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TITLE OF THE DOCTORAL THESIS

Tone and Internal Word Structure

The Interface between Morphosyntax and Phonology in a Variety of Northern Norwegian

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Tone and Internal Word Structure:
The Interface between Morphosyntax and Phonology in a Variety of Northern Norwegian

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Foreword

At long last, the thesis has finally been born. It has been a very long and tough process with a steep learning curve, but it has also been fun. Being part of the CASTLFish community, of the Phonology Reading Group, and of the Department for Language and Culture at UiT The Arctic University of Norway has been a privilege.

It is no exaggeration, however, to say that the thesis would not have seen the light of day without the help from my supervisors Antonio Fábregas and Birgit Alber, who have given me feedback and support on the way. I have learnt so much from both of you. Thank you for all the help that you have offered and for your endless patience!

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Og til sist ein takk til foreldra mine som har vore ei uvurderleg støtte for meg!

1 Introduction

The relationship between words and the system of rises and falls of pitch in language is in some sense a bit like the relationship between clouds and the surface of the earth. Just like clouds float above and separately from the surface of the earth, falls and rises in pitch float on top of words and phrases. Sometimes, a funnel cloud is created and reaches down towards the surface, resulting in a havocking tornado. Similarly, pitch sometimes reaches down through the layers of linguistic structure towards the lexical or grammatical level, thus giving rise to one type of a phenomenon that is generally known as linguistic tone.

This thesis deals with the interaction between linguistic tone and internal word structure in a variety of Northern Norwegian. More specifically, it focuses on the distribution of the two contrastive tonal accents (aka accent 1 and accent 2) that exist in tonal varieties of Norwegian and how this distribution can be affected by morphosyntactic structure. For instance, in the nominal paradigms for the two nouns in Table 1, the tonal accent contrast is visible in the singular definite forms, but is neutralised in the plural forms (presented in Norwegian Bokmål orthography, superscript numbers mark tonal accent):

Table 1 – nominal paradigms of tank *and* tanke

Sing. indef.	**Sing. def**	**Pl. indef.**	**Pl. def.**	*Gloss*
^{1}tank	^{1}tanken	^{2}tanker	^{2}tankene	*'tank'*
^{2}tanke	^{2}tanken	^{2}tanker	^{2}tankene	*'thought'*

On a more general level, the thesis also investigates the interface between morphosyntax and phonology. Phonological operations do not apply across the board but have been proven to be sensitive to morphosyntactic structure. However, the exact nature of the relationship between morphosyntactic domains and phonological domains remains an open question. The goal of this thesis is to shed light on the interface between morphosyntax and phonology through the prism of tonal accents in Norwegian. In order to do this, we need to situate the two tonal accents within the larger grammar of Norwegian. To be more precise, we need to figure out what the tonal accents are expressions of, and how they relate to morphosyntactic structure. In other words, what lies behind the tonal accents? Before we turn to that, a few details about the theoretical backdrop and the theoretical assumptions are in order.

1.1 The Syntax-Phonology Interface

It has been long known that the phonetic form of a word depends on its position in a given larger context. A classic well-known example from the literature is *raddoppiamento fonosintattico* (RS) in Italian[1] where, in a sequence of $word_1$ and $word_2$, a word initial consonant in $word_2$ is sometimes geminated. This gemination can be contingent on several factors, both phonological and syntactic, but the most important phonological factor that will concern us here is that $word_1$ has to end in a stressed vowel (see Kaisse 1985, Nespor and Vogel 1986, Ghini 1993, Truckenbrodt 2007, Krämer 2009 for more details on RS in Italian). RS is illustrated in (1-1) with the corresponding syntactic bracketing in (1-2) (data adapted from Nespor and Vogel 1986:40):

(1-1) a. *Colibrì [bb]rutti* – ugly hummingbirds

b. *Colibrì [k]osì [bb]rutti* – such ugly hummingbirds

(1-2) a. [*Colibrì*] $[$*brutti*$]_{AP}]_{NP}$

b. [*Colibrì*] $[$*così brutti*$]_{AP}]_{NP}$

In the a) example, we see that the final stressed vowel in *colibrì* triggers gemination of the initial /b/ in *brutti* whereas in the b) example, the gemination of /b/ is triggered by the final stressed vowel in *così*. Italian RS is thus an example of a phonological process that applies at the juncture of words and morphemes, also known as sandhi processes. However, such processes do not apply indiscriminately between any pair of adjacent words, even if the structural environments for the phonological rule seem to have been met. As shown in the b) example, there is no gemination of the initial /k/ in *così* even though it is preceded by a stressed vowel, so RS must be conditioned by something more than a simple linear phonological representation such as V́#C resulting in gemination of the C. The intuition is that syntactic structure plays a role, but a quick glance at the syntactic bracketing in (1-2) also reveals that a straightforward syntactic characterisation is not always obtainable. Stating the relevant environment in terms of syntactic constituent labels, e.g. "RS applies between an NP and an AP", does not capture the data.

[1] RS is a feature of central and southern varieties of Italian (de Mareüil et al. 2021).

These observations lead us to some of the core questions of phrasal phonology: what conditions the domains for phonological patterns and processes above the word level? How do we represent this formally in the grammar? A number of likely conditioning factors are available, such as information structure and intonation, but one controversy that is especially prominent in the literature revolves around the role that morphosyntax plays and to what extent phonology above the word level (i.e. sandhi and suprasegmental structures) can be read directly off from syntax. It is uncontroversial that there are mismatches between syntactic constituency on one side and domains for phrasal phonology on the other (as shown by the data in (1-1) and (1-2)), but there is debate as to what causes such mismatches. A recent incarnation of the debate centres on the possibility of equipping specific access points in the syntactic structure with small information packages dictating whether that particular access point has a footprint in phonology or not, thus encoding syntax-phonology non-isomorphism as a function of properties of syntactic structure (D'Alessandro and Scheer 2015). However, as pointed out by Bonet et al. (2019), any given syntactic access point in D'Alessandro and Scheer's model is expected to behave uniformly in all relevant contexts. If the access point is associated with a footprint in phonology, it should *always* leave a footprint in phonology. The problem is that this prediction is not met. Thus, the question still remains: what is the exact relationship between syntactic structures and domains for phrasal phonology?

The answers that have been given to this question can roughly be divided in two main camps known as the *direct reference approach* and the *indirect reference approach*. The former view holds that domains for phrasal phonology are derived from syntax such that an acoustic event at the phrase level maps *directly* onto a domain that is delimited by syntactic factors. Proponents of direct reference theories include Kaisse (1985), Odden (1987), Cinque (1993), Rizzi and Savoia (1993), Marvin (2002), Wagner (2005), Pak (2008), Samuels (2009), Newell and Piggott (2014) and D'Alessandro and Scheer (2015). The latter view on the other hand consists of positing a new level of representation, which serves as a mediator between syntax and phonology. Acoustic events at the phrase level thus maps onto domains that are delimited by this mediate level of representation, making the interface between syntax and phonology an *indirect* one. Proponents of indirect reference theories include Nespor and Vogel (1986), Selkirk (1986/2011), Chen (1987), Inkelas (1989), Truckenbrodt (1995), Inkelas and Zec (1995), Itō and Mester (2009/2019), Elfner (2012), Bennett (2018), Kalivoda and Bellik (2021).

The two different approaches are explored further in what follows. In section 1.1.1, I begin by presenting a short description of the theoretical backdrop we find in generative grammar.

We will see that the generative view on the architecture of grammar already set limitations as to the nature of the interface between syntax and phonology. The direct reference hypothesis will be the topic of section 1.1.2 while the indirect reference hypothesis will be discussed in section 1.1.3. In section 1.1.4, I consider the relationship between the two approaches on a scientific-theoretic level, in addition to what predictions they make for the interface.

1.1.1 Architecture and theoretical backdrop

In the generative tradition (Chomsky 1965/1970/1981), especially in Minimalism, (Chomsky 1995/2004) the architecture of grammar is traditionally represented by the inverted T-model as shown in Figure 1 below. A numeration – that is, a set of lexical items that are preselected as the atoms that will be combined to produce a particular structure (Chomsky 1995, Hornstein 2005, Hinzen 2006) – is drawn from the lexicon and is run through syntax, undergoing syntactic operations such as *Merge* and *Move* before the syntactic object is sent off to PF and LF for interpretation (Chomsky 2001).

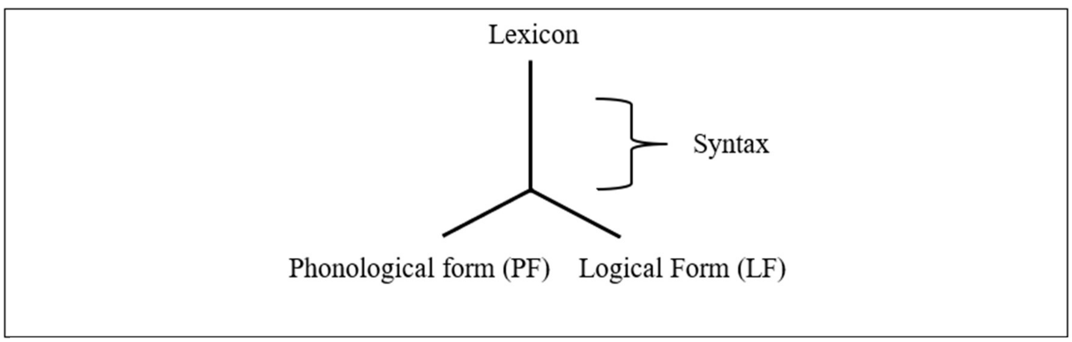


Figure 1 – The inverted T-model

The model takes the intuitive sound-meaning pairing known from structuralism as a starting point but this pairing is reformulated as a function of syntax. It is syntax that makes this pairing possible. The privileged status of syntax is also reflected in the fact that it is seen as the only component that is truly language internal insofar as it is not influenced by extra-linguistic domains. PF and LF on the other hand interact with extra-linguistic domains: PF with the articulatory-perceptual system and LF with the conceptual-intentional system. The crucial part of the architecture for the research goals of this thesis is the relationship between syntax on one side and phonology (PF) on the other.

A key feature of this feed-forward model is the division of labour into different modules, also known as modularity, where each module constitutes a system governed by its own principles and rules (Fodor 1983, Chomsky 1995). Modules are linked via interfaces where the output of one module acts as input for the next one. Given the architecture above, syntax always precedes PF in the linguistic derivation such that the output of the syntactic module feeds the PF module.[2] A postulate of modularity is that the modules do not operate with or on the same type of primitives. More specifically, syntax does not "speak" phonology and phonology does not "speak" syntax. This postulate rules out two types of inter-modular influences: I) phonology in syntax and II) syntax in phonology. I will deal with these in turn.

Type I refers to what is known as the principle of Phonology-Free Syntax (see Zwicky 1969, Zwicky and Pullum 1986). For instance, there is a rule in some languages that certain parts of speech have a designated position in the clause (i.e. verb second; see Holmberg 2015) but there is no language where words that start with nasals for example have to appear in a specific syntactic position. Syntax does not take phonological primes into account. There are however claims that prosodic considerations such as stress and size can have an effect on syntax (see for instance Inkelas 1989, Samek-Lodovici 2005). Another interesting case of phonologically conditioned syntax is found in some German dialects where admissibility of preposition stranding in some cases depends on the initial segment of the preposition. A consonant initial preposition may be stranded while a vowel initial one may not (Oppenrieder 1991).

This indicates that the Principle of Phonology-Free Syntax is perhaps too strongly formulated, as pointed out by Scheer (2011), who proposes that the term "melody-free syntax" is more accurate (p. 347-351). In fact, what we know as phonology may in reality consist of three distinct computational systems instead of just one (Scheer 2022). In particular, Scheer suggests that the phonological skeleton represented as abstract timing slots ties together properties from the three modules: Son(ority), Place and Lar(yngeal). The Son module operates on Son primes and is located above the skeleton and interacts with morphosyntax. The Place and Lar modules in contrast operate on Place and Lar primes (melodic primes) and are located

[2] An alternative model to the inverted T-model within the generative tradition is the *parallel architecture model* (Jackendoff 1997), where the three main components of language (syntax, phonology, and semantics) run in parallel.

below the skeleton. They do not interact with morphosyntax (hence “melody-free syntax”), but they do have an interface with phonetics.

Type I may appear to be excluded on architectural grounds as syntax precedes PF, but phonological influence in syntax is in principle also possible through the lexicon. It is nevertheless clear that the amount of phonological information that is available to syntax is limited and there are ways to deal with this given the architecture in figure 1. One way is to allow syntax to generate more than one possible structure and then let PF have a filtering effect, singling out the structure that best conforms to PF conditions (Rice and Svenonius 1998). Another option, which will be assumed in this thesis, is to adopt the principle of Late Insertion from Distributed Morphology (see section 1.2.2) where the phonological identity of syntactic items is revealed only post-syntactically.

As for type II, syntax in phonology, this is also excluded by the same postulate of modularity: PF does not process syntactic primes. That is, syntactic properties such as verbhood, nounhood or grammatical gender should not be visible/legible for the phonological component. However, this is not as easy to exclude on architectural grounds as syntax *feeds* PF, as reflected in the model in figure 1. Moreover, there is still the intuition that sandhi phenomena, such as RS from Italian shown in (1-1), have something to do with syntactic structure, thus indicating empirical support for type II influence. Yet the comparison with the syntactic constituency structure in (1-2) shows that that cannot be the whole story. Thus, we return to the question asked earlier: how do domains of phonological rule application relate to syntactic structure? As already mentioned, we find two different answers to this question in the literature, conventionally known as the *Direct Reference Hypothesis* (henceforth, DRH) and *the Indirect Reference Hypothesis* (IRH), labels that allude to what extent syntax is allowed to be present in the phonology. While IRH approaches restrict in principled ways the morphosyntactic information that sieves into phonology, the early DRH approaches to the interface were more permissive. For instance, Odden (1987:29) operates with a phonological rule that references nouns specifically. Another case, pointed out by Bermúdez-Otero (2012:53-55, citing McCarthy and Prince 1993a), is found in their treatment of reduplication where phonological constraints are indexed to morphological constituents. Both these cases are obvious violations of modularity.

The difference between the two current approaches, DRH and IRH, assuming that modularity holds, should perhaps rather be understood to be of an ontological nature. Indirect approaches operate with a set of primitives that denote domains for phonological rule application. They are *representational*. Direct approaches on the other hand deny the existence of these primitives and seek to derive domains for phonological rule application from the morphosyntactic structure. They are *derivational*. With this theoretical backdrop in mind, I move on to giving a closer description of direct approaches (1.1.2) and then indirect approaches (1.1.3).

1.1.2 Direct Reference Approaches

The immediate appeal of DRH approaches (Kaisse 1985, Odden 1987, Cinque 1993, Rizzi and Savoia 1993, Marvin 2002, Wagner 2005, Pak 2008, Samuels 2009, Newell and Piggott 2014 and D'Alessandro and Scheer 2015) to the syntax-phonology interface is that they do not require any additional machinery apart from notions we already know from syntax. In syntax, words are grouped together as chunks: they can move together, and they are interpreted together, clearly indicating that we are dealing with constituents or domains. A phonology that is sensitive to the very same domains is to be expected, especially given the architecture of grammar that is illustrated in fig. 1, so a direct approach to the interface is in principle more economical.

Another major advantage with DRH is that it provides phonology with some outside control. That is, postulating a domain for phonological rule application obviously needs phonological evidence but, in many cases, it has to be backed up by morphosyntactic evidence. Approaches to the syntax-phonology interface that adhere to the DRH are thus approaches that claim that phonological processes are directly sensitive to syntactic notions such as branching, sisterhood, c-command, phases, intervening nodes etc. Sandhi processes are thus understood to be conditioned by the structural relationship that exists between the two words involved. Phonological domains are in other words inherited directly from syntax in some way.

DRH approaches to the syntax-phonology interface have, as pointed out by Elordieta (2008), sometimes been accused of positing that syntactic domains and phonological domains are isomorphic. In such a view, all types of syntactic phrases are expected to behave the same way phonologically, making the distribution of sandhi processes such as RS in Italian in (1-1) puzzling (repeated below):

(1-1) a. *Colibrì [bb]rutti* – ugly hummingbirds

b. *Colibrì [k]osì [bb]rutti* – such ugly hummingbirds

(1-2) a. [*Colibrì*] [*brutti*]$_{AP}$]$_{NP}$

b. [*Colibrì*] [*così brutti*]$_{AP}$]$_{NP}$

A simple statement in terms of syntactic constituency is simply not a good predictor. However, no such view has been advocated within the framework of DRH and it would also most likely be untenable.

If we look at the analysis of *liaison* in French by Kaisse (1985:162-170) for instance, the phonological process is proposed to be constrained by c-command and branching while the notion of syntactic constituency does not play a role. Some of the relevant data from her analysis is shown below:

(1-3) a. *vraiment‿idiot*

'truly idiotic'

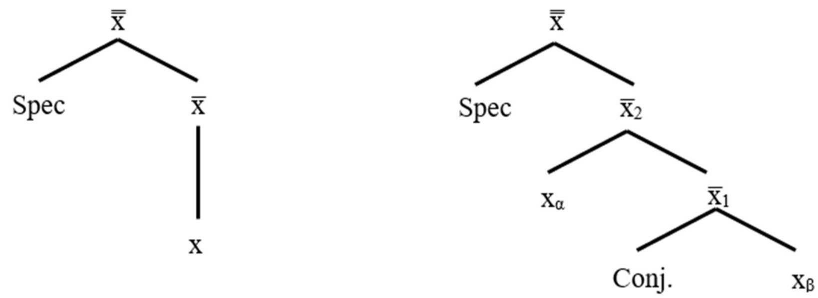
b. *vraiment | idiot et absurde*

'truly idiotic and absurd'

In (1-3)a, we see that *liaison* takes place between a modifying adverb and an adjective while it is blocked when we are dealing with a conjoined adjective phrase, as in (1-3)b. The analysis she proposes is one where the condition for *liaison* to apply is stated in terms of c-command.[3] More specifically: given a sequence of word$_1$ and word$_2$ where word$_2$ c-commands word$_1$ within the same maximal projection, *liaison* applies. The corresponding syntactic structures are shown below (adapted from Kaisse 1985):

[3] The definition of c-command that Kaisse is using is actually *domain c-command* (or m-command), where an element α can c-command into maximal projections but not out of them.

(1-4) a. b.



The idea is that the head of a given projection c-commands everything inside that projection. Thus, in (1-3)a with the corresponding syntactic structure (1-4)a, the non-conjoined head X is able to c-command the specifier of the maximal projection of X, thus meeting the requirements for *liaison* to take place. However, in (1-3)b with the corresponding syntactic structure (1-4)b, neither of the conjunct members is the head (the head in this case is $\bar{x}_2$), and consequently, none of them can c-command out of the conjunct. As *liaison* expresses a syntactic relationship between two words (the head $\bar{x}_2$ does not qualify), the result is that *liaison* is blocked. There are a number of problems with this analysis (see Elordieta 2008 for critical remarks), but as we have seen, Kaisse's analysis does not have isomorphism between syntax and phonology as one of its predictions.

The most recent proposal within direct approaches to deal with interface phenomena is Phase Theory (Chomsky 2000, 2001), an implementation of linguistic derivation aimed at lessening the burden on syntax for computational reasons. The original motivation for Phase Theory came from the necessity of limiting the lexical access during the syntactic derivation. When a numeration is drawn from the lexicon and is run through the syntax, the access syntax has to lexical items in the numeration is limited through the means of lexical *subarrays* or *sub-numerations*. In particular, the proposal was that syntax had to finish its work in one sub-numeration before moving on to the next one. In such a view, the numeration drawn from the lexicon is not a completely unorganised set of items (1-5)a, but is already specified with some structure (1-5)b.

(1-5) a. *Numeration*: {a, b, c, d, e}

b. *Numeration with subarrays:* {{a, b}, {c, d, e}}

Thus, if the subarray {a, b} in (1-5) is the first subset of the numeration, the two elements have to be merged into the structure *before* the second subset of the numeration, {c, d, e}, becomes available for syntactic operations.[4]

This cyclic organisation of syntactic structure building forms the basis of Phase Theory, where each lexical sub-numeration corresponds to a phase, which again can be defined as some kind of syntactic object. However, instead of making phases follow from the organisation of the numeration, it is rather seen as a property of syntactic structure itself. In particular, Chomsky (2000, 2001) proposed that phases are tied directly to particular points in the syntactic structure building. When the derivation reaches these points, the Spell-out function, which ships off the structure that has hitherto been built to the interfaces PF and LF, is activated.

In practice, Phase Theory opens for the possibility that syntax sends off smaller substructures throughout the entire derivation instead of sending *whole* utterances. Consequently, bits and pieces of syntax that have been merged and could be said to constitute a unit of some kind are shipped off and interpreted consecutively. It is these chunks that are referred to as phases. This cyclic mechanism is assumed to be driven by economy considerations. If syntax is allowed to operate on smaller structures like this, it frees up a lot space in working memory as syntax can "forget" about the internal structure of what has already been built and Spelled-out, an effect that is also assumed to apply to the phonological component (Chomsky 2001:12-13,15). Phase Theory is thus a theory that reduces the linguistic computational burden.

Furthermore, Phase Theory is also an attempt at unifying domains that are found in all the three main components of the language faculty: syntax, semantics and phonology. The common

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[4] The necessity for sub-numerations was justified by data such as in i) and ii) below, where the two sentences in question have the exact same numeration.

i. There exists [evidence [that a man was in the garden.]]

ii. [Evidence [that there was a man in the garden]] exists.

An independently motivated principle, *Merge-over-Move*, made sure that the expletive was merged into the specifier of the lower TP instead of raising the internal DP. However, this principle would also block the formation of structures such as in ii) where the expletive is merged in the specifier of the higher TP. The concept of sub-numerations provided a way out from this undergeneration problem. The difference between i) and ii) would simply reside in whether the expletive and the internal DP were in the same sub-numeration or not.

factor for domains within those three areas of study is that they seem to be "closed" somehow for external influence. Evidence for the presence of a phasal head can thus be syntactic, phonological and/or semantic and is best illustrated with the *Phase Impenetrability Condition* (PIC)[5] (Chomsky 2001):

(1-6) In the structure [$_{ZP}$ Z … [$_{HP}$ α [H YP]], the domain of H is not accessible to operations at ZP; only H and its edge are accessible to such operations.

That is, operations at ZP that require access to YP are not allowed because YP is embedded inside HP. The domain of HP remains however, partially accessible, but only its edges: α and H. Possible syntactic effects of the PIC, which are well known in the literature, are for instance island restrictions (e.g. *Left Branch Condition*) where syntactic processes such as extraction are unable to target objects that are located inside the island. A related phenomenon is subjacency, a locality constraint on syntactic movement. In English, extraction of objects DPs from an embedded CP is restricted (depending on the verb of the matrix clause). Subject DPs on the other hand can freely be extracted because they are located at the edge of the relevant domain.[6]

In addition to this, we should also expect to find phonological and semantic PIC effects given that the Spell-out function triggers shipping of the syntactic object to the modules for these domains: namely PF and LF. An example of a domain for semantic interpretation, which cannot be modified from the outside, is found in Modern Hebrew where the concatenation of two nouns falls into different classes depending on various properties (Borer 2009). Such noun concatenations are head-initial and may have compositional or non-compositional readings. Noun concatenations with non-compositional readings are classified as compounds by Borer, and they are cases of "closed" semantic domains. More specifically, noun concatenations in Hebrew in general allow their non-heads to be modified, but this is impossible in compounds without the loss of the non-compositional reading (data from Borer 2009):

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[5] There is a general consensus that there is a clustering effect in domains that has some morphosyntactic grounding, but the validity of the PIC has been called into question. See Newell (2017) for more details.

[6] There is disagreement concerning whether island and extraction restrictions are true syntactic constraints or not. See Culicover et al. (2022) for a different view.

(1-7) a. *beyt ha-xolim*
house the-patients.pl
'the hospital'
b. *beyt ha-xolim ha-xadaš*
house the-patients.pl the-new.sg
'the new hospital'
c. *beyt ha-xolim ha-xadašim*
house the-patients.pl the-new.pl
'the new patients' house'
*'the new hospital; the hospital for new patients'

In (1-7)a, we see that the concatenation of the words for 'house' and 'patient' gives rise to the non-compositional reading 'hospital' (presumably the compositional reading 'the patients' house' is also available). The structure as a whole is available for modification. This does not change the non-compositional reading, as shown in (1-7)b. However, attempts to modify the non-head, as in (1-7)c, results in breakdown of the non-compositional reading, thus showing that such constructions in Modern Hebrew form closed domains for semantic interpretation, a possible PIC effect.

On the phonological side, we find domains for the application of rules of phrasal phonology, typically sandhi processes, where a given rule applies between words that are both on the inside of the domain, while the same sandhi rule is blocked if one of the words is located outside of the domain. We have already seen examples of this from Italian (1-1) and French (1-3), that can be interpreted as phonological PIC effects.[7] It is clear though that the PIC for phonology may need a less rigid statement for certain properties (see Embick 2014). However, with the tools that Phase Theory gives us, we can make the assumption that syntactic extraction constraints, semantic domains and phrasal phonology all converge on the same unit: the phase.

[7] Note that using RS in Italian and liaison in French as diagnostics for a domain (see Kaisse 1985:156-170 for a DRH approach and Nespor and Vogel 1986:165-180 for a IRH approach) is not uncontroversial. As pointed out by Wagner (2015:1160-1161), sandhi processes may be highly variable and thus unreliable for domain identification.

An immediate advantage with the phasal approach is that it is easy to combine with the principle of modularity. The idea is that as soon as syntax has built an object and sent it off to the interfaces, the internal syntactic structure and bracketing are rendered "invisible" in the sense that they have no meaning for PF and LF. For instance, when a Spelled-out syntactic object arrives in PF, the phonological component starts interpreting the object through processes such as linearisation and vocabulary insertion (according to the assumptions in Distributed Morphology, see section 1.2.2 for more details). PF has its own set of primitives and principles that apply and is ignorant of syntactic categories such as nouns and verbs because such categories have no meaning at PF. In essence, this means that PF treats all phases the same way. Still, this leaves many open questions for which there is no general consensus.

For instance, there is no agreement on what counts as a phase. Chomsky's (2000, 2001) original proposal was that *v*P and CP were the locus of phasal heads, causing a Spell-out of their complements.[8] Bošković (2005) argues that DP is a phase on a par with CP. Marvin (2002), in her work on cyclic stress assignment coached within Distributed Morphology, is more generous and also counts categorising heads as phasal. Another type of domain derived from phases is what Pak (2008) refers to as the "constituent complements" (p. 24), the leftover string between Spell-out *n* minus the part that belongs to Spell-out *n-1*. In the same breath, it is worth mentioning Uriagereka (1999) where syntactic branching plays a role. His approach, even though not strictly phasal, advocates that syntactic objects that are located outside the spine of the tree have already been assembled and Spelled-out separately (i.e. undergone interpretation at the interfaces) *before* they are plugged into the main structure (we will get back to this in section 4.4.2).[9]

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[8] The phase represented by *v*P is limited to *transitive* *v*P. Passives and unaccusatives are excluded. See also Marantz (1997).

[9] The phasal approach to the syntax-phonology interface is in danger of overgenerating the number of phases, but it has also been criticised for not hitting the target (Cheng and Downing 2012). The standard assumption in Phase Theory is that a domain that is Spelled-out is the complement of the phasal head, leading to heads and complements being in separate Spell-out domains. As Cheng and Downing point out, this sometimes leads to the wrong predictions at the CP level.

In addition to the question of phasehood, there is also the question to what extent phases necessarily engender domain effects at the interfaces. The model does predict a unidirectional dependency in that the existence of domains of interpretation at the interfaces requires a phasal origin in syntax, but the model does not say if phases *always* give rise to such domains. D'Alessandro and Scheer (2015), for instance, operate with an implementation of the model where the Spell-out function is separated from any PIC effects. That is, Spell-out occurs in normal fashion at specific points in the derivation, but its effects (e.g. extraction islands, domains for phrasal phonology) are parameterised. Thus, every access point for Spell-out in the syntactic structure is endowed with an on/off button for PIC effects in PF (and in syntax). They look at RS data from Abruzzese Italian where the syntactic similarity between passives and unaccusatives is not mirrored in the phonology. RS is lexically triggered in Abruzzese Italian by what appears to be the auxiliary BE in passive contexts (1-8)a, but this does not apply to unaccusatives (1-8)b:

(1-8)	a. So [ww]ardatə	PASSIVE
	'I am watched'	
	b. So [r]əmastə	UNACCUSATIVE
	'I have stayed'	
	c. So [w]ardatə	ACTIVE
	'I have watched'	

D'Alessandro and Scheer assume that *v*P is the relevant a phase and that the auxiliary is located in T while the main verb is located in VP. The phase will thus not contain the auxiliary. They suggest that the difference between passives and unaccusatives lies in properties of the [voice] feature of *v*. More specifically, they propose that the passive value of the [voice] feature in *v* is equipped with a PF-specific PIC button that is set to off. The result is that the phase boundary between the auxiliary and the main verb in passive constructions is not phonologically active so that RS can apply between them. In other words, a phase does not necessarily come with phonological evidence. In unaccusatives on the other hand, the value of the [voice] feature in *v* is set to active, a setting that is associated with a PIC button that is set to on. Consequently, the auxiliary and the main verbs are in separate phonological domains and RS does not apply. Associating a phonological PIC effect with the active value of [voice] means that unaccusatives pattern together with actives, as shown in (1-8)c.

Other ways of tweaking the relationship between the Spell-out function and the phase have involved postponing the actual point of Spell-out with respect to the merger of the phasal head that triggers it. Newell and Piggott (2014), following ideas by Svenonius (2004), suggest that when the Spell-out function is called, its effectuation can be delayed in case the syntactic object in question still has uninterpretable formal features to check. The actual shipping of the syntactic object to Pf and LF is put on hold until the remaining uninterpretable features are checked, thus resulting in domains at the interfaces that are larger than the source phase.

Depending on the actual implementation of Phase Theory when accounting for interface phenomena, Phase Theory has the potential to unify two areas of phonology that have been taken care of by different tools. Morphology-sensitive phonology (below and up to the word level) has traditionally been taken care of by *derivational* means. This approach is exemplified by frameworks such as Lexical Phonology (Kiparsky 1982) (and to some extent also Stratal OT (Kiparsky 2000)) where phonological domains are identified as steps in the morphological derivation of words. Syntax-sensitive phonology on the other hand (i.e. phrasal phonology) has predominantly been taken care of by *representational* means[10], most notably through models based on Prosodic Hierarchy Theory (Nespor and Vogel 1986), which we will come back to in section 1.1.3. This fundamental difference in phonological competences between areas that are only distinguished by the size of the objects they work on is reminiscent of the debate between Lexicalism and Constructivism (see discussion in section 1.2.1). Given that this thesis assumes a constructivist view on morphosyntactic structure building (i.e. word formation takes place in syntax), it is natural to assume that a parallel situation holds for phonology. More specifically, there is no reason to assume that phonology can afford operating with two different strategies for domain delimitation. Phase Theory offers a way out of this by allowing lexical and phrasal phonology to be subsumed under the derivational umbrella. It is important to stress however, that this does not mean that we do not need anything representational, but the null hypothesis should nevertheless be that phonological domains are derived.

[10] Note that the distinction that is drawn here between *derivational* and *representational* is in the context of phonology that is sensitive to morphosyntax. There are phonological representational entities that have nothing to do with morphosyntax, such as syllables, feet, feature trees etc.

1.1.3 Indirect Reference Approaches

Indirect reference approaches to interface phenomena advocate for a less tight relationship between syntactic structure on one side and phonological/prosodic structure on the other than we find in the direct approaches (Nespor and Vogel 1986, Selkirk 1986/2011, Chen 1987, Inkelas 1989, Truckenbrodt 1995, Inkelas and Zec 1995, Itō and mester 2009/2019, Elfner 2012, Bennett 2018, Kalivoda and Bellik 2021). This view has no consequences for how the architecture of grammar is conceptualised (figure 1, repeated below):

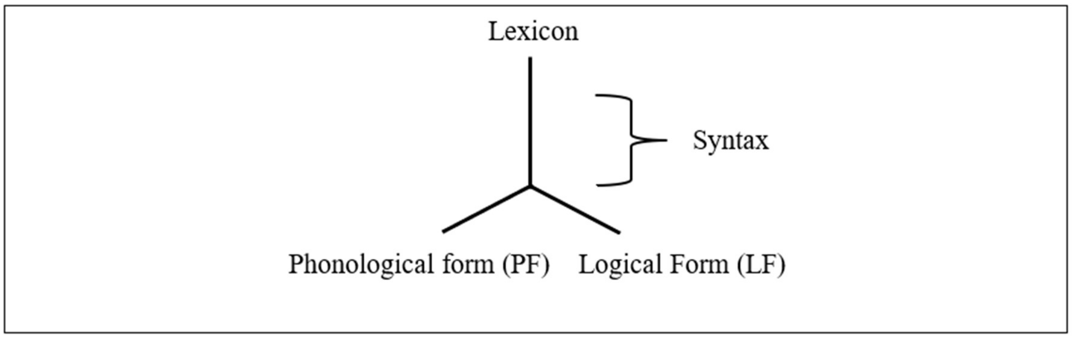


Figure 1 – The inverted T-model

That is, syntax does have a privileged status also in indirect reference approaches in that syntax feeds the phonological component. Thus, they take syntax as the starting point for delimiting domains for phrasal phonology. The diverging point however is how modularity is solved. Indirect approaches accept the premise of modularity and aim at limiting the access phonology has to morphosyntactic information, but it is done through the aid of a translating mechanism that mediates the communication between syntax and phonology.

The framework of indirect approaches is also known under the name Prosodic Hierarchy Theory, as they all subscribe to some version of the Prosodic Hierarchy (1-9), which is the upshot of the translating process that is assumed to take place between syntax and phonology. Domains for phrasal phonology are engendered in this process through the creation of prosodic levels:

(1-9) *Prosodic Hierarchy* (Selkirk 1986:384)

```
(------------------------------------------------------)   Utterance
(----------------------------------)(------------------)   Intonational Phrase
(----------)(----------------------)(------------------)   Phonological Phrase
(----------)(------)(--------------)(----------)(------)   Prosodic word
(--)(------)(------)(--)(----------)(------)(--)(------)   Foot
(--)(--)(--)(--)(--)(--)(--)(--)(--)(--)(--)(--)(--)(--)   Syllable
```

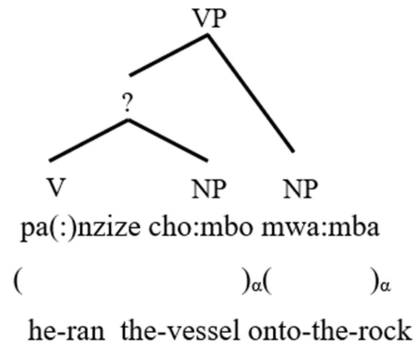
Prosodic Hierarchy Theory holds that every utterance is parsed into prosodic constituents as shown in (1-9), where any lower constituent is properly contained in the one above. This means that a boundary at the level of the Intonational Phrase implies a boundary of any lower ranked category, in accordance with the *Strict Layer Hypothesis* (Nespor and Vogel 1986:7).

Evidence for IRH and for prosodic constituency has been reported from a wide array of phonological variables such as sandhi processes (RS in Italian and *liaison* in French (Nespor and Vogel 1986) but there is also tonal sandhi in Xiamen Chinese (Chen 1987)), domain final lengthening (Italian: Ghini 1993, Zulu: Cheng and Downing 2007/2009), and pitch reset/downstep (Japanese: Selkirk and Tateishi 1991, Itō and Mester 2007). Selkirk (1986) argues that Chimwiini (a Bantu language) has a Latin-like stress system (right-aligned moraic trochees with final syllable extrametricality (Hayes 1995:91-92)) except that its domain is not the word like in Latin but some larger domain that she identifies as the phonological phrase. Chimwiini has several sources for long vowels (e.g. underlying, morpheme-induced, word-final position) but vowel length will only surface if the syllable in the relevant domain is stressed. This effectively results in a system where long vowels are found only in penults and antepenults. Thus, the lexical item in (1-10)a has a (perhaps underlyingly) long antepenult vowel, while the suffixed form in (1-10)b does not because the relevant vowel is no longer within the distributional window where long vowels are licit (data from Selkirk 1986):

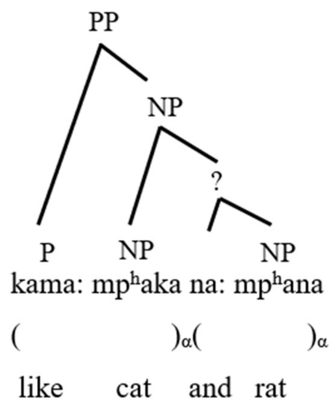
(1-10) a. *ma:limu* – teacher
b. *malimuwe* – his teacher

Crucially, the Latin-like stress rule takes scope over a domain that is larger than the word, and Selkirk argues that this domain does not correspond to a syntactic constituent. The domain is constrained by the right edge of XPs:

(1-11) a.



b.



In (1-11)a, the verb has a long vowel in the antepenult, but because the verb is phrased together with the object (as indicated by the parenthesis marked as α), the long vowel is no longer in a position where it is licit, resulting in shortening of the vowel. The long vowel of the object on the other hand is retained because it is the penult in the domain. The second NP is phrased separately as shown by the presence of the long vowel. The VP is in other words split up between two phrasal domains. Likewise, the PP in (1-11)b is also split up between two phrasal domains as shown by the distribution of the long vowels. Selkirk argues that the stress rule cannot refer to syntactic constituency because the α domains does not correspond to any syntactic constituent. Instead, she suggests that the stress rule refers to a phonological domain (i.e. the phonological phrase) that is sensitive to the right edge of syntactic XPs. Thus, Selkirk uses the distribution of long vowels in the language as diagnostics for phonological phrases.

The exact number of levels in the prosodic hierarchy may vary depending on the analysis, but the general core remains the same. The amount of morphosyntactic information is limited as Prosodic Hierarchy Theory only allows information about syntactic *constituency* to sieve through. The idea is that syntactic constituents are "translated" into phonological constituents through a set of mapping algorithms that do not always have to respect the original syntactic structure due to constraints and restrictions, which may or may not be language specific, in the phonological component. The result is that there may be mismatches between syntactic constituents on one side and prosodic constituents on the other. When phonological rules at the phrasal level apply, they do not refer to morphosyntactic properties, in accordance with modularity, but rather to prosodic constituents.[11] For instance, the domain for a given phonological rule may be specified to apply within the phonological phrase. The notation for this kind of information channelled into PF is by convention done with Greek symbols that denote the type of constituent in question: ω for Prosodic words, φ for Phonological Phrases and ι for Intonational Phrases.

This way of delimiting domains of application for phonological rules is *representational* because the prosodic constituents themselves have to be phonological primitives in order for PF to be able to process them as pieces of information that are phonologically meaningful.[12] Prosodic constituents in Prosodic Hierarchy Theory are admittedly influenced by syntax, so the approach represented by the theory is derivational in some sense, but the result is nevertheless

[11] Depending on the particular implementation of Prosodic Hierarchy Theory, there is disagreement whether modularity is respected. Scheer (2012) and Newell (2018) stress that phonological computations within Optimality Theory where purely phonological constraints proper are interleaved with interface constraints for the syntax-phonology mapping (in particular constraints from the ALIGN family and similar offshoots like MATCH constraints (Selkirk 2011)) are in direct conflict with the principle of modularity. Such computations imply that phonology is responsible for phonology proper *and* for the mapping procedure. Samek-Lodovici (2005) holds that interleaving of constraints is not necessarily a problem for modularity as long as the definition of the constraints that do not pertain to the interface itself is modularly pure.

