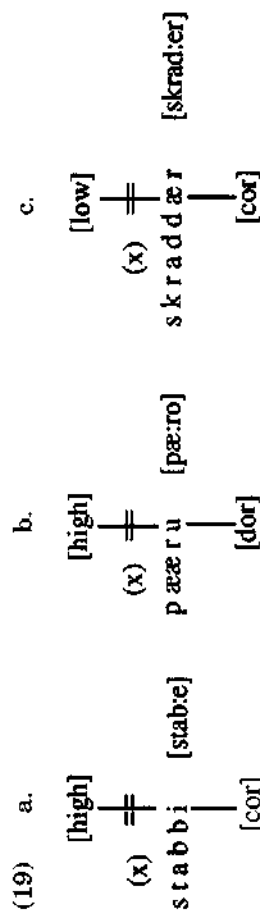
The typological pattern as well as the contextual pattern thus indicate that vowel balance involves two separate processes. It also provides us with a window on the finer diachronic progression of the implementation of balance.

2.2.4. Balance analyzed

The weakening part of vowel balance simply involves the removal of (peripheral) height features, in Älvdalska. The vowels /*i*/ and /*u*/ lose their [high] feature in the position after the primary stress foot. The low vowel /*æ*/ loses its feature [low]. In autosegmental terms, weakening would be the delinking of peripheral features from vowels in metrically weak positions, crucially outside of the primary stress foot. The result is centralization.

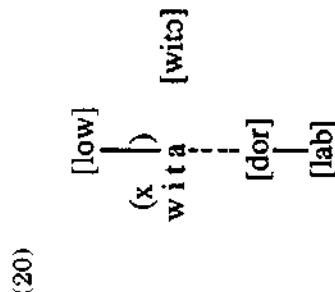
I will assume a feature organization similar to the one presented

in Clements (1991) and Clements & Hume (1995), with a basic division into a height/aperture node and a vowel place node. I will render this division by marking place features below the example given, and aperture features above.



In other dialects, apocope occurs in the position following the primary stress foot (cf. (18) above), which means that all features that can support a mora are removed.

Strengthening involves assigning the feature [dorsal] to the vowel /a/, the only placeless vowel in the system. The backing of /a/ will lead to labialization since back vowels are redundantly labial, in this dialect. We may depict this as an autosegmental dependence between [dorsal] and [labial].



Crucially, insertion of [dorsal] takes place on the placeless vowel, and inside the primary stress foot. The general expression of balance by weakening is peripheral vs non-peripheral vowel quality. Strengthening can be understood in similar terms, where the backing of *a* involves phonetic peripheralization. Backing leads to labialization (Riad 1992:205f.). The notion of strengthening as the origin of the

rounded vowel *ɔ* in the balance context capitalizes on the prominence difference that clearly holds between the positions inside and outside the foot (Hesselman 1948:53:251, 256f.). Other proposals hold that the *a* of the second syllable became lengthened and then rounded (viz. the development of stressed long *a*: in the vowel shift: *ga:s* > *go:s* 'goose'. For discussion, see Borg (1973:259ff.), Riad (1992:210ff.).

Balance, then, can be captured by two rules. Weakening removes peripheral features in non-prominent positions, whereby centralization neutralizations takes place. In the front vowel series neutralization occurs (*i* > *e* < *æ*). Strengthening is the addition of a place feature to a low vowel. The proposal here is that the vowel *a* is underlyingly placeless, in Älvdalska. The addition of a place specification [dorsal] is interpreted as a peripheralization. I return to the issue of phonetic vs phonological peripheralization in sections 2.4.1. and 4.

2.3. Harmony

Vowel harmony is dependent on vowel balance, that much is clear from its lexical and geographical distribution, but as mentioned the exact nature of the dependence is not obvious from simple inspection of the vocalic patterns. Harmony only affects L_{H} forms, and only concerns the first two syllables. Thus, it would seem to be bound within the bimoraic foot. According to the analysis given below, harmony of place of articulation in Älvdalska occurs in the low vowel series *æ* ~ *a* ~ *ɔ* and in high front vowels *i* ~ *y*. There is no manifest vowel height (or aperture) harmony in Älvdalska, otherwise a fairly common type (cf. Elverum, section 3 below). In (21), L_{H} and H_{H} forms are contrasted.

(21) Harmony in Älvdalska, overview

L_{H}	H_{H}
spɔr-ɔ	kast-a
spær-ær	kast-er
fɔt-ɔs	gaml-as
fæt-æs	gaml-es
sku ^a -mæk-ær	skradd-er
uu ^a v-slæg-ær	float-er
stæk-ær	tæll-er
dypyl	pyndzel
nytyl	dymbel
	'throw'
	'pres.sg.
	'to age'
	'pres.sg.
	'tailor'
	'log-floater'
	'cellar'
	'bundle'
	'treenail, dowel'

Where it applies, harmony is always total, in Älvdalska. However, it

only applies in few and well-defined contexts. These characteristics will be seen to follow from rigid constraints on application. As seen in (21), none of the harmonic effects occur in the H_{rt} forms.

2.3.1. Place harmony in low vowels

Let us first look at harmony in the low vowel series. There are two low vowel phonemes in Älvdalska: /a/ and /æ/. Balance creates another vowel quality, namely ɔ, which in turn may trigger harmony in the root syllable (in derivational terms: *baka* > balance > *bakɔ* > harmony > *bəkɔ*). Vowel harmony in the low series is always regressive, and spreads vowel place from the second syllable to the root syllable. In (22) a few other limitations of harmony are illustrated.

(22)	[dorsal] and [coronal] harmony (in [low] vowels)	
a. /bak-a/	bəkɔ infinitive	VH 'bake'
/bak-ad/	bəkɔð supine	VH
b. /bak-ær/	bækær pres.sg.	VH
/bak-æd/	bækæð pret.sg.	VH
c. /bak-um/	bakum 1p.pres.pl.	-
/wit-a/	witɔ infinitive	- 'know'
d. /bjær-a/	bjærɔ infinitive	- 'carry'
/dʒæt-a/	dʒætɔ infinitive	- 'mention'
/stjæl-a/	stjælɔ infinitive	- 'steal'

The harmonic pattern here occurs in words which have an /a/ in the light root syllable. If the second syllable contains /a/ or /æ/, balance will turn *a* into *ɔ*, and keep *æ*, in accordance with the rules discussed. Harmony will then produce ɔ and æ, respectively, in the root syllable. This pattern is entirely regular for all verbs that have an /a/ in a light root syllable. As (22c-d) illustrate, the phonological conditions beyond balance and level stress are the following.