[12] The phonological meaningfulness of the prosodic constituents is disputed. Scheer (2012) holds that the constituents from the Prosodic Hierarchy are diacritics, that is, they are alien units in the phonological component, as they serve no other purpose than to signal boundaries. His claim is that they are essentially the same as the hash marks # from SPE, except that hash marks were *linear* diacritics while {ω, φ, ι} are *autosegmental* diacritics. He suggests replacing the prosodic symbols with syllabic space (i.e. an empty CV unit), a more generally accepted currency in PF. As pointed out by Kim (2015), however, diacritic boundaries display an advantage in that they are easier to reconfigure and change throughout the phonological computation.

a phonology with an enriched set of primitives. Several arguments have been presented in favour of the Prosodic Hierarchy Theory, some of which are:

- **Non-isomorphism:** domains for phonological rule application are not always isomorphic with syntactic constituents. This is perhaps the most classic argument in the literature, demonstrated by the famous phrase from the poem "The house that Jack built", where the syntactic bracketing does not line up with the prosodic phrasing:

  Syntax: *This is* [*the cat that killed* [*the rat that ate the malt*]]
  Prosody: (*This is the cat*) (*that killed the rat*) (*that ate the malt*)

- **Clustering effects:** in languages with several phonological rules operating at the phrasal level, the domains of these rules tend to coincide. This would be unexpected if each rule could be sensitive to its own syntactic constituent, while it receives a more straightforward account under the assumption that phonological rules are forced to operate within a relatively small set of prosodic constituents. We have for instance already seen that the distribution of long vowels in Chimwiini (see (1-10) and (1-11)) takes the phonological phrase as its domain. Kisseberth and Abasheikh (2011) point out that Chimwiini also has a right-edge phrasal tone and that the distribution of this tone converges on the very same domain as vowel length.

- **Blindness to syntactic category**: certain types of morphosyntactic information such as features or category labels appear to be irrelevant to phonological phrasal rules. This suggests that these rules apply at a level of representation where this information is no longer accessible. For instance, in Norwegian retroflexion where the linear sequence of a rhotic /r/ followed by an coronal consonant /t d n s/ surfaces as a corresponding retroflex (or rather, apico-alveolar) also across word boundaries (Kristoffersen 2000, Solhaug 2010), syntactic categories such adjective, preposition, verb etc. are irrelevant.

- **Phonetically null elements are irrelevant**: null elements in syntax that are not phonetically realised (traces, PRO, copies etc) do not have blocking effects on sandhi phenomena. The PRO element in infinitives does not prevent in constructions with *want*, as in: *do you want* [$_{TP}$ PRO *to…*] → *do you wanna.*

The validity of these arguments will not be discussed in detail in this thesis, but for further discussion, see Pak (2008:42-60) and Bennett and Elfner (2019). What will be more interesting for our purposes are the predictions that are made by the direct and indirect reference frameworks, which I will get back to in section 1.1.4.

The agreement on the existence of the Prosodic Hierarchy itself notwithstanding, there are some unresolved questions within the framework for which there is no general consensus.

One point of contention is related to the fact that the number of prosodic categories that has been reported cross-linguistically varies a lot (see Vogel 2009:20 for a small overview). The question is: how do we accommodate phonological systems that distinguish more levels than we find in the Prosodic Hierarchy? This question touches on a long-standing debate between those who subscribe to the postulation of new prosodic categories (Downing 1999, Vogel 2009, Vigário 2010) and those who subscribe to recursion of already existing categories (Itō and Mester 2007/2009/2021, Selkirk 2011, Martínez-Paricio 2013, Martínez-Paricio and Kager 2015, Bennett 2018).

Another point of contention concerns the details of the nature of the relationship between syntactic constituency on one side and prosodic constituency on the other, in particular for the Phonological Phrase (φ-phrase). Nespor and Vogel (1986) argue for what is known as the *relation-based* approach where φ-phrase construction is done by reference to the head of lexical categories. The domain of the φ-phrase for them is a lexical head X including all the material on the non-recursive side up to the next lexical head outside of the maximal projection of X. It is thus an approach that relies on single-edge marking. Restructuring may apply in some cases, but it is nevertheless the lexical head that anchors the φ-phrase. If we take a simple head-complement-sequence such as VO as a toy example in a right-branching language, the relation-based approach would by default phrase V and O in separate φ-phrases, $(V)_{\varphi}(O)_{\varphi}$, as the complement would be on the *recursive* side of the head.

A slightly different mapping mechanism is suggested by Chen (1987), where φ-construction is based on maximal projections instead of on heads. This is known as the *end-based* approach. However, the single-edge marking is kept such that any given language will either use the right or the left edge of maximal projections as the basis for φ-phrase construction. Chen analysed tonal sandhi in Xiamen Chinese with reference to the right edge, and we saw that Selkirk (1986) suggested the same right-edge sensitivity for Chimwiini in (1-11). If we continue with our VO toy example, the end-based approach where right edges are marked would by default phrase V and O together in the same φ-phrase, $(VO)_\varphi$, as O marks the right edge of the VP that contains both of them.

Truckenbrodt (1995) represents an implementation of the end-based approach coached within an Optimality Theory framework. A first point of deviation with respect to the end-based approach we saw above is that instead of using syntactic notions as the anchoring point for construction of φ-phrases, he argues that prominence should play a bigger role. In particular, he holds that φ-phrases are constructed around phrasal stress, which comes about as the result of the work of the constraint STRESS-XP, a constraint that requires XPs to contain phrasal stress. When it comes to the actual formation of φ-phrases, Truckenbrodt assumes that the constraints ALIGN-R/L take care of this: the head of the φ-phrase (i.e. location of phrasal stress) is aligned with either the left or the right edge of the φ-phrase (i.e. single-edge marking). The edge-setting is generally determined by the branching direction in the syntax of the language (e.g. right-alignment if the syntax is right-branching). By bringing prominence to the forefront of the syntax-phonology mapping, prosodic structure and metrical structure are considered to be to be part of the same representation.

The second point of deviation relates to a problem that is difficult to solve by using the mapping procedure in Chen (1987) and Selkirk (1986), a problem that Truckenbrodt set out to solve. If XP_1 is contained inside XP_2 and their right edges coincide, is the edge marking for one or for the other (or both)? Looking at Chimwiini from (1-11) again and comparing it to similar structures in Chichewa (another Bantu language) reveals that they make different choices (only rudimentary syntactic structures shown below):[13]

[13] The diagnostics for the phrasing in Chimwiini are the distributions of vowel length and phrasal tone (Selkirk 1986, Truckenbrodt 1995, Kisseberth and Abasheikh 2011) while for Chichewa the basis is a vowel lengthening process as well as some tonal processes (Kanerva 1989, Truckenbrodt 1995).

(1-12) *Chimwiini*

[V [NP] [NP]]$_{VP}$ *Syntactic structure*

{ }$_{\varphi}${ }$_{\varphi}$ *Prosodic phrasing*

(1-13) *Chichewa*

[V [NP] [NP]]$_{VP}$ *Syntactic structure*

{ }$_{\varphi}$ *Prosodic phrasing*

While Chimwiini puts prosodic boundaries at the right edge of the two NPs contained inside the VP, thus creating two prosodic domains, Chichewa phrases the whole VP as one single domain. Truckenbrodt proposes that this is due to the constraint WRAP-XP, a constraint that forces syntactic XPs to be contained in phonological phrases. That is, the phonological phrase should be at least as large as the relevant syntactic phrase. He demonstrates that in Chimwiini, ALIGN-R ranks above WRAP-XP with the result that prosodic boundaries are installed on the right edge of every relevant XP. This also means that the VP is split up in two separate prosodic domains. In Chichewa, the ranking between the two constraints is reversed. When WRAP-XP ranks above ALIGN-R, the prosodic integrity of XPs become more important, thus blocking a phrasing where they are split up. By phrasing the VP and the two NPs it contains together in one single phonological phrase, none of them are split up. This analysis shows that a mapping procedure from syntax to prosody is far from trivial as conflicting demands may complicate the process.

A more recent addition to the family of mapping strategies is Selkirk's (2011) Match Theory (see also Elfner 2012, Itō and Mester 2013 and Bellik et al. 2023) where prosodic constituents are sensitive to *both* edges of syntactic constituents. This is done through Optimality Theoretic constraints requiring a strict 1-to-1 correspondence between syntactic constituents on one hand and prosodic ones on the other, taking three syntactic levels into account: words (X^0), phrases (XP) and clauses (CP). Establishing a strict correspondence between the two levels of representation has two major consequences: first, it limits the number of possible phonological interface primitives. With three mapping constraints (MATCH-CLAUSE, MATCH-PHRASE, MATCH-WORD) we get three distinct prosodic categories (ι, φ, ω) that interface with syntax. The fact that the mapping constraints tightly track syntactic constituency and structure entails that Match Theory predicts recursion of prosodic categories, thus showing that the model can accommodate languages where there are more prosodic levels than the three basic categories ι, φ and ω. Second, when the expected isomorphism between syntactic and prosodic structure is disrupted, the driving force does not lie in properties of the mapping procedure itself (as was the case for the relation-based and edge-based approaches discussed above) but rather in constraints on the prosodic well-formedness of the resulting structure. For instance, a head-complement-sequence such as VO could potentially be phrased as $(V)_{\varphi}(O)_{\varphi}$ due to the effect of the constraint MATCH-PHRASE (if we also assume that it is more important to φ-phrase the object NP than the VP). However, if dominated by a constraint requiring phonological phrases to contain minimally two prosodic words (e.g. BINMIN (φ, ω)), the phrasing would be $(VO)_{\varphi}$.

1.1.4 Predictions

As we have seen above, there are in principle two channels for morphosyntax to communicate with phonology. One possible channel of communication is done through derivational means, where discrete steps in the series of operations in syntactic computation have phonological effects. The other possible channel of communication is done through representational means, where the syntactic structure is enriched in the translation process with units that are legible for phonology and that carry information about boundary strengths. It is in principle possible that both channels are used but if economy considerations play a role, we would expect that the language faculty permits itself to have only one channel. In other words, there is no a priori reason that the same work needs to be done in two different ways. In case we do have to operate with two different communication channels, this will need to be justified by evidence.

Consequently, our default assumption is that only one approach to the syntax-phonology interface is correct: it is either derivational or representational. If the interface is characterised by both types of communication, this will have to be demonstrated.

Now, if communication between syntax and phonology bases itself on only one strategy, we need a way to figure out what that strategy is. Naturally, this will depend on empirical data and the interpretation of those with respect to the predictions that are made by different approaches to the syntax-phonology interface.

Before we turn to the predictions, there is also something to say about how the derivational approach and the representational approach relate to each other. They both give syntax a prominent role in defining and delimiting domains for phonological rule application, as that falls out from the architecture of grammar in figure 1, but as we have seen, the difference lies in how that is communicated to the phonology. In Phase Theory, the most important direct reference approach, the interface is derivational in that phonological domains fall out from how the Spell-out function operates. They are directly derived from syntax so there is in principle no “translation”. If we look at Prosodic Hierarchy Theory, the most important indirect approach, the interface is representational in that syntactic domains (generally assumed to be constituents) are “translated” into phonological domains. When these domains enter the phonological computation, they come with a little tag attached from the translation device, giving the phonology information about the nature of the chunk. The phonology will thus deal with it accordingly. Consequently, it is these little tags acting as additional primitives in the phonological component that demonstrate the representational nature of the approach. Both the direct and indirect approach are rooted in syntax, but the picture that emerges is one where the indirect approach is in some sense the direct approach *in addition* to something else. The central question concerns whether we need an enrichment in the set of phonological primitives or not. Given that the *indirect approach* is the more elaborate one as it represents this kind of enrichment, I will treat the direct approach as the *default hypothesis*. We should seek derivational accounts for interface phenomena before we turn to representational accounts. In other words, representation starts where derivation ends. However, I will also treat the direct approach as the *null hypothesis*, meaning that it is the direct approach that is put to the test. If a direct approach is not possible to a given interface phenomenon, this indicates that we might need something representational.

When it comes to the actual empirical arguments figuring in the literature for each of the two main approaches, we have already seen some of those in the preceding sections. Obviously, the specifics of the predictions that are made will naturally depend on the actual implementation of the approach. For instance, within Prosodic Hierarchy Theory, while both the relation-based mapping algorithm (Nespor and Vogel 1986) and the end-based mapping algorithm (Chen 1987) operate with representational units for phonological domains, they come with different predictions concerning the location of domain boundaries in some cases. Such variations in predictions within the same main approach notwithstanding, there still remains a core set of claims about the interface that is said to differentiate between the direct and indirect approaches when faced with empirical data.

I will not discuss all of them in this thesis, but rather focus on one property that is not discussed very often in the literature: boundary deletion in the phonological component. As already mentioned in section 1.1.3, the most common argument in favour of indirect approaches is the non-isomorphism that we find between syntactic constituents and phonological domains, a situation that can arise in different ways, boundary deletion being one of them. In spite of the frequent use of non-isomorphism as an argument in the debate, it is perhaps not always the best one because it is understood solely in terms of syntactic constituency. It is thus highly dependent on the syntactic analysis, meaning that a given mismatch between syntactic structure on one side and phonological structure on the other (a case of non-isomorphism) will disappear if the syntactic analysis is changed to accommodate the phonological structure.

This idea is pursued by Wagner (2005) and Royer (2022) amongst others, where the two types of structure are two sides of the same coin: seeing the structure in one helps in figuring out what the structure in the other is. For instance, Wagner argues that the apparent mismatch between syntax and prosody found in cases in which a predicate takes a coordinate structure as its complement (data in (1-14) adapted from Wagner (2005)) is better analysed with reference to syntactic extraposition (pp. 118-123).

(1-14) a. She (kissed Lysander)$_{\varphi}$ (and Demetrius)$_{\varphi}$
b. She has (some blueprints to leave)$_{\varphi}$ (and a book)$_{\varphi}$

The predicate 'kiss' takes the coordinate structure 'Lysander and Demetrius' as its complement, while the predicate 'leave' takes 'some blueprints and a book' as its complement. Yet the most natural prosodic phrasing installs a boundary between the conjuncts in (1-14). We saw a very similar example from Chimwiini in (1-11) (repeated in (1-15) here) where a preposition takes a coordinate structure as its complement but the phonological phrasing splits the conjuncts:

(1-15) (kama: mp^{h}aka)$_{\varphi}$ (na: mp^{h}ana)$_{\varphi}$
like cat and rat

In the end-based approach, such cases are accounted for by assuming that a φ-phrase boundary is placed at the right edge of XPs, thus forcing the conjuncts to be phrased separately from each other. However, Wagner advocates that we are rather dealing with syntactic extraposition of the second conjunct (including the connector), and he bases the argument on subject-verb agreement and on the possibility of having adverbials intervening between the conjuncts. If the second conjunct and the connector are extraposed to the right (albeit string-vacuous in the case of (1-14)), the prosodic phrasing follows suit. He also stresses that any approach to the phrasing of the data in (1-14) must take extraposition into account as the predicate sometimes is found inside of the coordinate structure (as in the b) example). The mechanism of extraposition is in other words needed anyway. By postulating that syntactic and prosodic structure mirror each other, we can use prosodic structure to shed light on what the syntax looks like.

If this is true, then a proposed prosodic domain that appears to deviate from syntax may be a *de facto* derived domain. It may well be though that we still have not figured out what the exact relation to syntax is, hence the mismatch. This type of mismatch arises if we have the wrong syntactic analysis or, as pointed out by Pak (2008:51), when we tacitly assume that the only relevant aspect of syntax in this respect is constituency.

There are two other types of non-isomorphism that we can conceive of and that are contingent on the capabilities of components in the post-syntactic derivation.

If we adopt the view advocated by DHR and Phase Theory, phonological domains are directly derived from syntax. It should be noted though that this does not imply that there are no independent phonological mechanisms at work in delimiting domains. Phase Theory is compatible with a model where syntax is the primary source of domains for phonological rule application while allowing for phonology to operate within the chunks defined by syntax. In this view, a boundary installed by syntax has to correspond to a phonological boundary, while a boundary installed by phonology does not necessarily correspond to a syntactic boundary. This situation will create a mismatch between syntax and phonology, but it is a type of mismatch that is in principle compatible with the DRH. The job for us then would be to figure out whether a given phonological domain is induced by syntax or by phonology.

If on the other hand we adopt the view advocated by IRH and Prosodic Hierarchy Theory, syntax still does play an important role in delimiting domains for phonological rule application. In this view however, the prominent role of syntax in defining domains has to be stipulated, generally through explicit mentioning of syntactic constituents in the mapping procedure (though there is in principle nothing in the theory that prevents the mapping procedure to be set up in a different way, for instance by referencing phases, c-command relations or something else.) There is some kind of post-syntactic mechanism that is responsible for translating syntactic constituents into phonological domains. Depending on the content of the instructions for translation, Prosodic Hierarchy Theory allows for syntactically installed boundaries to be overwritten and ignored by phonology. Consequently, a situation may arise where a syntactically installed boundary does not correspond to a phonological boundary, resulting in a syntax-phonology mismatch. Thus, we have two types of mismatches that depend on the capabilities of the phonological component (or whichever component is responsible for translation in indirect reference frameworks):

I. New boundaries can be inserted in the phonological component *in addition* to the ones that are put in place by syntax (compatible with both IRH and DRH).

II. Boundaries that are put in place by syntax can be overwritten in the phonological component (compatible with the IRH, but *not* with the DRH).

Given that the direct reference hypothesis is taken to be the null hypothesis in this thesis, it is this hypothesis that will be put to the test. With the predictions as stated above, we see that there is one point where the DRH and IRH split paths: are syntactically installed boundaries in phonology absolute? Said in other words: can phonology see through a syntactic boundary? Linguistic data that show that a rule at the level of phrasal phonology can apply across a syntactic boundary have to be interpreted with caution. There is no doubt that such data would indicate that the DRH, as represented by Phase Theory, is too strong. That does not entail however, that the IRH is correct in its entirety. What such data would indicate is that we might need something representational at the syntax-phonology interface, but to what extent would remain an open question. For instance, we might find that there are only certain types of syntactically installed boundaries that can be overwritten by phonology whereas others always remain intact.

1.2 The nature of morphology

This thesis is coached within the framework of Distributed Morphology (Halle and Marantz 1993, Embick and Noyer 2001/2007). Distributed Morphology (henceforth DM) is a model of grammar where a central tenet is that word-formation takes place in the syntax (i.e. syntax-all-the-way-down). This entails that syntax operates on both word-sized units and sub-word units. In the larger theoretical context of the controversy between Lexicalism and Constructivism, DM is a contribution to the constructivist side. In what follows, I start by discussing the aforementioned controversy, also making it clear why a constructivist approach is chosen for this thesis. That will be the topic of section 1.2.1. In section 1.2.2 I present the specifics of DM.

1.2.1 Lexicalism and Constructivism

The debate between Lexicalism and Constructivism concerns the locus of word-formation in grammar. The central conceptual difference between them boils down to how many generative engines there are in morphosyntactic structure building. Lexicalist approaches operate with two generative engines: one for morphology (i.e. word-formation) and one for sentences. Constructivist approaches reject the need for a separate generative engine for word-formation and operate only with one. Below, I present both approaches and their arguments, thus showing why a constructivist approach is chosen for this thesis.

<u>*Lexicalism*</u>

Lexicalism grew out of the need for a theory of word formation. In early generative grammar, word formation had been handled by phonology and by transformational rules. For instance, the fact that *destruction* is the nominalisation of *destroy* (instead of e.g. **destroy-ment*) was taken to be a matter of phonology (Chomsky 1965:184-185). As for compounds, the assumption was that they were the result of transformations of underlying sentences. This view was advocated by Lees (1960), and the motivation was that the semantic relationship that holds between compounds members is the same type of semantic relationship that holds between constituents in a sentence. A compound like *house owner* would then be seen as a transformation of the underlying sentence “person who owns a house”. The transformational approach was ultimately abandoned when it became clear that the transformations assumed to apply in word formation were not as neat and regular as the transformations that were assumed to apply in syntax. Consequently, the type of transformation that took place in word formation must be a different animal, thus sowing the first seeds of Lexicalism: the idea that morphology is an independent module in grammar, that is, a module independent of and different from syntax. The idea was first proposed in Chomsky (1970) and was explored in later work such as Halle (1973), Siegel (1974) and Allen (1978).

The separation of morphology and syntax in turn means that word formation in Lexicalism is something that takes place *prior* to syntax. Whether this process takes place in the lexicon (as the term ‘Lexicalism’ itself hints at) or in a separate morphological component is of less importance. The main point is that words are already formed by the time they reach syntax. Such a conceptualisation of grammar results in two generative engines: one word formation process, which we can refer to as morphology, and one sentence formation process, which we can refer to as syntax proper. With this view, the lexicon is not merely a fixed list of lexical items, be it simple words or idioms, but it is an engine for a word formation process that is generative. The lexicon changes from being a rigid fixed list with a limited number of items to becoming a dynamic part of grammar where new vocabulary items are created. The idea is that word formation is governed by other rules and principles than those we find for syntax and that this can be demonstrated empirically. In other words, the claim is that Lexicalism is necessary because there are phenomena that cannot be accounted for with a purely syntactic approach (see Ackema and Neeleman 2002, Williams 2007 and Newmeyer 2009).

With two separate modules that are connected through an interface, we would also expect modularity to hold between them (see section 1.1.1). Consequently, objects that are created in the morphology (i.e. words in a broad sense) are representational objects from the point of view of syntax, and they arrive in syntax already equipped with syntax-relevant information such as word class, argument structure etc. Thus, it follows that the only objects that syntax is able to work on are in a sense 'word sized'. This is reflected in the *Lexical Integrity Principle*, which all lexicalist theories subscribe to in some form or other:

(1-16) *Lexical Integrity Principle*
The internal structure of words is not accessible to syntax.

In other words, syntactic rules and processes are unable to refer to the individual building blocks (i.e. morphemes) inside these 'word sized' objects. From the point of view of syntax, objects created by the morphological component are monolithic chunks.

It is possible to distinguish between a strong and a weak version of Lexicalism, depending on the division of labour between morphology and syntax. A strong lexicalist position (e.g. Halle 1973, Lieber 1980) implies that *all* morphology, derivational and inflectional, is done in the lexicon (or in the morphological component). A weak lexicalist position (e.g. Anderson 1982, Booij 1996) on the other hand leaves some morphology for syntax. Typically, a weak lexicalist position holds that derivational morphology takes place in the lexicon, while inflectional morphology is syntactic. The distinction between strong Lexicalism and weak Lexicalism will naturally have consequences for the predicted scope of the Lexical Integrity Principle in (1-16).

Constructivism

Constructivist approaches (e.g. Halle and Marantz 1993, Borer 2005a/2005b/2013, Ramchand 2008) hold that there is only one generative engine, i.e. syntax, and we can think of this position as syntax-all-the-way-down. For a constructivist, there is no separation between word-formation and sentence-formation as they are both handled by syntax. This implies that the objects that syntax operates on are not necessarily word-sized; there must also be vocabulary items that are smaller than words. For instance, the Norwegian word form *uvenn* (lit. un + friend) 'enemy' contains two morphemes, the root *venn* 'friend' and the negative prefix *u*- 'un-', where only the former can be considered word-sized. The prefix on the other hand is never a stand-alone word so it always occurs attached to something else. On the assumption that syntax is responsible for this type of word formation, it follows that syntax is not merely dealing with word-sized items but also with affixes. For a constructivist, such forms are formed through the same syntactic process as the one that creates a VP from a verb and an object: Merge.

Constructivist approaches also advocate that words (or rather roots) are not verbs and nouns in and of themselves. The syntactic distribution of a root is in other words not governed by properties that are intrinsic to the root. The constructivist idea is rather that the vocabulary items that syntax operates on do not contain information regarding syntactic distribution and behaviour such as word class affiliation, but that these properties are derived by the syntax. That is, syntactic information is not present in vocabulary items when they enter the syntax (i.e. when they are drawn from the lexicon) but arises as a result of the structural environment. For instance, the lexical item *drink* in English can be used either as a noun or as a verb. The constructivist position is that we are not dealing with two separate lexical items here, where one is classified as a verb and the other is a noun. It is the same underlying root, but the exact interpretation of *drink* follows from the syntactic context. The constructivist approach thus captures the fact that $drink_{\mathrm{V}}$ and $drink_{\mathrm{N}}$ share a significant part of their conceptual semantics.

Constructivist approaches thus agree there is no word-formation that is pre-syntactic, but there are implementations of the constructivist programme, such as Embick and Noyer (2001/2007) that allow for certain post-syntactic morphological readjustments on the PF branch. According to Embick and Noyer, the formation of synthetic comparatives in English is the result of a process that inverts the linear order of two adjacent morphemes. Following Abney (1987), they assume a morphosyntactic structure of comparatives where the comparative feature dominates the adjective: $[_{\mathrm{DegP}}$ Comp $[_{\mathrm{AP}}$ A]]. However, even though the comparative is structurally higher than the adjective, its linearisation with respect to the adjective depends on the prosodic properties of the adjective. In monosyllabic adjectival stems and disyllabic adjectival stems with especially light second syllables, the comparative is linearised after the adjective as a suffix *–er* (Abney 1987:217). Otherwise, we find analytic comparative formation with *more*. This is shown in (1-17) below (data adapted from Embick and Noyer 2001):

(1-17) a. smart-er
b. more intelligent
c. *intelligent-er

Embick and Noyer interpret this as a post-syntactic movement operation where the linear order between two adjacent morphemes is inverted, thus producing the synthetic form in (1-17)c. We will get back to more details about their approach in section 1.2.2.

Comparison

The empirical ground for this thesis from a morphosyntactic perspective consists of morphologically complex words, i.e. derivations and compounds. As the preceding paragraphs have shown, morphologically complex words constitute an empirical domain, which lies at the heart of the controversy between Lexicalism and Constructivism. In that respect, compounds are particularly interesting as they seem to be a hybrid between morphology and syntax. They are considered to be word-sized structures in the sense that they occupy a single syntactic slot in a given phrase in spite of their potential infinite length. They appear to be created *before* syntax. At the same time, there is also the notion from Lees (1960) that compounds are the result of transformations of underlying sentences (see discussion about Lexicalism above), thus hinting at a syntactic nature.

When choosing between the two approaches, one should take the predictions of each into consideration as well as looking at what they can account for. Both lexicalists and constructivists agree that sentences essentially consist of morphemes, but the lexicalist claim is that phrases are built from morphemes indirectly. That is, the first step is to build words from morphemes. These words are then combined to build phrases. Lexicalism thus requires an intermediate level of representation, which is characterised by the *Lexical Integrity Principle* from (1-16) above, repeated here:

(1-16) *Lexical Integrity Principle*
The internal structure of words is not accessible to syntax.

The output from the morphological component in lexicalist approaches is an intermediate level of representation that is impenetrable to syntax.

One prediction that follows from this principle is that syntax should not have access to compound internal information. If compounds are formed in a pre-syntactic morphological component, their internal (morphological) structure should be rendered opaque by the time they reach syntax. This prediction is borne out if we look at formation of *wh* questions. In Norwegian and the other Germanic languages, it is not possible to form a *wh* question where the *wh*-phrase targets a compound internal element:[14]

(1-18) a. *eple-tre*
'apple tree'

b. *Det er et eple-tre*
'That is an apple tree'

c. **Hva*$_i$ *er det et t*$_i$*-tre?*
'What$_i$ is that a t$_i$ tree?'

As we can see in (1-18)c, the left member of the compound resists *wh* topicalisation, a fact that does not follow automatically from an approach based on syntax-all-the-way-down, i.e. a constructivist approach. It could instead be argued to be an effect of the *Lexical Integrity Principle*: syntactic processes are simply blocked from targeting sub-word parts.

However, the apparent opacity of morphologically complex words for syntactic processes is a lot more complicated than we might expect under Lexicalism. If the *Lexical Integrity Principle* is correct, we should not find processes that are able to straddle the morphology/syntax divide. But as noted by Bauer (2017:19-23) and Bruening (2018), there are processes that are able to access word internal elements that also operate on a phrasal level,

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[14] The data is presented in orthographic Norwegian Bokmål. In this thesis, morphological boundaries that I want to emphasise for the reader are marked with hyphens but note that this use of hyphens differs from the conventional use in Norwegian orthography. Morphologically complex words such as compounds are generally written without the use of hyphens.

such as coordination/ellipsis and pronominal reference. In coordination/ellipsis, morphosyntactic units of the same type are coordinated while the structure that can be inferred from the context is elided:[15]

(1-19) a. *John kjøpte et eple og ~~John kjøpte~~ en sjokolade*.
'John bought an apple and a chocolate.

b. *Bi-~~seksuell~~ og a-seksuell*
'Bi- and a-sexual'

c. *Infra-~~lyd~~ og ultra-lyd*[16]
'Infra- and ultrasound'

d. *Venn-~~skap~~ og fiend-skap*
'Friendship and enmity'

As shown in (1-19)a, coordination/ellipsis applies on a phrasal level, coordinating two object NPs while the inferred structure is elided. The rest of the data in (1-19) shows that the processes also can target sub-word parts. In both (1-19)b and (1-19)c, we find coordination of what is traditionally called prefixes while the head of the structure is elided for the first conjunct. An example of a case with suffixes is found in (1-19)d where two coordinated roots have the same derivational suffix, but the suffix is elided for the first conjunct. This is unexpected under the lexicalist view.[17] If the *Lexical Integrity Principle* does reflect how grammar works, we will have to explain why some syntactic processes (like the ones noted in (1-19)) have access to sub-word parts while others (e.g. *wh* formation in (1-18)) do not.

[15] Note that *ellipsis* here is used as a purely descriptive term for material that is not phonetically realised. Whether this is a result of actual elision (i.e. phonetic deletion) of material or due to not being generated in the morphosyntax at all is outside the scope of this thesis.

[16] On http://blog.marinbiologene.no/2012/09/undervannssty-den-nye-forurensningen.html, both orders of the conjuncts have been used.

[17] Bruening (2018) discusses the possibility that we are not dealing with coordination of subword parts, but rather coordination of phrases followed by subsequent word-part ellipsis. However, as he shows, trying to save lexicalism by moving coordination one floor up in the structure, from X-1 to the X0 level, forces one to accept that ellipsis can apply on X-1 and upwards. In either way, one of the processes will inevitably take place in both morphological and syntactic realms, contrary to the lexicalist hypothesis.

Another consequence of operating with two separate systems for word formation and sentence formation respectively is the order in which they apply. The former feeds the latter, thus predicting which syntax-morphology interactions are possible and which are not. In particular, we should expect to see no cases where the feeding relationship is reversed, i.e. where syntax feeds morphology. This prediction is not borne out though. All the Germanic languages allow phrases to appear as the left member in compounds:

(1-20) English:
She had that don't-you-dare! look. (from Bruening 2018)

Norwegian:
Det du-tror-det-ikke-før-du-får-se-det-store huset (from Eik 2019:54)
the you-believe-it-not-before-you-get-see-it-big house
'the you-won't-believe-it-until-you-see-it-big house'

Faced with data such as (1-20), the lexicalist hypothesis runs into problems. The phrasal left member of the compounds are clearly syntactic objects and appear in a construction that the lexicalists would place in a pre-syntactic realm. Phrasal compound members should thus be excluded for architectural reasons. Moreover, that kind of compound is also very productive and cannot be accounted for by assuming that the phrasal member is somehow lexicalised (as claimed by Bresnan and Mchombo (1995)) and as such, an independent lexical entry. It is difficult to see how phrasal compounds can be reconciled with Lexicalism because they require a nested type of interaction between morphology and syntax, something that the model does not allow for.[18]

On the whole, it seems that Lexicalism, a model that calls for a strict separation of syntax and morphology, is incompatible with the data we have seen. It does find some justification in the fact that *wh* formation cannot target word internal elements (1-18), but the facts from

[18] A parallel case from a morphological perspective is found in the distribution of genitival –s (traditionally assumed to be the exponent of a *morphological* category), which is able to attach to words *and* to phrases: i) [the man]'s car, ii) [a friend of mine]'s car (Lieber 1992:14). The same kind of phenomenon is also observed in Norwegian (Johannessen 1989).

coordination/ellipsis (1-19) and compounds with phrasal members (1-20) points to a less strict separation between morphology and syntax than the one advocated in Lexicalism.

As for Constructivism, we do not run into big problems when faced with the data in (1-19) and (1-20). On the assumption that we find syntax all the way down, we should expect to find phenomena that straddle the two realms that have been referred to as syntax and morphology traditionally. Operating with the principle that "morphology is syntax" also opens up for a more straightforward way of accounting for it. Nevertheless, there are still problems to handle. Recall that we did see an argument in favour of lexicalism in (1-18), where compound internal elements seemed to be sheltered from syntactic processes such as *wh*-topicalisation.[19] In a lexicalist framework, such a blocking of a syntactic process can be ascribed to the *Lexical Integrity Principle,* but in a constructivist framework, a similar principle is not available.

The lack of such a principle notwithstanding, there are ways to handle this in a constructivist approach. As pointed out by Haspelmath (2011) (and discussed in more detail by Bruening (2018)), the question is if the blocking effect we see in (1-18) has anything to do with an alleged privileged word-status of compounds (as expressed by the *Lexical Integrity Principle*) or if it can be ruled out by independent factors. Haspelmath shows that topicalisation is restricted to "entire referential phrases and not individual words". Hence the ungrammaticality in (1-21) (taken from Haspelmath 2011) <u>*and*</u> in (1-18):

(1-21) a. *I bought a lavishly decorated cake.*
b. **What kind (of) did you buy a ___ cake?*

Consequently, the impossibility of *wh*-topicalisation of compound internal members is not due to any word level opacity but rather to general restrictions on what syntax can topicalise. That is, the restriction is *internal* to syntax. It applies in (1-21), which is undoubtedly located in the syntactic realm, but it also applies in compound structures as in (1-18), a domain traditionally

[19] There are other arguments in favour of Lexicalism that have been put forth. Newmeyer (2009) for instance argues that nominals derived from verbs show the same surface syntax as underived nominals, indicating that the alleged verbal substructure of the former has no visible syntactic effects. That is, syntax cannot access structures below the word. This issue will not be addressed in this thesis, but see Bruening (2018) for a different view.

assumed to fall within the realm of morphology. Instead, it turns out that (1-18) provides yet another argument for syntax-all-the-way-down.

In light of the foregoing discussion, I assume a constructivist approach to morphologically complex words in Norwegian for this thesis. Note that this does not necessarily entail that we definitely do not need the intermediate lexicalist category "word" as an independent level of representation in Norwegian, but that needs to be empirically demonstrated. For now, a constructivist approach is the approach that best fits the empirical facts. In the next section, I turn to the syntactic model used in this thesis: Distributed Morphology.

1.2.2 Distributed Morphology (DM)

DM (Halle and Marantz 1993, Embick and Noyer 2001/2007) follows the constructivist doctrine where words are created in the syntax (i.e. syntax-all-the-way-down). In other words, DM does not recognise any pre-syntactic generative engine (i.e. the Lexicon) as conceived of in Lexical frameworks. In frameworks where the Lexicon plays an important part, it has three important functions: i) word formation, ii) sound-meaning pairing and iii) listing irregularities. As already stated, its role in word formation is outsourced to syntax in constructivist frameworks such as DM.

The second central tenet in DM is that syntax operates on abstract morphemes, defined in terms of morphosyntactic features. A natural extension of this tenet in light of modularity is the assumption that the primitives on which syntax operates lack phonological content. The actual pairing of syntactic terminal elements with phonological content, *Vocabulary Insertion* (henceforth VI), is thus assumed to take place post-syntactically. This is known as *Late Insertion*. Thus, *Late Insertion* bereaves the Lexicon of its second function listed above: the locus for sound-meaning pairing. DM aims at evacuating the Lexicon, distributing its roles and processes across various *lists* that are accessed at different points in the computation – hence, the name *distributed* morphology. The architecture of grammar in DM is shown in figure 2 below.

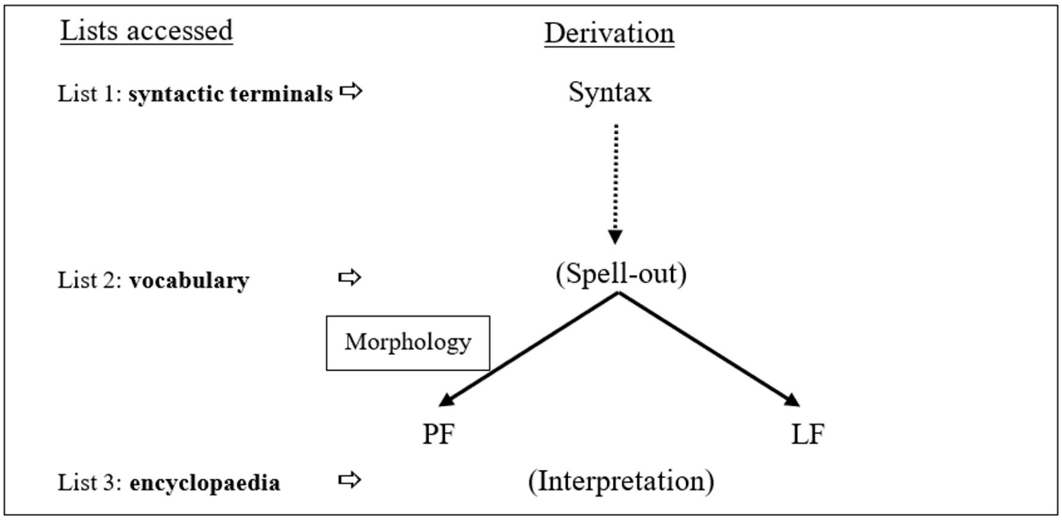


Figure 2 – Architecture of grammar DM (adapted from Embick and Noyer 2007)

Figure 2 shows how the derivation proceeds according to DM, and there are a few things that set this model apart from the one we find in Minimalism (see section 1.1.1). The most striking feature visually is perhaps the "morphology" box that appears on the PF branch. We will get back to that in 1.2.2.2. Conceptually, it is the removal of the Lexicon as a separate component that represents the most substantial deviation from Minimalism. In DM, there is a single computational component that is responsible for building words as well as phrases/sentences, i.e. syntax. The Lexicon as we know it from lexicalist frameworks such as Minimalism has been deconstructed and its roles have been dispersed throughout the entire computation in the shape of the lists in Figure 2. A short description of what each list contains is given below.

List 1: Syntactic atoms

The first list is what we can refer to as the "narrow" lexicon and is the list that most directly replaces the Lexicon architecturally. In this list, we find the atomic building blocks of syntax, i.e. the terminal nodes of syntactic trees, which are fed into and manipulated by syntax. I will refer to these as *morphemes*. DM recognises two types of morphemes, defined in terms of valency at VI (Harley and Noyer 1999): i) For certain morphemes, VI is deterministic, providing only one possibility in any given context. These morphemes are referred to as f*unctional morphemes* and are made up of bundles of grammatical features. These features encode grammatical information such as PLURAL and PAST. The set of features that we find in the feature bundles is assumed to be determined by Universal Grammar and also perhaps by language-specific principles. ii) For the other type of morpheme, VI is not deterministic, implying that there exists a choice as to what is inserted in a given context. These are referred to as the *roots* of the language, represented with the root symbol √, such as √CAT or √DRINK. Roots are generally assumed to be devoid of extra-syntactic content but there is no general consensus concerning the nature and identity of roots. We will get back to this in section 4.3.1.

List 2: The Vocabulary

This list provides the phonological forms, also known as the *exponents* or vocabulary items for the terminal nodes in syntax and applies both to roots and to the functional feature bundles. Vocabulary items in this list must therefore also contain the instructions that create a connection between one or more syntactic terminals and a specific phonological realisation. For instance, assuming that we have a syntactic object consisting of a root such as √BE merged with a functional feature bundle expressing third person, singular and present, list 2 will provide the instructions to realise this phonologically as "is": [3p, sg, present] ⇔ [ɪz] / {√BE}. That is, realise the feature bundle [third person, singular, present] as *is* in the context of √BE. List 2 partially subsumes irregularities and the sound-meaning pairing, functions that belong to the Lexicon in lexicalist approaches.

List 3: The encyclopaedia

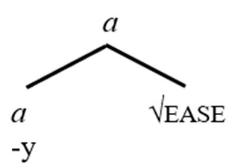
In the encyclopaedia, we find the list of idiosyncratic semantic information for the roots, relative to the syntactic context in which the roots occur. Naturally, the list will include idioms such as *a perfect storm* as the meaning of the idiom cannot be deduced from the meaning of each individual element in it. List 3 thus contains instructions that *storm* in the context of *perfect* should be interpreted as "the worst possible situation" (although a literal interpretation is also available). However, the list will contain *all* idiosyncratic and unpredictable semantic information so the meaning of simple roots such as √CAT also needs to be listed there.

Both list 2 and list 3 subsume irregularities and the sound-meaning pairing, functions that belong to the Lexicon in lexicalist approaches. In what follows, I explain how the syntactic derivation proceeds in DM (1.2.2.1) before I zoom in on the PF branch and the "morphology" box (1.2.2.2).

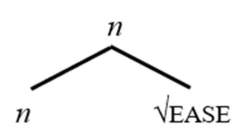
1.2.2.1 The syntactic derivation in DM

In the first part of the derivation, syntactic terminals from list 1 are combined and merged according to the principles of syntax in order to produce a syntactically well-formed object. As already mentioned, elements from list 1 come in two different flavours: i) roots and ii) functional morphemes. Roots are considered to be acategorial units that are devoid of any grammatical information. The idea is that a given root will not be interpreted as a noun, adjective, verb etc. unless it is merged with a categorising head from the set of functional morphemes. The categorising head may have an overt phonological exponent as in (1-22)a (also known as derivational affixes) or it may have a covert phonological exponent as in (1-22)b (i.e. there is no phonology associated with the categorising head).

(1-22) a.



b.



The structures are interpreted respectively as the adjective *easy* and the noun *ease*. Thus, it is the syntactic configuration that determines the category of a given root and, as a consequence, its syntactic properties and distribution.[20]

The next point in the derivation is the Spell-Out, where syntax hands off a well-formed syntactic object to the PF and LF component for phonological and semantic interpretation respectively. Starting with the PF branch of the derivation, this is where syntactic terminal nodes are linked to phonological exponents through VI. There is, however, not necessarily a one-to-one mapping between features in syntactic terminals and their respective phonological exponents. The VI process is governed by the subset principle, which states that phonological exponents of morphosyntactic structure cannot contain more features than what is found in the corresponding morphosyntactic structure itself. In other words, exponents are allowed to be

[20] Note that the structures in (1-22) are meant for illustration purposes only, and do not necessarily reflect what I take to be the actual structure in these cases.

underspecified with respect to the features of the syntactic terminals into which they are inserted (thus allowing for syncretism), but they cannot be overspecified.

One example of this is seen in Icelandic predicate adjectives showing gender and number agreement with the subject of the clause:

(1-23)	a. *Ég er veik-ur*.	I am sick-Masc	'I am sick'
	b. *Ég er veik-Ø.*	I am sick-Fem	'I am sick'

As the Icelandic data show, masculine adjectives are morphologically marked while feminine adjectives have zero-marking. The assumption is that the first person singular pronoun in Icelandic also contains gender features in the syntactic representation, but there is only one phonological exponent available, which is necessarily underspecified for the gender distinction by virtue of being the only available exponent for this context. Put differently, the morphosyntactic structure underlying the occurrences of the first person singular pronoun in (1-23) differ in their gender features, but this contrast is not reflected in the phonological exponent. In DM, VI is standardly assumed to be governed by context-sensitive mapping rules (that is, sensitive to the syntactic configuration and surroundings). For the Icelandic case above, such a rule could be stated as √VEIK ⇔ veikur / [1p, Sg, Masc, Nom] which states that the root √VEIK is realised with an *ur*-suffix in the context of first person, singular, masculine, nominative. Context-sensitive mapping rules also resolve situations where there is more than one possible phonological exponent for a given syntactic terminal (i.e. allomorphy). For instance, the past tense in English has three possible exponents, {*-t, -d, -Ø*}, but only one can be inserted in a given context so there is some sense in which allomorphs can be understood to be in competition with each other.

As for the LF branch of the derivation, this is where list 3 is accessed. Recall that list 3 was the Encyclopaedia containing information about all kinds of unpredictable sound-meaning pairings. This includes individual roots such as √CAT as well as expressions with idiomatic meanings such as *a perfect storm*. List 3 is implemented in more or less the same way as for list 2, with context-sensitive mapping rules that give instructions as to how to interpret a given expression given it syntactic surrounding. Now that the main details of the computational derivation in DM are in place, I turn to the "morphology" box.

1.2.2.2 Post-syntactic movement

Embick and Noyer (2001/2007) argue that the hierarchical structure of morphemes generated by syntax may be subject to a limited set of post-syntactic readjustments on the PF branch. That is, their claim is that some aspects of word formation are shaped by processes in PF but within confines imposed by syntax. These take place at a stage in the derivation right after Spell-out in figure 2 and are found inside the "morphology" box where they are interleaved with other PF processes. An illustration of this is shown in figure 3 below:

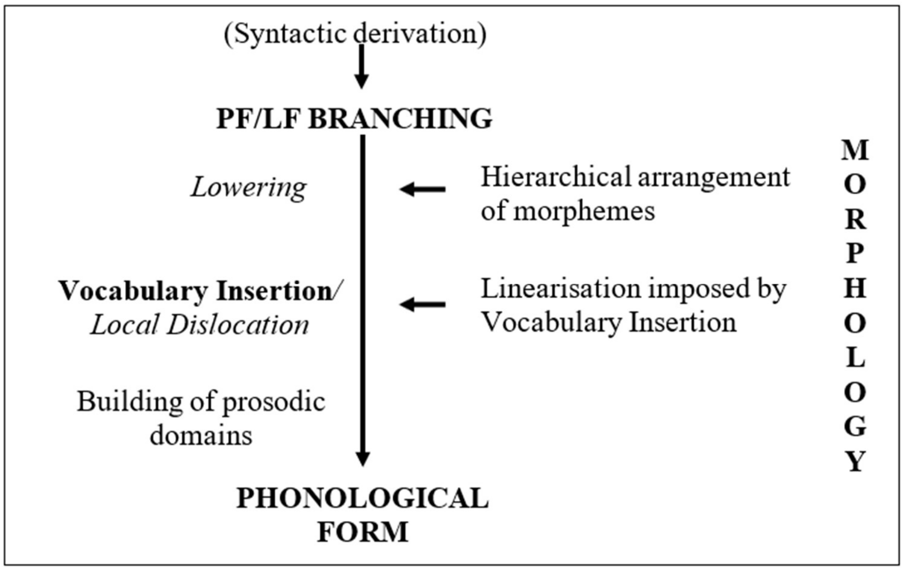


Figure 3 – The PF branch in grammar (adapted from Embick and Noyer 2001)

In order to accommodate mismatches between syntactic terminal nodes and phonological exponents, PF is allowed to perform certain *morphological mergers* between two elements X and Y such that X undergoes affixation to Y. They distinguish between two types of mergers depending on the timing of the merger with respect to Vocabulary Insertion (VI). The first type is called *Lowering* and applies *before* VI. It is a process that operates directly on the hierarchical structure dropped off by syntax and is required to unite syntactic terminal nodes that form a phonological unit together but are not joined by syntactic movement. An example of this is lowering of the T head to V in English such that T is realised as an affix on V. Lowering can cross intervening material such as adverbs.

The second type of morphological merger in PF is called *Local Dislocation* and applies *after* VI. Local Dislocation is not sensitive to hierarchical structure like Lowering is, but rather to linear precedence and adjacency. According to Embick and Noyer, the relations that syntax establishes between syntactic terminal nodes are defined in terms of hierarchy. The actual linear order itself, however, is a product of interface conditions. That is, the externalisation of the hierarchical syntactic structure has to pass through PF, a substance where hierarchical relations are by necessity translated into linear relations. As phonological exponents are being inserted and linearised during the VI process, PF will sometimes perform Local Dislocation between two string adjacent elements in order to resolve conflicts between the structure that syntax has provided and the actual phonological exponent. We saw an example of this in (1-17) (repeated below) where the comparative form of adjectives may be realised in two different ways:

(1-17) a. smart-er
b. more intelligent

Presumably, the syntactic structure is the same for synthetic and analytic comparatives, with the comparative head X dominating the adjective A. If the two syntactic nodes in questions are linearly adjacent, Local Dislocation will apply under the condition that the adjective is monosyllabic: $[_{\text{DegP}}\ X\ [_{\text{AP}}\ A]] \rightarrow [A{+}X]$. The fact that the process is sensitive to the prosodic size of the adjective demonstrates that it must apply after VI.

Embick and Noyer (2007) explore more morphological operations on the PF branch, such as fission and insertion/deletion of nodes/features. These naturally come in addition to processes that belong to "core" phonology (e.g. vowel harmony, epenthesis etc). The PF branch is this considered to be a highly articulated derivational component, yielding a number of intermediate structural representations before terminating in a surface phonological representation. The post-syntactic readjustments discussed above will not be explored in detail in this thesis, but will see a potential case of *Local Dislocation* in section 4.2.5. An important consequence of adopting the model in figure 2 though, which this thesis does, is that linearisation is not a syntactic property, but is imposed by requirements at PF.

1.3 Linguistic tone

In the world of physics, a periodic soundwave of a frequency in the audible range for the human ear create what we acoustically perceive as *pitch*. That is, we can hear the highness or lowness of a sound. We create this physical phenomenon with vocal fold vibration when we speak and the variation in pitch (i.e. the fundamental frequency) over an utterance is what we know as *intonation*. All languages use pitch for pragmatic effects (e.g. information structure, emotions) but some languages also use pitch in a way that is known as *linguistic tone*. That is, the use of pitch for lexical and/or grammatical purposes. Languages that deploy pitch this way are referred to as *tone languages*. A classic example is Mandarin Chinese where the sequence *mā* pronounced with a level high tone means 'mother' while *mà* pronounced with a falling tone, means 'scold'. Mandarin distinguishes between four such tones at the word level while Thai operates with a five-way contrast and some languages even have more. Tonal targets are usually annotated with H for high tones, L for low tones and M for mid tones, possibly combined with various modifying diacritics (ToBi notation, Pierrehumbert 1980). In other words, tone languages impose discrete steps in a continuous physical space (i.e. wavelength).

In the following sections, we delve into the world of linguistic tone. I begin in section 1.3.1 by looking at how tone is represented in phonology. The prevailing view here is that tones are segments in their own right, running on a tier that is parallel to the segmental one. I also discuss the notion of *TBUs* (tone bearing units) as well as the classical distinction between *register tone* languages and *contour* languages. Section 1.3.2 deals with tonal processes and how they can be analysed. Finally, in section 1.3.3, the relationship between tone and stress is discussed for a third group of tone languages that is recognised in the literature. These are known as the *pitch accent* languages, of which Norwegian is a part.

1.3.1 Tonal representation and association

Early generative phonology (SPE, Chomsky and Halle 1968) inherited from the Prague school the notion that distinctive features were the real arbiters of phonological processes, not phonemes (Jakobson 1939, Trubetzkoy 1939). In SPE, the distinctive features are gathered in feature matrices according to their concurrency, and these matrices are then again connected to a timing slot in the phonological string. With this kind of phonological representation, pitch features such as [+HighPitch] occur in the same feature matrices as other phonological features such as [+nasal], making pitch features inherent parts of the relevant segments.

The phonological representations notwithstanding, features such as tone and stress were already hypothesised to be different from others in that they were referred to as suprasegmentals. As pointed out by Goldsmith (1976), the notation created a situation where it was impossible to represent contour tones in short vowels (pp. 37-39) without compromising common assumptions about feature composition. Moreover, it also made it impossible to model cases where a given tonal host, e.g. a vowel, was deleted while the tonal feature survived in the output on a different segment (pp. 53-61). If tonal features were inherent parts of the feature matrices of segments, we would expect the tone to be deleted along with the host segment. Goldsmith argues that using the term “suprasegmental” for tones, albeit recognising that tones are not segmental in the same way as e.g. /i/ or /k/, is in itself slightly misleading in that it has led to the assumption that tones are not segmental in their own sense. In particular, Goldsmith suggests that segments (in the classic sense of the term) and tones run in a parallel structure (with two parallel tiers) where one level is not dependent on the other, yet they are connected (or associated). He refers to these levels as autosegmental levels, implying that they are autonomous.[21] Tones are thus autosegments, and not features.

A simple illustration from English of how Goldsmith’s model works is shown in (1-24) and (1-25) below. English is not a tone language but uses pitch to realise stress. The declarative intonation pattern in English is H*L where the H is associated with the stressed syllable (stress indicated with acute accent and tonal preference for stress with *).

(1-24)	a.	lántern	b.	lántern	c.	lántern	(segmental tier)
		H* L		H* L		H* L	(tonal tier)
(1-25)	a.	sún	b.	sún	c.	sún	(segmental tier)
		H* L		H* L		H* L	(tonal tier)

In (1-24)a and (1-25)a, the melodic tier and the tonal tier have not yet been linked to each other. In order for the representations above to be well-formed, Goldsmith proposes that they are subject to the *Well-Formedness Condition* (WFC), which can be summarised as follows:

[21] Note that ‘autonomous’ here refers to phonological autonomy. Tones, requiring vocal fold vibration to be realised, still remain parasitic on segments with actual vocal fold vibration, in particular on vowels but also on voiced consonants.

i) All tones are associated at least with one vowel *and* all vowels are associated with at least one tone.

ii) Association proceeds one-to-one, left-to-right.

iii) Association lines do not cross.

Association of tones proceeds from left to right, starting with establishing an association line between H* and the stressed vowel in both cases. The L tone in (1-24) falls on the unstressed syllable in order to satisfy WFC i). We could also imagine an alternative where the requirement that H* be associated with a stressed vowel does not hold, thus making (1-24)c a possibility, but this is illicit due to WFC iii) disallowing crossing lines. When linking the L in (1-25), we are forced to link it to the same syllable as H* as shown in (1-25)b, lest we get a violation of WFC i) because we have left a tone unassociated, as in (1-25)c. The intonation pattern in English represented as H*L, a falling tone, is thus realised on two different syllables in (1-24) but on the same syllable in (1-25), the latter being an example of a contour.

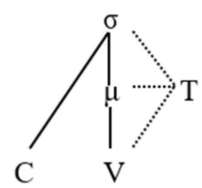
Goldsmith's Autosegmental Phonology model removes tones from the feature matrices of individual segments and places them in a separate plane, thus solving many of the tonal problems that had ridden generative phonology. The model also formally recognises that tones are independent phonological objects that may be subject restrictions and processes that are similar but not necessarily identical to the segmental tier. We will look at some in section 1.3.2.1.

The autosegmental model also paves the way for other theoretical questions. Given that the association lines connect two separate tiers in the phonological representation, a central question is what is actually being connected with what? In the following paragraphs, I will discuss the two sides of the association lines, starting with the notion of *Tone Bearing Units* on the segmental side in section 1.3.1.1 before I turn to the tonal side in section 1.3.1.2 where two different types of tone system will be central: the traditional distinction between *register tone* systems and *contour tone* systems.

1.3.1.1 Tone Bearing Units (TBUs)

In (1-24) and (1-25) above, we tacitly assumed that tones are associated to vowels. It is not an unreasonable assumption given that tones are parasitic on segments with vocal fold vibration. However, in spite of being a good approximation, the state of affairs is a bit more complicated. When metrical and prosodic structure is taken into account, there are in principle at least three possible TBUs in tone languages: segments, syllables and moras.[22,23] For instance, if we have a tone language where every syllable is open and mono-moraic and bears exactly one tone (like in (1-26) below), the three TBU options are equally possible as there is no way to distinguish them.

(1-26)



The tone, here represented as T, could be associated with any of the three levels in the structure in (1-26). In a tone language with a different syllable structure and other tonal properties than the one just described, we may find arguments for choosing a TBU over any other.

Evidence for the *mora* as TBU can be found in languages where short vowels only can host level tones while long vowels can host level tones *and* contour tones. This is what Bickmore (2007) proposes for Cilungu, a Bantu language spoken in the border areas between Zambia and Tanzania. In Cilungu, the tonal inventory includes level tones and contour tones. Crucially, the contour tones can only be realised on long vowels, which are characterised by having two moras, thus leaving space for two tonal specifications, i.e. contour tones.[24] This means that the phonological templatic representation for contour tones in Cilungu is like (1-27)a and not like (1-27)b:

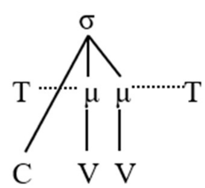
---

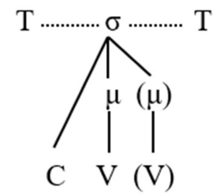
[22] This does not include the association points of non-lexical tones such as phrasal tones and boundary tones (Pierrehumbert 1980, Beckman and Pierrehumbert 1986) that in some analyses are associated to edges of higher prosodic constituents (see for instance Morén-Duolljá 2013).

[23] The status of the segment as TBU, albeit being a suitable tonal host, is questionable. Yip (2002:74) reports that there seem to be no languages where the TBU *must* be the segment, and suggests that tone always associates to the syllable or the mora. It has also been proposed that the *subsegment* can act as TBU (see Inkelas and Shih 2015).

[24] It has been claimed that contour tones reflect bimoraicity (Hyman 1985, Hayes 1989) but this view has also been disputed (Zhang 2004).

(1-27) a. b.



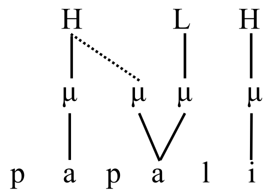


This is because if the syllable were the TBU in Cilungu, we would expect it to be able to host any number of tones irrespective of the number of moras.[25] Cilungu thus shows that we can argue for a specific TBU based on the tone inventory of a language and the distribution of these tones.

In Adhola, a Nilotic language spoken in Uganda, two overlapping but non-interacting tonal processes are used as arguments for the *syllable* as the TBU (Kaplan 2020). The first process is a process that lengthens (i.e. adds a mora to) the last preconsonantal vowel in the Phonological Phrase (PP-lengthening). The second one is referred to as High Tone Spreading (HTS) whereby a High tone spreads rightwards to an adjacent low-toned syllable. Kaplan argues that it is the syllable that is the target of HTS even though the mora is a viable target for this kind of process. This is because in cases where both processes apply and in principle could interact, the addition of a mora through PP-lengthening is invisible for HTS. HTS ignores the mora and targets the low-toned syllable. On the assumption that the relevant TBU in Adhola is the mora, as shown in the representations below, we can account for the contour tone on the medial vowel in (1-28)a by assuming that HTS targets the immediately following mora while the L tone associates with the second mora resulting from PP-lengthening.

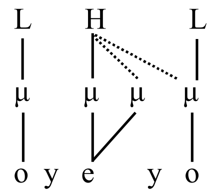
[25] On the assumption that long vowels consist of two segments of the same kind, the Cilungu data could also be compatible with an analysis where the (vocalic) segment is the TBU.

(1-28) a.



[pápâ:lí] ‘papaya’
*[pápá:lí]

b.



[òyé:yô] ‘rat’
*òyé:yò

However, if the mora is indeed the relevant TBU, we run into problems when faced with (1-28)b as we would need HTS to target *two* following moras. In other words, a moraic analysis requires HTS to have different ranges in terms of target moras in the two examples in order to produce contour tones on the low-toned syllable that follows the high-toned one. Kaplan shows that the syllabic analysis does not have this kind of problem and concludes that HTS targets the syllable and not the mora, making the syllable the appropriate TBU in Adhola.

1.3.1.2 Register tone vs. contour tone

The TBUs just discussed are associated to objects (i.e. tones) on the tonal tier, but it is not clear whether these objects can be complex or not. This question reflects the traditional tone language typology that makes a split between *register tone* languages and *contour tone* languages (Pike 1948). The former term roughly corresponds to an African style tone language while the latter roughly corresponds to an Asian style tone language. While the purely descriptive aspect of this split is uncontroversial (I think it is safe to say that the split is not a deep phonological one), it does reflect the controversy concerning the representation of contour tones: are contour tones derived, i.e. compositional, or should we treat them as basic?

The argument that contour tones are derived comes from work on African tone languages, and this is also what inspired the development of Autosegmental Phonology (Goldsmith 1976, see section 1.3.1). In Mende, a register tone language in the Mande group spoken in Western Africa, short vowels appear to be realised with five different pitch shapes: Low, High, Rising, Falling, Rising-Falling. Morphemes in this language can be up to three syllables long and if the distribution of the pitch shapes were completely random, we would expect there to be 5^3=125 possible permutations of these. However, as shown by Leben (1973), the number of possible melodies is limited to five, which get the status as underlying melodies (acute accent=H, grave accent=L):

(1-29)	H	kó ‘war’	pélé ‘house’	háwámá ‘waistline’
	L	kpà ‘debt’	bèlè ‘trousers’	kpàkàlì ‘tripod chair’
	HL	mbû ‘owl’	ngílà ‘dog’	félàmà ‘junction’
	LH	mbǎ ‘rice’	fàndé ‘cotton’	ndàvúlá ‘sling’
	LHL	mbã̂ ‘companion’	nʲàhâ ‘woman’	nìkílì ‘groundnut’

The underlying melodies are mapped from left-to-right in the words. If there are more syllables than tones, the last tone will spread (pélé, bèlè); if there are more tones than syllables, there is tonal crowding on the last syllable (mbû,, nyàhâ, mbǎ, mbã̂). What Leben’s (1973) work shows, is that tones in Mende are atomic units that combine to make a limited set of melodies that are mapped to morphemes (or prosodic stems). More importantly however, his work shows that contour tones can underlyingly be the result of a combination of register (i.e. level) tones. They are in other words tonally complex from a phonological point of view.

The view that contour tones are single phonological objects finds its justification if we look at tone in Asian languages. Mandarin Chinese, classified as a contour tone language, has four contrastive tones, which can be represented as H, HL, HLH, LH (High, Falling, Falling-Rising, Rising), and nearly all syllables in Mandarin are lexically specified with one of them. A first thing to note, looking at the tonal inventory, is that no syllable can be specified with L alone. This has the important consequence that contours in Mandarin never split up like they do in Mende (discussed above). If L never occurs on a TBU on its own, its ontological status in the phonology of Mandarin is called into question. It is in other words not clear whether we should represent the falling tone in *mà* ‘scold’ compositionally, as in (1-30)a, or non-compositionally, as in (1-30)b (the latter using an IPA tone letter to represent a unitary contour):

(1-30) a.

H L

mà

b.

˥˩

mà

As pointed out by Michaud and Vaissière (2015), the difference between the two structures is first and foremost a morpho-phonological one. Given the extreme analytic nature of Mandarin morphosyntax, evidence that Mandarin contours are decomposable is hard to come by. There is, however, phonological evidence such as speech errors (Wan and Jaeger 1998) and tonal sandhi (Hyman 2011a) that point to a representation along the lines of (1-30)b.

1.3.2 Tone as a study object

Linguistic tone is defined as discrete phonological objects with lexical and/or grammatical function expressed through pitch. The study of these discrete objects, however, is an undertaking with a number of complicating factors. First of all, there is no unique frequency interval that will be recognised as a High tone for instance. People's pitch registers are different, so the exact phonological value of a given pitch level is determined in relation to the general pitch register the speaker is using. In other words, a High tone is only recognised by virtue of its relative distance in frequency to a non-High tone. This makes tones discrete yet relational objects. A second complicating factor is the relationship between linguistic tone and intonation. Tones and intonation inhabit the same space (i.e. pitch), but are in principle independent from each other. Thus, high pitch acoustically speaking does not necessarily translate to phonological High tone.

Likewise, two phonological High tones do not necessarily have the same pitch. This can be seen in what is known as 'downstep', a very common tendency found in both tonal and non-tonal languages (English: Pierrehumbert 1980, Beckman and Pierrehumbert 1986; German: Truckenbrodt and Féry 2005; Japanese Itō and Mester (2007), Swedish: Hansson (2003)).[26] For instance, in a given utterance containing three High tone targets, each High tone can be downstepped relative to the one preceding one. In this way, the first High tone is realised with a higher pitch than the two that follow while the second High tone will be higher than the third one.[27]

These complications notwithstanding, tones are identified by their lexical and/or grammatical behaviour. In the lexical domain, they are part of a paradigm, i.e. they establish contrast, as in the Mandarin case already metioned (*mā* 'mother' vs *mà* 'scold'). In the

[26] While downstep is a common process in the languages of the world, there are also reports of the opposite ('upstep') in the literature whereby a series of High tones get successively higher pitch throughout a given domain (see Hyman and Leben 2020:51 and references therein).

[27] Syntactic structure and pragmatic aspects (information structure and focus) may also play a role for this process.

grammatical domain, they can express functional structure, as in the Aboh dialect of Igbo [Niger-Congo, Nigeria], where the difference between affirmative and negative is expressed through tone (Hyman 2011b): *ò jè kọ̀* 'he is going' vs. *ó jé kọ̀* 'he is not going'.[28] Tones also stand in a syntagmatic relationship with each other, and we can see how they operate along this dimension through various processes that are well-known in segmental phonology, such as spreading, deletion and assimilation. I give examples of these processes in section 1.3.2.1 before I turn to how tonal phenomena can be analysed in section 1.3.2.2.

1.3.2.1 Tonal processes

Tones are often modified and adjusted according to processes that may be recurrent in the tone languages of the world, but we also find cases of more idiosyncratic and language-specific tonal modifications. Such processes are context-sensitive, but for the data presented here, the focus is the nature of the tonal process itself and not its conditioning context. The distinction between the various types of tonal processes discussed below is not always clear-cut as particular cases may fit into more than one box. It should be pointed out however that this is by no means intended to be an exhaustive list.

<u>Spreading</u> is here understood to encompass long-distance processes whereby a tone assigned to a TBU spreads to other TBUs within a given domain.[29] High tone spreading (HTS) seems to be more common than Low tone spreading (LTS) (Hyman and Leben 2020:54-55). A case of HTS is reported from is Zenzontepec Chatino [Oto-Manguean, Mexico] (Campbell 2016). In this language, a H tone spreads rightwards through any toneless mora until it reaches a pause or another lexically specified tone (H <v́> or M <v̄>). A blocking tone will be downstepped, as shown in (1-31) below (taken from Campbell 2016:148):

[28] I do not know if this is the only way of expressing the affirmative/negative contrast in Igbo.

[29] Tonal *shifts* can be considered to fall into the same category. Tonal shifts refer to tones that have shifted away from the TBU they originated in. This can be analysed as spreading with subsequent delinking, giving the impression that the tone has shifted (Hyman 2017).

(1-31) a. *ta tāká tzaka nkwítẓa*
already exist one child
'There already was a child.'

b. *ta tāká tzaka nkwítẓa*
M H ꜜH

The H that originates on the last syllable of *tāká* is able to spread unhindered across the following tonally unspecified word *tzaka*. HTS is stopped by the presence of the H in *nkwítza*. The blocking H is downstepped as a consequence, and may be phonetically realised as M. However, its phonological identity as a H tone is revealed by its rightwards spreading.

<u>*Assimilation*</u> is here understood to be a *local* spreading process whereby two adjacent tones influence each other. It is useful to distinguish between two types of assimilation: vertical and horizontal assimilation (Hyman and Leben 2020:53-56). The former refers to upward or downward adjustment of pitch range while the latter refers to tones that reach into neighbouring TBUs. Horizontal assimilation is most commonly *perseverative*, that is, when a tone lasts longer than it "should", e.g. H–L → H–HL. It can also be *anticipatory*, implying that a tone reaches into the preceding TBU, e.g. H–L → HL–L. In both cases, a contour tone is created in the target. An example of perseverative horizontal assimilation is found in Yoruba [Niger-Congo, West Africa] (Laniran and Clements 2003). Yoruba has a three-way tonal distinction, {H vs. L vs. M}, but only H tones and L tones undergo the relevant assimilation This happens within words and across word boundaries, as shown in (1-32) below (taken from Laniran and Clements 2003):

(1-32) a. *Máyọ̀mí ra ìwé*
'Máyọ̀mí bought books'

b. Má yò mí rà wé = [máyộmǐ râwě]
H L H L H

The initial *ì* in *ìwé* is elided in normal pronunciation but passes on its L tone to the preceding vowel, thus accounting for the falling contour in *ra*.

<u>*Deletion*</u> of tones can apply for various reasons. There are some deletion processes that can be characterised as contour simplification (see Hyman and Leben 2020:56). Tones are also deleted so as to avoid OCP violations (Myers 1997). A common rule in Bantu languages is Meeussen's Rule, which deletes (or changes) the second tone of two identical consecutive tones. The

environment for the rule to apply can be created by particular morphosyntactic constructions. For instance, in Ruund (or Ruwund) [Niger-Congo, Angola/Democratic Republic of the Congo], there is a two-way tonal contrast {L vs. Ø} where phonological processes target L tones (Nash 1994). Toneless TBUs are assigned a H tone by default in citation forms, (1-33)a and (1-33)c. However, in predicative constructions, an L tone is assigned to the prefix, as shown in (1-33)b and (1-33)d. Crucially, if the noun stem already has an L on its first syllable, as in (1-33)c, this L is deleted in the predicative, (1-33)d.

(1-33) a. *n-zal* 'hunger'
b. *ǹ-zal* 'it is hunger'
c. *mu-kìl* 'tail'
d. *mù-kila* 'it is a tail' cf. **mù-kìla*

1.3.2.2 Tonal directionality

The tonal processes discussed above do not by any means cover everything that tone is capable of doing, but they do represent central aspects of what any analysis of tone needs to be able to account for. Yip (2002:65) identifies a set of general properties of tone, and I wish to concentrate on two of those properties:

A. One-to-many: A single tonal feature shared by two or more segments.
B. Many-to-one: Multiple tonal features surfacing on a single host.

These two properties correspond to spreading (as discussed in 1.3.2.1 above) and to contour tones (as discussed in 1.3.1.2) respectively. They are important as they lie at the heart of a controversy concerning the role of *direction* in tonal mapping. One ingredient in serial tonal mapping algorithms is the phonological directionality parameter whereby tones are mapped from left to right or from right to left, where the former seems to be the more common one.[30]

[30] Both Yip (2002:15) and Zoll (2003) make this claim. Archangeli and Pulleyblank (1994:294-298) treat left-to-right association as the default parameter setting. I am not aware, however, of any typological study that supports this.

This directionality preference is reflected in the *Well-Formedness Condition* (WFC) in Goldsmith's Autosegmental Phonology (see 1.3.1), repeated here:

(6-1) All tones are associated at least with one vowel *and* all vowels are associated with at least one tone.

(6-2) Association proceeds one-to-one, left-to-right.

(6-3) Association lines do not cross.

This mapping algorithm proceeds in steps and has specific predictions concerning the properties one-to-many (i.e. spreading) and many-to-one (i.e. contours) identified by Yip above. More specifically, they are both predicted to be right-edge properties due to the mapping direction.

We can show this by looking at cases where there is a mismatch in number between tones and TBUs. This situation arises in some of the data from Mende (Leben 1973) we had a look at in (1-29). For instance, the lexical entry for 'junction' in Mende contains the melodic string /felama/ and the tonal string /HL/. We thus have more TBUs than we have tones. At the beginning of the derivation, the two tiers start out *unassociated* (as shown in (1-34)a). Then we apply the mapping algorithm until all tones are associated to a TBU and all TBUs are associated to one tone.

(1-34) a. H L felama b. H L felama c. H L felama 'félàmà' – junction

At the end of the stepwise derivation, in (1-34)c, we have a situation where one tone is associated to more than one TBU, thus a case of one-to-many. This is also known as spreading. Following the left-to-right procedure as dictated by the WFC, one-to-many is predicted to be a property of only the rightmost tone in a given domain (in this case it is L). Spreading of the leftmost tone would only be possible if it was also the rightmost tone at the same time (i.e. the *only* tone).

Now, if we have more tones than TBUs, we produce a different effect. This happens in the Mende word for 'woman', which contains the melodic string /n^{j}aha/ and the tonal string LHL. The derivation is shown in (1-35) below:

(1-35) a. L H L n^{j}aha b. L H L n^{j}aha c. L H L n^{j}aha d. L H L n^{j}aha 'n^{j}àhâ' – woman

At the end of the stepwise derivation, in (1-35)d, the final TBU is linked to more than one tone, also known as a contour, and is thus case of many-to-one. Following the left-to-right procedure as dictated by the WFC, contour tones (along with spreading as we saw in (1-34)) are predicted to be located at the right edge of words.

With the shift in phonology from rule-based derivation, i.e. serialism, to Optimality Theory, i.e. parallelism, (Prince and Smolensky 1993), the insight from Autosegmental Phonology that phonology is tier organised was kept, but the status of directionality for tone in phonological grammar is disputed. Is it a real driving force in grammar that should be encoded as constraints in Optimality Theory (henceforth OT) or merely a relic of rule-based phonology?

Yip (2002:82-88) shows that both one-to-many and many-to-one can be accounted for in an OT implementation where directionality is built into the grammar. This is done through adapting the notion of *alignment* (McCarthy and Prince 1993b) to tonal properties. In particular, OT alignment constraints govern the mapping between tones on one side and edges of prosodic constituents (see 1.1.3) or TBUs on the other. A tentative OT analysis of a spreading pattern, i.e. one-to-many, with rightwards directionality and no contours could consist of the following constraints (as defined by Yip 2002:83):

- ALIGN-L: Each T(one) should align with the left edge of the domain (gradiently assessed).
- SPECIFY: A TBU must be associated with a tone.
- *LONGT: A tone may be associated with at most one TBU.
- *CONTOUR: A TBU may be associated with at most one tone.

With a bitonal input for a trisyllabic word, we can derive the correct output with the following constraint ranking[31], as shown in Tableau 1:

[31] For the sake of clarity, other constraints with relevant candidates have been left out.

/σσσ/ LH	SPECIFY	*CONTOUR	ALIGN-L	*LONGT
a. σ σ σ L H	*!		*	
☞ b. σ σ σ L H			*	*
c. σ σ σ L H		*!		*
d. σ σ σ L H			**!	*

Tableau 1 – right edge spreading

The crucial constraint rankings here are: i) SPECIFY >> *LONGT, which favours candidate b) over candidate a) and ii) *CONTOUR >> ALIGN-L, which favours candidate b) over candidate c). The effects of ALIGN-L are visible when we compare candidate b) to its mirror image, candidate d). Both of them incur violations of this constraint, but not to the same extent. Candidate b) incurs fewer violations than candidate d), thus making candidate b) the optimal one. This constraint ranking effectively produces a grammar that predicts a one-to-one mapping from left to right with spreading taking place on the right.

As for the right edge preference of contours, the constraint ranking we have above is not able to account for that due to the ranking *CONTOUR >> ALIGN-L. However, if we reverse the ranking in order for contours to be licit, we lose the one-to-one preference at the left edge. A solution to this is proposed by Zoll (1997) who notes that the distribution of certain kinds of phonological phenomena is characterised by what she calls conflicting directionality. Various kinds of complex phonological phenomena are licensed at the right edge in spite of what seems to be a default left edge setting. Applied to tone, this means that contours are preferred at the right edge as opposed to the left edge. With some new constraints, this directionality paradox can be modelled in OT:

- MAX-T: No deletion of tones (Yip 2002:83).
- ALIGN-R CONTOUR: Contour are linked to the rightmost TBU (Zoll 1997).

With a tritonal input for a disyllabic word, we arrive at the following constraint ranking, as shown in:

/σσ/ LHL	MAX-T	ALIGN-R (contour)	*CONTOUR	ALIGN-L
a. σ σ L H L	*!			*
☞ b. σ σ L H L			*	**
c. σ σ L H L		*!	*	*

Tableau 2 – right edge contour

The crucial constraint rankings here are: i) MAX-T >> *CONTOUR, which favours candidate b) over candidate a) and ii) ALIGN-R CONTOUR >> ALIGN-L, which favours candidate b) over candidate c). This constraint ranking effectively produces a grammar where unavoidable contours are put on the right edge, thus showing the many-to-one property.

The assumption that directionality is built into the grammar when it comes to tonal mapping has been called into question. Zoll (2003) argues that the alleged connection between tonal spreading and contour tones does not hold. One of the central arguments for a directional mapping of tones from left to right was the distribution of contour tones: in many languages they are restricted to the right edge. However, Zoll shows that there is not necessarily a connection between right-aligned contour tones and the direction of spreading. In Mende for instance, contour tones are restricted to the right edge, indicating a left-to-right mapping. This was shown in (1-35) above. However, spreading can indicate left-to-right mapping and right-to-left mapping depending on what the underlying melody is (data from Zoll 2003):

(1-36)	a. LHL – n^jàhâ 'woman'	*left-to-right*
	b. HL – félàmà 'junction'	*left-to-right*
	c. LH – lèlèmá 'mantis'	*right-to-left*

The HL melody pattern with the contour tones is compatible with a left-to-right mapping, as shown in (1-36)a and (1-36)b. If we look at the LH melody instead (1-36)c, it indicates the opposite mapping order, from right-to-left.

The second point Zoll brings up concerns the distribution of contour tones and she notes a couple of problems with the directionality-based account. The first problem addresses the limit in range of the accounts discussed so far. That is, although it may be true for a language that non-final contours are blocked, any previous account can only deal with this on a *lexical* level while the blocking of contours may extend beyond the purely lexical level and apply at the *phrasal* level too. This entails that the blocking of contours in non-final position may be due to some independent mechanism that has got nothing to do with directionality. Citing Zhang (2001), Zoll points out that the second problem with directionality-based accounts for contour tone distribution is that the distribution is not a function of directionality, but rather of duration and sonority of rhymes.

If contour tone distribution is not governed by directionality and languages may operate with conflicting directionality requirements in tonal spreading (as shown in (1-36) for Mende), the assumption that directionality in tonal mapping is built into the grammar is seriously weakened. Zoll proposes instead that the distribution of contour tones is governed by special licensing constraints that restrict complex tones to a limited set of positions (e.g. long vowels, sonorous rhymes, word finally). This avoids the range limit problem of directionality-based accounts as it targets the distribution of contour tones on a more general level than the mere lexical one.

As for directionality in spreading, Zoll argues that this is an effect of the tonal version of two constraints that have been used to account for stress distribution, CLASH and LAPSE, referring to sequences of identical levels of stress. Zoll defines the tonal version as follows:

- CLASH: There is no H sequence on adjacent TBUs.
- LAPSE: There is no non-H sequence on adjacent TBUs.

If we look again at the Mende data in (1-36) above, nothing can be said about the directionality of tonal spreading. However, the tone that spreads is in each case is the L tone. This results in the following OT ranking (Tableau 3) for the two constraints at hand:

/σσσ/ LH	CLASH	LAPSE
a. σ σσ L H	*!	
☞ b. σ σσ L H		*

Tableau 3 – spreading as Clash *or* Lapse *preference*

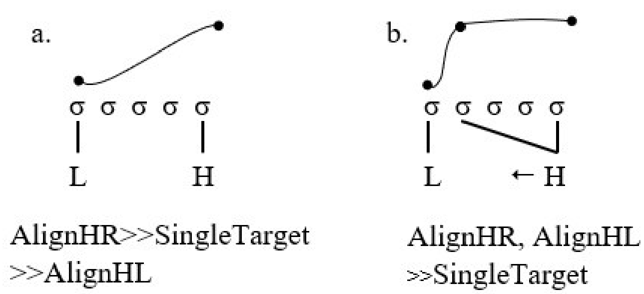
Both candidate a) and candidate b) have sequences of adjacent tones that are identical. Given the indication from the limited data set in Mende that L tones spread instead of H tones, CLASH ranks above LAPSE, which makes candidate b) the optimal one. The trisyllabic input thus comes out as LLH. With the opposite input melody, HL, the constraint ranking would give HLL. Reanalysing tonal spreading in terms of which sequence of identical tones is more tolerated in a language gives us a way of disposing with directionality as a parameter. Whether this can be applied to every tone language where tones spread remains an open question.

A third type of approach that is worth mentioning when it comes to tonal spreading sees spreading as a by-product of phonetics (Gussenhoven 2000). This kind of approach relies on having *double* alignment of a given tone. Even though Gussenhoven investigates intonational *boundary tones* in Roermond Dutch, his idea of how spreading takes place should be possible to implement in a language with spreading of lexical tone. He proposes the following OT constraints (adapted from Gussenhoven 2000:135):

- ALIGN-H-RIGHT: align H to the rightmost TBU.
- ALIGN-H-LEFT: align H to the leftmost TBU.
- SINGLETARGET: a tone is implemented as a single pitch target.