- (23) (i) agreement in vowel height
(ii) no conflict in vowel place

Thus, there is no vowel harmony when there is no agreement in vowel height (*bakum*, *witɔ*, not **bəkum*, **wutɔ*), nor when there is a conflict in vowel place specification: *stjælɔ*, *dʒætɔ*, not **stjɔlɔ*, **dʒɔtɔ* or **stjælæ*, **dʒætæ*. The vowel /æ/ is [coronal], while the vowel /a/, strengthened by balance to ɔ, is specified [dorsal]. A vowel cannot be both [coronal] and [dorsal] at the same time. Since harmony may not change extant feature specifications in this dialect, harmony is blocked.

2.3.2. Place harmony in high vowels

Vowel harmony also occurs with the feature [labial] in the high front vowels.

(24)	[labial] harmony (in [high], [coronal] vowels)	
a. /dypil/	dypyl	VH 'dip'
/nyky/	nytyl	VH 'key'
b. /kyt-ær/	tçytær pres.	- 'coire'
c. /drup-i/	drupi	- 'drop'
d. /wik-u/	wiku	- 'week'
e. /mys-u/	mysu	- 'whew'

The same conditions as with low harmony appear to obtain. The vowels must agree in height (not **tçytær*, but *tçytær*) and not conflict in vowel place (not **drupy*, **wyku*, but *drupi*, *wiku*). These restrictions, together with the fact that /y/ hardly occurs in non-tonic syllables, boil down to one possible context for harmony, namely *y-i*, as in /dypil/. The target forms mostly exhibit the etymological *-ila* suffix, cf. *ketyl* etc. in (11) above. Notice that harmony is here progressive.

When we now turn to the analysis of harmony, we must account for the changes that do take place and also exclude the ones that do not.²²

(25)	drupi	'drop'	*drupu, *dripi, *drypy
	wiku	'week'	*vuku, *vyky, *vyku
	mysu	'whew, obl.'	*mysy, *mysu

Here, the vowels agree in height, but nevertheless, there is no sign of harmony. This shows that the height agreement is not enough for harmony to take place in Älvdalska; the [coronal] agreement is important too for the labial feature to be shared between high vowels. In (25) the place features of the vowels in each word are in conflict with each other, in violation of (23ii).

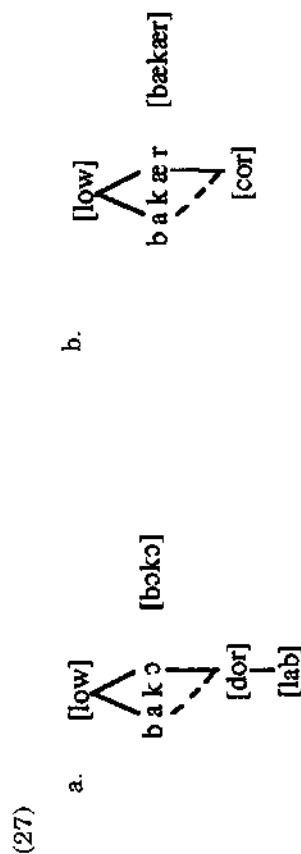
2.3.3. Harmony analyzed

We can depict harmony as autosegmental spreading. The basic analysis, then, is that spreading of features is free under the various conditions already mentioned above, and summarized in (26).

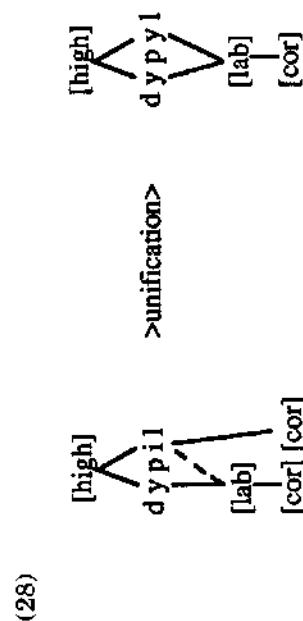
- (26) Harmony in Älvdalska:
Feature spreading is free under the following conditions
prosodic: first foot of L_{rt} ³
presence of accent 2

- segmental: agreement in height
no conflict in place
precedence: regressive harmony has precedence over progressive harmony

Harmony in Älvdalska is illustrated below, where dependence of redundant features on distinctive features is marked as autosegmental dependencies.²³



In (27a,b) the vowel place feature – underlying or provided by strengthening – spreads to the placeless vowel /a/.



In (28) it is the feature [labial] which spreads. Distinctively [labial] vowels are redundantly [coronal], which means that spreading to a [coronal] vowel will not cause a feature conflict.²⁴

The common theme of harmony in Älvdalska, then, is that feature spreading will take place as long as there is no conflict of feature specifications between the vowels. This is clear in spreading both among the high and the low vowels. This would mean that the grammar will generally value the preservation of underlying specifications

higher than the implementation of harmony. These constraints narrow the contexts for harmony to such an extent that only vowels which are already very similar actually undergo harmony. This results in total harmony, but in a limited set of forms. As we shall see, things are different in Elverum (section 3).

2.4 Discussion

The main assumption regarding the *a*→*ɔ* alternation in Älvdalska concerns the specification of the vowel /a/. I have assumed that /a/ is placeless and that balance inserts the feature [dorsal] on this vowel, in the context of a *L_{FT}*. Subsequently, that feature may spread to an /a/ in the root vowel, by harmony. A few arguments warrant these assumptions.²⁵

The first argument is simplicity of description. /a/ is relatively versatile in the dialect. In harmony, underlying /a/ can receive either a coronal feature (*bækær*) or a dorsal feature (*bɔkɔ*). If /a/ lacks a place specification, the harmonic patterns of Älvdalska can be characterized simply and precisely as the filling in of features, under two quite specific conditions, namely height agreement (*bakum*, not **bɔkum*) and absence of place conflict (*drupi* and *wiku*, not **drupy* and **wyku*). If /a/ is not specified for place, then there is no conflict of place between /æ/ and /a/, and harmony is expected (*bækær* > *bækær*). If /a/ were specified for place (say [dorsal]), then it would be hard to see why *bækær* should harmonize (by feature change), while no harmony would occur in comparable forms like **stjælɔ* (< *stjælɔ* < *stjælæ*) and **wyku* (< *wiku*). In other words, the risk for overgeneration becomes imminent once one lets feature changing harmony into the analysis. The proposal and conclusion here is that the asymmetry between /stjæl-/ *stjælɔ* and /bak-/ *bɔkɔ* with respect to harmony derives from place specification status in the root vowel.

A related issue is why the place specification added by balance to /a/ should be [dorsal] rather than [labial], in Älvdalska. Adding [labial] to placeless /a/ predicts a low, coronal, rounded vowel. This is in fact an attractive solution for several dialects, but not for Älvdalska. E.g. in Näs and other dialects along the western Dala river valley (Levander 1925: 108), the output of vowel balance on /a/ is indeed a non-dorsal, labialized, lowish vowel.²⁶ Geijer (1921:6) describes the balance alternation as one between an open *ø*-sound and *a*. Adding [dorsal] to /a/ in the here proposed vowel system, makes us expect a back vowel, even a rounded vowel, under the assumption that all back vowels are redundantly [labial] in this dialect.