The three constraints form the basis of two types of situations in which the target H behaves in two different ways. In one situation, the H is aligned with a single TBU and there are no signs of spreading. In the other, the H is aligned with two TBUs, the necessary configuration for spreading, as shown by the illustrations in (1-37):

(1-37)



Abstracting away from what kind of domain we are dealing with, we have an L tone that is associated with the first TBU and a H tone that is associated with either one or two TBUs, depending on the constraint ranking. In (1-37)a, SINGLETARGET ranks above ALIGN-H-LEFT, creating a situation where the H tone will align only with the right edge, excluding it from being realised anywhere else. The curved line we see is an illustration of the pitch movement, starting from an L tone, going through a steady rise until we reach the target H tone. This rise comes about as a result of interpolation between the two target tones and as such does not have any discrete points or steps. It is purely a phonetic effect. In (1-37)b on the other hand, the ranking has changed such that ALIGN-H-LEFT dominates SINGLETARGET, thus forcing the double alignment of the H tone. Following the curved line showing the pitch movement, we have a steep rise from the initial L to the first target of the H, which is then followed by a H plateau until we reach the second target of the H. In parallel to (1-37)a, the pitch movements we see between the different tonal target points are cases of interpolation. This means that the plateau we see in (1-37)b is in essence no different from the pitch rise. What appears to be a case of tonal spreading is thus reduced to a trivial phonetic effect.

1.3.3 Tone and stress

The traditional classification of tone languages (Pike 1948) makes a split between register tone systems and contour tone systems (see 1.3.1.2), and in both systems, tones are quite pervasive, either as templatic melodies or as properties of syllables. However, some languages make use of pitch as a means to express prominence, and at the same time, this use of pitch is lexically specified. These languages are referred to as *pitch accent*[32] languages (Yip 2002:258-260 calls them 'accentual languages') because of their reminiscence with *stress accent* languages, where typically one syllable in a word is more prominent than the rest. Pitch accent languages are generally recognised as a type of tone language as they use pitch for lexical and/or grammatical purposes (albeit in a rather limited way), but the coherency of this tone language type is questionable (Hyman 2009). Descriptively however, the term covers languages where tone is used in a limited way, with one or perhaps two tonal melodies that are lexically linked to particular TBUs (Yip 2002:260).

[32] The term 'pitch accent' is not used unambiguously in the literature. The term has also been used to refer to *intonational* tunes that link to stressed syllables (Pierrehumbert 1980) but here we will understand the term to refer to a *lexical* property.

A classic example of a pitch accent language is Japanese where stress is realised by a falling contour, usually annotated as H*L, that can fall on any syllable of a word.[33] This variability of pitch accent location in the word and the fact that the Japanese lexicon is divided in two parts (accented words and unaccented words) makes pitch accent an idiosyncratic property of lexical items in Japanese. Some words are simply specified to have a H*L contour, and, as pointed out by Féry (2017:195), it is even possible to find three-way contrasts based on the presence vs. absence of the accent and if present, its location in the word:

(1-38)	a. Accented, initial	b. Accented, final	c. Unaccented
	H* L	H*L	
	hána	*haná*	*hana*
	(personal name)[34]	'flower'[35]	'nose'

When accented words occur in larger contexts, the accent may be moved or deleted (see for instance Kubozono 1995). Other examples of pitch accent languages are Lithuanian (Blevins 1993), Basque (Elordieta 1998), Turkish (Levi 2005), Swedish (Riad 2014) and Norwegian (Kristoffersen 2000), to which we now will turn.

Norwegian and Swedish are also classified as pitch accent languages. They have developed a pitch accent system with two contrastive tonal melodies, or *tonal accents* (following the terminology in Kristoffersen 2000, Riad 2014). The two tonal accents are known as accent 1 and accent 2 and instantiate two distinctive ways of signalling *primary stress* by way of pitch (other correlates of primary stress include duration and loudness) and are thus an inherent part of the stress realisation system.

[33] To be precise, Japanese is language where the pitch accent is linked to a mora rather than to a syllable. That is, the moraic structure is important for placement of stress, but it is the syllable hosting the mora that ends up realising the pitch accent (McCawley 1968).

[34] This is a truncated version of the name 'Hanae' (see Kawahara 2015 for more details)

[35] The final L may be truncated if there is no TBU following the accented syllable.

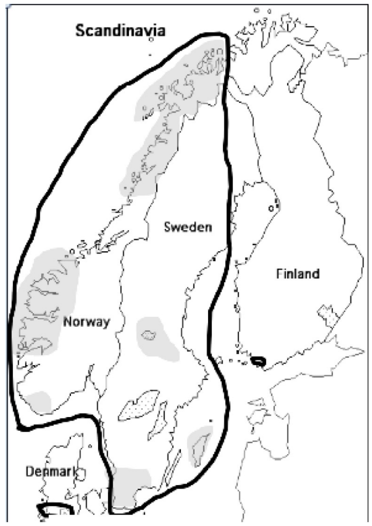


Figure 4 – Scandinavian tonal accent isogloss (taken from Kristoffersen 2021)[36]

Furthermore, primary stress is obligatorily realised with a tonal accent, which makes the tonal accents pervasive in these two Scandinavian languages as *all* lexical words will be realised with one or the other. The distribution of the tonal accents in the lexicon is governed by phonological and morphosyntactic factors. These factors interact with each other, sometimes resulting in alternations in tonal accent for the same lexeme in various contexts (this naturally presupposes that the relevant lexeme is the prosodic head, i.e. receives primary stress). For instance, the most important phonological factor governing tonal accent distribution is the space requirement of accent 2. Accent 2 requires a disyllabic trochee in order to surface, which entails that in monosyllables and in polysyllables with final stress, we only find accent 1. Morphosyntactic structure building may provide additional syllables to these accent-1 "reserved" domains, thus paving the way for a possible change in tonal accent, as the Norwegian data in (1-39) below shows (the superscripts mark both stress and tonal accent):

[36] Areas in grey are areas where accent 2 has only one pitch peak (as opposed to two).

(1-39) a. ^{1}*dag* – day (singular noun)
b. ^{1}*dagen* – the day (singular, definite)
c. ^{2}*dager* – days (plural, indefinite)
d. ^{1}*dagstur* – day trip (compound)
e. ^{2}*dagtid* – day time (compound)

(1-40) a. *me*^{2}*tode* – method (singular noun)
b. *me*^{1}*todisk* – methodically (derived adjective)

The change from accent 1 in monosyllabic domains to accent 2 when additional syllables are available is not guaranteed. Both (1-39)b and (1-39)d have accent 1 in spite of the potential for accent 2. Furthermore, a shift in tonal accent does not necessarily go from accent 1 to accent 2. This is shown in (1-40) where what appears to be the less complex form morphologically surfaces with accent 2 while the more complex one surfaces with accent 1. It should be clear though that morphosyntax plays a role in tonal accent distribution.

1.4 Research questions

As mentioned in the introduction, the aim of the current project is to shed light on the interaction between linguistic tone and internal word structure in a variety of Northern Norwegian. The distribution of the two contrastive tonal accents, accent 1 and accent 2, is governed by phonological factors but also the morphosyntactic structure plays a role. The task here is to understand how these two governing factors relate to each other, thus engendering the synchronic distribution of the tonal accents.

I propose the following *research questions* for this thesis:

I. To what extent is a derivational approach to delimiting domains for phonological computation able to account for the distribution of tonal accents?
II. Are compounds special in any sense that grants them a special status in phonology?
III. If a derivational approach is possible, what does that tell us about the nature of the tonal accents in the phonological grammar?

In order to answer these questions, we must as a first step define what the empirical ground is. A few points concerning the specifics of the object of inquiry are thus in order. There are two notions that we need to elaborate on: *internal word structure* and *a variety of Northern Norwegian*. I will start with the former.

i. Traditional descriptive approaches to word formation distinguish between two types of morphemes, free morphemes (roots) and bound morphemes (affixes), where the former may occur as complete words on their own while the latter cannot.[37] Depending on properties of the elements involved, it is possible to distinguish between various strategies for creating novel lexical items. *Compounding* is when two or more free morphemes are put together while *affixation* refers to the combination of a free morpheme with a bound morpheme. Affixation can further be split into *prefixation* and *suffixation*, depending on the linearisation of the affix with respect to the free morpheme.[38] It is also common to differentiate between affixation that is *derivational* and affixation that is *inflectional*, depending on the formal syntactic and semantic properties of the affix in question. Derivational affixes are affixes that change the meaning of the unit they attach to and possibly also the lexical category. Inflectional affixes never change the lexical category and generally appear as a grammatical necessity and not for meaning contribution.

There are in other words many aspects of word formation that could fall under the umbrella "internal word structure" and consequently form part of the empirical ground for this thesis. A way to delimit it is provided by the architecture of grammar in DM, as conceptualised in figure 2, where a cut-off point is established at Spell-out, thus drawing a line between morphology that is syntactic and morphology that is post-syntactic. This

[37] This is reminiscent of the distinction between roots and functional morphemes in DM but it is conceptually different. For instance, free morphemes (or roots) in traditional descriptive approaches have an inherent lexical category while roots in DM do not. See also section 1.2.2.

[38] It is common to differentiate between *concatenative* and *non-concatenative* strategies for word formation cross-linguistically. Concatenative strategies involve putting at least two distinct morphemes together and include compounding and affixation (e.g. prefixation, suffixation, infixation, circumfixation, transfixation). Non-concatenative strategies on the other hand involve performing operations on one single morpheme and include conversion, root-and-pattern morphology, truncation, reduplication, etc (see Booij 2007 for more details). Word formation in Norwegian is overwhelmingly concatenative, while non-concatenative strategies are marginal. Non-concatenative strategies are not discussed this thesis.

splits the umbrella term "internal word structure" into two separate domains. I wish, however, to delimit the empirical ground from the morphosyntactic perspective even further. I will look at word structure within the confines of what is known as the *stem* in morphology (we will get back to more details about this term in section 4.3.2). More specifically, I look at internal word structure below any extended projections in the morphosyntax. This constitutes the first component of the empirical ground for this thesis. Word formation processes such as compounding and derivation are thus included, while inflection, typically realising heads in extended projections, will only be referred to if relevant.

ii. The second notion to elaborate on is "a variety of Northern Norwegian". Norwegian is a North Germanic language spoken mainly in Norway. With Swedish and Danish, it forms a dialect continuum, which we may refer to as Mainland Scandinavian.[39] Within the Norwegian language area, there is variation in terms of syntax, vocabulary and pronunciation, which makes it possible to identify distinct varieties. In this thesis, I focus on the variety spoken in Tromsø in the north of Norway. This is the variety I have native speaker intuitions about and I also have access to other native speakers, providing an outside control.

An early classification of dialects in Norwegian dialectology drew a distinction between two dialect groups: Eastern Norwegian (*austnorsk*) on one side and Western Norwegian (*vestnorsk*) on the other (see Larsen 1897, Ross 1906). These dialect groups are defined on the basis of two factors: i) the diachronic development of the post-stress syllable in so-called 'equal weight words' (*jamvektsord*) in Old Norse, a group of disyllabic words where the two syllables were of equal weight, and ii) the distribution of the so-called 'thick l', a retroflex flap, which is mostly an Eastern Norwegian trait. According to this classification, the Tromsø variety falls into the Western Norwegian group (Ross, p. 18). This east/west typology, however, has been criticised. Christiansen (1954) argues that the model results in certain geographic anomalies, in particular in Northern Norway, where some dialects that are considered Eastern Norwegian in the

[39] This is in contrast to Insular Scandinavian, which comprises Icelandic and Faroese.

east/west model are spoken in areas that are located to the west of Western Norwegian dialects. She further argues that more criteria should be taken into account and proposes a typology, which distinguishes between four dialect groups: Eastern, Western, Central and Northern.[40] According to Christiansen's classification, the Tromsø variety falls into the Northern Norwegian group. However, the criteria she lists for Northern Norwegian are largely the same as for Western Norwegian, thus calling into question the split. She even acknowledges that the Northern Norwegian group lacks unifying characteristics.

The four-dialect group model proposed by Christiansen is nevertheless commonly used. One advantage is that it reflects the fact that most Norwegians are able to correctly place someone's dialect in one of the four groups based on prosodic properties such as stress and intonation (Jahr 1990:10). This is something that Christiansen also alludes to when she mentions that Northern Norwegian has a 'speech music' (*talemusikk*) that is distinct from the one in Western Norwegian, even though both of them belong to the same intonational group. Norwegian dialectology categorises dialects according to the geographical distribution of two basic intonational tunes known as 'low tone' (*lågtone*) and 'high tone' (*høgtone*) (see Skjekkeland 1997:34, 252-253).[41] This roughly refers to whether a given dialect will have a low tone or a high tone on stressed syllables. Eastern (and Central) Norwegian is characterised by having a low tone connected to stressed syllables and will overall have a rising intonation whereas the opposite holds for Western (and Northern) Norwegian, which is characterised by a high tone connected to stressed syllables and an overall falling intonation. In spite of being part of the same intonational macro group, Western and Northern Norwegian are still distinct from each other and we may characterise this distinction in terms of tonal accent properties. As seen in section 1.3.3, Norwegian is classified as a pitch accent language where tone is tightly connected to the stressed syllable in the word. When we look at words with more than one stressed syllable, we can tease Western Norwegian and Northern Norwegian apart from each

[40] Christiansen uses the terms *østnorsk*, *vestnorsk*, *trøndsk* and *nordnorsk*.

[41] Note that this distinction is not the same as tonal accent. Tonal accent is a *lexical* property that applies to tonal varieties of Norwegian (and Swedish) (see Kristoffersen 2021 for an overview of the Mainland Scandinavian tonal accent isogloss). The distinction between low tone dialects and high tone dialects concerns *intonational types* and it thus applicable to both tonal *and* non-tonal varieties.

other. Following typological work on Scandinavian tonal accents (see Riad 2006/2014 and references therein), Western Norwegian varieties are characterised by linking the tonal accents to only one (stressed) syllable in words with more than one stressed syllable. That is, there is *one association point* (i.e. TBU) for tonal accents in Western Norwegian. Northern Norwegian varieties on the other hand are either characterised by having *two association points* for tonal accent in words with more than one stressed syllable (this is also the case in Standard Swedish) or by not having tonal accents at all (non-tonal varieties). Northern Norwegian is thus defined as high tone varieties (just like Western Norwegian), but with tonal accent properties that are not Western Norwegian. This will be explored further in section 2.1.

The second component of the empirical ground for this thesis is thus a synchronic description of the tonal accent system in the Tromsø variety, a tonal variety of Northern Norwegian. A central point is in other words to figure out what Tromsø Norwegian, and perhaps Northern Norwegian in general, can teach us about the nature of tonal accents. As has been stated earlier, Mainland Scandinavian is a dialect continuum where common features such as tonal accents vary phonetically and phonologically, but they may still be recognisable by speakers of other varieties. There is also considerable overlap in the vocabulary regarding the distribution of the tonal accents. Consequently, a lot of what will be said about Tromsø Norwegian in this thesis may be applicable to other typologically close Mainland Scandinavian varieties. This naturally presupposes that the varieties do things the same way.

As for morphosyntax, word formation processes are fairly uniform across the Norwegian language area. However, one word formation strategy, known as adjective-incorporation, seems to be dialectally conditioned in that it is mostly a Northern Mainland Scandinavian property (Sandström and Holmberg 2003, Eik 2019:40). The strategy involves the incorporation of an adjective into a noun, resulting in what appears to be an adjective-noun compound on the surface (example taken from Eik 2019:40):

(1-41) a. <u>Adjective Incorporation</u> *lang-bord-et*
long-table-DEF.NEUT
'the long table'

b. <u>AN-compound</u> *lang-bord-et*
long-table-DEF.NEUT
'the refectory table'

In spite of the surface similarity, the structures have different syntactic and semantic properties (Vangsnes 2003), as indicated by the translations, but prosodically there is no difference. Structures with adjective-incorporation pattern with compounds as far prosody is concerned. Apart from this, nothing further will be said about any dialect specific word formation process in this thesis.

On a more general level, the current project is also a contribution to the long-standing debate between *direct* and *indirect* approaches within the generative tradition when it comes to the interface between morphosyntax and phonology. This debate was discussed at length in section 1.1 where we saw that the main difference between direct and indirect approaches was of an ontological nature: the indirect approach posits a set of primitives that define and represent chunks for phonological computation. It is *representational*. The direct approach on the other hand denies the existence of this set of primitives and seeks to derive chunks for phonological computation from the morphosyntactic structure directly. It is *derivational*.

By virtue of the indirect approach being the more elaborate one as it represents an enrichment of phonological primitives, I will treat the direct approach as the null hypothesis. That is, it is the direct approach that is put to the test. If a domain for phonological computation cannot be derived through a direct approach, this suggests that we might need something representational. Put differently, representation starts where derivation ends.

As this thesis deals with the interface between morphosyntax and phonology, we need to make explicit assumptions about the morphosyntactic structure of the constructions in question and about the properties of the tonal accents. These will be developed in the chapters to follow.

1.5 Methodological considerations

The data that is used in this thesis has been collected from various sources. A substantial part of it, a part we can say is common to all tonal varieties of Norwegian, comes from earlier work on the topic, which is focused mainly on the variety that is known as Urban Eastern Norwegian (see Kristoffersen 2000:8-10 for a definition). In addition to this, data has also been drawn from dictionaries (in particular the Norwegian Academy's Dictionary at www.naob.no) and everyday conversations.

There is to my knowledge no previous synchronic description of the tonal accent system in Tromsø Norwegian. With me being a native speaker, there is then no way around using some elements of introspection. Even though this has been a common way of doing scientific inquiries in theoretical linguistics, the method has an in-built risk of confirmation bias. That is, the linguist may want a specific result, with the consequence that judgments are coloured. Now, one case study by Sprouse and Almeida (2012) did show that the linguist's own intuitions were reliable. Work that is published is peer-reviewed after all, but the size and familiarity of the language in question may play a role. Controversial data is more readily disputed and/or rectified if the language is well-studied and there is easy access to native speakers.

For lesser studied languages, like the one at hand, introspection should be supplemented with other methods in order to strengthen the claims put forth. A data collection method that is increasing in popularity in linguistics is controlled experiments where the linguist seeks to elicit certain structures or behaviours from the subjects or asks them to give acceptability judgments. Due to the subtle nature of some of the properties under scrutiny in the current project however, it is difficult to undertake an experiment that would have any bearing on the issue. Most native speakers of Norwegian are not really aware of the tonal accents and the fact that they imbue the whole grammatical system. At best, they have some vague notion about some famous "minimal pairs" from the popular scientific literature. I have nevertheless asked other native speakers for their judgments and intuitions in order to have some outside control. Even though this merely gives impressionistic support, it does give indications as to whether I am on the right track or not. In case there is disagreement about some of the judgments of the data, this will be indicated in the text.

1.6 Structure of the thesis

This thesis is structured as follows:

Chapter 1 has defined the empirical ground of the current research project, both in terms of the structures that are under scrutiny, namely the interaction between linguistic tone and internal word structure, and in terms of linguistic variety, namely Tromsø Norwegian. This was placed in a larger theoretical context, helping us formulate specific research questions.

Chapter 2 is dedicated to a description of the lexical distribution of the two tonal accents in morphologically simplex and complex words. This also includes a description of how they relate to other parts of the phonological system, and how they are realised phonetically.

Chapter 3 presents a review of earlier accounts of tonal accent in Norwegian (and Swedish). The central questions that are discussed concern aspects of their ontological nature. What are the tonal accents expressions of, and what characterises the relationship between them? This chapter also presents the view that is adopted in this thesis.

Chapter 4 provides a description of what characterises complex morphosyntactic structures below the extended projection. The chapter also presents a review of previous morphosyntactic research on these structures, thus also pointing to how they are dealt with in the current work. Attention is also given to how the communication at the interface between morphosyntax and phonology is carried out.

Chapter 5 develops an analysis of some of the basic empirical facts concerning the distribution of tonal accent in a few types of morphologically complex structures, traditionally known as compounds. This is done with the help of the tools that have been explored in the preceding chapters as well as the assumptions that have been made. The analysis also provides certain insights when it comes to the mapping of tones inside a given domain.

Chapter 6 shows how the analysis developed in chapter 5 also can account for the distribution of tonal accent in some morphologically complex structures derived through what is traditionally known as affixal derivation.

Chapter 7 concludes the dissertation by returning to the research questions that were defined in chapter 1.

2 A descriptive overview

Norwegian as a tonal language was briefly introduced in 1.3.3, and in this chapter, we will go more into depth. The tonal properties of Norwegian are limited to the two contrastive tonal accents, which are inherent parts of the stress realisation system. That is, every primary stressed syllable will be realised with one of the two tonal accents. Consequently, the tonal accents are pervasive in the language, as all lexical words will be realised with one or the other, depending on phonological and morphosyntactic factors. In spite of the ubiquity of the tonal accents and the potential they carry for distinguishing between words that are otherwise similar, the functional load of their contrastive function is not really exploited. Furthermore, there are no true minimal pairs as all reported cases differ in more respects than the purely tonal one. They are accompanied by other differences in the underlying representations of the morphemes involved, as shown in (2-1) below:

(2-1)	a. *tanken* [^{1}tɑŋkən] – the tank	(indefinite: *tank* [^{1}tɑŋk])
	b. *tanken* [^{2}tɑŋkən] – the thought	(indefinite: *tanke* [^{2}tɑŋkə])
	c. *tanker* [^{2}tɑŋkəɾ] – the tanks/thoughts	

The apparent minimal pair between the definite nouns in (2-1)a and (2-1)b can be traced back to the indefinite forms. However, this contrast is neutralised in the plural, as shown in (2-1)c, which also demonstrates that the tonal accents interact with morphosyntactic structure.

There is considerable variation across different varieties when it comes to how the tonal accents are realised phonetically. However, as noted by Riad (1998b), the lexical distribution of the tonal accents is strikingly stable across all Scandinavian tonal varieties. There is in other words considerable overlap for the tonal grammar in the phonological systems. However, in order for a speaker of one tonal variety to recognise for instance an accent 2 in other varieties, some exposure is naturally necessary.

In what follows, I have a look at the phonetic realisation of the tonal accents and related aspects (section 2.1). As most work on tonal accents in Norwegian has been based on Urban Eastern Norwegian (henceforth UEN) (see Kristoffersen 2000:8-10 for a definition), I make a comparison between the phonetic implementation of the tonal accents in UEN and in Tromsø Norwegian. I then move on to a descriptive overview of the distribution of the tonal accents in the Norwegian lexicon (section 2.2). This includes various types of word formation processes. Given the cross-dialectal uniformity for the lexical distribution of the tonal accents, most of what follows will be true for a vast number of Norwegian (and Swedish) varieties. If anything is particular to Tromsø Norwegian, this will be pointed out.

2.1 Phonetic realisation

Any description of tonal accent in Norwegian (or Swedish) needs to highlight the connection they have with stress. As briefly mentioned in section 1.3.3, the tonal accents are inherent parts of the stress realisation system. That is, they instantiate two distinctive ways of signalling primary stress. A few words on what *stress* is and on how the stress system in Norwegian works are thus in order. *Stress* refers to the relative prominence or emphasis given to a particular syllable in a word or to a particular word in a phrase[42], and can be realised in various ways cross-linguistically such as higher/lower pitch, stronger intensity, spectral tilt, full articulation of vowels and longer duration of the element bearing prominence in addition to potential effects on neighbouring segments (i.e. typically consonants), which can undergo gradation processes like fortition or lenition (Gordon 2011).

Stress systems cross-linguistically are commonly characterised by two properties: *culminativity* (i.e. only one per domain) and *obligatoriness* (i.e. at least one per domain) (see Liberman and Prince 1977:262, Hayes 1995:24-25, Hyman 2009).[43]Norwegian is no exception to this. Norwegian has in addition two phonologised acoustic correlates of stress: segmental quantity and tonal accent (or more generally: pitch). Starting with the former, long vowels and geminates (i.e. long segments) have a distribution that is limited to stressed positions as they reflect a general requirement on the weight of stressed syllables. We can characterise the relationship between stress and syllable weight with a two-way implication: stressed syllables

[42] *Stress* is sometimes used interchangeably with *accent* but it can be useful to draw a distinction between these two terms. Following Féry (2017), we can define *stress* as the abstract property of being prominent while *accent* can be defined as realised prominence or stress. Distinguishing between these two terms however serves no purpose in the current work, and the term *stress* is used to cover both.

[43] Note that for Norwegian, the domain for stress as a culminative and obligatory property refers to words in the lexical classes: nouns, verbs and adjectives. Monosyllabic function words are exempted, though polysyllabic ones, such as the preposition *gjennom* [^{1}jɛn.nɔm] ‘through’, should be included.

are heavy and heavy syllables are stressed (Lorentz 1996, Kristoffersen 2000, Rice 2006).[44] Assuming a moraic theory of syllable weight in Norwegian, there is a bimoraic requirement on the stressed syllable. According to Kristoffersen (2000:145), syllable weight in the unmarked case is implemented by a VC-rhyme (i.e. a closed syllable) where the consonant receives Weight-by-Position (Hayes 1989:258), $V_{\mu}C \rightarrow V_{\mu}C_{\mu}$, thus obtaining bimoraicity. If no C is available, the stressed syllable will be subject to prosodic expansion in order to meet the bimoraic requirement and this happens in one of two ways (subject to lexical marking): i) vowel lengthening, i.e. $V_{\mu} \rightarrow V_{\mu\mu}$ or ii) gemination of a following onset consonant, i.e. $V_{\mu}.CV_{\mu} \rightarrow V_{\mu}C_{\mu}.CV_{\mu}$. This means that long vowels and geminates are direct correlates of stress, meaning that they can be used to identify stress positions.[45]

As for the use of pitch (modulation of the fundamental frequency in our voices, see section 1.3) to signal stress, tonal varieties of Norwegian have two distinct ways of doing that. These are known as accent 1 and accent 2.[46] The choice between the tonal accents is partially lexically

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[44] Diachronically, this system was engendered by the quantity shift in the transition from Old Norse to Middle Norwegian where the set of possible stressed syllables was reduced. More specifically, stressed VC and V:C: syllables were absorbed by stressed V:C and VC: (Torp and Vikør 2014:56-59).

[45] As for actual stress placement within simplex words, it falls within a three-syllable window on the right edge, subject to various factors (see for instance Kristoffersen 2000:140-167). This will not be discussed further here.

[46] As for the diachronic origin of the tonal accent distinction, there are two competing hypotheses. The traditional and most common hypothesis is known as the *Old Scandinavian Hypothesis*, and is associated with the work of Oftedal (1952), Elstad (1980), Bye (2004) and Iosad (2016). According to this hypothesis, the tonal accent distinction developed from a system in Old Norse where monosyllables, e.g. *vintr* 'winter', and disyllables, e.g. *sumar* 'summer', had different accentual melodies. A subsequent phonological process epenthesised a vowel to break up sonority violating clusters at the end of words, resulting in the shift *vintr* → *vinter*. However, this change was not followed by a change in the tonal melody. Consequently, the tight relationship that existed between the tonal melody in a given word and the number of syllables in the same word broke down. That is, the tonal melody associated with monosyllables was suddenly also found in disyllabic words, sowing the first seeds of an emerging contrast.

The other hypothesis is known as the *Proto-Nordic Hypothesis* and is associated with the work of Kock (1901) and Riad (1998a/2003). According to this hypothesis, the tonal accent distinction developed as a result of stress clash resolution in Proto-Nordic. In Proto-Nordic, all heavy syllables were stressed and consequently had a pitch accent. They were separated from each other by an unstressed medial vowel, e.g. **dóomijàn* 'to judge' (stressed vowels are underlined while accented vowels are marked with acute/grave accents). However, these medial vowels were at some point syncopated, leading to the two heavy syllables being adjacent, e.g. **dóomijàn* → **dǿømàn*. The resulting stress clash was resolved by destressing the second syllable, governed, which means that we are dealing with a case of linguistic tone, as defined in section 1.3, and not merely signals for stress. With the inherent link they have to the stress realisation system, it is possible to identify the location of primary stress in a word with help from the pitch contours, but that is not always the case, as we will see in section 2.1.1.

When it comes to the actual phonetic implementation of the tonal accents, being defined as linguistic tone, they come with discrete tonal targets. There is however, some variation in what the exact tonal targets are and how they are distributed within the relevant domain. Recall from section 1.4 that Norwegian dialectology operates with a distinction between 'high tone' and 'low tone' varieties (see Skjekkeland 1997:34, 252-253). These terms refer to what basic *intonational* tune a given variety has (falling or rising respectively), a distinction that is made independent from tonal accent as it also includes non-tonal varieties. The grouping of varieties in different intonation types however, partially determines bits of the phonetic implementation of the tonal accents for varieties that have them. Some of the phonetic aspects of tonal accents in Urban Eastern Norwegian (UEN), a low-tone variety, are presented in section 2.1.1. I then present what these are for Tromsø Norwegian, a high-tone variety, in section 2.1.2. Section 2.1.3 is devoted to a few thoughts on the what the TBU is.

2.1.1 Tonal accent in Urban Eastern Norwegian

Urban Eastern Norwegian (UEN) is the Norwegian variety that has been studied the most and is also the closest we get to a national standard (albeit unofficial). It has been described in detail by Kristoffersen (2000) and the description I present here is based mostly on his work. UEN is classified as a low-tone variety, which roughly means that there is a low tone connected

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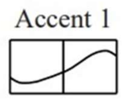
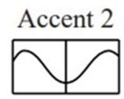
while the pitch accent properties of this syllable remained intact, *d<u>ǿø</u>mà*. With this development, pitch information was separated from other stress information (e.g. duration, loudness), thus allowing for a tonal tier to be established. According to Riad, it is this reanalysis that engendered lexical tone in Scandinavian.

to the stressed syllable, and that there is an overall rising intonation. This is reflected in its tonal accents, as shown by the pitch diagrams (taken from Bye 2004[47]), below:

(2-2) a. *bønder* [¹bœn.nəɾ] 'farmers' b. *bønner* [²bœn.nəɾ] 'beans'





The vertical line represents the syllable boundary. As we can see, the pitch curves are distinct from each other but partially overlapping. Accent 1 is characterised by starting low in the first syllable and then the pitch rises throughout the word. Accent 2 on the other is characterised by starting high, then the pitch drops before it rises again. Establishing a tonal decomposition of the pitch curve (see Lorentz 1981 and Kristoffersen 1993/2000/2003) using ToBi notation (Pierrehumbert 1980), the tonal accents in UEN are as follows (H=high, L= low):[48]

(2-3) <u>Tonal accents in UEN</u>
Accent 1: L*H%
Accent 2: H*LH%

Kristoffersen classifies the L as a *prominence tone* whose contribution is purely prosodic: it signals primary stress. The final H on the other hand is considered to be an intonational *boundary tone* that signals accent/focus on a sentential level. There is an initial H in the accent 2 melody that is not present in the accent 1 melody. Kristoffersen labels this a *lexical tone* (cf. section 3.2.2.1). Abstracting away from the diacritics, accent 1 in UEN is thus analysed as LH[49], while accent 2 is analysed as HLH. The reader is referred to Kristoffersen (2000:233-253) for more detailed pitch tracks.

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[47] Bye refers to the variety as 'Standard Eastern (Oslo) Norwegian'. This corresponds more or less to what Kristoffersen (2000:8-10) calls 'Urban Eastern Norwegian' (UEN).

[48] The asterisk * marks that the tone is synchronised with stress while % marks that the tone is a boundary tone.

[49] This is the default, perhaps most neutral, realisation of accent 1 in UEN. However, work by Lorentz (1981) and Teig (2001) indicates that the initial tone in accent 1 is not necessarily low pitched. We will abstract away from this here.

Adopting Goldsmith's (1976) autosegmental model where tones run in a tier that is parallel to the melodic one as discussed in section 1.3.1, I now show how the two tiers map to each other. I will be using syllabic templates for convenience as the number of syllables does play an important role in constraining the distribution of the tonal accents in the lexicon (this will be discussed further in section 2.2). Note however, that this does not mean that I take the relevant TBU to be the syllable and not the mora or something else (see section 2.1.3 for further comments on the TBU). Starting with accent 1, it is not constrained by the number of syllables in a given domain and the mapping for its two tones is quite straightforward: the L* links with the primary stress (marked with bold face) while the H% links with the right edge of the relevant domain (the domain is delimited by square brackets). Note that the syllabic templates may conceal morphological complexity:

(2-4) *Accent 1, UEN*

a. Domain-final	b. Non-domain-final
L*H%	L* H%
[(…) **σ**]	[(…) **σ** (…) σ]

In what I have defined as a domain-final context (typically monosyllables and words with final stress), the two tones in accent 1 are both realised within the same syllable, resulting in a rising contour as shown in the autosegmental representation in (2-4)a. In non-domain-final contexts (typically roots with non-final stress or morphologically complex domains), the L* links again to primary stress while the final H% "wanders" off to the right, as shown in (2-4)b. This H can even cross into other words (Kristoffersen 2000:190-191). As for any intervening syllables, they are realised with a low tone, but not as low as the stressed one. Kristoffersen tentatively interprets it as rightwards spreading of L (see Kristoffersen 2000:247-250).

As for accent 2, it has an initial H that is not present in the accent 1 melody (see (2-3)). A further difference with respect to accent 1 is that accent 2 *is* restricted by the number of syllables. More specifically, it needs at least a disyllabic trochee to be possible, effectively banning it from domains with final stress and monosyllabic domains. The mapping of the tones is also slightly different from accent 1: the initial H* links with the primary stress while the L links with the post-stress syllable. The final H%, as above for accent 1, links with the right edge of the relevant domain. Note that the syllabic templates may conceal morphological complexity:

(2-5) *Accent 2, UEN*

a. Domain-final

H*LH%

[(…) **σ** σ]

b. Non-domain-final

H*L H%

[(…) **σ** σ (…) σ]

When the disyllabic trochee that hosts accent 2 is domain-final, the initial H is realised on the stressed syllable while the following L and H are realised on the post-stress syllable, resulting in a rising contour, as shown in (2-5)a. This contour however, is split up when the disyllabic trochee is not domain-final, leaving room for the final H% to drift rightwards. Note that the L remains on the post-stress syllable. Just like for accent 1, Kristoffersen proposes an L-spreading rule for any intervening syllables between L and the final H%.

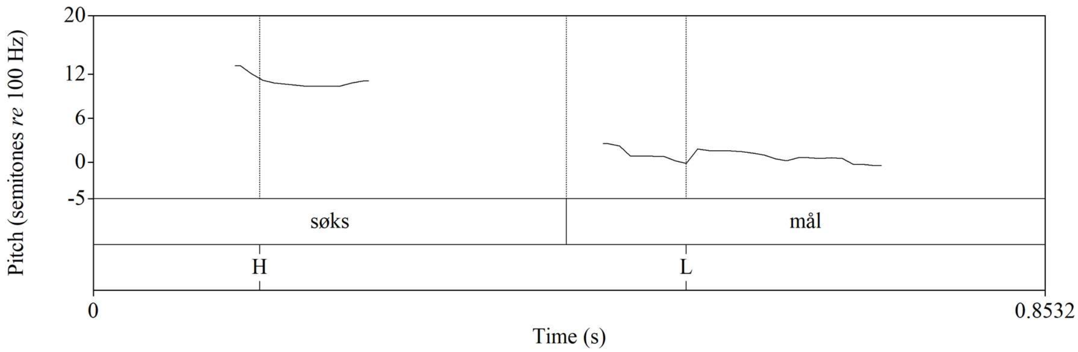
To sum up, both tonal accents in UEN are anchored to the position of primary stress by virtue of being actual realisations of stress. However, pitch alone cannot help us identify the location of primary stress seeing that it can be realised with a low tone (accent 1) or with a high tone (accent 2). Also note that secondary stress does not play any role for where the tones are realised (Kristoffersen 2000:249). That is, in non-domain-final contexts which includes compound structures, any secondary stressed syllable will have no effect on the location/spreading of the prominence tone L or the boundary tone H. This contrasts with Tromsø Norwegian, discussed in next section, where secondary stress does play a role.

2.1.2 Tonal accent in Tromsø Norwegian

Tromsø Norwegian (TN), which is the variety of focus in the current work, is classified as a high-tone variety, which roughly means that there is a high tone connected to the stressed syllable, and that there is an overall falling intonation. As we will see, this is reflected in its tonal accents, which are distinct from each other but partially overlapping, just like for UEN. Based on the Norwegian dialectological intonation type typology (high-tone vs. low-tone varieties, falling vs. rising intonation), TN and UEN may seem to be mirror images of each other. However, the differences between them when it comes to what the tonal accents look like and how they behave are substantial.

Starting with accent 1, it is realised with a high tone where primary stress is located, with a subsequent fall in pitch. This is shown in the pitch trajectory in Figure 5 below. It represents the pronunciation of *søksmål* [¹sø:ksˌmo:l] 'lawsuit' by a female speaker from Tromsø born in 1985:[50]

Figure 5 – TN pitch curve, accent 1



The pitch trajectory shows that the pitch is high for the stressed syllable and that it falls to a low tone for the post-stress syllable. A tentative suggestion for a tonal decomposition for accent 1 in TN is HL. The tone values are the exact opposite from the ones found in UEN. As for tonal behaviour, TN also has a tone that links to primary stress (H*) but there is a difference in behaviour for the final tone of the melody between the two varieties. The L in TN does not appear to be a boundary tone because the low tone target is reached very early in the post-stress syllable. This indicates that the L is realised maximally one syllable away from stress instead of linking with the right edge of the relevant domain (the low tone at the end of the domain can

[50] The recording and the illustration were made with Praat (Boersma and Weenink 2024). The word was embedded in the carrier sentence *han snakka om et…* 'He talked about a…'

be accounted for by assuming rightwards spreading of the L or by assuming that there is a separate L boundary tone at the right edge).[51] Thus, the ToBi notation gives us H*L.[52]

I will again use autosegmental representations with syllabic templates to illustrate how the tones line up within the domains. Just like for UEN, this is only for convenience and does not entail that the relevant TBU in TN is the syllable rather than the mora. And as before, the syllabic templates may conceal morphological complexity. TN Accent 1 (which is unconstrained by the number of syllables) thus has the following autosegmental representation:

(2-6) *Accent 1, TN*

a. <u>Domain-final</u>	b. <u>Non-domain-final</u>
H*L	H*L
[(…) **σ**]	[(…) **σ** σ (…)]

In domain-final contexts, both tones are realised within the same syllable, resulting in a falling contour as shown in the autosegmental representation in (2-6)a. So far, this is an exact parallel to accent 1 in UEN, albeit with opposite tones. In non-domain-final contexts on the other hand, the H links to the primary stress as expected, but the L does not drift to the right edge of the relevant domain in the same way as H does in UEN. Instead, it falls on the post-stress syllable, as shown in (2-6)b.

As for accent 2 in TN, it is realised with a rise in pitch where primary stress is located with a subsequent fall in pitch. A high-tone plateau may also appear in between the initial rise and final fall, depending on what kind of structure we are dealing with. The accent-2 pitch trajectory

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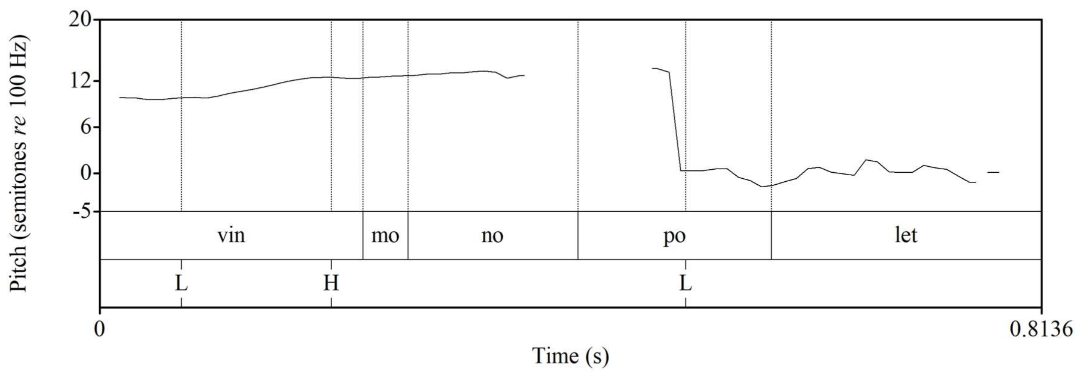
[51] Alternatively, the L is indeed linked to the right edge of the domain and then spreads *leftwards* to any intervening syllables between the right edge and the primary stress. If we can apply the same kind of tonal decomposition to TN as we saw for UEN in section 2.1.1, the TN accent 1 melody HL would consist of H as prominence tone and L as boundary tone. To the extent that TN and UEN are commensurable, the spreading processes would then be different. Under this view, TN would have *leftwards* spreading of the *boundary tone* while in UEN, Kristoffersen suggested *rightwards* spreading of the *prominence tone*. We are left with a non-trivial difference regardless of the association point of the L.

[52] We find the same kind of accent in Japanese, Basque and Turkish (see Féry 2017:194-200 for an overview).

is shown in Figure 6 below. It represents the pronunciation of the compound structure *vinmonopolet* [²ʋiːnmunuˌpuːlə] 'the wine monopoly' by a female speaker from Tromsø born in 1985:[53]

Figure 6 – TN pitch curve, accent 2



The pitch trajectory shows that the pitch rises inside the primary stressed syllable, levels out on a high plateau before it drops. A tentative suggestion for a tonal decomposition for accent 2 in TN is LHL. The tone values are the exact opposite from the ones found in UEN. The tonal behaviour, however, is quite different and there are three important properties to note:

a) Even though there is enough structure for the tones to space out, the tonal target represented by the H is already reached in the stressed syllable.
b) There is a high-tone plateau that ranges from the primary stress until, but not including, the last secondary stress in the structure.[54] We can interpret this as H-spreading.
c) The final L links preferably to the last secondary stress (if there is any). If not, it links to the post-stress syllable (i.e. it does not behave like a boundary tone in the same way as in UEN).

[53] The word was embedded in the carrier sentence *han snakka om*… 'He talked about…'

[54] This interpretation is different from what Lorentz (1995) assumes for Narvik Norwegian, a closely related variety. He assumes that in compound structures, the H is linked to *all* the stressed syllables, including the last one. See also Riad 1998b.

In light of the discussion on register tones vs. contour tones in section 1.3.1.2, property a) above is interesting. Recall that there is a controversy concerning the representation of contour tones: should they considered basic tonal primitives in themselves or are they derived (i.e. a combination of tones)? A good argument for the former analysis is if the tonal contour never splits up in individual tones while we would expect them to be able to split up if they were derived. We did see for UEN that domain-final tonal accents had contours surfacing but they vanished as soon as the tones were able to spread out in non-domain-final contexts (see (2-4) and (2-5)). However, what we see in TN in Figure 6 is that the whole rise in pitch towards the target H takes place within the primary stressed syllable. In spite of a relatively big domain, we have what looks like a contour tone. How do we best represent this?

The pitch rise we see in accent 2 in TN does not lend itself easily to the view that contours can be decomposed because the tones do not split up. At the same time, positing that TN has a true unitary contour tone is perhaps not very plausible either, seeing that contours are quite rare cross-linguistically, being limited mostly to Chinese and the 'Sinosphere' (Matisoff 1999). In order to differentiate between the two options, I propose that the high-tone plateau as described in property b) can point us in the right direction. This plateau can be interpreted as H-tone spreading, suggesting that the High tone in the rise within the stressed syllable is a separate phonological object (i.e. it behaves independently from any initial L). However, in order to avoid the notation L*H*, which suggests that both tones are discrete independent targets within the stressed syllable, I opt for the notation ^{L}H*: a late High. This notation privileges the H at the same time as it reflects that we are perhaps not dealing with a true phonological unitary contour tone.[55]

[55] The notation is very close to the representation Bye (2004:31) suggests for accent 2 in Nordland Norwegian except that he suggests that H in accent 2 is always associated with two syllables (the stressed *and* the post-stress syllable in simplex words). The association of H might constitute a dialectal difference between Tromsø Norwegian and Nordland Norwegian, where the latter then would have a H-tone that is more right-oriented in the tonal domain compared to the one in Tromsø Norwegian. This is left for future research. Furthermore, in Bye's representation, there is no initial L in accent 2 as a discrete target for Nordland Norwegian, an analysis that has also been suggested by Kristoffersen (1992) based on descriptions in Elstad (1979). This might also be the case for Tromsø Norwegian.

The fact that the "contour" is never divided shows that TN, compared to UEN, has a relatively strong preference for linking tonal events to stressed positions. This is further supported by property c), namely that accent-2 final L prefers linking with secondary stress if there is any. I will use the notation $L^{(*)}$ to denote this behaviour. Thus, we arrive at the following ToBi notation for the accent 2 melody: $^{L}H^{*}L^{(*)}$. The autosegmental representation with syllabic templates is shown in (2-7) below (as before, the caveats concerning the TBU and morphological complexity apply). Also, the same distributional difference we find for the tonal accents in UEN also applies to TN: accent 2 needs at least a disyllabic trochee to be possible.

(2-7) *Accent 2, TN*

a. <u>One stress</u>

$^{L}H^{*}L$

[(…) **σ** σ (…)]

b. <u>More stresses</u>

$^{L}H^{*}$ L^{*}

[(…) **σ** (…) **σ** (…)]

As illustrated in the autosegmental representations above, the mapping of the tones in accent 2 does not depend on the geometric anchoring point within the domain (final vs. non-final), but rather on the stress properties internal to the domain, showing a one-versus-many split. More specifically, the $^{L}H^{*}$ always links to the primary stress while the linking of the final L depends on the prosodic properties of the rest of the domain. If there is only one stress, the L links to the post-stress syllable, as in (2-7)a. However, if there are more stress locations, the final L seeks out the rightmost stress, as in (2-7)b. This is also accompanied by H-spreading to any intervening syllables (cf. property b) above). Due to this phonological behaviour, accent 2 in Tromsø Norwegian (along with other Northern Norwegian varieties as well as Central Swedish) has been classified as *connective* (see Bruce and Hermans 1999:616, Riad 2003, Bye 2004 and references therein). That is, accent 2 generally signals the connection between the primary stressed syllable (realised with $^{L}H^{*}$) and what follows (including at least the final L) as belonging to the same unit.[56]

[56] A similar thing has been noted in the 'announcing intonation' in Urban Eastern Norwegian where the stressed syllable of the right-most compound member in accent 2 compounds hosts a tonal event (Lorentz 1981).

Summing up, we have the following ToBi notations for the TN tonal accents:

(2-8) Tonal accents in TN
Accent 1: H*L
Accent 2: ^{L}H*L$^{(*)}$

As is reflected in the notation that has been chosen, both tonal accents have a target H* synchronised with the primary stress, which means that we can use pitch to identify the location of primary stress. Furthermore, the target H* is followed by a fall in pitch in both tonal accents. Thus, they share a lot, but the timing is slightly different as the H* comes late in accent 2 (hence the notation ^{L}H*). When the H* is late, it also has the potential to spread. The late H* is also correlated with the ability the final L has to seek out stressed positions, thus demonstrating the role secondary stress plays in TN. Thus, stressed positions in TN are always associated with a tonal event.

2.1.3 The TBU in Norwegian

In the previous section, autosegmental representations of the tonal accents were used with syllabic templates, with the caveat that it was for ease of exposition only. That is, the TBU (see section 1.3.1.1) may be something else than the syllable. Both the mora and the syllable have been proposed as TBUs in the literature on Norwegian, though it seems to be variety dependent.

Considering the TBU in UEN first, both the mora and the syllable have been suggested. Kristoffersen (1993) proposes that the *mora* is the relevant unit and finds support in that the initial tone in accent 1 (L) comes *late* in the stressed syllable while the initial tone in accent 2 (H) comes *early* in the stressed syllable (this timing difference is not visible in the syllabic templates in (2-4) and (2-5)). If the tones are associated with sub-syllabic units (i.e. moras) instead of being associated directly with the syllable, the different timing of the initial tones can be accounted for. Kristoffersen (2000:241-2246) on the other hand argues that the syllable is the 'primary TBU 'in UEN (p. 245)[57], supported by the fact that the tones in the full accentual

[57] It is not clear to me whether 'primary' here means that the syllable is the *preferred* TBU (cf. in Optimality Theory terms) or the *only* TBU.

melody of the tonal accents (LH and HLH) prefer to have their own syllables if there is enough space instead of sharing (e.g. the accent-2 words *bǿnněr* 'beans' vs. *bǿnnèné* 'the beans').[58]

When it comes to the TBU in other Norwegian varieties, the analyses that have been proposed vary. Hognestad (1997) and Abrahamsen (2003) argue that the mora is the only relevant TBU for the Egersund dialect and the Sunnmøre dialect respectively, whereas Kristoffersen (2007) reports that the mora is the TBU in the Oppdal dialect but in the North Gudbrandsdal it is the syllable. It has also been proposed that we can find both the syllable and the mora deployed as TBU within the same variety. In Lorentz' (1995) OT analysis of the Bergen dialect and the Narvik dialect, the syllable is the *preferred* TBU but in case there is a lack of syllabic TBUs, the mora can take over this role in order to accommodate all tones.

As for the TBU in Tromsø Norwegian, it will obviously depend on which and how many discrete tonal targets there are in the full tonal accent melodies. If our assumptions concerning the autosegmental tonal accent strings above are correct, one of the differences between accent 1 and accent 2 lies in the timing of the H*. By virtue of defining ^{L}H* in accent 2 as a late high, the H* from accent 1 is then early. This timing difference of the target H within the stressed syllable indicates that the mora is the relevant TBU. However, this is not readily reconcilable with the alternating anchoring point of the final L. If tones are mapped to the segmental tier through a left-to-right association convention (see section 1.3.2.1 on the role of directionality for linguistic tone), the fact that the final $L^{(*)}$ in accent 2 seeks out a stressed syllable on the right makes the mora a less plausible TBU candidate. An interesting proposal in this respect comes from Riad (1998b), who points to the fact that the anchoring point for the tonal accents in Scandinavian is the stressed syllable. This indicates that it is not the syllable itself that is the TBU but rather some higher prosodic unit such as the foot or the prosodic word, where stress is assigned. Riad is in other words operating with a TBU unit that possibly contains several "traditional" TBUs (i.e. syllables and moras). The stressed syllable as TBU is thus only an illusion due to its status as head of the tone bearing prosodic unit in question.[59] While the

[58] We would perhaps expect bimoraic syllables (i.e. stressed syllables, see 2.1) to be able to host two tones at the same time if the relevant TBU was the mora, but there are no contours on stressed syllables in UEN.

[59] The stressed syllable is also central in Bruce and Gussenhoven (1999), but they assume that the stressed syllable really *is* the TBU.

concept of the TBU will not be discussed in detail in this thesis, consequences of my analysis that relate to Riad's proposal are explored in section 5.1.

2.2 Lexical distribution

As stated in the beginning of this chapter, stress is an obligatory (surface) property of all vocabulary items belonging to the major lexical categories. Given that the tonal accents *realise* stress, it follows that all lexical words will be associated with (or surface with) one of them. Put differently, the tonal accents are ubiquitous in the language. However, to what extent each instance reaches its full phonetic potential depends on various factors. Compounds for instance surface with only *one* tonal accent in spite of its members each having their own. The pragmatic context is also relevant as the position of the tonal accents with respect to focus can affect their pitch ranges (see Kelly and Smiljanić 2017 and Fretheim 1992).

The data that is presented here is organised partially according to their morphological complexity and partially to the morphosyntactic delimitations specified in section 1.4. I begin in section 2.2.1 with the tonal accent distribution in simplex words, which gives us the best window into the purely phonological factors governing tonal accent distribution. Section 2.2.2 and 2.2.3 are both dedicated to morphologically complex words. The former concentrates on morphology up until the extended projections (≈derivational morphology and compounding, note that derivational *prefixes* are discussed in chapter 6) while the treats morphology in the extended projections (≈inflectional morphology). Data is given in orthographic Norwegian Bokmål alongside with IPA transcriptions for Tromsø Norwegian. A few notes on the transcriptions:

- Following the conventions from Kristoffersen (2000), I will use the superscripts ^{1} and ^{2} for accent 1 and accent 2 respectively (e.g. *bil* [^{1}biːl] 'car', *kjøre* [^{2}çœːɾə] 'drive'). Due to the inherent connection to the stress system, the superscripts also signal that a given syllable carries primary stress. Secondary stress, if relevant, is marked with [ˌ] (e.g. *alvor* [^{2}ɑlˌʋɔːɾ] 'gravity').
- Norwegian has geminated consonants in certain contexts, and this is signalled in the IPA transcription with a syllable boundary (e.g. TN *kjenne* [^{2}çɛɲ.ɲə] 'to know'). The same symbol is also used to show that two adjacent vowels are not pronounced as a diphthong (e.g. *kaos* [^{1}kɑː.us] 'chaos'). Apart from this, syllable boundaries are not marked.

- TN has, just like UEN, a two-way contrast in sibilants between a lamino-alveolar /s/ and a retracted sibilant that I will transcribe as /ʂ̺/. Kristoffersen (2000:23-24) points out that the retracted sibilant has two sources: i) historic /sj-/ and /skV/, where V represents a front vowel and ii) synchronic retroflexion of /rs/ sequences. The former process is expected to have a laminal or palatal outcome such as [ʃ] while the latter is expected to have an apical outcome such as [ʂ̺]. For the varieties that developed both sounds, there has probably been a contrast between these two at some point (see Sivertsen 1967:79), but it has been reported, at least for UEN, that many speakers do not differentiate between them (see Vogt 1939 and Popperwell 1963:62), and I suspect the same is true for TN. I remain agnostic, however, as to the precise phonetic realisation of /ʂ̺/.
- Traditional TN has probably had a three-way contrast in laterals (just like we find in closely related varieties such as Borgfjord Norwegian (see Elstad 1982:70-73)) between i) a dental lateral /l/, ii) a palatal lateral /ʎ/ and iii) a retroflex (apico-alveolar) lateral /ɭ/ stemming from synchronic retroflexion of /rl/ sequences. However, the system of laterals in many Norwegian varieties seems to have undergone massive changes the last decades. Jahr (1981) and Svendsen (2012) report that in the variety spoken in Oslo (which falls inside the UEN area), the retroflex lateral /ɭ/ is spreading to environments in which we find /l/ historically. I suspect the same thing has happened in TN as I detect no phonological contrast between *rødlig* 'reddish' and *rørlig* 'moveable', they are both pronounced [^{2}ɾøːɭi], with a retroflex (apico-alveolar) [ɭ]. Similarly, Torp (2016:204) and Røyneland (2018:250-251) report that the palatal lateral /ʎ/ is also losing ground in the Norwegian varieties that have it. According to Torp, it is replaced by the retroflex (apico-alveolar) /ɭ/ in Northern Norwegian. Older speakers retain the palatal /ʎ/ but younger speakers do not use it. I will therefore assume that there is only one lateral in TN, but in spite of its articulatory properties, I will transcribe it as /l/.

2.2.1 Simplex words

Even though each vocabulary item in the lexical categories is associated with a tonal accent, the lexical distribution of the tonal accents is not completely idiosyncratic as it is largely predictable based on phonological properties of the vocabulary item in question. The most important phonological contribution to the distribution is the aforementioned distributional restriction on accent 2, limiting it to domains that contain at least a disyllabic trochee[60](i.e. it is blocked in monosyllables and polysyllables with final stress.[61] Consequently, monosyllables and polysyllables with final stress have accent 1.[62] Some examples of this are shown in Table 2 below:

Table 2 – monosyllables and final stress

Orthography	**IPA for TN**	**Gloss**
hus	[^{1}hʉ:s]	‘house’
ting	[^{1}tiŋ]	‘thing’
kladd	[^{1}klɑɟ]	‘draft’
svulst	[^{1}sʊʉlst]	‘tumour’
orkidé	[ɔɾki^{1}de:]	‘orchid’
kamel	[kɑ^{1}me:l]	‘camel’
portrett	[pu^{1}ʈɻæt]	‘portrait’
intervju	[intəɾ^{1}vjʉ:]	‘interview’

As we can see, monosyllables are always accent 1, regardless of the complexity of the syllable structure and of the vowel quality. Words with final stress also receive accent 1 across the board.

One consequence of excluding accent 2 from monosyllables and polysyllables with final stress is that the tonal accents are effectively only in competition with each other in words with

[60] This restriction does not apply to the so-called circumflex accent varieties in Norwegian where the unstressed vowel in originally disyllabic accent 2 words has been syncopated. Accent 2 has been retained though (Kristoffersen 1992).

[61] The reasons for this distribution are possibly diachronic, resulting in a structural requirement in the synchronic grammar. See the *Old Scandinavian Hypothesis* in footnote 46.

[62] Vanvik (1956, 1961) has argued that monosyllables and polysyllables with final stress have no tonal accent at all because the phonetic realisation varies a lot (i.e. there is no fixed pitch target), thus limiting accent 1 to polysyllables with non-final stress. Haugen (1963) has pointed out, however, that we find the same kind of variation for polysyllabic accent-1 words with non-final stress (see also footnote 49).

penultimate and antepenultimate stress. However, the distribution of the tonal accents in these two stress classes does not appear to be random but is skewed in one way or another due to what appear to be phonologically grounded restrictions (see Kristoffersen 2000:255-257), although not as strict as the one for accent 2 described above. Looking first at simplex words with antepenultimate stress, they are overwhelmingly accent 1, as shown in Table 3 below:

Table 3 – antepenultimate stress

Orthography	**IPA for TN**	**Gloss**
ananas[63]	[¹ɑnɑnɑs]	‘pineapple’
tombola	[¹tumbulɑ]	‘tombola, raffle’
narkotikum	[nɑɾ¹ku:tikʉm]	‘drug’
Afrika	[¹ɑ:fɾikɑ]	‘Africa’
Amerika	[ɑ¹me:ɾikɑ]	‘America’
linoleum	[li¹nu:le.ʉm]	‘linoleum’
brokkoli	[¹bɾɔk.kuli]	‘broccoli’
paprika	[¹pɑ:pɾikɑ]	‘bell pepper’
risiko	[¹ɾis.siku]	‘risk’
helvete	[²hælʋətə]	‘hell’
legeme	[²le:gəmə]	‘body’
menneske	[²mɛn.nəskə]	‘human’

There are as far as I know, we find only three cases of accent 2 (the three grey rows in Table 3) realising antepenultimate stress. There are few other monomorphemic words, such as *eventyr* [²æ:ʋənˌty:ɾ] ‘adventure, fairy tale’, *herberge* [²hæ:ɾˌbæɾgə] ‘hostel’ and *mareritt* [²mɑ:ɾəˌɾit] ‘nightmare’ that have stress on the antepenultimate syllable realised as accent 2. However, as indicated in the transcriptions, they also have a secondary stress, suggesting that they have more prosodic structure than the words with penultimate stress in Table 3. We will get back to these in section 6.3.2.2.

[63] Along with *domino* [¹duminu] ‘domino’, this word is one of the few ones where the requirement for bimoraicity on stressed syllables is not met (Stausland Johnsen 2019). However, NAOB (*The Norwegian Academy Dictionary* available at www.naob.no) lists both of them with geminates.

In simplex words with penultimate stress, the distribution is much more even but there is a strong correlation between properties of the post-stress syllable and tonal accent. More specifically, if the unstressed vowel is a schwa (in the orthography <e>), we predominantly get accent 2 (the three exceptions from Table 3 above also fit this description).[64] Relevant data is shown in Table 4 (with some exceptions listed in the grey rows).[65]

Table 4 – penultimate stress, unstressed /e/

Orthography	**IPA for TN**	**Gloss**
røre	[^{2}ɾø:ɾə]	‘batter’
sjanse	[^{2}ʂɑŋsə]	‘chance’
fasade	[fɑ^{2}sɑ:də]	‘façade’
barrikade	[bɑɾi^{2}kɑ:də]	‘barricade’
krokodille	[kɾuku^{2}dil.lə]	‘crocodile’
vanilje	[ʋɑ^{2}niljə]	‘vanilla’
glukose	[glʉ^{2}ku:sə]	‘glucose’
asteroide	[ɑstəɾu^{2}i:də]	‘asteroid’
lokale	[lu^{1}kɑ:lə]	‘room, venue’
brudulje	[bɾʉ^{1}dʉljə]	‘kerfuffle’
ordre	[^{1}ɔɖɻə]	‘order (n)’
moderne	[mu^{1}dæ:ɳə]	‘modern’
historie	[hi^{1}stu:ɾjə]	‘story, history’
komedie	[ku^{1}me:djə]	‘comedy’

[64] The correlation between schwa in the unstressed syllable and accent 2 is even stronger in TN than it is in UEN. Certain stress-attracting nominal endings such as *–isme* and *–asje* are pronounced with accent 2 in TN, e.g. *kommunisme* [kumi^{2}nismə], *bagasje* [bɑ^{2}gɑ:ʂə] ‘luggage’. In UEN on the other hand, they are traditionally pronounced with accent 1 (but Kristoffersen (2000:256) reports that accent 2 seems to be gaining ground for some of those suffixes).

[65] It should be noted, though, that what qualifies as a simplex word is not always straightforward. The orthographic <e>-ending, realised as schwa and overwhelmingly correlated with accent 2, is the most common infinitival ending and a very common ending for singular indefinite nouns. This schwa is commonly dropped when other inflectional endings are added, which makes one wonder if words ending in *–e* are simplex or complex. I will not try to answer that question here, but the generalisation should nevertheless be pointed out in a thorough description of tonal accent distribution in Norwegian.

The tendency for words with post-stress schwa to surface with accent 2 is so strong that even foreign proper names such as *Firenze* [fi²ɾɛnsə] ‘Florence’, *Trieste* [tɾi²ɛstə] ‘Trieste’, *Alicante* [ɑli²kɑntə] ‘Alicante’, *Goethe* [²gø:tə] and *Schäuble*[66] [²ʂɔjblə] are pronounced with accent 2.

If the post-stress syllable is something else than a single schwa (e.g. presence of coda consonants, another vowel), the rule is then that the word has accent 1, as shown in Table 5:

Table 5 – penultimate stress, unstressed non-/e/

Orthography	**IPA for TN**	**Gloss**
aroma	[ɑ¹ɾu:mɑ]	‘aroma’
villa	[¹ʋil.lɑ]	‘villa’
bikini	[bi¹ki:ni]	‘bikini’
kilo	[¹çi:lu]	‘kilo’
hubro	[¹hʉ:bɾu]	‘eagle owl’
Torino	[tu¹ɾi:nu]	‘Turin’
Italia	[i¹tɑ:lja]	‘Italy’
alligator	[ɑli¹gɑ:tuɾ]	‘alligator’
fenrik	[¹fɛnɾik]	‘second lieutenant’
fosfor	[¹fɔsfuɾ]	‘phosphor’
asparges	[ɑ¹spɑɾgəs]	‘asparagus’
appendiks	[ɑ¹pɛndiks]	‘appendix’
alene	[ɑ²lɛjnɑ]	‘alone’
salmonella	[salmu²nel.la]	‘salmonella’
sangria	[sɑŋ²gɾi:.ɑ]	‘sangria’
akademia	[ɑkɑdə²mi:.ɑ]	‘the academic world’
paranoia	[pɑɾɑ²nɔj.jɑ]	‘paranoia’
Eritrea	[ɛɾi²tɾe:.ɑ]	‘Eritrea’
eddik	[²ɛd.dik]	‘vinegar’
harpiks	[²hɑɾpiks]	‘resin’

[66] The last name of the German minister of finance from 2009 to 2017, Wolfgang Schäuble.

The exceptions (some are listed in the grey rows) seem to be limited mostly to unstressed /a/.[67] What the data above shows is that it is possible to predict the surface tonal accent to a large extent solely on the basis of phonological properties of the vocabulary item in question.

2.2.2 Derivational suffixes and compounding

Compounding and derivation represent an increased level in morphological complexity with respect to the data treated in section 2.2.1. Even though they are traditionally treated as separate word formation processes, the difference between them does not seem to be a grammatically fundamental one. As pointed out by Ralli (2010), the two processes intermingle in various ways, indicating that they operate in the same zone of morphosyntactic structure building. The difference between these terms resides mainly in the phonological autonomy of the elements involved. That is, compounding applies between free morphemes while derivation involves at least one bound morpheme, which is subject to positional restrictions (i.e. it is a prefix or a suffix). Note however that this does not mean that derivation and compounding are the same thing for all practical purposes. Their properties are explored in more detail in section 4.1. In spite of the fact that the boundary between derivation and compounding is a blurry one, I will present the data as if there was a very clear distinction.

Starting with compounds, they represent a situation where what we can refer to as lexemes (or roots, see chapter 4), each being associated with their own tonal accent, are put together to create a *new* lexeme. However, not all the tonal accents that are contained in it will be realised. The compound as a whole will have only one tonal accent, regardless of the number of member lexemes. Furthermore, the tonal accent of the compound will be anchored to the stressed

[67] The group of exceptions would be even bigger if we included personal first names such as *Håvard*, *Viljar*, *Kari* and *Nora*, all of which are pronounced with accent 2. I have chosen to exclude them here because personal first names seem to form a separate class as they are subject to less restrictive phonotactics. The group of bivocalic roots that end in a full vowel plus at least one consonant consists of personal first names only (Kristoffersen 2000:65). This suggests that they represent a different type of beast.

syllable of the left-most compound member (i.e. compound stress is by default left-aligned (Kristoffersen 2000:196)).

I will first give a brief presentation of the system in UEN, following Kristoffersen's (2000:263-267) description. UEN represents a system where compounds *inherit* the tonal accent from its left-most member. Thus, the distribution of accent 1 and accent 2 in UEN compounds is largely predictable once we know what kind of accent the first member has in isolation. However, as pointed out by Kristoffersen (2000:263-264), this observation only holds for compounds whose first members are polysyllabic. The general pattern that arises is that polysyllabic first members will impose the tonal accent they have in isolation onto the compound as a whole. Consequently, the tonal accents of other compound members do not play any role. Some data is presented in Table 6 below (IPA given for UEN):

Table 6 – polysyllabic first member, UEN

First	Second member	Compound	IPA	Gloss
^{1}lager	*^{1}dør*	*^{1}lagerdør*	[^{1}lɑ:gəˌɖø:ɾ]	‘storage door’
^{1}lager	*^{2}bygning*	*^{1}lagerbygning*	[^{1}lɑ:gəɾˌbygniŋ]	‘storage building’
^{2}skole	*^{1}lag*	*^{2}skolelag*	[^{2}sku:ləˌlɑ:g]	‘school team’
^{2}skole	*^{2}klasse*	*^{2}skoleklasse*	[^{2}sku:ləˌklɑs.sə]	‘school class’
ka^{1}fé	*^{1}tur*	*ka^{1}fétur*	[kɑ^{1}fe:ˌtʉ:ɾ]	‘café visit’
ka^{1}fé	*^{2}eier*	*ka^{1}féeier*	[kɑ^{1}fe:ˌæjəɾ]	‘café owner’

As we can see from Table 6, the tonal accent of the compound is the same as the tonal accent of the first member.[68]

If we look at monosyllabic words on the other hand, the picture gets more complicated. As accent 2 is banned from monosyllables (as explained above, see also Table 2), we would expect

[68] There are some exceptions to this pattern (Kristoffersen 2000:267) where we see a shift in accent. That is, when the first member is accent 1 in isolation but has accent 2 in compounds. For example: *^{1}finger* + *^{1}ring* = *^{2}fingerring* ‘finger ring’. In this case, the accent 2 seems to come from nowhere. There is to my knowledge no cases where the opposite happens (i.e. shift from accent 2 to accent 1).

the general rule "tonal accent of compound = tonal accent of first member" to give accent 1 for compounds with monosyllabic first member, but many of them get accent 2 (grey rows).

Table 7 – monosyllabic first member, UEN (examples from Kristoffersen 2000:264)

First member	**Second member**	**Compound**	**IPA**	**Gloss**
¹ball	*¹sal*	*¹ballsal*	[¹bɑlˌsɑ:l]	'ball room'
¹ball	*²kjole*	*¹ballkjole*	[¹bɑlˌçu:lə]	'ball gown'
¹ball	*¹spill*	*²ballspill*	[²bɑlˌspil]	'ball game'
¹ball	*²trening*	*²balltrening*	[²bɑlˌtre:niŋ]	'ball exercise'
¹voks	*¹lys*	*¹vokslys*	[¹ʋɔksˌly:s]	'wax candle'
¹voks	*²tavle*	*¹vokstavle*	[¹ʋɔksˌtɑʋlə]	'wax tablet'
¹talg	*¹lys*	*²talglys*	[²tɑlgˌly:s]	'tallow candle'
¹talg	*²lampe*	*²talglampe*	[²tɑlgˌlɑmpə]	'tallow lamp'

In Table 7, all the first member words are monosyllables and are accent 1 in isolation, but this accent 1 is not always imposed on compounds. In some cases, the compound will be accent 2. The most interesting case in this table is perhaps *ball*, which allows for both accents in compounds resulting in a meaning alternation. If *ball* appears as the first member in a compound with accent 1, the meaning is that of a formal social gathering for dancing. With accent 2, it refers to the round spherical object. Consequently, it is perfectly possible to have *²ballkjole* 'ball gown', but the meaning would perhaps be a gown that is decorated with a ball pattern.

The last compound pattern that will be described here is what I will refer to as *s-compounds* because there is a linking element, an –*s*– (see section 4.1.2 for more details), that occurs between two compound members.[69] What is interesting about the linking –*s*– is that compounds where the first member is a monosyllable followed by the –*s*– are accent 1. These are marked in grey rows in Table 8 below. Yet, the same monosyllable as first member in other compounds but without the –*s*– comes with accent 2.

[69] There are also compounds that take a linking –*e*– but I will leave that out of this description. This linking element is generally associated with accent 2.

Table 8 – s-compounds, UEN

First	Second	Compound	IPA	Gloss
^{1}*dag*	^{1}*lys*	^{1}*dag-**s**-lys*	[^{1}dɑksˌly:s]	‘day light’
^{1}*dag*	^{1}*tid*	^{2}*dagtid*	[^{2}dɑgˌti:]	‘daytime’
^{1}*skog*	^{2}*arbeid*	^{1}*skog-**s**-arbeid*	[^{1}skuksˌɑɾbæj]	‘lumbering’
^{1}*skog*	^{2}*vokter*	^{2}*skogvokter*	[^{2}sku:gˌʋɔktəɾ]	‘forest ranger’
^{1}*land*	^{1}*mann*	^{1}*land-**s**-mann*	[^{1}lɑnsˌmɑn]	‘compatriot’
^{1}*land*	^{1}*bruk*	^{2}*landbruk*	[^{2}lɑnˌbrʉ:k]	‘agriculture
^{2}*glede*	^{1}*rus*	^{2}*glede-**s**-rus*	[^{2}gle:dəsˌɾʉ:s]	‘euphoria’
^{2}*glede*	^{2}*tåre*	^{2}*glede-**s**-tåre*	[^{2}gle:dəsˌto:ɾə]	‘tear of joy’

Note that we only see this effect with *monosyllabic* first members. As shown in Table 8, words such as *glede* ‘joy’ can also take the linking *–s–* in compounds but it has no effect on the tonal accent.

Turning now to tonal accent in compounds in TN, the system is quite different. Instead of inheriting the tonal accent from the first member, there is a general *neutralisation* of the tonal accent contrast in the direction of accent 2. This happens irrespective of the tonal accent associated with each member in the compound. Taking some of the compounds we have already had a look at for UEN, this gives us the following data:

Table 9 – compound neutralisation, TN

First	Second member	Compound	IPA	Gloss
^{1}*lager*	^{1}*dør*	^{2}*lagerdør*	[^{2}lɑ:gəˌɖø:ɾ]	‘storage door’
^{2}*skole*	^{1}*lag*	^{2}*skolelag*	[^{2}sku:ləˌlɑ:g]	‘school team’
ka^{1}*fé*	^{1}*tur*	*ka*^{2}*fétur*	[kɑ^{2}fe:ˌtʉ:ɾ]	‘café visit’
^{1}*ball*	^{2}*kjole*	^{2}*ballkjole*	[^{2}bɑlˌçu:lə]	‘ball gown’
^{1}*ball*	^{1}*spill*	^{2}*ballspill*	[^{2}bɑlˌspil]	‘ball game’
^{1}*voks*	^{1}*lys*	^{2}*vokslys*	[^{1}ʋɔksˌly:s]	‘wax candle’

When we discussed the data in Table 7 for UEN, we saw that some monosyllabic first members surface with accent 2 while others surface with accent 1. In TN on the other hand, there is no such contrast. Thus, the semantic contrast we saw between ^{1}*ballkjole* and ^{2}*ballkjole* for UEN is neutralised in TN, leaving all interpretation to the pragmatic context.

This general neutralisation notwithstanding, there are compounds in TN where both tonal accents are allowed. What is interesting, however, is that the semantic interpretation of the compound changes according to the tonal accent.

(2-9) a. i) ^{1}*kystvakt* 'Coast guard'
ii) ^{2}*kystvakt* 'coastal guard'

b. i) ^{1}*bydel* 'suburb (administration)'
ii) ^{2}*bydel* 'city part'

c. i) ^{1}*jordbær* 'strawberry'
ii) ^{2}*jordbær* 'earth berry'

d. i) ^{1}*Island* 'Iceland'
ii) ^{2}*island* 'ice country'

A few things should be noted for the data in (2-9). *First*, with the exception of (2-9)d, accent 2 is compatible with both listed meanings, perhaps due to it being the more generally used one. The entries that appear with accent 1 however, are only compatible with the less transparent meaning listed for that tonal accent. *Second*, the difference is subtle and not all speakers of TN make use of accent 1 in these cases. However, that does not mean that a pronunciation with accent 1 in the cases above would be considered incorrect. *Third*, even though the listed meanings for accent 2 are not in use on an everyday basis, the meaning still arises naturally based on compositional principles that are at play in every compound structure (see also section 4.1.1). However, access to those meanings may be more or less impeded by conventionalised interpretations. In any case, there is nothing in the structure itself that prevents the meanings listed for accent 2.

As for *s*-compounds in TN, they turn out to be a bit more complicated than in UEN. It is true that compounds with a linking –*s*– involving a monosyllabic first member can be realised with accent 1, but in TN, this also seems to depend on the size of the compound as a whole. If what follows is another monosyllabic word such that the compound as a whole ends up being *disyllabic*, we get accent 1. If it is larger, the compound construction can also surface with accent 2. Some relevant data is shown in Table 10 below. It should be noted, though, that there is variation when it comes to this so there is perhaps no unique system.

Table 10 – s-compounds, TN

First	The rest	Compound	IPA	Gloss
^{1}*dag*	^{1}*lys*	^{1}*dag-**s**-lys*	[^{1}dɑksˌly:s]	'day light'
^{1}*dag*	^{1}*verk*	^{1}*dag-**s**-verk*	[^{1}dɑksˌʋæɾk]	'a day's work'
^{1}*skog*	^{1}*troll*	^{1}*skog-**s**-troll*	[^{1}skuksˌtɾɔl]	'woodland troll'
^{1}*skog*	^{1}*bær*	^{1}*skog-**s**-bær*	[^{1}skuksˌbæ:ɾ]	'forest berries'
^{1}*tid*	^{1}*press*	^{1}*tid-**s**-press*	[^{1}titsˌpɾæs]	'time pressure'
^{1}*tid*	^{1}*frist*	^{1}*tid-**s**-frist*	[^{1}titsˌfɾist]	'deadline'
^{1}*liv*	^{1}*tid*	^{1}*liv-**s**-tid*	[^{1}lifsˌti:]	'lifetime'
^{1}*liv*	^{1}*tegn*	^{1}*liv-**s**-tegn*	[^{1}lifsˌtæŋn]	'life sign'
^{1}*dag*	*re*^{1}*vy*	$^{1/2}$*dag-**s**-reˌvyen*	[$^{1/2}$dɑksɾeˌvy:.ən]	(the NRK news)
^{1}*dagsˌlys*	^{2}*lampe*	^{2}*dag-**s**-lys-lampe*	[^{2}dɑksˌly:sˌlɑmpə]	'day light lamp'
^{1}*skog*	^{2}*arˌbeid*	$^{1/2}$*skog-**s**-arbeid*	[$^{1/2}$skuksɑɾˌbɛj]	'lumbering'
^{1}*skog*	^{2}*bilˌvei*	^{2}*skog-**s**-bilvei*	[^{2}skuksˌbi:lˌʋɛj]	'forest road'
^{1}*liv*	^{2}*mestring*	$^{1/2}$*liv-**s**-mestring*	[$^{1/2}$lifsˌmɛstɾiŋ]	'coping with life'
^{1}*liv*	^{2}*grunnˌlag*	$^{1/2}$*liv-**s**-grunnlag*	[$^{1/2}$lifsˌgɾʉnˌlɑ:g]	'basis of life'

One potentially relevant factor is the degree of conventionalisation. For instance, *skogsarbeid* is a much more conventionalised compound than *skogsbilvei*. Sociolinguistic factors could also play a role, however. Compounded structures that are prosodically heavy (e.g containing ≥ 3 stresses) and pronounced with accent 1 are missing the prototypical Northern Norwegian *connective* accent 2 (see section 2.1.2). As such, they are associated with *non-tonal* varieties that are spoken in the north-east (see map in section 1.3.3), which I conjecture are perceived to be of lower prestige.

As for derivational suffixes, the focus here will be *nominalising* suffixes that are *not* stress-attracting.[70] Even if the ones presented here at not stress-attracting, there is evidence that they do not necessarily have the same prosodic properties. For instance, some of them contain a long

[70] Stress-attracting suffixes such as *–sjon* in *presenta*^{1}*sjon* 'presentation' would trigger final stress, and consequently accent 1. Other ones such as *–isme* in *kommu*^{2}*nisme* come with accent 2 in TN by virtue of ending with –e (see section 2.2.1).

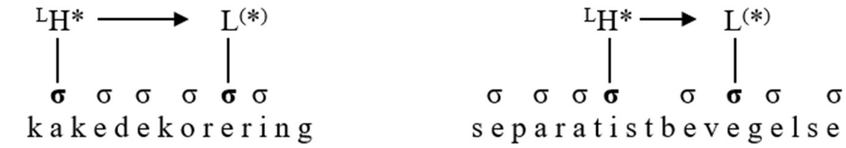
vowel, which indicates that they are stressed (see introduction to section 2.1), whereas others are unstressed. This will have consequences for their tonal (in)visibility in TN. Among the *unstressed* nominalising suffixes, we find *–ing* and *–else*. They both create deverbal nouns and they compete with each other to some extent, even though *–ing* is the only one that is productive (Faarlund et al. 1997:97-101, Conzett 2016:290-292). For the constructions in which they occur, both accent 1 and accent 2 are allowed. Some examples of this are shown in Table 11 below (IPA for TN are given for the derived noun):

Table 11 – suffixes, -ing *and* -else

Verbal base	Suffix	Derived nominal	IPA for TN	Gloss
^{1}*sy*	*-ing*	^{2}*sying*	[^{2}sy:iŋ]	'sew/-ing'
^{1}*blø*	*-ing*	^{2}*bløing*	[^{2}blø:iŋ]	'bleed/-ing'
^{2}*kjøre*	*-ing*	^{2}*kjøring*	[^{2}çø:ɾiŋ]	'drive/-ing'
^{1}*garantere*	*-ing*	*garan*^{1}*tering*	[gɑɾɑn^{1}te:ɾiŋ]	'guarantee/-ing'
deko^{1}*rere*	*-ing*	*deko*^{1}*rering*	[dɛku^{1}ɾe:ɾiŋ]	'decorate/-tion'
^{2}*heve*	*-else*	^{2}*hevelse*	[^{2}hæ:ʋəlse]	'swell/-ing'
^{2}*spøke*	*-else*	^{2}*spøkelse*	[^{2}spø:kəlse]	'haunt/ghost'
be^{1}*vege*	*-else*	*be*^{1}*vegelse*	[bə^{1}ʋæ:gəlsə]	'move/-ment'
^{2}*ydmyke*	*-else*	^{2}*ydmykelse*	[^{2}y:dˌmy:kəlse]	'humiliate/-tion'

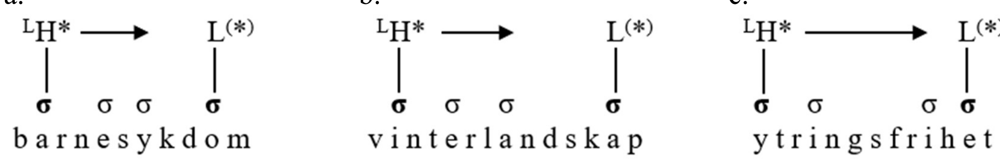
The data shows that deverbal nouns produced with polysyllabic verbal bases keep the tonal accent from the verbal base. The data also reveals that adding the suffix *–ing* to monosyllabic verbal bases gives accent 2, showing that it is tonally visible (recall that accent 2 requires a disyllabic trochee in order to surface). However, none of the suffixes acts as a tonal anchoring point in compounds with accent 2 in TN, showing that they are unstressed. That is, if the deverbal nominals in Table 11 occur as the right-most member in a TN compound, the $L^{(*)}$ from the accent 2 melody in TN ($^{L}H^{*}L^{(*)}$, see section 2.1.2), anchors to the root vowel and not to the suffix (the connective property of accent 2 does not include the suffix). This is shown in the compounds *kake-dekorering* [^{2}kɑ:kədɛkuˌɾe:ɾiŋ] 'decoration of cakes' and *separatist-bevegelse* [səpɑɾɑ^{2}tistbəˌʋæ:gəlsə] 'separatist movement' in (2-10) below:

(2-10) a. b.