In *dypil* > *dypyl* it seems clear that it is the feature [labial] which spreads between two high vowels, each of which has a place specification. There is a [labial] feature in the structure, which is not in conflict with [coronal], and the vowels agree in all other respects. Hence, the vocalic structure can unify. Harmony in the high vowels is progressive, but it is impossible to know if that is a principled fact or not, since we never find *y* in the second syllable, other than as the output of harmony.

We may now summarize the main features of harmony in Ålvdalska. Harmony only occurs in place features, which spread regressively (dorsal: *bɔkɔ*, coronal: *bækær*) or progressively (labial: *dypyl*) under height agreement and with no conflict of place.

2.4.1. *Phonetic or phonological?*

I have assumed without discussion that balance and harmony in Ålvdalska operate via phonological features rather than in a purely phonetic fashion. There are some indications of this.

We have already noted the complete lack of harmony and balance in true epenthetic vowels (cf. *nagel*, not **nagil*), and the presence of some exceptions to balance by weakening (cf. *kastir*, not **kaster*). This would seem to defeat a postlexical analysis.

Also, balance feeds harmony. The putative allophonic strengthening effect of *a* > *ɔ* may be transferred by harmony. The phonological character of harmony becomes very clear when a feature spreads between quite different vowels, as for instance in Elverum height harmony, below.

Another indication of the phonological status of the processes is the fact that balance and harmony may take place in several morphemes which are subsequently strung together in a compound. In *kulɔ-wiɔ-ogger* 'coal wood chopper' the two first elements are *L₄+S*, both displaying balance, although the prosodic context is likely to differ in each of the sites. In *sku^æ-mækær* 'shoe maker' and *dɔɔ-njukks* 'person from Ålvdalen', we have examples of harmony in the first and second elements of two compounds.

More circumstantially, we may also note that the balance dialects tend to keep the vowel alternations of harmony and balance, as they pass through the quantity shift. If balance and harmony were purely phonetic, we would perhaps have expected fewer traces of harmony in the modern dialects.

The phonetic basis for balance may however give rise to different phonological codings in the dialects. In Ålvdalska the *a* ~ *ɔ* alternation is one of dorsality. In some other dialect, the labiality of the phonetic

alternation could get phonologized. In such a dialect we may expect spreading of [labial], as harmony develops, since that place feature is not in conflict with [coronal] vowels. In northeastern Telemark in Norway (Geijer 1921:9) we find vowel balance and vowel harmony in forms like */vita/* > *vytɔ*. The active harmonic feature here is clearly [labial]. Nearer Ålvdalen, we find forms like */liva/* > *lœvɔ* and */vita/* > *vœtɔ* (Rättvik, Bingsjö, cf. Levander 1925-28:136), where height harmony is also involved.

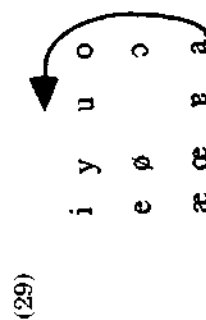
Let us now go across the border into Norway and take a look at the dialect of Elverum.

3. *Elverum*

The actual quantitative difference between light and heavy root syllable in Elverum is nowadays more or less gone. However, the dialect retains a transparent system for balance and harmony, although the vowel system has undergone some new developments. I will describe the vowel alternations as if they were still productive, that is, I will extract the balance and harmony patterns from the present system, and reconstruct them as productive.²⁷

3.1. *Vowel system*

The vowel system of Elverum contains more vowels than Ålvdalska. One reason for this is surely the fossilizing effects of the quantity shift, as well as other factors like the vowel shift. The modern system of vowels that would be classified as phonemes in an orthodox structuralist model are given in (29). The chart is slightly etymologizing in order to keep track of the vowel shift in the back vowels (*u*, *o*, *ɔ*, *a*). Thus the pre-shift symbols are placed in their post-shift positions.



However, the many restrictions on contrast reveal that (29) is poorer than it looks. For instance, */e/* is invariably short, */ɔ/* is argua-

bly always long. /e/ and /a/ only contrast in root syllables, but even if they do in some words, there are systematic segmental patterns that makes much of the variation look very allophonic. This is true for the contrast between /ø/ and /œ/, too.

To get a meaningful description of balance and harmony in Elverum, I will abstract away from some aspects that do not interact in the harmonic system. In particular, we may regard *ε* as the short allophone of /a/.²⁸ Also, we can consider *æ* a combinatory allophone of /ø/, triggered by a post-vocalic liquid. Finally, we disregard long /ɔ:/ in the discussion of harmony. This vowel arises by the vowel shift, and is assumed to set off the push chain, alluded to in (29) (*a* > *ɔ*/o, *o* > *u*, *u* > *ʊ*). This leaves us with a reconstructed older vowel system that is quite similar to Älvdalska, with the difference that there is no particular evidence for /a/ being placeless, as opposed to [dorsal].

(30) Harmonic vowel system of Elverum

place height	cor		(cor)	(lab)
			lab	dor
high	i	y		u
low	e	ø		o (ɔ:)
	æ	(œ)	(e)	a

The non-low back vowels are redundantly rounded. Elverum lacks the otherwise very common vowel balance *a* > *ɔ* (Geijer 1921, Bergfors 1961). When *ɔ* does occur in the second syllable of *L_{rt}*, the quality is due to progressive harmony, as we shall see.

The course taken in paradigmatic levellings has resulted in the fact that there are almost no instances of the high coronal vowels in the second syllable of *L_{rt}s* among the nouns. For instance, the oblique form (-*a*) has been generalized in weak masculines, instead of the nominative (-*i*). This is the common development in the East Norwegian dialect group (to which Elverum belongs), as opposed to West Norwegian (e.g. Lie 1990:109f.). The only case when a high coronal vowel occurs in this context is where progressive rounding harmony has applied, i.e. forms like *nykyl* (<*nykil*) 'key'. In the verbal paradigms, /i/ remains in e.g. the supine of strong verbs, but the study of its potential effects in harmony are obscured, by ablaut in

the root syllable, and by the fact that weakening is not applicable in the *H_{rt}* supines on /i/.²⁹

3.2. Balance

Vowel balance is primarily instantiated by weakening outside the bimoraic foot, i.e. in *H_{rt}* forms. Weakening is radical, all vowels reducing to [e]. In *L_{rt}* forms the etymological quality is retained. However, which vowel is retained is influenced also by the course taken in morphological simplification, as mentioned. A set of illustrative forms is given below.³⁰

- (31) /u/ [u] ~ [e]
 gut-u 'street' kull-e 'girl'
 vik-u 'week' klokk-e 'clock'

- (32) /a/ [ə] ~ [e]
 bak-ə 'to bake' næi-e 'to curtsy'
 væt-ə 'to know' blonn-e 'to mix'

As mentioned, there is no alternation between [i] and [e] deriving from underlying /i/ (corresponding to Älvdalska *aki-stabbe*), since the *L_{rt}* members are missing. We may contend, then, that the vowels made available by balance (retention of etymological quality) and morphological change (e.g. paradigmatic levellings favouring oblique case) for harmonic interaction with the root vowel are basically two {a, u}, in Elverum, out of the otherwise common three {a, u, i} or {ɔ, u, i}, and sometimes four {ɔ, u, i, æ} (Älvdalska).