Among the *stressed* nominalising suffixes, we find *–dom* and *–skap*, both of which are used to derive nouns from adjectives and from other nominal roots (Faarlund et al. 1997:106-107).[71] In addition to these, we also find *–het* that derives nouns from adjectives. Of these three, only *–het* can be considered productive even though both *–dom* and *–skap* have been used in nominalisations that must be considered relatively recent, such as *cowboyskap* 'cowboyhood' and *gründerskap* 'entrepreneurship' (Conzett 2016:294). Corroboration for the claim that they are stressed can be found in their behaviour in TN compounds where they are able to act as a tonal anchoring point (i.e. connective accent 2) if the derived nominal they are a part of, is the right-most compound member (thus, they contrast with *–ing* and *–else* in (2-10) above). This is shown in the compounds *barne-sykdom* [^{2}bɑ:ɳə̩ˌsy:kˌdɔm] 'childhood illness', *vinter-landskap* [^{2}ʋiɲcəˌlɑɲˌskɑ:p] 'winter landscape' and *ytrings-frihet* [^{2}ytɾiŋsˌfɾi:ˌhe:t] 'freedom of speech' in (2-11) below:

(2-11) a. b. c.



In addition to this, both *–skap* and *–het* have long vowels, something which is considered to be a correlate of stress (see introduction to section 2.1).

As for their behaviour with respect to tonal accent in TN, the suffixes create compound-like structures by virtue of carrying some sort of secondary stress (though not stress-attracting),

[71] Their semantic contribution can vary according to the lexical category of the base to which they attach, but the meaning is generally rather abstract. For instance, the nominal root *troll* 'troll' can take both suffixes: *trolldom* [^{2}trɔlˌdɔm] 'witchcraft, sorcery' and *trollskap* [^{2}trɔlˌskɑ:p] 'wickedness'.

attaching to lexical roots that are necessarily stressed themselves. For TN, this means that we except that accent 2, being the default for compounds, to be favoured for this set of suffixes. This is true for *–dom* and *–skap* as shown in Table 12:[72]

Table 12 – suffixes, -dom *and* -skap *in* TN

Base	Suffix	Derived nominal	IPA for TN	Gloss
¹syk	*-dom*	*²sykdom*	[²sy:kˌdɔm]	'ill/-ness'
¹barn	*-dom*	*²barndom*	[²bɑ:ɳ̩ˌdɔm]	'child/-hood'
²fattig	*-dom*	*²fatigdom*	[²fɑt.tiˌdɔm]	'poor/poverty'
¹klok	*-skap*	*²klokskap*	[²klu:kˌskɑ:p]	'wise/-dom'
¹land	*-skap*	*²landskap*	[²lɑɲˌskɑ:p]	'land/-scape'
²viten	*-skap*	*²vitenskap*	[²ʋi:tn̩ˌskɑ:p]	'knowledge/science'

As for *–het*, it has somewhat different properties. It was shown in (2-11)c above that the suffix is stressed because the L$^{(*)}$ from the TN accent 2 melody is able to seek it out. It contributes to the prosodic "compoundness" of the structure and is therefore tonally visible. However, the suffix *–het* is also present in some constructions with accent 1 in TN. We see this most clearly in *het*-nominalisations of some derived adjectives[73], as shown in Table 13 below (accent 1 nominalisations in grey rows):

[72] Note that the suffix *–skap* in UEN has a split behaviour when it comes to tonal accent. Specifically, we find that when it attaches to nominal stems, the result is accent 2, e.g. *landskap* [²lɑnˌskɑ:p] 'landscape' from *land* [¹lɑn] 'land (n)', whereas when it attaches to adjectival stems, the derived noun tends to inherit the tonal accent from the adjective, e.g. *galskap* [¹gɑ:lˌskɑ:p] 'madness' from *gal* [¹gɑ:l] 'crazy, mad', *svangerskap* [¹sʋɑŋərˌskɑ:p] 'pregnancy' from *svanger* [¹sʋɑŋ.ŋər] 'pregnant' and *dovenskap* [²dɔ:ʋənˌskɑ:p] 'lazyness' from *doven* [²dɔ:ʋən] 'lazy'. There are exceptions though, e.g. *dårskap* [¹do:ˌʂkɑ:p] 'folly' from *dåre* [²do:rə] 'fool (n)'.

[73] Derived adjectives are formed by suffixation of *–lig*, *–ig, –som* and *–bar*. These are discussed further in section 6.3.

Table 13 – het-nominalisations, TN

Adjectival Base	Suffix	Derived nominal	IPA for TN	Gloss
^{2}*hemmelig*	*-het*	^{2}*hemmelighet*	[^{2}hæm.meliˌhe:t]	‘secret (a)/(n)’
^{2}*kjærlig*	*-het*	^{2}*kjærlighet*	[^{2}çæ:liˌhe:t]	‘loving (a)/love (n)’
^{2}*vanskelig*	*-het*	^{2}*vanskelighet*	[^{2}ʋɑnskəliˌhe:t]	‘difficult/-y’
^{2}*ensom*	*-het*	^{2}*ensomhet*	[^{2}e:nsɔmˌhe:t]	‘lonely/-ness’
sann^{1}*synlig*	*-het*	*sann*^{1}*synlighet*	[sɑn^{1}sy:nliˌhe:t]	‘probable/-ility’
viten^{1}*skapelig*	*-het*	*viten*^{1}*skapelighet*	[ʋi:tn̩^{1}skɑ:pəliˌhe:t]	‘scientific/-ity’
an^{1}*svarlig*	*-het*	*an*^{1}*svarlighet*	[ɑn^{1}sʋɑ:liˌhe:t]	‘responsible/-ity’
opp^{1}*merksom*	*-het*	*opp*^{1}*merksomhet*	[up^{1}mærksɔmˌhe:t]	‘attentive/-tion’

What the data in Table 13 shows, is that the tonal accent that we find in the adjectival base is kept also for the noun derived through *het*-suffixation. In derivatives with accent 2, the suffix *–het* adds to the prosodic “compoundness” of the structure by virtue of being stressed, and is therefore tonally visible and included in the connective accent 2. However, in the derivatives with accent 1, it appears that *–het* is unable to add to (or create) a compound prosody, with the consequence that the suffix does not act as a tonal anchoring point, as if it were tonally invisible. This is shown in (2-12) below for *vitenskapelighet* [ʋi:tn̩^{1}skɑ:pəliˌhe:t] ‘scientificity’:

(2-12)

```
            H*  L
            |   |
σ σ         σ   σ σ   σ
v i t e n s k a p e l i g h e t
```

The behaviour we see in (2-12) is very different from what we see in (2-11)c. In the latter, the suffix behaves like a compound member and is sought out specifically as a tonal anchoring point for the final $L^{(*)}$ in the accent 2 melody, while in the former, it does not play any tonal role at all. Note, however, that this behaviour is clearest for morphologically *derived* adjectives. In *het*-nominalisations of monomorphemic adjectives, the default pattern in TN is accent 2, which means that this group of deadjectival nominals do not inherit the tonal accent from the adjective.[74] Some examples are shown in Table 14:

Table 14 – het*-nominalisations in TN, underived adjectives*

Adjectival Base	Suffix	Derived nominal	IPA for TN	Gloss
¹sikker	*-het*	*²sikkerhet*	[²sik.kər̩ˌhe:t]	'secure/-ity'
¹klar	*-het*	*²klarhet*	[²klɑ:ɾˌhe:t]	'clear/-ity'
¹snill	*-het*	*²snillhet*	[²snilˌhe:t]	'kind/-ness'
¹svak	*-het*	*²svakhet*	[²sʊɑ:kˌhe:t]	'weak/-ness'

Just like for the compounds already discussed, there are cases involving *het*-nominalisations of monomorphemic adjectives that allow both tonal accents, but with a shift in meaning depending on the tonal accent.

(2-13) a. i) *¹ømhet* 'affection
ii) *²ømhet* 'soreness'

b. i) *¹skjønnhet* 'beauty (a person)'
ii) *²skjønnhet* 'beauty (abstract concept)'

Accent 2 can be used for both meanings, but accent 1 is only compatible with the less transparent meaning listed for that tonal accent. The contrast is subtle, and may not be exploited by all speakers. It should be clear though, that accent 2 gives access to a transparent interpretation of the construction, an interpretation that cannot be accessed with accent 1.

2.2.3 Inflection

Norwegian does not have a lot of inflection, but we find some in all the lexical classes (nouns, verbs, adjectives). Even though they are inflected for different morphological categories, we will see that they behave quite uniformly when it comes to the distribution of tonal accents. The distribution that stems from the restriction on accent 2 in simplex words is

[74] In UEN on the other hand, inheritance of the tonal accent from the adjective in *het*-nominalisations applies across the board, irrespective of the morphological complexity of the adjective.

partially inherited when inflectional endings are added, but there is also a split between what can be described as regular and irregular inflection, where accent 1 is characteristic of the latter group. I will first describe tonal accent with verbal inflection before I move on to adjectives. Finally, I show how tonal accent behaves with nominal inflection.

Verbs in Norwegian are inflected for tense (present vs. past) and there is also a contrast in voice for infinitives and for the present tense that distinguishes between active and what is generally referred to as passive (or medio-passive). These are reflected in the Norwegian Bokmål orthography as follows:

(2-14)	*Infinitive*:	*–e*
	Present:	*–*(*e*)*r*
	Past:	*–dde, –te*, *–de, –et*/*–a*[75]
	Passive:	*–*(*e*)*s*

Here I focus on the infinitive and on the active tenses as the passive patterns tonally with the infinitive. The data is presented in orthographic Norwegian Bokmål with additional tonal accent diacritics, which also show the position of stress. TN IPA transcriptions are offered for the present and the past. The data for monosyllabic infinitives is given in Table 15. Monosyllabic infinitives do not take any infinitival inflectional morpheme.

[75] The allomorphy in the past tense suffix is largely driven by phonological properties of the root. Verbal roots that end in a vowel take *–dde*. Verbal roots ending in a single consonant usually take *–te* or *–de* (depending on the voicing of the preceding consonant), while verbal roots ending in consonant clusters (including geminates) usually take *–et* or *–a* (subject to sociolinguistic factors.) There are numerous exceptions to these generalisations though. Strong verbs are naturally not included here as they form their past tense through *Ablaut* (e.g. *tvinge* ‘to force’ vs. *tvang* ‘forced’).

Table 15 – verbs with monosyllabic infinitives

Infinitive		**Present**		**Past**	**Gloss**
^{1}*ha*	^{1}*har*	[^{1}hɑːɾ]	^{2}*hadde*	[^{2}hɑd.də]	‘have’
^{1}*skje*	^{1}*skjer*	[^{1}ʂeːɾ]	^{2}*skjedde*	[^{2}ʂɛd.də]	‘happen’
^{1}*bo*	^{1}*bor*	[^{1}buːɾ]	^{2}*bodde*	[^{2}bud.də]	‘live, dwell’
^{1}*snø*	^{1}*snør*	[^{1}snøːɾ]	^{2}*snødde*	[^{2}snœd.də]	‘snow’
^{1}*fri*	^{1}*frir*	[^{1}fɾiːɾ]	^{2}*fridde*	[^{2}fɾid.də]	‘propose marriage’
^{1}*sy*	^{1}*syr*	[^{1}syːɾ]	^{2}*sydde*	[^{2}syd.də]	‘sew’

Here we see that the general trend is that accent 1 is found in the monosyllabic present tense, as expected, while accent 2 surfaces when there is a second syllable provided by morphology in the past tense suffix.[76] Note that the present tense suffix itself does not force accent 1 as we find that neutralisation to accent 2 in compounds (as discussed in 2.2.2) also applies to verbal compounds where the present tense *–r* is attached to one of the monosyllabic verb stems in Table 15, e.g. *prøve-bor* [^{2}pɾøːʋəˌbuːɾ] ‘trial-dwell.PRES’.

Moving on to verbs with polysyllabic infinitives (i.e. the ones that do take an infinitival suffix), there is a split between verbs that end with Latinate *–ere* and the rest when it comes to tonal accent. The first group consistently takes accent 1 while the second group surfaces with accent 2. This also correlates with location of stress. The relevant data is shown in Table 16 below:

[76] There is also an alternation in the length of the root vowel. There is a long vowel in the present tense (this vowel is also long in the infinitive as there are no other options to obtain bimoraicity). In the past tense, however, the root vowel is short.

Table 16 – verbs with polysyllabic infinitives

Infinitive	**Present**[77]		**Past**		**Gloss**
^{2}*klatre*	^{2}*klatrer*	[^{2}klɑtrə]	^{2}*klatra*	[^{2}klɑtrɑ]	‘climb’
^{2}*kaste*	^{2}*kaster*	[^{2}kɑstə]	^{2}*kasta*	[^{2}kɑstɑ]	‘throw’
^{2}*dyrke*	^{2}*dyrker*	[^{2}dyɾkə]	^{2}*dyrka*	[^{2}dyɾkɑ]	‘cultivate’
^{2}*prøve*	^{2}*prøver*	[^{2}prø:ʋə]	^{2}*prøvde*	[^{2}prœʋdə]	‘try’
^{2}*bygge*	^{2}*bygger*	[^{2}byg.gə]	^{2}*bygde*	[^{2}bygdə]	‘build’
^{2}*bake*	^{2}*baker*	[^{2}bɑ:kə]	^{2}*bakte*	[^{2}bɑktə]	‘bake’
^{2}*rope*	^{2}*roper*	[^{2}ɾu:pə]	^{2}*ropte*	[^{2}ɾuptə]	‘shout’
^{2}*bruke*	^{2}*bruker*	[^{2}brʉ:kə]	^{2}*brukte*	[^{2}brʉktə]	‘use’
^{2}*mene*	^{2}*mener*	[^{2}me:nə]	^{2}*mente*	[^{2}me:ntə]	‘mean’
^{2}*kjøre*	^{2}*kjører*	[^{2}çø:ɾə]	^{2}*kjørte*	[^{2}çø:ʈə]	‘drive’
deko^1*rere*	*deko*^{1}*rerer*	[dɛku^{1}ɾe:ɾə]	*deko*^{1}*rerte*	[dɛku^{1}ɾe:ʈə]	‘decorate’
ju^1*stere*	*ju*^{1}*sterer*	[jʉ^{1}ste:ɾə]	*ju*^{1}*sterte*	[jʉ^{1}ste:ʈə]	‘adjust’
eksi^1*stere*	*eksi*^{1}*sterer*	[æksi^{1}ste:ɾə]	*eksi*^{1}*sterte*	[æksi^{1}ste:ʈə]	‘exist’
garan^1*tere*	*garan*^{1}*terer*	[gɑɾɑn^{1}te:ɾə]	*garan*^{1}*terte*	[gɑɾɑn^{1}te:ʈə]	‘guarantee’

The data in Table 16 is quite straightforward and shows that the tense paradigms are uniform for each verb. That is, a given verb is either all accent 1 for all verbal inflections or all accent 2.[78] This shows that the inflectional suffixes are compatible with any tonal accent.

There is, however, an alternation in tonal accent for a few *strong* verbs that have gained a more regular inflectional paradigm. Traditionally, strong verbs do not have inflectional ending for the tenses, but make use of *Ablaut* instead, e.g. *bite* ‘bite.INF’, *bit* ‘bite.PRES, *beit* ‘bite.PAST’. However, the present tense of the strong verb *komme* ‘come’ in TN is *kommer* [^{1}kɔm.məɾ] with accent 1, for *sove* ‘sleep’ we get *sover* [^{1}so:ʋəɾ] and for *gråte* ‘cry’, we get

77 Note that the present tense suffix –*r* in the orthography is not pronounced for verbs with polysyllabic infinitives in TN. Consequently, the infinitive and the present tense are homophonous. Dropping of present tense –*r* is a very common dialectal trait (Skjekkeland 2005:221).

78 There is a vowel length alternation for some of the verbs. For instance, *bruke* ‘use’ has a long vowel in the infinitive/present, but this vowel is short in the past tense.

gråter [¹grɔ:tər], also with accent 1. This mirrors the pattern in UEN for strong verbs, which have an overt present tense ending and accent 1.

Adjectives in Norwegian inflect for gender, number, definiteness and degree (Faarlund et al. 1997:350-386). Overt gender marking is limited to the neuter singular where only a subset of adjectives is suffixed with an inflectional *–t*. This suffix does not have any effect on tonal accents in adjectives, which means that adjectives overtly inflected for the neuter have the same tonal accents as the uninflected masculine/feminine forms: *enkel* [¹æŋ.kəl] 'easy/single.$_{\mathrm{M/F}}$' vs. *enkelt* [¹æŋ.kəlt] 'easy/single.$_{\mathrm{N}}$', and *gammel* [²gɑm.məl] 'old.$_{\mathrm{M/F}}$' vs. *gammelt* [²gɑm.məlt] 'old.$_{\mathrm{N}}$'. For the other inflectional categories, we find the following orthographic suffixes:

(2-15) *Plural*/*Definite*: *–e*
Comparative: –(*e*)*re*
Superlative: –(*e*)*st*

The suffix used in definite contexts (also known as the *weak* declension, be it singular or plural) and the plural suffix are the same.[79] The suffix is often omitted for adjectives ending in vowels (e.g. *rosa* 'pink'). For the comparative and superlative, the exact shape of the morpheme depends on properties of the adjective (Faarlund et al. 1997:350-359). Note that the superlative can be combined with the definite suffix, –(*e*)*ste*. The relevant data for the plural/definite suffix is shown Table 17 below:

[79] For the adjective *liten* 'small', there are distinct forms for the plural (*små*) and the definite singular (*lille*).

Table 17 – plural/definite adjectives

Singular		**Plural/definite**		**Gloss**
^{1}*stor*	[^{1}stu:ɾ]	^{2}*store*	[^{2}stu:ɾə]	‘big, large’
^{1}*rask*	[^{2}ɾɑsk]	^{2}*raske*	[^{2}ɾɑskə]	‘quick’
^{1}*enkel*	[^{1}æŋkəl]	^{2}*enkle*	[^{2}æŋklə]	‘easy, single’
^{1}*dyster*	[^{1}dystəɾ]	^{2}*dystre*	[^{2}dystɾə]	‘gloomy, somber
^{2}*gammel*	[^{2}gɑm.məl]	^{2}*gamle*	[^{2}gɑmlə]	‘old’
^{2}*rolig*	[^{2}ɾu:li]	^{2}*rolige*	[^{2}ɾu:li.ə]	‘calm’
ka^{1}nadisk	[kɑ^{1}nɑ:disk]	*ka^{1}nadiske*	[kɑ^{1}nɑ:diskə]	‘Canadian’
^{1}*rytmisk*	[^{1}ɾytmisk]	^{1}*rytmiske*	[^{1}ɾytmiskə]	‘rhythmic’
na^{1}iv	[nɑ^{1}i:ʋ]	*na^{1}ive*	[nɑ^{1}i:ʋə]	‘naïve’
nasjo^{1}nal	[nɑʂu^{1}nɑ:l]	*nasjo^{1}nale*	[nɑʂu^{1}nɑ:lə]	‘national’

As can be seen from the data, the suffix provides an additional syllable, thus enabling the change from accent 1 to accent 2 for adjectives that are monosyllabic in the singular. There are some polysyllabic adjectives that go through the same change in tonal accent from the singular to the plural, e.g. *dyster* ‘gloomy, somber’, where it can be argued that they are underlyingly monosyllabic structures, /dystr/, that are subject to schwa-epenthesis in the singular to avoid sonority violations. The schwa is not there in the plural forms. This leaves *gammel* ‘old’ as an exception because it shows the schwa-zero alternation, yet it takes accent 2 in both the singular and the plural. When it comes to other polysyllabic adjectives that have accent 1 in the singular, this is retained also for the plural form (rows marked in grey in Table 17).

Moving on to the comparative and superlative suffixes, there is a split between *regular* and *irregular* adjectives. For the former class, the suffixes behave just like the plural/definite suffix in Table 17 above and provide syllabic space for accent 2, while for the latter class, there is also root suppletion or umlaut, and they surface with accent 1. Some data are presented in Table 18 below (IPA transcriptions are for TN):

Table 18 – comparative and superlative

Positive	**Comparative**		**Superlative**		**Gloss**
^{1}*fin*	^{2}*finere*	[^{2}fi:nəɾə]	^{2}*finest*	[^{2}fi:nəst]	‘nice’
^{1}*fri*	^{2}*friere*	[^{2}fɾi:.əɾə]	^{2}*friest*	[^{2}fɾi:.əst]	‘free’
^{1}*lett*	^{2}*lettere*	[^{2}læt.təɾə]	^{2}*lettest*	[^{2}læt.təst]	‘light’
^{1}*fersk*	^{2}*ferskere*	[^{2}fæʂkəɾə]	^{2}*ferskest*	[^{2}fæʂkəst]	‘fresh’
^{2}*rolig*	^{2}*roligere*	[^{2}ɾu:li.əɾə]	^{2}*roligst*	[^{2}ɾu:likst]	‘calm’
^{2}*kjølig*	^{2}*kjøligere*	[^{2}çø:li.əɾə]	^{2}*kjøligst*	[^{2}çø:likst]	‘cold, cool’
^{1}*enkel*	^{2}*enklere*	[^{2}æŋkləɾə]	^{2}*enklest*	[^{2}æŋkləst]	‘easy, single’
^{1}*stor*	^{1}*større*	[^{1}stœɾ.ɾə]	^{1}*størst*	[^{1}stœʂʈ]	‘big
^{1}*lang*	^{1}*lengre*	[^{1}læŋɾə]	^{1}*lengst*	[^{1}læŋst]	‘long’
^{1}*tung*	^{1}*tyngre*	[^{1}tœŋɾə]	^{1}*tyngst*	[^{1}tœŋst]	‘heavy’
^{1}*god*	^{1}*bedre*	[^{1}be:dɾə]	^{1}*best*	[^{1}bæst]	‘good’
^{2}*gammel*	^{1}*eldre*	[^{1}ɛldɾə]	^{1}*eldst*	[^{1}ɛlst]	‘old’
^{2}*liten*	^{1}*mindre*	[^{1}mindɾə]	^{1}*minst*	[^{1}minst]	‘small’

As can be seen from the data in Table 18, the comparative and superlative forms of adjectives that can be considered regular are accent 2, while adjectives which involve idiosyncrasies such root suppletion or umlaut, have accent 1.[80] Accent 1 as an exceptional tonal accent in irregular adjectives is trivial for the superlative forms, which are all monosyllabic, but clearly a more salient property of the comparative forms. For the superlative forms, they lose their accent 1 when the definite suffix –*e* is added, e.g. *beste* [^{2}bæstə] ‘(the) best’.[81]

Nouns constitute the last lexical category that is inflected in Norwegian. They are inflected for number (singular vs. plural) and for definiteness (indefinite vs. definite), which means that each noun has up to four distinct forms. Singular indefinite nouns carry no inflection, which entails that we find overt marking for plurals and for definites. In the Bokmål orthography, we

[80] Note that adjectives, ending with –(*l*)*ig* and displaying the alternation ∅~k, where the latter only shows up in the superlative, fall into the class of regular adjectives.

[81] The system in UEN is somewhat different from the system in TN presented here. They behave the same way for the comparative form, but in UEN, the superlative suffix takes accent 1 across the board (regular adjectives included) unless the definite suffix –*e* is also present, in which case we get accent 2 (Kristoffersen 2000:260-261).

find the following expressed suffixes for these categories (the zero indefinite plural ending is found mostly in monosyllabic neuter nouns):

(2-16) *Definite singular*: *–en, –a, –et*
Indefinite plural: *–er*, *–∅*
Definite plural: *–ene*

For the singular *definite* form, there is allomorphy for the definiteness morpheme, governed by the gender of the noun.[82] For the plural forms, we find complete syncretism in Bokmål, both in the definite and indefinite forms while TN still mark gender distinctions to some extent.[83] Starting with nouns that are monosyllabic in the basic singular form, we find the same kind system already seen, where morphology can add the syllables needed for a change to accent 2. Some relevant data are provided in Table 19 below (transcriptions are for TN). Note that it is only with the plural suffix (if overt) that we find accent 2. The definite suffix comes with accent 1 for monosyllabic nouns.[84]

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[82] These forms are used with masculine, feminine and neuter nouns respectively.

[83] Some possible surface realisations in TN of the suffixes:

A. Singular definite:
   i. *Masculine*: {ən, n̩}, e.g. *leken* [¹le:kən] 'the game', *gutten* [¹gʉtn̩] 'the boy'
   ii. *Feminine*: {ɑ}, e.g. *elva* [¹ælʋɑ] 'the river'
   iii. *Neuter*: {ə}, e.g. *toget* [¹to:gə] 'the train'

B. Plural indefinite:
   i. *Masculine*: {ɑ}, e.g. *biler* [²bi:lɑ] 'cars'
   ii. *Feminine*: {ə}, e.g. *elver* [²ælʋə] 'rivers'
   iii. *Neuter*: {∅, ɑ}, e.g. *tog* [¹to:g] 'trains', *epler* [²æp.lɑ] 'apples'

C. Plural definite:
   i. *Masculine*: {ɑn}, e.g. *bilan* [²bi:lɑn] 'the cars'
   ii. *Feminine*: {ən, n̩}, e.g. *elvene* [²ælʋən] 'the rivers', *kattene* [²kɑtn̩]' the cats'
   iii. *Neuter*: {ɑn}, e.g. *eplene* [²æp.lɑn] 'the apples'

The surface form of the masculine singular definite and the feminine plural definite suffixes seem to be sensitive to properties of the preceding segment. For instance, a syllabic [n̩] shows up after coronal stops. Other possible realisations such as [n] and [ɳ] seem to show up after coronal sonorants, e.g. *bilen*$_{\mathrm{M}}$ [¹bi:ln] 'the car' and *dørene*$_{\mathrm{F}}$ [¹dø:ɳ] 'the doors'. This needs further investigation.

[84] There is at least one exception to this. The monosyllabic noun *mor* [¹mu:ɾ] 'mother' is pronounced with accent 2 in the definite form *mora* [²mu:ɾɑ] 'the mother'. This is also true for UEN, while western Norwegian seems to have the more regular accent 1.

Table 19 – monosyllabic nouns

Sing. indef.		**Sing. def.**		**Pl. indef.**		**Pl. def.**		**Gloss**
gutt	[1gʉt]	*gutten*	[1gʉtn̩]	*gutter*	[2gʉt.tɑ]	*guttene*	[2gʉt.tɑn]	'boy'
film	[1film]	*filmen*	[1filmən]	*filmer*	[2filmɑ]	*filmene*	[2filmɑn]	'film
vei	[1ʋɛj]	*veien*	[1ʋɛjən]	*veier*	[2ʋɛj.jɑ]	*veiene*	[2ʋɛj.jɑn]	'road'
bygd	[1bygd]	*bygda*	[1bygdɑ]	*bygde*	[2bygdə	*bygden*	[2bygdn̩]	'village'
elv	[1ælʋ]	*elva*	[1ælʋɑ]	*elver*	[2ælʋə]	*elvene*	[2ælʋən]	'river
tid	[1ti:]	*tida*	[1ti:.ɑ]	*tider*	[2ti:.ə]	*tidene*	[2ti:.ən]	'time'
fly	[1fly:]	*flyet*	[1fly:.ə]	*fly*	[1fly:]	*flyene*	[1fly:.ɑn]	'airplane'
tog	[1to:g]	*toget*	[1to:gə]	*tog*	[1to:g]	*togene*	[1to:gɑn]	'train'
hus	[1hʉ:s]	*huset*	[1hʉ:sə]	*hus*	[1hʉ:s]	*husene*	[1hʉ:sɑn]	'house'
ting	[1tiŋ]	*tinget*	[1tiŋ.ŋə]	*ting*	[1tiŋ]	*tingene*	[1tiŋ.ŋɑn]	'parliament
ting	[1tiŋ]	*tingen*	[1tiŋ.ŋən]	*ting*	[1tiŋ]	*tingene*	[1tiŋ.ŋɑn]	'thing'
sko	[1sku:]	*skoen*	[1sku:.ən]	*sko*	[1sku:]	*skoene*	[1sku:.ɑn]	'shoe'
mus	[1mʉ:s]	*musa*	[1mʉ:sɑ]	*mus*	[1mʉ:s]	*musene*	[1mʉ:sn̩]	'mouse'

A few generalisations can be made based on the data in Table 19. First, we see that the definite singular suffix never triggers a change to accent 2, even if it adds a syllable. Second, an overt indefinite plural suffix does cause a change to accent 2 for monosyllabic nouns. Third, if the noun does not take any overt indefinite plural marking (which is the case for a limited set of monosyllabic nouns), we find accent 1 on the definite plural (rows marked in grey in Table 19).

A second pattern is found in a group of monosyllabic nouns that take an overt indefinite plural suffix, but that have umlaut too. There is only a handful of nouns that fall into this class, and it is common for them to have accent 1 throughout the paradigm. Thus, they display a behaviour similar to the umlauted adjectives presented in Table 18. There are exceptions to this, however, mostly consisting of kinship terms. Some of these irregular nouns are presented in Table 20 below (the ones taking accent 2 in the plural are marked in grey rows):

Table 20 – umlauted monosyllabic nouns[85]

Sing. indef.		Sing. def.		Pl. indef.		Pl. def.		Gloss
tann	[¹tɑɲ]	*tanna*	[¹tɑɲ.ɲɑ]	*tenner*	[¹tɛɲ.ɲəɾ]	*tennene*	[¹tɛɲ.ɲəɳ]	'tooth'
hand	[¹hɑɲ]	*handa*	[¹hɑɲ.ɲɑ	*hende*	[¹hɛɲ.ɲəɾ]	*hendene*	[¹hɛɲ.ɲəɳ]	'hand'
tang	[¹tɑŋ]	*tanga*	[¹tɑŋ. ŋɑ]	*tenger*	[¹tæŋ. ŋəɾ]	*tengene*	[¹tæŋ. ŋəɳ]	'plier'
natt	[¹nɑt]	*natta*	[¹nɑt.tɑ]	*netter*	[¹næt.təɾ]	*nettene*	[¹næt.təɳ]	'night'
bok	[¹bu:k]	*boka*	[¹bu:kɑ]	*bøker*	[¹bø:kəɾ]	*bøkene*	[¹bø:kəɳ]	'book'
fot	[¹fu:t]	*foten*	[¹fu:tn̩]	*føtter*	[¹fœt.təɾ]	*føttene*	[¹fœt.təɳ]	'foot'
kraft	[¹kɾɑft]	*krafta*	[¹kɾɑftɑ]	*krefter*	[²kɾæftəɾ]	*kreftene*	[²kɾæftəɳ]	'force'
far	[¹fɑ:ɾ]	*faren*	[¹fɑ:ɳ]	*fedre*	[²fe:dɾə]	*fedrene*	[²fe:dɾən]	'father'
mor	[¹mu:ɾ]	*mora*	[²mu:ɾɑ]	*mødre*	[²mø:dɾə]	*mødrene*	[²mø:dɾən]	'mother'
bror	[¹bɾu:ɾ]	*broren*	[¹bɾu:ɳ]	*brødre*	[²bɾø:dɾə]	*brødrene*	[²bɾø:dɾən]	'brother'

Finally, we have nouns that are polysyllabic in the indefinite singular form. This is in a way the most well-behaved class because the tonal accent of a polysyllabic noun in its indefinite singular form predicts its tonal accent for the entire paradigm. In particular, this means that the general picture that has emerged in this section, where adding morphemes can enable accent 2, does not apply to polysyllabic nouns. Data for this is given in Table 21 below:

Table 21 – polysyllabic nouns

Sing. indef.		Sing. def.		Pl. indef.		Pl. def.		Gloss
bilde	[²bildə]	*bildet*	[²bildə]	*bilder*	[²bildɑ]	*bildene*	[²bildɑn]	'picture'
kirke	[²çiɾkə]	*kirka*	[²çiɾkɑ]	*kirker*	[²çiɾkə]	*kirkene*	[²çiɾkən]	'church'
ordre	[¹ɔɖɽə]	*ordren*	[¹ɔɖɽən]	*ordrer*	[¹ɔɖɽɑ]	*ordrene*	[¹ɔɖɽɑn]	'order'
silo	[¹si:lu]	*siloen*	[¹si:lu.ən]	*siloer*	[¹si:lu.ɑ]	*siloene*	[¹si:lu.ɑn]	'silo'
kafé	[kɑ¹fe:]	*kafeen*	[kɑ¹fe:.ən]	*kafeer*	[kɑ¹fe:.ɑ]	*kafeene*	[kɑ¹fe:.ɑn]	'café'
kamel	[kɑ¹me:l]	*kamelen*	[kɑ¹me:ln]	*kameler*	[kɑ¹me:lɑ]	*kamelene*	[kɑ¹me:lɑn]	'camel'

[85] For the last item in this list, *bror* 'brother', it's plural forms can also be [¹bɾø:ɾ] and [¹bɾø:ɳ] for the indefinite and definite respectively.

3 Underlying tone

A core concept in the study of phonology is the idea of 'contrast', which serves as a basis for understanding the relationship between strings like seal [si:l] and zeal [zi:l] in English. They differ along one parameter only: voicing. The former starts with a voiceless sibilant while the latter starts with a voiced one. This subsegmental difference forms the basis for the idea that speech sounds can be decomposed into *distinctive features*, which have further been shown to be the real arbiters of phonological processes (Trubetzkoy 1939). Thus, the notion of contrast has had an important role in establishing subsegmental distinctive features as the unit of reference in phonology. It has also sparked a lot of research on the nature of contrast in phonology and on the dependency relationships between phonological contrasts.

In section 1.3.1, we saw that there are reasons to assume that tones are (auto)segments in their own right, and we might ask the question of how the notion of contrast applies to tone. In this section however, I will not be delving into the distinctive features of individual tones (see Yip 2002:39-64 for an overview), but rather focus on the question of the nature of tonal contrast, and in particular, how this applies to Norwegian tonal accents. This chapter is organised as follows: in section 3.1, I give a brief overview of different types of contrast as applied to features and show how this is also applicable to tone. In section 3.2, I review different proposals concerning the nature of tonal accents in Norwegian: what is the locus of the tonal accents and what type of contrast do we find between them? Answers to these questions can roughly be divided in two groups: one group treats tone as privative and advocates for the lexicon as the locus of tonal accent while the second group opts for equipollent marking of tone and places tonal accent in the prosodic structure. We will see that there are good reasons to believe that the tonal accent contrast in Norwegian is privatively marked in the lexicon, and that what is known as accent 1 is underlying.

3.1 Theory of contrast

A contrast or an opposition is a function that consists of two ingredients. First, we need a property for which two or more objects are to be compared. The property can be defined in physical terms such as shape {round, square, elliptic…} and colour {red, blue, yellow…}, but it can also be more abstract or culturally conditioned, such as "prime numbers" or "has been married". The second ingredient is the description of an object for that property. For instance, oranges and bananas are different along many dimensions, but there is no contrast between them in and by themselves. The notion of contrast only makes sense insofar as we define it in terms of a specific property such as colour. Oranges and bananas contrast with each other for the property colour.[86] They contrast in other ways too, but a contrast is always defined in terms of a specific property.

Applied to phonology, examples of such properties are distinctive features for which different segments may receive different descriptions or values. There is some debate concerning exactly which features (i.e. our first ingredients of contrast) we should operate with in phonology, but the second ingredient (i.e. how to formulate the value of a given feature) is perhaps even more interesting because it can be done in two different ways: *equipollent* marking and *privative* marking. These two ways of valuing phonological features have different implications for the phonological system. In an equipollent system, a given property (or feature) comes with two or more possible values. The most common type of equipollent marking in phonology is through *binary* features that take + (plus) or – (minus) values, most notably used in SPE (Chomsky and Halle 1968).[87] Thus, the contrast between /s/ and /z/ found in the English minimal pair *seal* [si:l] vs *zeal* [zi:l] resides in the specification of the feature [±voice], where /s/ is defined as [–voice] while /z/ is [+voice]. Using equipollent marking of phonological features has the consequence that the possible values of a given feature are in principle in an equity relationship. That is, neither value has a privileged status. Consequently, which values

[86] Even though colour is rooted in physical properties of objects and the way the human eye works, there are still certain cultural factors that may influence this. Not all languages distinguish between 'yellow' and 'orange', showing that a contrast can be perceived by some and by others not. However, it does not change the nature of the notion of contrast.

[87] I will use the term *equipollent* instead of *binary* though, as there is in principle no reason to limit the number of possible feature settings to two. Even with a binary system, it is possible to operate with a three-way contrast if we allow for features to be unspecified. In such a system, a given feature F may have the values [+F], [–F] and [Ø], where the last option is not a feature value per se, but rather expresses the lack of a feature value.

turn out to be phonologically active or inert in a given language does not fall out from the feature marking itself.[88]

A different system is found with *privative* marking where features can take only one value. This is implemented by having the presence of a given property marked, while its absence is simply left unmarked. In a voicing context, segments that are phonologically voiced would have the feature [voice] while for segments that are not phonologically voiced, the specification for this feature would just remain empty [ ]. Notation of features as privative automatically entails that only the marked value will be phonologically active. This is simply because the unmarked option [ ], i.e. the absence of a phonological property, does not leave anything to which phonological processes can refer. This way of valuing features has much stronger predictions for phonological systems than what we find for equipollent feature specification. Privative marking specifically points out phonologically privileged features while equipollent marking does not point out any.

When it comes to the notion of contrast applied to tone, the situation is slightly different because tone is not a distinctive feature of melodic segments. Recall that tones form a separate system of autosegments on a tier that is parallel to the purely melodic one (see section 1.3.1). They run in parallel but are strictly speaking independent form each other. Tonal contrast is thus a contrast that is internal to the tonal tier and will depend on what we think tone is, and also on what the tonal system looks like in a given language. For instance, in the traditional taxonomy discussed in section 1.3.1.2,there is a difference between register tone languages and contour tone languages. In register tone languages, the contrast would simply be between H tones and L tones (and possibly M) as any surface contour are decomposable. Such systems lend themselves quite easily to privative analyses. For contour tone languages on the other hand,

[88] Given a feature F, the plus value [+F], the minus value [–F] or both may be targets in phonological processes. In German for instance, voiced obstruents are devoiced in syllable-final position (Wiese 2000:200-205), indicating that [+voice] is targeted and changed to [–voice] while there is no process targeting [–voice] in German. The "opposite" case has been claimed for Norwegian, where [–voice] seems to be the phonologically active feature value (Kristoffersen 2000:72-87), while for Turkish, Kim (2002:11-25) argues that both values of [±back] for vowels in harmony processes are active.

such as Mandarin Chinese, which exhibits a four-way tonal contrast, a privative analysis is not readily available, so an equipollent analysis will take us much further.

We also distinguished a third type of tone language, pitch accent languages, which includes languages such as Japanese and Norwegian (see section 1.3.3). As discussed there, Japanese is a pitch accent language where lexical prominence is found only in a subset of the lexicon. This prominence is realised through pitch only in the shape of a falling contour, usually annotated as H*L. As lexical prominence is found only in a subset of the lexicon, it is reasonable to assume that we are dealing with a privative system. In other words, the contrast is simply based on the presence versus absence of such marking in the lexicon.