3.3. Harmony

The most striking systematic harmonic requirement in Elverum is that height harmony should hold between the vowels. If the underlying vowels differ in height, the second vowel will determine the height of the first, irrespective of any previous specifications on the target vowel. Notably, height harmony works with high *u* and low *a* equally. This is in interesting contrast to e.g. Italian metaphony where assimilation is generally raising (section 4.2).

Let us now look at the height harmonic data. When the second vowel is high dorsal /u/ we find the following pattern.

- (33) [high] harmony
- | | | | | |
|----|------------|-------|-----|--------------------------------|
| a. | /vik-u/ | viku | i-u | 'week' |
| | /mid-ju/ | miu | | 'waist' |
| b. | /mys-u/ | mysu | y-u | 'they' |
| c. | /hos-u/ | husu | u-u | 'pants' |
| d. | /snar-u/ | snuru | u-u | 'snare' |
| | /gat-u/ | gutu | | 'street' |
| e. | /skjer-u/ | juru | u-u | 'sickle' |
| | /rek-u/ | ruku | | 'rake' |
| f. | /ev-ju/ 31 | ivju | i-u | 'still, non-circulating water' |

The high dorsal vowel has no effect on another high vowel in the first syllable, the height harmonic condition being met. When the first vowel is *e*, *o* or *a*, the result is complete assimilation (33c-e). The dorsal vowels are raised by height harmony alone. The coronal vowel *e* is both raised and backed in *skjeru* and *reku*, but not in *evju*. We return to dorsal harmony below.

- (34) a. [low] [high]
- g a t u [guŋu]
- [high]
- e v j u [ivju]
- [cor]
- b.

The low dorsal vowel causes lowering in high and mid front vowels. Recall that the quality [e] is just an allophone of /a/ in the second syllable of *L_{rt}s*.³²

- (35) [low] harmony
- | | | | | |
|----|-----------|--------|-----|------------|
| a. | /vit-a/ | væte | æ-e | 'to know' |
| | /bik-a/ | bæke | | 'to pitch' |
| b. | /het-a/ | hæte | | 'heat' |
| | /les-a/ | læse | | 'to read' |
| | /set-ja/ | sætte | | 'to set' |
| c. | /dyl-ja/ | dølje | ø-e | 'to hide' |
| | /flyt-ja/ | fløtje | | 'to move' |
| | /spyr-ja/ | spørje | | 'to ask' |

The low vowel causes lowering in the first syllable. In the coronal series lowering results in a low vowel. The labial vowel *y* lowers to *ø* and sometimes to an even lower rounded vowel *œ*.³³ The propo-

sed analysis is that second syllable /a/ spreads its [low] feature and that complete lowering takes place. However, segmental conditions limits the lowness of the phonetic output. This gives a simpler analysis than assuming that [ø] in a form like *fløtja* is a compromise between the lowness of /a/ and the highness of /y/.

- (36) a. [high][low]
- v i t a [væte]
- [high][low]
- s p y r j a [spørje]
- [lab]
- b.

Spreading of [low] thus means that the output will be as low a vowel as permissible under the system.

There is no interaction between the vowel [e] in the second syllable and short [a] in root syllables. This is expected, of course, under the assumption that they are indeed non-distinct within the harmonic system. As mentioned (footnote 32) the *e/a* contrast in root syllables is of a more recent vintage.

- (37) [low] harmony
- | | | | |
|---------|------|-----|----------------|
| /tel-a/ | tæle | e-e | 'to speak' |
| /hak-a/ | hake | a-e | 'hook' (*hæke) |

A more general statement of the indiscriminate height harmony, is that the whole height/aperture node obligatorily spreads in the dialect of Elverum. The rest of the harmonic system in Elverum is much as in Älvdalska.

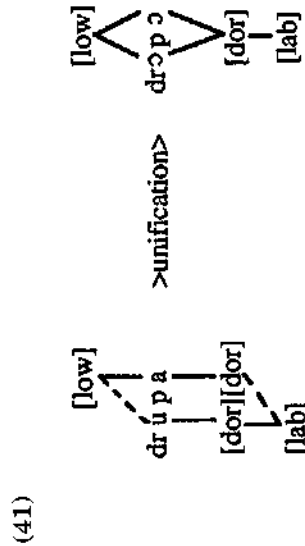
- (38) Height harmony in Elverum:
Spread the height/aperture node regressively
- (39) Place harmony in Elverum:
Place feature spreading is free under the following conditions
segmental: agreement in height
no conflict in place
precedence: regressive harmony has precedence over progressive harmony

The prosodic conditions are the same. Let us now turn to cases

where there is a non-low dorsal vowel in the first syllable and a low vowel in the second syllable.

- (40) [low] and [labial] harmony
- | | | | | |
|----|----------|-------|-----|----------------------------|
| a. | /pos-a/ | pɔsɔ | ɔ-ɔ | 'bag' |
| | /rot-a/ | rɔtɔ | | 'wretch' |
| b. | /spun-a/ | sponɔ | ɔ-ɔ | 'spinning; something spun' |
| | /drup-a/ | drɔpɔ | | 'drop' |

Height harmony is obviously attained, by spreading the height feature [low]. This causes the dorsal /o, u/ to lower as much as possible without losing their labiality. The labial feature instead spreads progressively to /a/. The net result is ɔ-ɔ.



In the phonological analysis, this means that a feature [labial] is available for spreading from the non-low dorsal vowels. This constitutes an argument for full specification of stable features in the underlying representation (Inkelas 1994; cf. also Cole & Kisseberth 1994). Progressive regressive spreading of [labial] also occurs in the high coronal and labial /y/.

- (42) [labial] harmony
- | | | | | |
|----|----------|-------|-----|----------------------|
| a. | /nykil-/ | nykyl | y-y | 'key' |
| | /tyr-i/ | tyry | | 'resinous pine-wood' |

Note, however, that [labial] spreading is further constrained by harmony in place features. [Labial] spreads under [coronal] harmony (nykyl), and under [dorsal] harmony (spɔnɔ), but not when there is a conflict, viz. dɔtjɛ, not *dɔtjɛ. Thus, like in Älvdalska, there must not be a conflict between the extant place specifications for the place feature [labial] to spread.

Finally, there is [dorsal] spreading in forms like *reku* > *ruku*.

- (43) [dorsal] harmony
- | | | | | |
|----|-----------|-------------|-----|--------------------------------|
| a. | /skjer-u/ | ʃuru | u-u | 'sickle' |
| | /rek-u/ | ruku | | 'rake' |
| b. | /ev-ju/ | ivju | i-u | 'still, non-circulating water' |
| | /sel-ju/ | silju/sillu | i-u | 'calm water (in river)' |

Height harmony would lead us to expect **riku*. This is what happens in *ivju* (<evju) and *silju* (<selju). In the latter forms, however, there is a coronal glide in the second syllable, which might be what blocks dorsal harmony. At any rate, [dorsal] spreading appears to be limited to the vowel *e*.³⁵ Beyond this case, there appears to be no regressive spreading of vocalic place in Elverum.

The main features of Elverum harmony can now be summarized. Regressive height harmony is mandatory (high: *gutu*, low: *væta*), and applies in a feature changing fashion. Labial place harmony is progressive (nykyl, drɔpɔ, but not *vyku) and occurs under height harmony/agreement and with no conflict of place (spɔerja, not *spɔerjɔ). Dorsal place harmony is regressive and only targets *e* (*ruku*).

3.4. Summary

The balance and harmony systems of the two dialects described are summarized in (44). I have put [dorsal] harmony in Elverum to the side here (*reku* > *ruku*), since the evidence is inconclusive.

- (44) Älvdalska Elverum
- | | | | |
|---------------|----------------|--------------|--|
| Balance | | | |
| weakening | æ, i, u > e, o | (i) u, a > e | |
| strengthening | a > ɔ | - | |

- Height harmony
- | | | |
|-------------|---|---------------|
| regressive | - | [high], [low] |
| progressive | - | - |

- Place harmony
- | | | |
|-------------------|--------------|---------------|
| regressive | {dor}, {cor} | [dor] |
| progressive | {lab} | [lab] |
| height agreement | yes | yes |
| no place conflict | yes | yes |
| | | no, target: e |
| | | yes |

Älvdalska and Elverum exhibit quite different balance patterns.

To some extent, this affects the harmonic patterns. The major harmonic difference between Ävdalska and Elverum, however, resides in the mode and extent of harmonic application. In Elverum, height harmony may change extant feature specifications. This will make all forms meet the condition on height agreement necessary for further place harmony. In Ävdalska, height agreement occurs only incidentally, a fact that limits the opportunities for place harmony.³⁶

4. Reflections

While we should regard balance as a phonetically coherent process – peripheral vs non-peripheral vowels, due to distinct prosody inside and outside the primary foot – it is phonologically a composite thing. Balance is not simply reducible to either of the phonological parameters that characterize vowels, viz. height/aperture or place.

Also, the balance pattern is not reducible to one type of rule, since there is an asymmetry in the near-complementarity of the strengthening and weakening environments. While the typology shows that dialects may have either, both or none of the two rules, all balance dialects must differentiate between the two environments, precisely because of the asymmetry with regard to syllable status as open or closed, which is relevant to weakening, but not relevant to strengthening nor to preservation of underlying specifications. This means that balance is necessarily two statements, one about H_{L_T} s and one about L_{T^*} s.

The vowel pattern of balance is partly a historical effect of emerging prosodic conditions (level stress), which reduce many syllables, which exempt certain other syllables from reduction, and which bring about a sound change $a > \text{ɔ}$ in yet other syllables, in some dialects.³⁷ The sound change can be connected with the similar general transition in long $a > \text{ɔ}$ (and some instances of short a) in root vowels (discussion in Bergfors 1961:22ff.). The latter change sets off the push-chain of the vowel shift. The nature of the connection between $a > \text{ɔ}$ and $a > \text{ɔ}$ is somewhat disputed, but the connection as such is generally taken for granted.³⁸ The general picture of balance, then, is that it has a holistic prosodic coherence, even though the details are variable.

Obviously, it is a problematic situation if a phonological pattern cannot be expressed as a general pattern within the phonology.³⁹ The topic clearly requires more attention, and with a broader typological investigation in hand, there would be at least two lines of analy-

sis to explore. The first is to accept the processes as phonetically coherent, but phonologically disparate. The original phonetic alternation of balance at some point becomes a set of phonological alternations. From this point onwards, harmonic spreading can take place. This relativistic approach makes some predictions as to dialectal variation, since no necessary connection between the set of vowel features participating in balance and those which spread in harmony is made (other constraints being the same, of course). Dialects should vary quite extensively.

Another line of inquiry to pursue concerns the phonetic analysis of what remnants of productive balance and harmony there is today. Such an investigation might answer the question whether the vowel systems of balance dialects are indeed correctly characterized by the usual vowel features. In particular it would be interesting to know whether there is some articulatory or perceptual basis for a unified characterization of all alternations involved in balance, which would motivate a feature [peripheral] (Lindau 1978: 557ff., Labov 1994:170ff.) or [tense] (Chomsky & Halle 1968:324f.) as a *phonological* element.⁴⁰ As Lindau (1978:557) points out, such a feature is needed for phonetic description and for phonological rules, though hardly for classification since length appears always to cooccur with such a feature. If phonetically motivated, we could obviously use such a feature in the phonological analysis, where in the simplest of cases (or best of worlds), balance would reduce to a phonological distinction [peripheral]–Ø, and harmony would be the spreading of [peripheral]. At the same time, the alternations exhibited by Ävdalska and Elverum seem to be in close correspondence to the type of vowel features used in this paper, i.e. features based on the traditional height, frontness/backness and rounding parameters. The constraints on spreading also seem to respect those particular parameters. We may thus be facing a distinctive overlap between a putative [peripheral] feature and the other features.

Turning now to harmony, we meet a picture similar to balance. The basic datum to reckon with is that harmony operates with the vowels provided by balance in L_{T^*} s. Geography and phonology both testify to the dependence of harmony on balance. For better known cases of harmony, functional explanations have included both ease of articulation and enhancement of perception of some feature in some context (Suomi 1983, Kaun 1995). For Scandinavian harmony, it seems clear that the segmental combinations alone will not suffice as basis for a coherent analysis, neither in terms of articulation nor perception. The harmonic patterns in adjacent dialects may be too dispa-

rate for that to be likely, and within one dialect, spreading may be quite indiscriminate as to what features are involved. In the two dialects examined here, we have seen spreading of all eligible features.