When it comes to Norwegian, the situation may appear less clear. Norwegian shows a contrast between what appears to be tonally complex units: accent 1 and accent 2 (as discussed in chapter 2). The phonetic details of the tonal accents vary between varieties, but in general, they are made up of a combination of tones. What interests us in light of the current discussion on privative versus equipollent analyses is whether tonal accents in Norwegian are underlying, i.e. lexical. More specifically, are both tonal accents underlying and to what extent, i.e. partially or completely?

3.2 The phonological status of the Norwegian tonal accents

The tonal accents in Norwegian have traditionally been referred to as "tonemes" (see for instance Vanvik 1961 and Rischel 1963), a structuralist term that hints at the paradigmatic understanding of the relationship between them. In this conception, the tonal accents are seen as inhabiting the same paradigmatic space, implying that they are also mutually exclusive. Where we find one, the other is absent and vice versa. This also means that both of them are phonological objects in a sense, reminiscent of equipollent feature marking, but this idea has been largely abandoned in more recent approaches to Norwegian tonal accents. The term "toneme" also sets them apart from "phonemes", reflecting that they are not melodic segments.

In what follows, I review some of the accounts that have been proposed and they can be divided in two groups.[89] The first group assumes marking of (abstract) linguistic tone proper on individual morphemes. I will refer to these accounts as the *tonal* accounts. The other group removes tone from the equation and argue instead that the tonal accents are expressions of certain configurations of prosodic structure. I will refer to these as the *prosodic* accounts. This section is organised as follows: in 3.2.1, I give a brief summary of the relevant generalisations concerning tonal accents in Norwegian that need to be accounted for. The tonal accounts will be treated in section 3.2.2 while the prosodic accounts will be discussed in section 3.2.3. In section 3.2.4, I outline the view on tonal accent adopted in this thesis. We will see that there is reason to assume a system where accent 1 is underlying (i.e. lexically marked).

3.2.1 What needs to be accounted for?

As most accounts of tonal accent in Norwegian have been dealing with Urban Eastern Norwegian (Kristoffersen 2000:8-10), the generalisations we will concentrate on when reviewing these accounts will be from this variety. A short summary of these generalisations is in order before we move on to discuss how they are dealt with in each account. The most important generalisations are the following:

a. <u>Phonological size requirement</u>: accent 2 is dependent on a bimoraic trochee in order to be realised. In practice, this means that accent 2 does not surface in monosyllables and in lexical items with final stress. For these cases, only accent 1 is possible.

b. <u>Nominal and verbal morphology</u>: infinitives, tensed verbs and plural nouns are usually accompanied by accent 2. Marking of definiteness in nouns on the other hand does not

[89] A third type of approach worth mentioning is the timing hypothesis (Haugen and Joos 1952, Bruce 1977), where the two tonal accents are underlyingly the same, but where the tonal nucleus is timed differently with respect to the stressed syllable. This idea is further developed by Kristoffersen (2006), where an attempt is made to combine the insights of the timing hypothesis and privative analyses. More specifically, Kristoffersen suggests that the input melody is the same for both tonal accents, but that surface privativity arises due to an interaction between faithfulness to a pre-linked L* in a subset of lexical items and a general preference for H tones to be associated with stressed syllables and L tones to be associated with unstressed syllables.

have an effect on tonal accent. Infinitives with Latinate *–ere* and irregular verbs and nouns are exempted from this generalisation and generally take accent 1.

c. Unstressed verbal prefixes: an infinitive with *–e* and accent 2 will change to accent 1 when prefixed with an unstressed prefix.

d. Derived adjectives: certain adjectival derivational suffixes require stress adjacency. If stress is aligned with the left edge in the derived adjective, the result is always accent 2. Otherwise, we get accent 1.

e. Compounds and linking elements: the tonal accent of the leftmost member in a compound dictates the tonal accent of the compound as a whole. However, leftmost members that are monosyllabic (and accent 1 according to generalisation 1) can also trigger accent 2 for a subset of the relevant lexical items. If there is a linking element between the leftmost compound member and the rest of the compound, the linking element dictates the tonal accent. Linking *–s–* tends to take accent 1, linking *–e–* takes accent 2.

A more detailed overview of these generalisations is found in section 2.2. Even though the system of tonal accents in Urban Eastern Norwegian could in principle be different from the system found in Tromsø Norwegian, I will assume that the two varieties have enough in common to say that the underlying system for tonal accents is the same. The only major point of deviation is that Urban Eastern Norwegian has a tonal accent contrast in compound structures while in Tromsø Norwegian, this contrast is largely neutralised. Thus, the earlier accounts of tonal accent in Urban Eastern Norwegian are highly relevant for the variety treated in this thesis.

3.2.2 Tonal accounts

The tonal accounts that are discussed here share the view of the tonal accents as linguistic tone proper, meaning that tones (also abstractly) can be stored in the lexical entries of individual morphemes. They also see the tonal accent contrast as privative in that only one tonal accent can be stored, thus removing redundancy from the system. If we encode only one of the tonal accents on lexical items, we can let the phonology assign the other by rule to lexical items that are not specified. However, they disagree on which tonal accent is lexically marked.

3.2.2.1 Accent 2 is lexically specified

The view that accent 2 is lexically specified has been advocated by Rischel (1963), Haugen (1967), Aslaksen (1991), Lorentz (1995), Kristoffersen (2000) amongst others (see also Riad (2014:181-191) for Swedish) and finds part of its motivation in the fact that, in Urban Eastern Norwegian, the tonal template for accent 1 LH is contained in the one for accent 2 HLH. That is, the accent 2 melody equals accent 1 plus an additional H tone. The fact that accent 2 contains something extra has led to the not unreasonable assumption that it is precisely this one that is lexically marked while accent 1 is the default. In terms of contrastive marking, this entails that accent 2 is marked privatively on lexical items and signals presence of tone phonologically, while accent 1 is the tone-less tonal accent. The idea that accent 2 is lexically marked is also in line with the notion of *articulatory markedness*: the articulatorily more complex member in an opposition is the marked one.[90]

Another possible argument for accent 2 being lexically marked comes from the diachronic domain. There are different theories as to what the nature of tonogenesis was in mainland Scandinavian (Kock 1885, Oftedal 1952, Liberman 1984, Riad 1998a, Lahiri and Wetterlin 2015, Iosad 2016, see also footnote 46) but a comparison with prominence marking in the non-tonal Germanic languages reveals in any case that accent 2 is the innovated one. However, one

[90] The term markedness is not unproblematic given that there are different ways of defining markedness that may or may not overlap. Accent 2 is tonally more complex (and hence articulatorily more complex) than accent 1 and can thus be considered marked from that point of view. However, this does not say anything about whether accent 2 is *typologically marked*. Answering this question presupposes that we know what kind of phonological objects the Norwegian tonal accents are and that such objects can be counted. For typological markedness then, frequency does play a role (Croft 2003:110-117), both within the same language and across sets of languages. However, as pointed out by de Lacy (2009:12-15), the frequency of a given linguistic entity seems to be subject to language external factors (e.g. performance issues, E-language) rather than language internal factors (i.e. I-language), so it is not clear what frequency actually shows. Another way of defining markedness relates to processing, but in the context of tonal accent in Scandinavian, there is no consensus as to how that plays out. Felder et al. (2009) hold that accent 1 is lexically specified (marked) and that marking speeds up processing, while Roll et al. (2011) hold that accent 2 is lexically specified (marked) and that marking slows processing down. Thus, even though accent 2 is articulatorily marked, it is not clear whether that has consequences for frequency or processing. It could be that there is a timing difference for acquisition of the tonal accents, but I am not aware of any such study.

should be careful with using diachronic factors as support for statements about current affairs as this does not necessarily have any bearing on the synchronic system.

In what follows, I focus on Kristoffersen (2000), using his analysis to represent accent-2 accounts. It should be noted that even though the works cited above all share the assumption that accent 2 is lexically marked, they differ for a variety of other assumptions.

Kristoffersen's analysis

Kristoffersen (2000:253-273) presents an analysis where accent 2 is marked in the lexicon by the presence of an H tone, reflecting the fact that in Urban Eastern Norwegian, the difference between accent 1 and accent 2 is that accent 2 has an additional H tone. The H can be part of the lexical representation of root items, such as in /^{H}kirke/ 'church' or /^{H}sjokolade/, with IPA surface forms [^{2}çɪɾkə] and [ʂuku^{2}lɑːdə] respectively or the H is part of the lexical representation of suffixes, such as the plural suffix (-^{H}er). He further assumes that this H is floating and that it needs to be linked to a *primary stressed* syllable in order to be licensed. In order to account for the distribution of accent 2 in root items in the lexicon, Kristoffersen proposes that H-linking is subject to a constraint that limits accent 2 in roots to initial and antepenultimate position:

(3-1) *Linking of H*

```
      (x
[X  (x x) Y]ω
      σ σ
      ⋮
      H
```

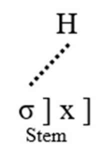
Condition: Either X or Y must be empty

As for any floating H found in suffixes, the same requirement applies: in order to be licensed, the floating H needs to link to a stressed syllable. Given that inflectional suffixes in Norwegian are always unstressed, any floating H in the lexical representation of the suffix is forced to migrate from the suffix to the stressed syllable in the root. A suffix containing a floating H, such as the plural suffix (-^{H}er), is thus capable of inducing accent 2 (*bil* [^{1}biːl] 'car', *biler*

[^{2}bi:ləɾ] ‘cars’).[91] Linking of a floating H across morpheme boundaries however, is subject to two constraints in order to account for the absence of accent 2 in root items with final stress (*pilot* [pi^{1}lu:t] ‘pilot’, *piloter* [pi^{1}lu:təɾ] ‘pilots’) and in root items with non-final stress not already marked for accent 2 (*villa* [^{1}ʋil.lɑ] ‘villa’, *villaer* [^{1}ʋil.lɑəɾ] ‘villas’).

The first constraint that Kristoffersen proposes is a locality restriction, forcing the linking of floating H from the suffix to the stem to be strictly local, making the last TBU of the stem the only available landing site (Kristoffersen 2000:259):

(3-2) *Locality Constraint*



This ensures that accent 2 will not be induced in root items such as *villa* [^{1}ʋil.lɑ] ‘villa’ when pluralised because the stressed syllable is too far away for H-linking to be licit.

The second constraint is a morphological restriction on accent 2, which applies in morphologically complex words: “A tonal foot built by a morphological rule can […] only occur at the left edge” (Kristoffersen 2000:260).[92] Thus, there is an asymmetry between underived words and derived words in terms of edge alignment of the syllabic trochee that hosts accent 2: it has to be left-aligned. For our H-linking template in (3-1), this means that X has to be empty in morphologically derived words, thus accounting for the absence of accent 2 in plural formations involving root items with final stress (*piloter* [pi^{1}lu:təɾ] ‘pilots’). Accent 2 is blocked because the relevant syllabic trochaic host is not left-aligned.

---

[91] The plural suffix does not always trigger accent 2. In nouns that get an *umlaut* in the plural in addition to the plural suffix, the result is accent 1: *strand* [^{1}strɑn] ‘beach’ versus *strender* [^{1}strɛn.n(ə)ɾ] ‘beaches’. In addition to this, there is a pattern in Urban Eastern Norwegian where noun stems that end with syllabic sonorants in the singular get accent 1 in the plural: *sykkel* /sykl/ [^{1}sykl̩] ‘bike’ versus *sykler* [^{1}syklɽ̩] ‘bikes’.

[92] A “tonal foot” according to Kristoffersen (p. 257), is a unit that is distinct from the metrical foot, not in terms of denoted domain, but in terms of what it governs. The tonal foot is defined as a syllabic trochee that hosts the accent 2 melody.

The distributional constraint in (3-1) (applying in the lexicon) and the locality constraint in (3-2) with the added morphological restriction effectively results in a system where the floating H of a suffix can only link to an immediately adjacent monosyllabic root if the monosyllable is stressed *and* left-aligned in its domain. This is shown in table 4 below, where H linking is blocked (or vacuous if the root is specified with its own H) in all but the simple monosyllabic cases. Kristoffersen is thus able to account for the most important generalisations concerning tonal accent and nominal/verbal morphology including unstressed verbal prefixes:

Table 22 – application/blocking of H-linking

Morphology	*Stem*	*Derived form*	*H-linking*	*Gloss*
a. /bil/ + $\{^{H}\text{er}\}_{\text{PL}}$	^{1}bil	^{2}biler	Yes	*car*
b. /villa/ + $\{^{H}\text{er}\}_{\text{PL}}$	^{1}villa	^{1}villaer	Locality constraint[93]	*villa*
c. /pilot/ +$\{^{H}\text{er}\}_{\text{PL}}$	pi^{1}lot	pi^{1}loter	Morphological constraint	*pilot*
d. /^{H}kirke/ +$\{^{H}\text{er}\}_{\text{PL}}$	^{2}kirke	^{2}kirker	Vacuous	*church*
e. /skriv/ + $\{^{H}\text{e}\}_{\text{INF}}$	^{1}skriv	^{2}skrive	Yes	*to write*
f. /be/ + /skriv/ + $\{^{H}\text{e}\}_{\text{INF}}$	be^{1}skriv	be^{1}skrive	Morphological constraint	*to describe*

Urban Eastern Norwegian also displays a contrast between the tonal accents in compounds. In particular, the tonal accent of the left-most member, which is also the one carrying compound stress, is the tonal accent that applies to the compound as a whole. Thus, lexical items such as *villa* and *pilot* from table 4 above will induce accent 1 if they are the left-most member compounds while *kirke* will induce accent 2. However, monosyllabic words are not as well behaved in that some of them induce accent 1 in compounds while others induce accent 2, as shown in table 5 below. In addition to this, if the left (monosyllabic) member is followed by a linking element (LE) such as *–s–* or *–e–*, this also has an effect on the tonal accent of the compound, inducing accent 1 and accent 2 respectively:

[93] Kristoffersen assumes that this constraint is also responsible for blocking H linking in plural formations for nominal roots ending in syllabic sonorants in Urban Eastern Norwegian: *sykkel* /sykl/ [^{1}sykl̩] 'bike' versus *sykler* [^{1}syklr̩] 'bikes'. The H would have to cross the syllable with the consonant nucleus in order to reach the stressed syllable that would license it (p. 258-259).

Table 23 – compound tonal accents

Morphology	*First member*	*Second member*	*Compound*	*Gloss*
a. /brann/ + /bil/	^{1}brann	^{1}bil	^{1}brannbil	*fire engine*
b. /bil/ + /brann/	^{1}bil	^{1}brann	^{2}bilbrann	*car fire*
c. /dag/ + /tid/	^{1}dag	^{1}tid	^{2}dagtid	*daytime*
d. /dag/ + LE + /lys/	^{1}dag	^{1}lys	^{1}dagslys	*daylight*
e. /dyr/ + LE + /liv/	^{1}dyr	^{1}liv	^{2}dyreliv	*wild life*

To account for the data, Kristoffersen augments the lexical representations for the monosyllables with a *compound stem*. The compound stem for some of them contains a floating H, while for others a linking element is also specified. Crucially, the linking *–e–* always comes with a floating H while a linking *–s–* never has a floating H (p. 266):

(3-3) *Compound stem*[94]

a. Floating H   b. e-suffixation   c. s-suffixation

$$\overset{\text{H}}{[[\ \text{X}]_{\text{N, A}}]}_{\text{Compound Stem}} \qquad \overset{\text{H}}{[[\ \text{X}]_{\text{N, A}}\ \text{e}]}_{\text{Compound Stem}} \qquad [[\ \text{X}]_{\text{N}}\ \text{s}]_{\text{Compound Stem}}$$

This ensures that the tonal accent behaviour of monosyllables like *bil* and *brann* changes when they appear as independent words and when they appear as the left-most member in a compound.[95] When they appear as independent words, there is no lexical marking of tonal accent on the stems so accent 2 appears only if there is a suffix inducing accent 2 (like the plural). This means that *bil* and *brann* have the same tonal accent behaviour in the nominal paradigm. In compounds however, *bil* has a compound stem in its lexical representation where tonal accent is lexically specified in the shape of a floating H, as in (3-3)a. This H is linked to

[94] As the subscripts N and A in the lexical representations indicate, adjectival stems do not undergo s-suffixation while nominal stems do.

[95] Kristoffersen (1992) has shown that there is a correlation between the tonal accent of compounds headed phonologically by monosyllables and the sonority of the rhyme of the monosyllable. High sonority rhymes (non-high vowels, sonorant codas) increase the probability for accent 2.

the stressed syllable according to the template in (3-1). The lexical item *brann* however, does not induce any tonal or segmental adjustments in the compounds it is heading so its compound stem is identical to the stem (or it lacks a compound stem altogether).

Assessment:

To sum up, the account Kristoffersen proposes for tonal accents in Norwegian is one where accent 2 is assumed to be lexically marked. In a given word that surfaces with accent 2, the tonal accent may have three possible sources: i) marking on the stem, ii) marking on a suffix or iii) marking on the compound stem. If accent 2 is marked on any of the stems, it will always surface while marking of accent 2 on suffixes is subject to blocking effects such as the locality constraint in (3-2) in addition to the left-edge requirement in morphologically derived forms. Kristoffersen is able to account for the major patterns by assuming that accent 2 is lexically marked but in doing so, he also develops an intricate system to constrain and block the very same tonal accent from surfacing. This is rather unusual for properties that are allegedly lexical. Simultaneously, he adds massively to the lexical representations in order to make sure that accent 2 is able to surface in compounds. The compound stem is in some cases proposed to contain a floating H that induces accent 2, but this suspiciously only applies to a subset of monosyllabic nouns (default accent 1 by virtue of being monosyllabic), and not to other polysyllabic nouns with accent 1 in isolation. That is, to my knowledge, there is no polysyllabic noun that takes accent 1 in isolation, such as *ananas* [^{1}ɑnɑnɑs] 'pineapple', and that has a compound stem inducing accent 2 in compounds: */^{H}ananas/$_{\text{Comp.stem}}$.[96] It is clear that augmentation of lexical representations with a compound stem is necessary to account for segmental changes in some cases (i.e. *billed*–$_{\text{Comp.stem}}$ versus *bilde*$_{\text{Free form}}$ 'picture') but gaps like */^{H}ananas/$_{\text{Comp.stem}}$ are left unexplained.

[96] Some *disyllabic* prepositions (or particles) seem to have that property though. As prepositions, the lexical items *under* [^{1}ʉn.n(ə)ɾ] 'under', *over* [^{1}oːʋ(ə)ɾ] 'over', *gjennom* [^{1}jɛn.nɔm] 'through' and *mellom* [^{1}mɛl.lɔm] 'between' have accent 1 but when they appear as prefixed verbal particles, the result is accent 2: *undersøke* [^{2}ʉn.nəʂøːkə] 'investigate', *overnatte* [^{2}oːʋəɳɑt.tə] 'spend the night', *gjennomføre* [^{2}jɛn.nɔmføːɾə] 'implement' and *mellomlande* [^{2}mɛl.lɔmlɑn.nə] 'have a layover'.

Lastly, the introduction of a phonological unit that he names the "tonal foot", which he explicitly states should be distinct from the metrical foot, is an odd addition to the phonological structure. Its motivation lies in the fact that accent 2 requires at least a disyllabic domain to be realised (in particular a disyllabic trochee), and it can be argued that, in spite of considerable geometric overlap, it is sufficiently distinct from the metrical foot in that the tonal foot is a syllabic trochee while the metrical foot is a moraic trochee.[97] However, it also implies that accent 2 is doubly marked: first in the lexical representation by marking the initial H in accent 2 with a superscript as in /^{H}kirke/ 'church', and then also in the tonometrical structure through the presence of the tonal foot that is dependent on the metrical foot. Recall that tonal accent is a way of realising stress. This double marking is not necessarily a problem and is in a way reminiscent of gender marking in the morphosyntactic domain, but it calls into question the locus of tonal accents in Norwegian. Overall, one may wonder if the account developed by Kristoffersen ends up being too baroque and thus loses sight of a more economic system to deal with tonal accents in Norwegian.

3.2.2.2 Accent 1 is lexically specified

Given the containment relationship between accent 1 and accent 2 in Urban Eastern Norwegian (accent 1 = accent 2 + High tone), it may seem counterintuitive to posit accent 1 as lexically specified. However, if we zoom out from Urban Eastern Norwegian and look at the insular North Germanic dialect continuum as a whole, accent 1 in Norwegian and Swedish corresponds to a large extent to another suprasegmental unit that lends itself to a privative analysis: *stød* in Danish (see for instance Basbøll 1985, Grønnum and Basbøll 2001 and Basbøll 2005:82-87). *Stød* is also referred to as a glottal accent and is realised through some laryngeal activity (a glottal stop or creaky voice). Norwegian *våpen* [^{1}ʋoːpən] 'weapon' corresponds to Danish *våben* [vɔːˀb̥m̩] (with *stød*) while Norwegian *åpen* [^{2}oːpən] 'open' corresponds to Danish *åben* [ɔːb̥m̩] (without *stød*). Accounts that take accent 1 to be lexically specified are most notably represented by Lahiri et al. (2005, 2006) and Wetterlin and Lahiri (2012) (but see also Kristoffersen 2006). I will henceforth refer to these articles as LWJS.

[97] For a discussion on the shape of the metrical foot in Norwegian, see Kristoffersen (2000) chapter 6.

LWJS' analysis:

LWJS assume a phonological system where accent 1 is marked in the lexicon by the presence of an abstract diacritic (ˣ) on free morphemes or affixes. Using an abstract diacritic allows them to remain agnostic with respect to the actual phonetic content of the lexically specified tonal accent. How this diacritic is implemented phonetically will depend on the dialect, as some will use an H tone on the primary stressed syllable where others use an L tone, see section 2.1, (or *stød* in the case of Danish). They are thus able to offer an analysis that is detached from the specificities of Urban Eastern Norwegian, while including Norwegian and Swedish varieties where there is no containment relation between accent 1 and accent 2 in addition to Danish *stød* (Wetterlin and Lahiri 2012:285). Lexical marking of accent 1 is dominant in the sense that it will take precedence whenever it is present in a given structure.[98] A simple illustration of how this works is given in table 6, displaying derivational verbal morphology:

Table 24 – derivational verbal morphology

Morphology	*Surface form*	*Tonal accent*	*Gloss*
a. /skriv/ + $\{e\}_{INF}$	²skrive	Default accent 2	*write*
b. /bĕ̽/ + /skriv/ + $\{e\}_{INF}$	be¹skrive	Lexical accent 1 dominates	*describe*
c. /bann/ + $\{e\}_{INF}$	²banne	Default accent 2	*swear*
d. /fŏ̽r/ + /bann/ + $\{e\}_{INF}$	for¹banne	Lexical accent 1 dominates	*curse*

According to LWJS, when there is no lexical accent specified in a given structure, a default accent will be assigned depending on the size of the domain. In table 6, the two unprefixed infinitives, a) *skrive* and c) *banne*, are polysyllabic domains and thus receive default accent 2

[98] The surface position in the morphosyntactic structure of the morpheme with lexical tonal accent marking matters in compounds. Properties of the left-most compound member dictate the tonal accent of the compound as a whole. A compound member marked for accent 1 occurring in any other compound-internal position will not have an effect. However, Lahiri et al. (2005:77) allow non-compound morphologically complex words to get accent 1 from both left-most morphemes (unstressed prefixes like *be–*: ²*skrive* 'write' versus *be*¹*skrive* 'describe') and from right-most morphemes (Latinate infinitive *–ere*: *kontroll*¹*ere* 'control'). This asymmetry is not addressed.

(monosyllabic domains get default accent 1). However, if there is a prefix present, such as /bĕ̌-/ and /fŏ̌r-/, both of which are carriers of the abstract diacritic for accent 1, the result is accent 1 for the entire structure, as shown for b) *beskrive* and d) *forbanne*.

They furthermore assume a model of phonology based on Lexical Phonology (see Kiparsky 1982), where phonology is organised in different levels in close interaction with morphology. They operate with three levels in the phonology: *level 1, word level* and the *post-lexical level*. Each level is associated with different types of morphology, and consequently different types of phonology:

Table 25 – layering of phonology (adapted from Wetterlin and Lahiri 2012:297)[99]

Phonological level	***Morphosyntax***	***Phonology***	***Example***[100]
Level I	Compound formation, irregular inflection. Derivational affixes, e.g. {bĕ̌-}, {-ĕ̌re}$_{\mathrm{INF}}$	Lexical tone and stress, compound stress	^{1}brannbil
Word level	Regular inflection, derivational affixes, e.g. {-ig}, {-lig}, {-e}$_{\mathrm{INF}}$, {-er}$_{\mathrm{PL}}$	Lexical tone inherited from *level I*. If not, default stress and tone: 1σ → Accent 1 2σ (trochee) → Accent 2	^{1}brann/ ^{2}branner
Post-lexical	Cliticisation, e.g {=en/et}$_{\mathrm{DEF\ SG}}$, {=s} for phrasal compounds.	Accent inherited from earlier cycles.	^{1}brannen/ ^{2}brannene

As for tonal accent, their particular proposal is that lexically marked tonal accent is only a property of *level 1*. That is, lexically specified tonal accent in Norwegian is not able to percolate further up in the strata unless it has already been dispensed at the very first cycle. If its presence

[99] The classification of infinitival –*ere* as accent-1 inducing is from Lahiri et al. (2005). The association of -*ere* with *Level I* in the Lexical Phonology of Wetterlin and Lahiri (2012) is mine.

[100] See Table 26 for further details about *brann* 'fire'.

has not been able to manifest itself already at *level 1*, it is rendered invisible and will be "overwritten" by default tonal accent assignment rules at the *word level*: monosyllabic structures get accent 1, polysyllabic structures get accent 2. This system allows for them to account for the split behaviour exhibited by monosyllables in compounds (some come with accent 1, others with accent 2) in addition to "unexpected" accent 1 in plural forms for some nouns. These accent 1 forms are found in shaded cells in table 8 below:[101]

Table 26 – tonal accents in nominal paradigms and compounds

Singular indef.	*Singular def.*	*Plural indef.*	*Plural def.*	*Compound*	*Gloss*
^{1}brann	^{1}brannen	^{2}branner	^{2}brannene	^{1}brannbil	*fire/fire engine*
^{1}bil	^{1}bilen	^{2}biler	^{2}bilene	^{2}bilbrann	*car/car fire*
^{1}kino	^{1}kinoen	^{1}kinoer	^{1}kinoene	^{1}kinokultur	*cinema/cinema culture*
kul^{1}tur	kul^{1}turen	kul^{1}turer	kul^{1}turene	kul^{1}turkino	*culture/culture cinema*

In LWJS' system, the three lexical items *brann*, *kino* and *kultur* all have in common that they are lexically specified for accent 1: /bra̽nn/, /ki̽no/ and /ku̽ltur/ respectively.[102] However, they behave differently in the nominal paradigm ultimately due to stress assignment and to the relationship between tone and stress. Wetterlin and Lahiri (2012) view stress as "relational notion between strong and weak. Thus at least two units are required to have phonological stress" (p. 305). This means that polysyllabic roots will always be assigned stress on *level 1*, thus providing a docking site for any lexical tones. Lexical items such as / ki̽no/ and /ku̽ltur/ will in other words always surface with accent 1 as they are always big enough for stress to be assigned at *level I* and with that, the tonal potential in the diacritic (ˣ) is discharged.

As for /bra̽nn/, it is monosyllabic and its tonal potential will not be released by virtue of not being stressed at *level I*, *unless* it forms a compound at this level. In that case, it can be assigned compound stress, creating the necessary prerequisite for lexical tone to dock onto it. Other types

[101] Tonal accent indications also show placement of (primary) stress.

[102] The diacritic is placed on the first vowel for convenience. It is not a stress mark.

of morphosyntactic additions such as the plural ending applies at the *word level*, which is too late for the lexical marking of tone to surface. Consequently, it is lost.

An observation that may seem counterintuitive in light of the domain size requirement we already know exists for accent 2 is that LWJS' system effectively puts a similar requirement on *lexical* accent 1: it is only visible in polysyllabic domains. The only evidence for underlying tonal accent in monosyllabic stems like /brånn/ for instance is their behaviour when they appear as the first member in compounds. This is reminiscent of Kristoffersen's notion of the *compound stem*, but there is an important difference. Kristoffersen's *compound stem* is part of the lexical representations of each lexeme while LWJS account for the tonal accent alternations through derivational means instead, thus obliterating the need for a separate representational unit.

As for the linking elements (required by some monosyllables), they do without lexical marking altogether (Wetterlin and Lahiri 2012:307-314). They assume that compounds built with linking –e– are created at *level I* and then receive default accent 2 at the *word level*. Compounds with linking –s– on the other hand are classified as phrasal compounds and belong to the post-lexical sphere, which implies that the monosyllable in question passes through the *word level* where it will be assigned default accent 1 *before* the compound is formed.

<u>Assessment</u>

To sum up, the account LWJS propose for tonal accents in Norwegian is one where accent 1 is assumed to be lexically marked. They further assume a division of phonological layers that interact with morphosyntax (Lexical Phonology). Crucially, lexical marking of tonal accent is only available for structures that end up being polysyllabic on *level I*. Any tonal accent marking at this level will prevail if the size requirement is met. If, however, the size of the lexical item carrying lexical tonal accent remains monosyllabic at *level I*, the lexical specification is lost and default rules for assignment of tonal accent apply: monosyllabic domains get accent 1, polysyllabic domains get accent 2. In other words, accent 1 has two sources: i) lexical specification that is realised at *level I* or ii) default assignment of accent 1 to monosyllables at the *word level*. When a tonal accent has been assigned at one stratum in the Lexical Phonology, either by default or by lexical marking, any following strata will inherit this tonal accent. The requirement for a polysyllabic domain at *level I* for lexical tonal accent to apply has the consequence that evidence for lexical specification of tonal accent in monosyllabic words only shows up in compounds.

With the analysis they propose, LWJS are able to account for the major patterns, but there are a few issues.[103] The Lexical Phonology they propose for instance, has two weak points. The first one is that they put together derivational affixation and compound formation at *Level I*. At this level, lexical tonal accent is assumed to prevail regardless of which morpheme it originates in. However, if derivation and compounding are combined, we are not necessarily guaranteed that a lexical specification for accent 1 will survive. The compound formation between a non-derived item such as ^{1}*del* 'part' and a derived item such as *be*^{1}*taling* 'payment' does not surface with accent 1 as the presence of the derivational affix {bĕ̽-} would predict, but with accent 2: ^{2}*delbetaling* 'part payment'. Why accent 1 is blocked in this case does not fall out from their Lexical Phonology. It could be argued that lexical accent 1 needs to be domain initial in order to be dispensed, but they also allow suffixes to be lexically marked for accent 1, such as {-ĭ̽sk} (Wetterlin and Lahiri 2012:293). Presumably, this suffix is a *Level I* suffix, thus accounting for cases like ^{1}*praktisk* 'practical'. However, adding what is most likely to them a derivational *Word level* affix can block accent 1, as in ^{2}*upraktisk* 'unpractical'. The same problem also arises with the Latinate infinitive *–ere*, which LWJS assume is a *Level I* suffix marked for accent 1, as in *kommuni*^{1}*sere* 'communicate'. However, this lexical marking disappears under compounding, also at *Level I*: ^{2}*underkommunisere* 'under-communicate'. This suggests that derivational affixes at *Level I* are perhaps not specified for tonal accent.

The second weak point in LWJS' Lexical Phonology is the split they make between compounds formed at *level I* and phrasal compounds formed at the post-lexical level (signalled by the presence of a linking –s–). This split was made to accommodate the tonal accent

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[103] One point worth mentioning is LWJS' claim that accent 1 represents the exceptional tonal accent (loanwords and words with non-regular stress do tend to end up in this class). However it is unclear whether the class of monosyllables that induce accent 1 in LWJS' account is that exceptional. Kristoffersen (2006:126-129) contends that the number of accent-1 inducing monosyllable with accent 2 plurals (such as *brann*) is not as small as claimed by Lahiri et al. (2005:89), and that the pattern is consistent and predictable. Marking them as exceptional with a simple diacritic (ˣ) thus seems to by-pass a whole generalisation. This will not be addressed in the current work however.

properties, but it does not line up with other phonological facts. Monosyllabic words that take linking –s– in compounds often undergo other phonological mutations such as vowel shortening and devoicing of coda consonants: *liv* [¹liːʋ] 'life', but *livserfaring* [¹lifsærfɑːɾiŋ] 'life experience'; *dag* [¹dɑːg] 'day', but *dagslys* [¹dɑksly:s] 'daylight' (Kristoffersen 2000:77-78). If *liv* and *dag* pass through *level I* and the *word level* before they reach the post-lexical level where phrasal compounds are created in the Lexical Phonology suggested by LWJS, we would expect their melodic make-up to be relatively cemented by then. Such phonological mutations are more likely to happen at earlier cycles in the phonological derivation. Moreover, one may wonder how having two locations for compound formation in the Lexical Phonology aligns with extra-phonological evidence. Semantically for instance, we might expect early formations of compounds to have more idiosyncratic meanings than late formations of compounds (see section 4.3 about roots versus stems). If we compare the compound *dagslys* 'daylight' (which would be a post-lexical phrasal compound according to LWJS) with the minimally different compound *daglys* 'daylight' (a *level I* compound according to LWJS), it is actually the former that has a very specific meaning (light from the sun). The latter is open to contextual interpretation (subject to the "Variable R" condition, see section 4.1.1) and can refer to any type of light or light source. Thus, the semantic facts do not support the split between compounds formed at *level I* and phrasal compounds formed at the post-lexical level.

A last and perhaps more serious point in LWJS analysis is what happens with tonal accents in derived adjectives. LWJS classify adjectival suffixes such /-*lig*/ and /-*ig*/ as *word level* suffixes, which entails that they have no effect on tonal accent, i.e. they are not lexically specified. The syllabic expansion that follows from this kind of suffixation means that /-*lig*/ and /-*ig*/ will generally be associated with accent 2, unless the stem to which they attach is already specified with accent 1. This prediction is borne out: *mulig* [²mʉːli] 'possible', *synlig* [²sy:nli] 'visible', *vanlig* [²ʋɑːnli] 'usual, common', *heldig* [²hɛldi] 'fortunate', *farlig* '[²fɑːli] 'dangerous', *lydig* [²ly:di] 'obedient' but *håndterlig* [hɔn¹te:li] 'manageable' and *kontinuerlig* [kuntinʉ¹ɥe:li] 'continuous'.[104] However, some of the adjectives derived through suffixation of

[104] For the accent 2 cases, the stem is monosyllabic: *mu-, syn-*, *lyd-*, *van-*, *hel(d)-* and *far-*. The accent 1 cases are morphologically complex, built on forms suffixed with Latinate infinitive –*ere*, that LWJS take to be a *level I* suffix lexically specified for accent 1.

/-*lig*/ and /-*ig*/ are also compatible with the negative prefix *u*–. From a semantic point of view, the prefix takes scope over the adjective as a whole, suggesting that it is added *after* /-*lig*/ and /-*ig*/, thus accounting for the non-existent lexical items **usyn*, **ufar* and **ulyd.*[105] The negative prefix *u*– will consequently be classified as a *word level* affix, i.e. no specification of tonal accent possible. The prediction then is that *u*– affixation will not affect tonal accent, but this prediction is not borne out: *umulig* [ʉ¹mʉ:li] 'impossible', *usynlig* [ʉ¹sy:nli] 'invisible', *uvanlig* [ʉ¹ʋɑ:nli] 'unusual, uncommon', *uheldig* [ʉ¹hɛldi] 'unfortunate', *ufarlig* '[ʉ¹fɑ:li] 'harmless', *ulydig* [ʉ¹ly:di] 'disobedient'. None of the morphemes is licit carriers of lexical tone in LWJS' system, so it seems that accent 1 comes from nowhere in these cases. However, this pattern is part of a more general trend where a prosodic property of the suffixes /-*lig*/ and /-*ig*/ seem to shift stress away from the left edge with accent 1 as the result: *alvor* [²ɑlˌʋo:ɾ] 'gravity (n)' vs. *alvorlig* [ɑl¹ʋo:li] 'seriously', *eventyr* [²e:ʋənˌty:ɾ] 'adventure, fairy tale' vs. *eventyrlig* [eʋən¹ty:li] 'adventurous', *rettferd* [²ɾɛtfæɽd] 'justice' vs. *rettferdig* [ɾɛt¹fæɽdi] 'just', *vennskap* [²ʋɛnˌskɑ:p] 'friendship' vs. *vennskapelig* [ʋɛn¹skɑ:pəli] 'amicable', *ungdom* [²uŋˌdɔm] 'youth' vs. *ungdommelig* [uŋ¹dɔm.məli] 'youthful' (see also section 6.3). Kristoffersen (see 3.2.2.1) captured this by postulating a morphological constraint that blocked accent 2 in case stress was not left-aligned in the word. This generalisation does not fall out from LWJS' analysis.

3.2.3 Prosodic accounts

Accounts of tonal accent in Norwegian that take tonal accent to be coded in the prosodic structure lean on the fact that prosody does seem to play a role. The role of prosody can be seen both in terms of the number of syllables (e.g. monosyllables are necessarily accent 1) and in terms of position in the word, (e.g. accent 2 is not found in words with final stress). These observations have led to approaches to tonal accents in Scandinavian, which are radically different from the ones already discussed. In particular, it has been suggested that tonal accents in Scandinavian are expressions of prosodic structure. In practice, this would imply that

[105] The root *lyd*- is semantically ambiguous. One meaning is 'sound' while the other is 'obey'. A bare root with the negative prefix *u*– is possible only with the former meaning: *ulyd* 'noise, unpleasant sound, disharmony'. The latter meaning requires the root to be adjectivalised in order for *u*– affixation to work.

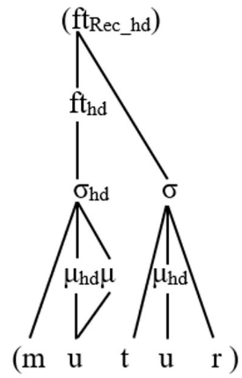
Norwegian does not have linguistic tone proper, effectively removing Norwegian from the list of languages that are considered truly tonal. I discuss some of these approaches in what follows.

3.2.3.1 Foot recursion

Morén-Duolljá (2013) sets out to unite the major insights from earlier accounts of tonal accent in Scandinavian: i) distribution of tonal accent is predictable (i.e. rule governed). Ii) Accent 2 is in some sense more phonologically "marked" than accent 1 in that accent 2 contains more structure. Iii) Accent 1 is more "marked" than accent 2 in the sense that truly exceptional cases of pitch accent are accent 1. Thus, it bears resemblances to both Kristoffersen (section 3.2.2.1) and LWJS (section 3.2.2.2) but there is a fundamental difference with respect to the locus of tonal accent. In particular, Morén-Duolljá argues that tonal accents are expressions of prosodic structure and not part of lexical representations in the shape of floating tones and/or diacritics. It should be noted that he deals with tonal accent in Swedish and not in Norwegian, but given the extremely close genetic affiliation between the two languages, it is reasonable to assume that his account of tonal accent in Swedish can be applied to Norwegian as well. In what follows, the data that is used is found in both languages and any differences will be specified.

Morén-Duolljá assumes a version of the Prosodic Hierarchy (Nespor and Vogel 1986) where recursion is allowed and there is maximally binary branching. He takes accent 2 to be encoded in the prosodic structure as an *uneven trochee*, represented as a recursive foot where the head is a bimoraic foot, which merges with the post-stress syllable. This is shown for the lexical item *motor* 'engine' in (3-4) below, which has accent 2 in Swedish (note though that it has accent 1 in Norwegian):

(3-4) *Accent 2 as an uneven trochee*[106]



motor [²mu:tuɾ] – 'engine'

The stress rules of Swedish assign stress to the penultimate syllable, which also means that it gets an additional mora[107]. This results in the construction of a bimoraic minimal foot, which is parsed together with the final unstressed syllable, creating a recursive foot structure with most of the weight to the left (i.e. uneven trochee). The presence of what is labelled 'ft_{Rec_hd}' in the tree structure above in (3-4) is what is phonetically realised as accent 2 in Swedish[108]. The absence of the recursive foot level in a given structure, results in what Morén-Duolljá takes to be the "elsewhere" accent: accent 1.