- (45) regressive spreading: [dorsal], [coronal], [high], [low], ([labial])
 progressive spreading: [labial]

If we take one other dialect into account we have evidence also for regressive spreading of [labial] (e.g. *vyt* in Telemark, Norway, cf. Geijer 1921:9), which means that all features needed to characterize a typical central Scandinavian vowel system can spread regressively. This is in stark contrast with progressive harmony, which may even be limited to the [labial] spreading under height agreement, seen in Ålvdalska and Elverum.⁴¹ Thus, while harmony primarily projects properties of the second vowel, the one affected by balance, it does so in a rather blunt manner.

In the light of this, a functional explanation relying on the ease of articulation would seem defeated on the segmental field.⁴² The constraining factors on harmony appear to be less particular (perhaps more accidental), such as the organization of the vowel system, and the degree of operational freedom allowed by constraints on faithfulness to the underlying/input structure in a given dialect (Prince & Smolensky 1993). The above comparison of Ålvdalska and Elverum illustrates both of these facets.

One could entertain the hypothesis that harmony is functionally there in order to secure the perception of qualities in the second syllable, because those qualities carry information of morphological importance. The general idea behind perceptual explanations for harmony is that such harmony helps to make salient such features that are perceptually non-optimal. By extending the realization of some feature over e.g. the full foot domain, that feature is more likely to be correctly perceived (Kaun 1995). In Scandinavian, it is obvious that harmony has the concrete effect of telling the listener about properties of the second vowel, already in the first vowel. In this respect Scandinavian harmony is like Romance metaphony and Germanic umlaut. In Italian metaphony (Maiden 1991), a raised root vowel means that a high vowel follows in the second syllable, which in turn means that the word occurs in a particular inflection. Finnish palatal harmony may function similarly, too, but in the opposite direction. Once the root vowel has been identified, the scope of vowels in the second syllable is limited such that identifying which one it is will be a simpler task than without palatal harmony (Suomi 1983). The

twist for Scandinavian balance and harmony (and perhaps for many other systems) is that the morphological argument is absent. Consider the H_n forms, which in some dialects reduce any post-tonic vowel to *e*, while the L_n s keep or enhance that vowel. Thus, the same morphological information is thrown away or enhanced on a quantitative basis, which makes no sense in the functional perspective.

The fact remains, though, that balance and harmony develop, get phonologized, and that the vowel pattern is kept in that part of the lexicon. The prevailing impression of the behaviour of harmony is that it is triggered when some marked vowel quality is put under duress, by the prosody which gives rise to balance, i.e. level stress. The actual form it takes in a given dialect is partly unpredictable. While there are surely tendencies for certain features to be common in harmony – for instance, height harmony appears to be a prerequisite for further harmony – the variation is still large.

Possibly, then, harmony is a phonological freak, much like the tone accent distinction in Scandinavian (on this cf. Riad 1998). It is there for historical prosodic reasons, but it plays no significant role in the language. The ontology and motivation of balance and harmony must therefore be sought at the holistic, prosodic level. The prosodic conditions in L_n forms, in the period before the quantity shift is what should ultimately be connected with, and held responsible for, balance and harmony. The variability of the harmonic patterns, both as regards vowel qualities and degree of application, should be understood as an effect of prosodic forces at some suprasegmental level. It would seem that the relevant prosodic factors trigger a general behaviour in the vowels, namely regressive spreading of features. How this happens, and if tonal or metrical structure is involved will have to remain open questions. We may however be able to reduce the exoticism of this harmony by comparing it with other similar phenomena.

4.1. Germanic umlaut

Scandinavian harmony is resemblant of the Germanic umlauts in that a root vowel assimilates to the post-tonic vowel. However, the differences are numerous. For one thing, umlaut is generally exercised by one vowel quality at a time. There is no natural connection between *u*-umlaut and *i*-umlaut, which might lead us to expect simultaneous application. Instead, they each exhibit a clear segmental pattern (*i*-umlaut spreads [coronal], *u*-umlaut spreads [labial]). Scandinavian harmony, as we have seen, does not have such a specific segmental profile. Another difference is that the trigger of umlaut

is in a weak metrical position. The triggering sound often disappears by syncope, a testimony to its weakness. In Scandinavian harmony, the triggering vowel is in a position that is prominent in some respect. No harmony is exercised from truly weak positions (cf. H_{rt} s). Furthermore, the umlauts do not display the sensitivity to root syllable weight, which is typical of Scandinavian harmony.⁴³ Also, with time, the conditioning factor of umlaut is lost and the alternations become morphologized (e.g. the plural marking function in present-day English, German and Swedish). Scandinavian harmony, as we have seen, does not have great expectations on a morphological next life. The weight distinction, underscored by harmony, cuts right through the morphological classes. The only similarity between harmony and umlaut, then, is the assimilatory process as such.

4.2. Romance metaphony and Scandinavian harmony⁴⁴

When we turn to compare with metaphony of the Romance kind, we find a few more points of similarity, especially if we allow ourselves to make broad comparisons with both Italian and Spanish metaphony.

The Spanish dialects of Tudanca Montañés and Lena Bable exhibit metaphony which is bound inside the metrical foot (Hualde 1989).⁴⁵ The metrical conditioning is here clear in a typological perspective, since other harmonic dialects nearby lack it. Metrical bounding also obtains in Italian metaphony (the disyllabic foot), but less obviously, for lack of contrast, weightwise within the dialect, as well as typologically. The metrical bounding is a major point of similarity with Scandinavian harmony.

The predominantly regressive application of harmony is also a common feature of metaphony and Scandinavian harmony, while the mix with some progressive harmony appears to be a Scandinavian speciality.

The segmental patterns are generally better behaved (or perhaps simply better understood) in Romance metaphony. In particular, the upward trend typical of Italian metaphony has no obvious counterpart in Scandinavian harmony, where many different features spread, albeit not randomly.

If Cole (this volume) is right in her analysis of Italian metaphony, that phenomenon is actually two, vowel shift and assimilation (harmony). Deconstructing Italian metaphony that way makes it look more similar to the Scandinavian situation in that both would seem to have an important relationship between a strong-weak pat-

tern and an assimilation. The vowel shift part of Italian metaphony (and the centralizing metaphony of Tudanca Montañés) would seem to relate to a peripheral-non-peripheral (or strong-weak) contrast, somewhat like Scandinavian balance. On the other hand, the difference between the systems in their extent of harmony becomes evident. In Cole's analysis, the assimilation part of Italian metaphony is much smaller than previously assumed, perhaps limited to just the mid-high vowels in the context of a following high vowel. Dialect after dialect exhibits this pattern. Scandinavian dialects display a more motley spreading pattern, although there are clear consistencies, such as the conditioning role of height harmony for other harmonies. What is lacking is the segmental focus which is typical of Italian harmony.

A point at which the two systems part company is the morphological conditioning, which is as present in Italian metaphony, as it is absent in Scandinavian harmony.

In comparison with metaphony, the Scandinavian pattern seems spectacular in two respects. First it heeds a weight distinction that cuts right into the set of disyllabic forms, targeting the L_{rt} s and exempting all the H_{rt} s. Second, and on top, there is the other pattern, that of weakening which targets the exempted set of forms, namely the H_{rt} s. Separating the processes in the appropriate way is a useful exercise, which makes each part look more familiar. The connection between prosody and segmental spreading, however, remains poorly understood, in the absence of a simple segmental pattern of spreading.

4.3. Level stress

No doubt, the prosody of L_{rt} s is different from H_{rt} s. The two word types develop in quite different directions. The brief comparisons with metaphony and umlaut suggest that the prosody of Scandinavian L_{rt} s is different also from Romance L_{rt} s and Proto-Nordic L_{rt} s, which do not seem to differ much from contemporary H_{rt} s. Also, the segmental coherence, visible in metaphony and umlaut, seems to be of a different kind in Scandinavian harmony. This brings us back to the prosodic property that makes Scandinavian different, namely level stress, and its nature. Is level stress stress or accent?

In Riad (1992), I argued that the special prosodic property of L_{rt} s in balance dialects has a natural place in the development of stress structure towards the quantity shift. After all, the dialects that deve-

lop into the standard language do pass through the stage of balance before they implement the quantity shift. The quantity shift can be characterized as a transition of conditions on primary stress, from the level of the foot to the level of the syllable.⁴⁶ When this development gets stuck – perhaps because of the failure of the segmental quantity system to simplify from double (C and V quantity) to simple (C or V quantity) – we get a stage when the two moras of the primary stress foot are both prominent, whether in the same or different syllables, effectively level stress. If level stress prevails, harmony will eventually develop in the L_{-1} balance forms. Recently, Bye (1996) has also carefully argued for a stress based analysis of balance, in which the initial foot contains two stresses, i.e. a clash. In both of these proposals, it is assumed that stress or at least a metrical domain is required for harmony to take place.

The alternative is to assume that harmony applies under tonal auspices. There are good distributional, and some phonetic, arguments for level stress being the realization of tonal structure, namely that of accent 2. The pattern in (16) above could be taken to show that balance and harmony are sensitive to accent. Also, the historical timing might be right, at least according to some theories which would date the birth of a lexical accent as late as around 1200, i.e. not long before balance develops. A connection between accent and balance and harmony would certainly fit the non-utilitarian aspect of balance and harmony, in that accent, too, would seem to have a prosodic motivation, but carry very little distinctive load (Riad 1998).

The problems for tonal theories of balance and harmony begin with the characterization of the relationship between a tonal structure and the segmental operations of balance and harmony (Riad 1992:196f., Bye 1996:164f.). Bye points out that level stress has been studied primarily in citation forms (though not exclusively), a fact that might contaminate the data with phrasal prosodic properties. The tonal hypothesis would also have to be reconciled with the presence of balance in several parts of a compound like *ku^ul^o-wið^o-ogger* 'coal wood chopper'. In a compound the tonal domain encompasses the entire word, not just a single foot.

For the purposes of sorting out the vowel interactions in Älvdalska and Elverum, it has sufficed to look at the foot structure (moraic trochee). Obviously, the prosodic connection is in need of further research.

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Notes

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¹ In most eastern (i.e. Swedish) dialects, as well as in the emerging Swedish standard language, the quantity shift was concluded by the end of the 17th century.

² The dialectal forms are given in slightly normalized form. Most of the time, I will give the words in their surface form (as in Levander 1909 or 1925-28). Exception is made when clarity warrants a more phonemic form, e.g. as in *chi*, where the medial *k* is actually affricated in pronunciation: *tʃi*.

³ Among other things, the segmental triggers of harmony are still present. This is in contrast with metaphony in some Italian dialects where the conditioning feature has been lost (type C dialects in Maiden's 1991 description).

⁴ Other cases of metrically bound harmony are discussed in Hualde (1989).

⁵ The English term 'level stress' is due to Liberman (1982).

⁶ Typological comparison with other dialects within the analytical framework used here will have to wait. A rich body of information on harmonic dialects is of course available in the Scandinavian dialectological literature. For overviews of sources, see Kolsrud (1974), Sandøy (1987), Wessén (1970), Pamp (1978).

⁷ Whether or not these features are present in the underlying representation makes no difference for balance and harmony in Älvdalska. In Elverum (section 3) corresponding predictable features spread in the harmonic system, providing an argument for full vowel specifications.

⁸ For instance, the root vowel of */hak-/* 'bake' alternates between three qualities: *æ* ~ *a* ~ *ɔ* – *bækker* ~ *bakum* ~ *bokk*, a situation that cannot be accounted for (without changing features) if */a/* has a specified V-place.

⁹ In some of his works (1909), Levander uses the same sign <o> for both short */o/* and the output of balance and harmony on */a/*, that is *ɔ*, while in others (1925-28) he differentiates them as <o> and <â>.

¹⁰ Some dialects treat forms containing a medial *Cj* cluster as light roots. The Elverum dialect discussed in section 3 is like this, e.g. *døljv* 'to hide', *ivju* 'still, non-circulating water'.

¹¹ As we shall see there is variation in reduction in the second syllable of H_{-1} s relating to an open/closed distinction, but this variation patterns according to vowel quality rather than according to prosodic extrametricality.

¹² The term "post-tonic" here refers to the syllable following the root syllable. Specifically, it is not a statement about the status of the second syllable of L_{-1} forms as stressed or unstressed, which is a controversial issue bearing on the characterization of level stress (unstressed: Nyström 1991, Kristoffersen 1991 vs stressed: Riad 1992, Bye 1996).

¹³ Other H_{-1} adjectives of the same inflectional category have *-en*: *i'gen* 'introvert', *i'ntæægen* 'insistent', or syllabic *-n*: *su'ltu* 'starved'.

¹⁴ In H_{T+} s like *gaffel* 'fork' e can be analyzed either as a weakened ghost ($i > e$) or a straightforwardly epenthetic e . The choice depends on whether we wish to keep L_{T+} s and H_{T+} s within the same paradigm, or whether we assume that the paradigm has split as a consequence of the effects of balance.

¹⁵ Similar forms that have a stable vowel include: *eril*, *eriler* 'forge, pl.', *bitil*, *bitiler* 'bridle, pl.'. Concerning the latter, Levander (1909:12) cites the $-il$ form, while Nyström (1982:59) cites *bitul*.

¹⁶ Similar but with a stable vowel: *tydyl*, *tydylem* 'goat's tether. def.dat.sg.', *dgyryl*, *dgyrylem* 'soft, non-chewable resin, def.dat.sg.'

¹⁷ Again, a stable vowel occurs in a few words: *bitul*, *bitul-er* 'bridle, pl.', *stapul*, *stapul-em* 'bell tower, def.dat.sg.'

¹⁸ There are different reports on the quantity of the root syllable of *okul* (heavy, Levander 1909:16, light, Nyström 1982:59).

¹⁹ The lower millstone rested on this wooden base, onto which the flour fell.

²⁰ Nyström (1982:56) registers different quantities than Levander in some of these forms: *fugel*, *agel*, *bib:el* or *bib:el*.

²¹ Land surveying term.

²² Several of the forms on the right do occur in other dialects.

²³ Note, however, that harmony in other dialects may require different specifications. In Rättvik in Dalarna for instance, [labial] may spread without [dorsal] spreading: *vita > væt:ɔ*.

²⁴ Unification in vowel harmony is discussed under the name of 'fusion' in van der Hulst & van de Weijer (1995).

²⁵ Note that these arguments concern Ävdalska specifically. It would seem to be quite possible for a neighbouring dialect to specify the vowel as underlyingly [dorsal] with the addition of [labial] under balance, or for another neighbouring dialect to leave /a/ underlyingly placeless, but to add [labial] under balance.

²⁶ In the Swedish phonetic dialect alphabet this vowel is often depicted as <8>.

²⁷ The Elverum pattern is no longer productive for both prosodic reasons (quantity shift) and morphological reasons (generalization of oblique case form). The underlying forms indicated in Elverum are therefore partly reconstructed, in order to reflect a productive stage. The general source of evidence for setting up a particular underlying form is paradigmatic alternation, and morphological class. This is straightforward in Ävdalska, where alternations like e.g. *bak-ɔ-bæk-er-bakum* motivate the root /bak-/ synchronically. When we reconstruct root vowels in Elverum, we do this on comparative grounds within the dialect (other paradigms with different vocalism) and across dialects, with the typical result of installing historical root vowels. Thus, several of the forms in (33) below are weak feminines which used to display an inflectional alternation between -a (nom.) and -u (obl.) in singular, e.g. *vika/viku* 'week/obl.', *snara/snaru* 'snare/obl.'. Morphological levelling and vowel harmony in Elverum result in *viku/viku* and *snuru/snuru*. While reconstruction inevitably involves some measure of hypothesis, we may note that the second vowel has in most cases not been changed (only generalized, with morphology), which gives a dialect internal anchor to the reconstruction.

²⁸ /a/ is the dorsal low vowel. All instances of long a belong to this phoneme, along with many short. The other phoneme, here marked /e/, is a non-dorsal low vowel (something like Br.E. *hut* Sw. *hatt*, [e], Arve Borg, p.c.). This vowel also contrasts with the low coronal vowel /æ/, in roots.

²⁹ One generalization that appears to be attributable to harmony is height harmony when the root vowel is /e/.

(i) blesid > blisi, blesi
lesid > lisi, lesi
brutid > bröti

/i/ in the second syllable causes optional raising of /e/ in the first syllable. Thus, height harmony would appear to be effected by /i/ under coronal agreement. Whether there are other harmonic effects is unclear. All supines with an /i/ in the second syllable have a coronal vowel in the first syllable anyway: Elverum *bröti* (cf. Ävdalska *brutið*, with etymological vocalism). This holds irrespective of the original weight of the root syllable (H_{T+} *fönni* 'fount' and L_{T+} *bröti* 'broken'). It is thus hard to know whether vowel height harmony is inhibited (viz. expected **bryti*) by some other rule, such as ablaut, or simply not applicable among the strong verbs.

³⁰ I here disregard the quantitative changes that have taken place in some of the words.

³¹ Several harmonic forms have a medial *Cj* cluster. As mentioned, such clusters do not make a root syllable heavy in Elverum (Hogstad 1906:13f.). Similar treatment of *Cj* clusters is common in other East Norwegian dialects.

³² Dorsal [a] does not occur at all in the second syllable of balance and harmony words. The qualitative complementarity between [e] and [a] reflect an older quantitative distinction between allophones of a single a -phoneme. The short dorsal [a] is the qualitative innovation.

³³ The vowel α has several historical sources (Hogstad 1906:11f.). In some positions it is distinctive, but it is also obviously an allophone to /æ/, namely in the position before a liquid. The sound α is characterized as being located 'between $\emptyset$ and α '.

³⁴ There are no instances of $u-i$, because of paradigmatic levelling.

³⁵ A possible line of analysis would involve underspecification, where the /e/ would be analysed as completely unspecified, underlyingly (e.g. the epenthetic vowel of the dialect is e). However, to stop such a proposal from overgenerating, the high vowel i would have to be specified for place (or for some feature that would withstand the advances of /w/).

³⁶ In optimality theoretic terms the height harmony constraints are more highly ranked in Elverum than the relevant faithfulness constraints, which strive to preserve the input vowel qualities. Note, however, that the dialects are similar in the use of height agreement/harmony. Both require height agreement, and no place conflict, for place harmony to happen.

³⁷ For discussion of the general prosodic development, and the relation of balance to the quantity shift, see Riad (1992, 1995), and references therein.

³⁸ The transition $a > \alpha$ does however not appear to be a prerequisite for balance $a > \alpha$ in view of the fact that Ävdalska has not yet developed α .

³⁹ I assume that balance and harmony are not fully accounted for as phonetic processes, as discussed earlier (section 2.4.1).

⁴⁰ Lindau (1978) and Ladefoged & Maddieson (1990:106ff., 1996:302ff.) dismiss the feature [ATR] as a viable alternative to [tense]/[peripheral], for English and German. The reason is that the tongue root is not used independently from height features in these Germanic languages.

⁴¹ A systematic search of the Scandinavian dialects may of course reveal more types. The point is that progressive harmony is obviously marginal as compared with regressive harmony.

⁴² This does not exclude the possibility that the smaller quantity of the L_{T+} , as compared to H_{T+} , would make it more liable for vocalic assimilation.

⁴³ The historical evidence for Germanic i -umlaut does not tell us whether it hap-

pened earlier in either L_n or H_n . The recorded precedence of H_n over L_n is a reflex of the order of phonologization, which is contingent on reduction and syncope.

⁴⁴ The term 'metaphony' for parts of the Scandinavian pattern is not unheard of, cf. Bergfors (1961), Liberman (1982).

⁴⁵ Hualde (1989) proposes to analyze the harmony as a percolation effect, the harmonic feature becoming part of the stress foot, and then percolating to either just the head or to all syllables of the foot. A similar suggestion for Scandinavian is given in Riad (1992). This type of analysis would predict harmony within a heavy syllable in Scandinavian dialects, viz. monophthongization of diphthongs, according to the general harmonic pattern.

⁴⁶ In constraint grammatical terms this development involves the upgrading of stress constraints vis-à-vis quantitative faithfulness to input structure. For instance, real vowel lengthening under stress becomes a possibility.

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