This "elsewhere" accent shows up in some Swedish tonal accent alternations between morphologically related lexical items due to additions of morphemes that alter the prosodic structure. Morén-Duolljá's account does not have any underlying tonal specifications so there is no need to deal with mechanisms to restrict tonal percolation. Instead, tonal accents change because the prosodic structure changes. Morén-Duolljá argues that this happens with the plural of Swedish *motor* [²mu:tuɾ] – 'engine', which surfaces with accent 1:

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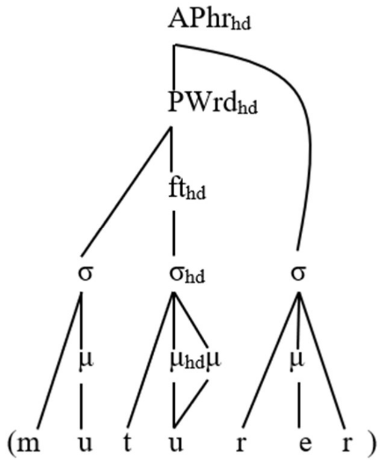
[106] Higher levels such as the Accent Phrase and Intonation phrase in the prosodic structure have been omitted.

[107] Swedish, like Norwegian, displays a tight relationship between stress and syllable weight whereby stressed syllables are heavy. Heavy syllables are obtained through moraic coda consonants or vowel lengthening (see Riad 2014:159).

[108] To be precise, Morén-Duolljá assumes that tonal accents mark *edges* of prosodic constituents. The left edge of the recursive foot is marked tonally with HL while the rest of what has traditionally been assumed to be the entire accent 2 melody in Swedish (HLHL in its entirety) marks right edges of higher prosodic constituents.

(3-5) *"Blocking" of accent 2*[109]



motorer [mu¹tu:ɾeɾ] – 'engines'

The addition of the plural suffix *–er* causes a stress shift with respect to the singular form in that the penultimate syllable (the default locus for stress) moves one syllable to the right, which results in an additional mora for this syllable.[110] A bimoraic minimal foot is built on top of the stressed syllable, but the creation of a recursive uneven trochee based on the stressed syllable and the following unstressed syllable is blocked for two reasons. First, Morén-Duolljá crucially assumes that branching above the syllable is maximally binary. Second, he also assumes that the initial unfooted syllable is incorporated into the structure *before* the suffix. This syllable merges to form a prosodic word with the stressed syllable and not a recursive foot (probably because this would result in an illicit foot type, i.e. uneven recursive iamb). The maximally binary branching forces the final unstressed syllable to merge above the prosodic word level (he opts for the Accent phrase level because of the position of other tones).[111] In other words, the presence of an initial unfooted syllable preceding the main stress effectively blocks the construction of an uneven recursive trochee and consequently, accent 1 surfaces.

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[109] The Intonation phrase has been omitted in the prosodic structure.

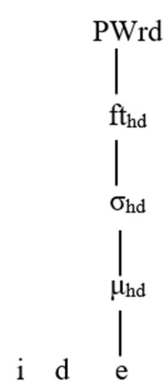
[110] Norwegian optionally shifts the stress for *motor* in the plural, but accent 1 is found throughout the paradigm. Thus, we have [¹mu:tuɾ] in the singular, but [¹mu:tuɾəɾ] or [mu¹tu:ɾəɾ] in the plural.

[111] The rule for parsing of unstressed syllable seems to be based on headedness at each level of representation. Feet are left-headed (trochees); prosodic words are right-headed; accent phrases are left-headed. Non-head syllables are parsed accordingly, merging with the structure without breaking the principle of maximally binary branching and the direction of headedness at the relevant level.

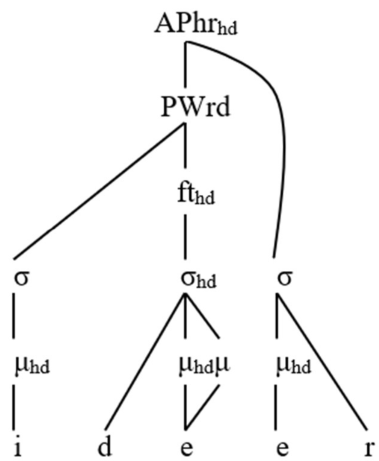
From the perspective of the tonal accounts discussed in section 3.2.2.1 and 3.2.2.2, the alternation in (3-4) and (3-5) is anomalous and cannot be accounted for without additional assumptions. Morén-Duolljá shows, however, that the above cases demonstrate how alternations in tonal accent can arise from regular phonological principles for stress assignment and structure building. There is in other words nothing exceptional about it.

As for what he calls truly exceptional accent, he follows LWJS in considering accent 1 to be the lexically marked one, although not in the shape of abstract tonal specifications. Rather, to the extent that there is a need to "lock" a given lexical item to a specific tonal accent (in this case accent 1), this is done through prespecification of prosodic structure, which effectively prevents the formation of uneven recursive trochees and by extension, accent 2 is prevented. Given that the exceptions are defined as lacking the potential of building uneven recursive trochees, Morén-Duolljá suggests that prosodic prespecification involves the lexical storage of heads of prosodic structures to a point *above* the foot (e.g. the prosodic word). Such prespecified structures apply to lexical items with unexpected accent 1 in lexical items with penultimate stress and to anomalous stress patterns (antepenultimate stress, final stress with open syllable). An example of this is shown in (3-6) below, *idé* [i^{1}de:] 'idea', where the final syllable carries stress in spite of being open (closed syllables at the right edge generally attract stress). This is because the lexical representation already contains information about the head of prosodic constituents up until the prosodic word. Note that the prespecified prosodic structure is not affected by the concatenation of inflectional morphemes, which results in stability of tonal accent throughout the paradigm. The full prosodic structure of the plural form *idéer* [i^{1}de:.ər] 'ideas' is shown in (3-7).

(3-6) *Underlying representation exceptional final stress*



(3-7) *Surface representation, exceptional final stress with plural suffix*[112]



idéer [i¹de:əɾ] – 'ideas'

When the structure in (3-6) is suffixed with the plural suffix and is parsed in the phonological computation, the prespecified structure it already comes with makes sure that stress invariably falls on the final syllable of the root, awarding it with an additional mora causing lengthening of the vowel, as show in (3-7). The prespecified structure that reaches the level of the prosodic word also makes it impossible for other syllables to attach to levels below the prosodic word, effectively blocking the potential for a formation of an uneven recursive trochee. Given the restriction on maximally binary branching, the initial unstressed syllable is parsed under the prosodic word while the syllable containing the plural suffix is parsed under the accent phrase. The prosodic structure in (3-7) is identical to the structure for *motorer* in (3-5), but they differ when it comes to the origin of the structure. In (3-5) it comes about as a result of regular stress assignment to the penultimate syllable (there is in other words nothing exceptional about it), while in (3-7) there is a prespecified prosodic structure, which indeed makes it exceptional.

<u>Assessment</u>

Morén-Duolljá proposes an account where tonal accents are expressions of prosodic structure. In particular, he suggests that the presence of a *recursive uneven trochee* in the structure is implemented phonetically with accent 2, while the absence of this recursive level

[112] The intonation phrase has been omitted from the structure.

results in accent 1. Having this kind of representation of the tonal accents comes with some advantages. First of all, it establishes a direct relationship between the most important (phonologised) phonetic correlates of stress in Swedish (and Norwegian): segmental quantity and pitch. Recall that the tonal accents are two possible ways of realising stress. By tying the tonal accents directly to the foot structure, we can account for the dependency tonal accents have on stress instead of stipulating anchoring processes of floating tones. Second, the prosodic structure also reflects a hierarchical relationship between accent 1 and accent 2 in that accent 2 is accent 1 plus additional structure. Thus, it captures the generalisation that accent 2 is also phonetically bigger because it spells out more structure. Third, the disyllabic requirement for accent 2 to surface immediately falls out from the assumption that accent 2 expresses an uneven recursive trochee. Monosyllables and words with final stress, by virtue of their prosodic properties, are unable to build uneven trochees and are thus phonetically realised as accent 1 by necessity. Accent 1 is also what Morén-Duolljá takes to be the truly exceptional tonal accent. This is done through lexical pre-specification of prosodic structure to a point *above* the foot, thus locking the structure to be phonetically interpreted as accent 1.

One interesting observation concerning Morén-Duolljá's account of tonal accent in Swedish is that he is able to account for accent 1 in Swedish lexical items such as *motorer* [mu^{1}tuːrer] 'engines', *betala* [be^{1}tɑːla] 'pay', *piano* [pi^{1}ɑːnu] 'piano' in a completely regular fashion. That is, they all follow from regular phonological principles for stress assignment (penultimate stress) and structure building (pre-stress syllable parsed under the prosodic word, post-stress syllable parsed under the accent phrase). Consequently, they are all subsumed under the same analysis because they end up having the same prosodic structure (shown in (3-5)) without any lexical marking.[113] In amphibrachs and other (larger) structures with penultimate stress, any pre-stress syllable is parsed under the prosodic word, respecting the right-headedness of this prosodic constituent (see footnote 111). Due to the maximally binary branching, the final syllable is forced to be parsed under the accent phrase, so no uneven recursive trochee (realised as accent 2) can be constructed.

[113] This is in stark contrast to LWJS' account, where all have them would require lexical marking of accent 1.

Applied to Norwegian, the way prosodic structure is built in this model has a very desirable consequence: the distributional restriction on accent 2 in derived polysyllables in Norwegian (cf. Kristoffersen's morphological restriction on the *tonal foot*) falls out directly from it. Recall that according to Kristoffersen, accent 2 in morphologically derived words were subject to an additional constraint in that the tonal foot (which is the bearer of accent 2 in his account) had to be left aligned in Norwegian, giving rise to alternations such as *^{2}skrive* vs *be^{1}skrive*, *^{2}synlig* vs *u^{1}synlig*. These morphologically complex accent-1 words would thus pattern with *pi^{1}ano* and *li^{1}noleum* where, abstracting away from how stress is assigned in each case (default rule, morphological requirements, lexical marking etc), the mere presence of the pre-stress syllable would force accent 1 to appear, thus obliterating the need for theoretical constructs such as the tonal foot.

This is however, a point where Swedish and Norwegian split paths, as the analysis would only work for *morphologically derived* words in Norwegian. It would make the wrong prediction for *underived* words with penultimate stress, as Norwegian here allows both accent 1 and accent 2.[114] *Accent 1: bikini* [bɪ^{1}ki:nɪ] 'bikini', *aroma* [ɑ^{1}ɾu:mɑ] 'aroma', *dynamo* [dy^{1}nɑ:mu] 'dynamo' *safari* [sɑ^{1}fɑ:ɾɪ] 'safari'. *Accent 2*: *sjokolade* [ʂuku^{2}lɑ:də] 'chocolate', *vaksine* [ʋɑk^{2}si:nə] 'vaccine', *vanilje* [ʋɑ^{2}nɪljə] 'vanilla', *parade* [pɑ^{2}ɾɑ:də] 'parade', *hypotese* [hypu^{2}te:sə] 'hypothesis'.[115] Opting for prosodic pre-specification for the words that take accent 1 would not help as the problem lies in the fact that accent 2 is unattainable. Morén-Duolljá's account works well for Swedish, but it cannot be transferred directly to Norwegian without adjustments. One solution could be to allow the post-stress syllable to be parsed *before* any pre-stress syllable in accent 2 amphibrachs, thus enabling the creation of an uneven recursive trochee. However, this solution would be paramount to lexical marking of accent 2, directly or indirectly, unless there is a way of making the tonal accent in the amphibrachs above

[114] As pointed out in section 2.2.1 (see also this section for exceptions), there is a strong correlation between tonal accent and material in the post-stress syllable. Words ending in a schwa generally takes accent 2. Otherwise we get accent 1.

[115] The corresponding Swedish words to the Norwegian accent 2 words do not have the post-stress schwa we see in Norwegian, and are thus stressed on the final syllable: choklad [ɧu^{1}klɑ:d], *vaccine* [ʋak^{1}si:n] *vanilj* [ʋa^{1}nilj], *parad* [pa^{1}ɾɑ:d], *hypotes* [hypo^{1}te:s] respectively. They behave like other words with final stress for tonal accent, which are accent 1.

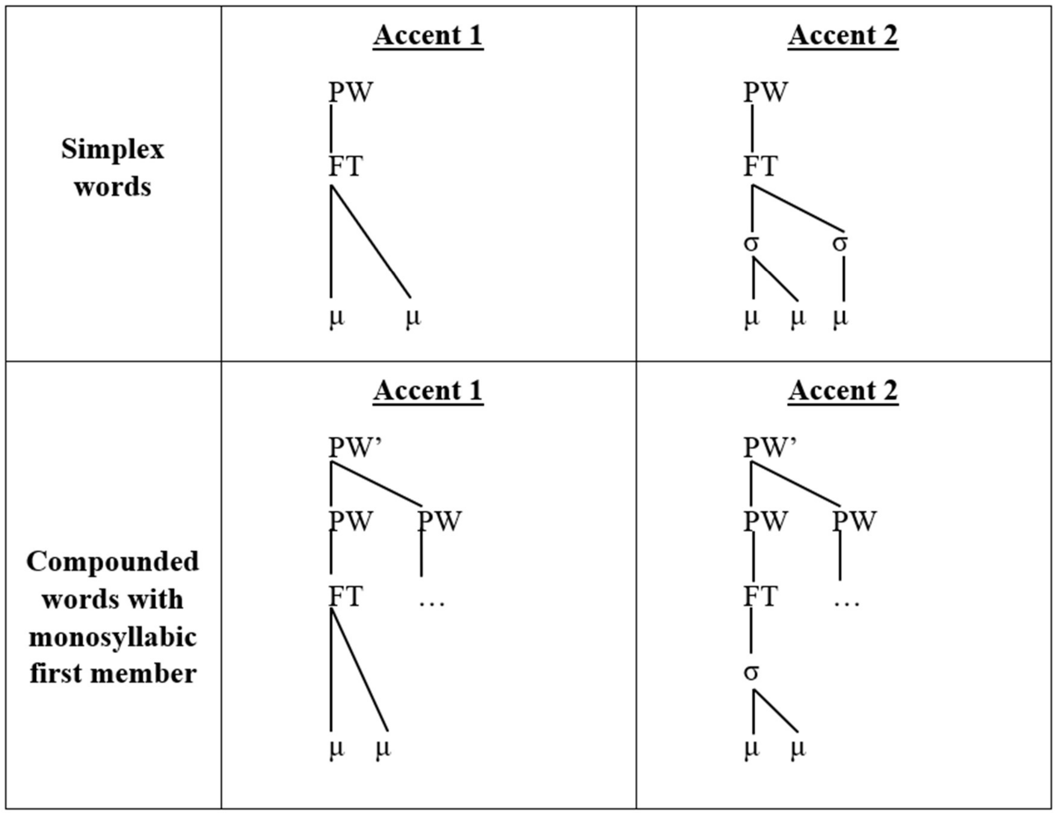
fall out from properties related to the post-stress vowel. The possible viability of such a solution notwithstanding, it would mask the role that morphosyntax seems to play in it: derived words where stress is kept away from the left edge are all accent 1.

As for tonal accent in compounds, this is not discussed at all by Morén-Duolljá. In Swedish, all compounds are neutralised to accent 2 (just like in Tromsø Norwegian), which, under the assumption that accent 2 in simplex words and compounded words are actually the same thing phonologically, could be interpreted as obligatory formation of uneven recursive trochees on the syllable carrying compound stress and the post-stress syllable. We can only speculate as to how Morén-Duolljá would include compounds in his analysis, but if accent 2 is the same on the two levels (simplex words and compounded words), it would be typologically odd to have neutralisation in the direction of accent 2 as this is the more structurally marked one. Furthermore, under the assumption that compounds are analysed as recursive prosodic words in the prosodic structure, it would not be clear why the presence of this level in the prosody would be necessarily associated with the presence of uneven recursive feet (giving accent 2) lower in the structure.

3.2.3.2 Syllabic versus moraic trochees

A recent approach to tonal accents in Scandinavian is to see them as expressing different types of metrical feet (Kaldhol and Köhnlein 2021, henceforth referred to as KK). Their approach is reminiscent of Morén-Duolljá's work on Swedish (2013) discussed in the previous section, but instead of focusing on simplex words, they concentrate on compounds, particularly in Urban Eastern Norwegian. Thus, in some sense, their work is a continuation of Morén-Duolljá, but they differ on one important detail (the language difference aside): the representation of tonal accents in the prosodic structure. Morén-Duolljá encoded accent 2 as uneven recursive trochees, while accent 1 surfaced when this structure was absent. KK on the other hand, suggest that accent 2 is represented by a *syllabic* trochee while accent 1 is represented by a *moraic* trochee. In the case of the syllabic trochee, the foot is built directly on syllables, reflecting the by now well-known fact that accent 2 (as represented as a syllabic trochee in KK's approach) requires a disyllabic domain to be realised. The moraic trochee on the other hand is constructed directly on moras, skipping the syllable level in the prosodic hierarchy.[116] The representational structure of the tonal accents for both simplex words and compounds are as follows:

(3-8) *Metrical structure of tonal accents* (Kaldhold and Köhnlein 2021)



The prosodic structures show that the configuration that corresponds to accent 1 systematically lacks the syllable level while it is present in the configuration corresponding to accent 2, both in simplex words and in compounds. Thus, in one case the foot is built directly on moras and in the other on syllables. Furthermore, they analyse compounds as recursive prosodic words, but given that it is the first member of the compound that counts in assignment of tonal accent in Urban Eastern Norwegian, the prosodic structure of non-initial compound member is omitted.

[116] KK specify that syllables still exist in the structure but that they are realised in “a third dimension” (p. 6). They are skipped by foot construction.

At a first glance, their approach might seem identical to what Morén-Duolljá proposed, albeit with different labels for the prosodic constituents. However, within Prosodic Hierarchy Theory, the two approaches are quite different and come with different predictions. Both approaches rely on structures that are considered marked, meaning that they are subject to penalisations by Optimality Theoretic markedness constraints in the phonological derivation, but it is not the same tonal accent as represented by the prosodic structure that is marked in each of the approaches. In Morén-Duolljá's case, it is the recursive foot structure, and by extension accent 2, that is marked. In KK's analysis on the other hand, the skipping of the syllable level is marked[117], and this is the structure that represents accent 1. In neutralisation processes, there is a cross-linguistic tendency for neutralisation in the direction of the unmarked (TETU effects, McCarthy and Prince 1994). Under the assumption that Morén-Duolljá's analysis can be extended to compounds too, the two analyses would thus have different predictions for the direction of any neutralisation patterns for Scandinavian tonal accents. Neutralisation of tonal accents in compounds is found in Northern Norwegian tonal varieties as well as in Central Swedish (Riad 2014:127) and they are both in direction of accent 2. There is, to my knowledge, no variety of Norwegian/Swedish that has tonal accent neutralisation in compounds in the direction of accent 1, which suggests that KK's analysis has an advantage (as they also aim at accounting for neutralisation).

They further assume, like Morén-Duolljá, that lexical items can have pre-specified metrical structure in their underlying representations, reflecting what kind of foot they are prone to construct in stressed positions. One subset of the lexicon will be specified with an underlying trochaic foot template that is linked to moras (=accent 1) while in another subset, the template is linked to syllables (=accent 2). The underlying representations do not necessarily surface as they are subject to distributional constraints formulated in Optimality Theory. If a given word does not have any detectable underlying foot preference, it is left unspecified and the constraint system will impose a metrical structure on it in accordance with the constraint ranking. A full

[117] KK have chosen the label recursive prosodic word *PW'* for compounds, a prosodic constituent which is itself marked by virtue of being recursive. However, the label appears to be used purely for convenience. They do not commit explicitly to the idea of recursion in prosody and they point out that they believe their analysis is compatible with non-recursive strategies such as Vogel's (2010) *composite group*. This is why I have not counted it as a marked structure.

prosodic structure is preferred (i.e. the syllabic level is included) so unspecified structures surface with accent 2. Thus, accent 2 is considered to be the default/neutral tonal accent in compounds by KK.

The fact that both accent 1 and accent 2 have the potential to be lexically specified makes them conclude that the contrast we find between accent 1 and accent 2 is equipollent, and not privative (p. 6). This is a point where KK's account deviates from the others that have been discussed in this chapter. The empirical justification for marking both accent 1 and accent 2 as underlying (resulting effectively in what is a three-way contrast, accent 1 vs accent 2 vs unmarked) comes from a small set of nouns that do not have expected tonal accent alternations. The most important point to note in Table 27 below is that the linking element *–s–* is correlated with accent 1, an observation that leads them to postulate that the linking element is lexically specified for accent 1. However, there are some exceptions to this (one example in the shaded row) where there is a linking element, but the compound surfaces with accent 2.[118]

Table 27 – tonal accent with/without linking -s-

Without linking –s–		***With linking –s–***	
^{2}land-bruk	*agriculture*	^{1}land-s-mann	*compatriot*
^{2}dag-bok	*diary*	^{1}dag-s-lys	*daylight*
^{2}skog-brann	*forest fire*	^{1}skog-s-troll	*woodland troll*
^{1}liv-vakt	*bodyguard*	^{1}liv-s-tid	*lifetime*
^{1}post-mann	*postman*	^{1}stat-s-mann	*compatriot*
^{1}post-kasse	*mailbox*	^{1}stat-s-kasse	*treasure*
^{2}kveld-fiol	*(a plant)*	^{2}kveld-s-mat	*supper*

KK interpret this to mean that accent 2 can surface due to underlying specification of precisely this tonal accent. If the specification of underlying accent 2 in a structure comes into conflict

[118] The class of nouns that form exceptions to this is marginal: *kveld* 'evening', *ovn* 'oven' and *loft* 'attic'. However, compound formation with these nouns including the linking element is productive and results in accent 2: ^{2}*kveld-s-mat* 'supper (lit. evening food)', ^{2}*ovn-s-krok* 'corner by the oven', ^{2}*loft-s-bod* 'attic storeroom' etc.

with an underlying specification for accent 1, accent 2 wins out. Based on the data above, they assume that lexical items such as *kveld* are specified for accent 2 /^{2}kveld/, while lexical items such as *liv*, *post* and the linking –*s*– are specified for accent 1: /^{1}liv/, /^{1}post/, /^{1}-s-/. Note that the only evidence we have for the underlying accent 2 specification of *kveld* is that it comes into conflict with the underlying accent of the linking element (and prevails).[119] Consequently, /land/, /dag/ and /skog/ must be left unspecified because they yield to the underlying tonal accent of the linking element. As for the concrete details of the prespecifications, analysing tonal accents as a foot level phenomenon allows KK to get away with relatively small underlying structures. Specifically, they propose that lexical items that induce accent 1 come with a mora that is marked as a foot head, while items that induce accent 2 come with a syllable that is marked as a foot head.

They further go on to give an OT analysis of tonal accents in compounds in Urban Eastern Norwegian that has two main constraints[120]: *Head-Match (Ft)*, requiring faithfulness to underlying foot heads, and *Exh-Ft (PW')*, penalising level skipping at the foot level in the context of recursive prosodic words. In other words, it imposes a prosodic template on compounds where the syllabic level has to be present in the prosodic structure (the mark of accent 2 in KK's analysis). The ranking *Head-Match (Ft) >> Exh-Ft (PW')* ensures that in cases where there is only one underlying tonal accent, it will be preserved faithfully in the output because *Head-Match (Ft)* is undominated. The more interesting case is where we have two underlying and *conflicting* tonal accents in the input, such as ^{2}*kveld*-^{1}*s-mat*, where only one tonal accent can surface so no completely faithful mapping is possible. As the issue cannot be solved by faithfulness, the verdict will be determined by markedness considerations. In this case, *Exh-Ft (PW')* will favour the candidate with the most exhaustive prosodic parsing, so the syllabic level will be included and accent 2 will surface. This constraint will also force accent 2 in cases where no compound element has any underlying specifications for tonal accent, reflecting that accent 2 is the default. Thus, accent 2 in KK's approach has two sources:

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[119] This also entails that there is no way we can differentiate between words that are specified with accent 2 but that never take a linking element and words that are unspecified, receiving accent 2 by default.

[120] They do operate with a third constraint, WdBin, requiring binarity at some rhythmic level in prosodic words (including recursive prosodic words), but the constraint does not play any role in compounds. Its effects show up in monosyllabic words, blocking prosodic structures that would lead to accent 2.

underlying specification and the default tonal accent imposed by the constraint system whenever there is no underlying one.

<u>Assessment</u>

KK's analysis opts for the possibility of lexical marking of both tonal accents in Norwegian and thus easily captures the important patterns. Accent 1 is codified as a moraic trochee in the prosodic structure wile accent 2 is codified as a syllabic trochee, making the fact that monosyllables and stress-final polysyllable are all accent 1 fall straight out from the representations themselves. As for compounds, they show that lexical specifications surface faithfully unless there is a conflict between them, in which case the Optimality Theoretic constraint system favours accent 2, thus accounting for the neutralisation that takes place in compounds in Swedish (and also in Northern Norwegian). Accent 2 is also the default tonal accent imposed by the constraint system in case there is no underlying marking. In spite of the equipollent marking, their analysis also reflects the idea that accent 1 is exceptional as it is the only one that really requires protection from faithfulness constraints to surface. Furthermore, operating with both tonal accents as potentially underlying allows them to include lexical items that have been treated as exceptions by other analyses.

However, there are a few problems with their analysis. First of all, the evidence that points KK in the direction of equipollent marking instead of privative marking involves the "exceptional" accent 2 found in compounds with *kveld* 'evening', *ovn* 'oven' and *loft* 'attic' and the accent-1 inducing linking –*s*–, whose effects on compound tonal accent is cancelled with these three nouns. Their claim is that these "exceptions" reflect what the system truly looks like (p. 11), thus seeking to incorporate them instead of putting them aside. An alternative solution is to consider the linking –*s*– as part of a compound stem, a concept that is needed anyway to account for allomorphy in compounds: *billed-bok* 'picture book' (free form: *bilde*) (see Eik (2019:220-221) for more examples.) The lexical item *kveld* in Table 27 could thus come with a compound allomorph *kvelds-,* obliterating the need for postulating accent 2 as possibly underlying.[121] Such an analysis would predict that the relevant group of nouns (*kveld*, *ovn*, *loft*) should come with the *–s–* in every compound and it would appear that this prediction is contradicted by one compound given by KK where the *–s–* is absent: ^{2}*kveldfiol* (a type of flower). However, I suspect that this compound is unknown to the vast majority of Norwegian speakers (the writer of this thesis included) and that most speakers feel that there should be an *–s–* there, which, if true, is compatible with a compound stem analysis.[122]

Another issue is postulation of *two* basic foot types in Scandinavian tonal varieties that both seem to serve as the structural basis for identification of tonal accent (and hence of main stress). This should perhaps be justified with other types of phonetic or phonological evidence related to the two foot-types.[123] Kristoffersen (2000:298) argues that both moraic and syllabic trochees are needed to account for different phenomena. He suggests a biplanar model (p. 297) where stress and rhythm appear on separate planes, but where rhythm is still dependent on stress. Moraic trochees belong to the stress plane and are thus anchoring points for stress assignment[124], whereas syllabic trochees belong to the rhythmic plane, adding points of prominence while respecting assigned stresses in addition to serving as basis for other

[121] Seeing *kvelds* as a unit is supported by the fact that it can be used on its own with the same meaning as the compound *kveldsmat* 'supper'.

[122] A search on Google mostly gives dictionary and crossword related entries but no pictures or scientific descriptions of the flower, calling into question whether such a word should be used to argue for a specific grammar of tonal accents in Norwegian.

[123] In the literature, it is tacitly assumed that a given language is always making use of the same foot-type for stress assignment. However, in typology-oriented frameworks such as OT, there is in principle nothing that excludes the possibility that a language can deploy both iambs and trochees (Alber 2005:518-521), and this has indeed been argued to exist, e.g. Yidiny (see Hayes 1995:260, Houghton 2013 and references therein). In the case of Yidiny though, the two foot-types arise naturally as a result of interaction between phonological constraints on metrical structure, receiving further justification from phonological processes (e.g. vowel lengthening) that are sensitive to the foot-type in question. The two-foot types suggested by KK on the other hand do not fall out from constraint interaction; they are stipulated for the sole purpose of dealing with tonal accent.

[124] He assumes that the moraic trochee is the default foot type constructed by The Main Stress Rule (Kristoffersen 2000:158). However, he also suggests that the syllabic trochee can form the basis of main stress in some cases, subject to lexical marking (e.g. the suffix /-isk/, p. 174-178).

phonological processes (e.g. speech-rate governed reductions, word size, accent 2).[125] KK's claim thus has some support, but it is questionable whether multiplanar foot structures are actually needed (Bennett 2013).

A far more serious point related to the prosodic representations of the tonal accents stems from KK's decision to lump monosyllables together with polysyllables with final stress, using the same (surface) representation for both to derive obligatory accent 1. It is a tempting move, seeing that accent 1 surfaces in both as a necessity without further stipulation, but at the same time, it also masks the fact that these two groups of words behave in different ways when it comes to their ability to surface with accent 2, both in nominal inflection paradigms and in compounds. The conflation manifests itself most notably in the representations that KK have chosen for accent 2. In particular, there is a peculiar difference between simplex words and compounds when it comes to the number of syllables they have included in the syllabic foot (accent 2) (see (3-8)). In simplex words, there are *two syllables* in the relevant syllabic trochee, reflecting the requirement for a disyllabic domain for accent 2 to be realised. In the compound structure on the other hand, there is only *one* syllable in the relevant syllabic trochee. Whether KK want this to mean that accent 2 is represented by an *actual disyllabic trochee* or by the mere *presence of the syllabic level* in the prosodic structure, is unclear to me, but there are challenges with both options. If it is the former, it will straightforwardly account for the fact that polysyllables with final stress always surface with accent 1 in compounds, as no disyllabic trochee is available. For the same reason, however, it will erroneously also block accent 2 in

[125] Another possibility could be the phonetic length of the relevant structures, where we find indications that syllables with accent 2 are phonetically longer than syllables with accent 1 (Fintoft 1965/1970, Kelly 2015) but this could also be due to tonal crowding. Generally, accent 2 has more tones to realise than accent 1. It is plausible that putting two tonal targets inside one syllable will increase the phonetic length of that syllable compared to a situation where there is only one tonal target. The aforementioned studies only looked at maximally disyllabic words. For varieties such as Urban Eastern Norwegian where accent 2 is realised as HLH, tonal crowding is unavoidable. Disentangling the potential phonetic length effects of tonal crowding and of different foot types could perhaps be found in compounds where the tones spread out.

compounds with monosyllables.[126] If it is the latter, accent distribution for monosyllables in compounds is easily accounted for, but now the problem shows up in polysyllables with final stress. If monosyllables can be underlyingly specified for accent 2, as KK argue is the case for words such as *kveld*, then the fact that polysyllables with final stress <u>always</u> induce accent 1 in compounds must appear as a coincidence to them. There is, to my knowledge, no polysyllabic word with final stress that has the same property as *kveld*: an underlying prosodic template where the foot is linked to a syllable, enabling accent 2 in compounds. Overall, KK have an interesting proposal for tonal accent in Scandinavian, but using the same representation for tonal accent in monosyllables and in polysyllables with final stress hides the fact that these two

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[126] One solution to this problem would be to allow a subset of monosyllables build syllabic trochees across compound internal word boundaries, but how that would unfold in the prosodic structure is not explored by KK. Two alternatives exist: a monoplanar approach or a multiplanar approach.

(i)	$(\acute{\sigma}\quad \acute{\sigma})_{Ft}\sigma$	Post-compound footing
	$(\acute{\sigma})_{Ft}\ (\acute{\sigma}\ \ \sigma)_{Ft}$	Pre-compound footing
	lys *pære*	= ‘light bulb’ (lit. light pear)

Monoplanar: In a compound such as *lyspære* [^{2}ly:sˌpæ:ɾə] in (i), stress feet are constructed in each compound member, resulting in vowel lengthening so as to adhere to the two-way requirement that stressed syllables are heavy and heavy syllables are stressed (Kristoffersen 2000:116-12, Rice 2006), as shown in the pre-compound footing. (The coda consonant /s/ in *lys* can be analysed as extrametrical (Kristoffersen 2000:118) or as the onset of a syllable with an empty nucleus (Rice 2006). In any case, the coda consonant does not contribute to syllable weight). However, “borrowing” the initial syllable of the following word is problematic because it would violate the *Strict Layer Hypothesis* (Nespor and Vogel 1986:7) as the edges of higher-level constituents should coincide with the edges of lower-level constituents. The syllabic trochee would span across the string *lyspæ*, resulting in the right edge of the constituent *lys* not coinciding with any edge at lower levels. The usurped syllable in this case is even heading its own foot, causing a deeper violation in terms of the depth of the cut in the structure seeing that the foot constructed over *pære* is effectively disintegrated. On a diachronic note, to the extent that syllable usurpation is a possibility, a natural effect would be loss of stress on the second compound member. Such prosodic shifts have happened historically and they are often accompanied by phonological changes on the segmental level. In some cases, there have also been accent shifts, from accent 2 to accent 1. Diachronic changes like this seem to be driven by lexicalisation (Bakken 1998:97-101). A *multiplanar* approach where the syllabic trochee that encodes accent 2 appears on a separate plane would not have any layering problem, but KK have already placed the syllabic level of *accent 1* in a “third dimension”. If instances of accent 2 that are realised across word boundaries (as opposed to accent 2 in simplex words) are also put into a different dimension (very reminiscent of Kristoffersen’s ‘tonal foot, section 3.2.2.1), the geometry of the structure is getting very complex.

classes have different behaviours in compounds. This is a serious shortcoming for a proposal that aims to account for tonal accent in precisely compounds.

As for tonal accent in words created through non-compounding morphology, it is not discussed by KK, but their foot type approach might be difficult to transfer. They would need a mechanism at the level of the prosodic word to resolve competition between conflicting tonal accent specifications, such that monosyllables get accent 2 in the plural[127] while polysyllables with final stress get accent 1 in the plural: *brann* [¹bɾɑn] 'fire' vs. *branner* [²bɾɑn.nəɾ] 'fires', *kafé* [kɑ¹fe:] 'café' vs *kafeer* [kɑ¹fe:.əɾ] 'cafés'. It should also be able to handle the by now well-known left-edge asymmetry we find in derived adjectives where left-aligned stress gives accent 2. Otherwise we get accent 1: *eventyr* [²e:ʊənty:ɾ] 'adventure, fairy tale' vs. *eventyrlig* [eʊən¹ty:li] 'adventurous', *synlig* [²sy:nli] 'visible' vs. u*synlig* [ʉ¹sy:nli] 'invisible'.

3.2.4 Tonal accent in this thesis

So far, we have seen different types of analyses where the Scandinavian tonal accents are seen either as (abstract) tonal entities or as expressions of prosodic structure. All approaches agree though that some lexical marking is necessary. There is no doubt that there is a contrast, but there is no consensus concerning the nature of this contrast. Some accounts take the contrast to be privative, marking only one tonal accent as underlying, while others allow both tonal accents to be marked underlyingly. They also vary with respect to what role morphosyntax plays (i.e. lexical phonology or prosodic hierarchy). The fact that we use the same umbrella term *tonal accent* to refer to accent 1 and accent 2 is perhaps a heritage from the paradigmatic understanding of them from the structuralist tradition. This gives the impression that we are dealing with the "same" kind of object phonologically speaking, but that is not necessarily the case. To some extent, this is true because they are both possible realisations of stress, and they stand in a mutually exclusive relationship to each other. In other words, they cannot appear at the same time. However, that does not necessarily mean that they are the same kind of object phonologically speaking, an idea that the privative accounts reflect: the lexically marked accent

[127] Recall that this is the default pattern, but umlauted plurals have accent 1 in the plural (IPA given for TN): *tann* [¹tɑɲ] 'tooth' vs. *tenner* [¹tɛɲ.ɲəɾ] 'teeth', s*trand* [¹strɑɲ] 'beach' vs. *strender* [¹strɛɲ.ɲəɾ] 'beaches'.

is tonal accent while the unmarked tonal accent is absence of tone as it were, but they occupy the same space, just from different angles. This separation is not found in the accounts that take tonal accents to be expressions of prosodic structure for the simple reason that they do not take tone in Scandinavian to be a phonological primitive.

We have also seen in the accounts discussed above that instances of a specific tonal accent is not necessarily the "same" as another one. They may have different sources. For instance, LWJS operate with *lexical* marking of accent 1 at the same time as they set it to be the default tonal accent of monosyllabic domains in their lexical phonology. In what follows, I will outline the details of the view on tonal accents assumed in this thesis, building on some of the insights from the accounts discussed above. It has already been mentioned that true minimal pairs for tonal accents do not exist in Norwegian, as apparent cases of tonal contrast are accompanied by differences in morphosyntactic structure. Choosing one accent to be underlying then is not obvious, and it becomes even more complicated when different varieties of Norwegian are taken into consideration. It is not given that the system found in one variety is the same as the system in another one. The variety of focus in this thesis is Tromsø Norwegian, so the argumentation will mostly be based on this variety. I will assume, however, that it can be extended to other tonal varieties, given the extremely close genetic relationship between them and the ease with which speakers are able to identify tonal accents in other varieties, in spite of differences in phonetic realisation.

<u>Why is accent 1 underlying?</u>

Following LWJS (section 3.2.2.2), I take accent 1 to be the *lexically* marked one, also in Tromsø Norwegian. This assumption is based on three observations. First, recall from section 2.2.1 that there is a strong tendency for penultimate stress in polysyllabic words ending in /e/ (realised phonetically as a schwa) to be realised with accent 2, but that there are exceptions to this (e.g. *fasade* [fɑ^{2}sɑːdə] – 'façade' but *lo^{1}kale* [lu^{1}kɑːlə]'room, venue'). However, both instances of schwa are deleted under hiatus. This happens in plural formation but the tonal accent from the singular form remains also in the plural (plural formation in TN: [fɑ^{2}sɑːdɑ] and [lu^{1}kɑːlɑ] respectively). On the natural assumption that word final unstressed /e/ is some kind of inflectional ending due to its tendency to be deleted under hiatus (it is in fact the only vowel that shows this behaviour), we can now say that neither [–ə] (as a marker of, say, singular indefinite forms) nor [–ɑ] (a plural morpheme) are marked for tonal accent. We can still maintain that accent 2 is lexically marked on the root itself in words like *fa²sade* instead of on suffixes, but this would result in massive redundant marking as an overwhelming majority of words ending in /e/ take accent 2. A more economical solution is thus to posit that accent 1 is lexically marked on the roots in question.

Second, just like LWSJ, I also rely on evidence from compounding, but from a somewhat different angle than the monosyllables that LWJS used. Recall from section 2.2.2 that compounds are generally neutralised to accent 2 in Tromsø Norwegian. This indicates that accent 2 is the unmarked member of the opposition, as neutralisation processes across languages tend to pick out the unmarked one.[128]

Third, there seems to be a correlation between placement of primary stress in a word and its tonal accent. Recall that there is a tight relationship between stress as an abstract property and tonal accents. Tonal accents are *realisations* of stress so where you find tone, you find stress. If accent 1 is stored in the lexical representation, it would not be unreasonable to assume that stress is stored along with the accent so as to avoid redundancy in the system. Stress in Norwegian, however, is largely predictable, falling on the head of a moraic trochee constructed at the right edge (Kristoffersen 2000:158). If accent 1 is exceptional *and* stored together with the location of stress, we should expect to see a correlation (though not necessarily a perfect one) between accent 1 and exceptional stress patterns. In this class, we may include stress patterns that do not fall out from the stress assignment rule suggested by Kristoffersen without some special lexical marking (e.g. extraprosodicity, marking of moras): antepenultimate stress and final stress in words with final open syllables. As words with final stress, regardless of the presence/absence of a final coda, have accent 1 by the distributional constraint on accent 2 (at least a disyllabic trochee is needed for accent 2), we are left with words with antepenultimate stress, which are indeed correlated with accent 1 (Kristoffersen 2000:255-257), e.g. *ananas*

[128] Interestingly, certain varieties of Urban Eastern Norwegian have another type of neutralisation in *simplex words*, where non-initial stress realised with accent 1 is shifted to initial stress with accent 2: *konkurranse* ‘competition’ [kuŋkʉ¹ɾɑnsə] → [²kuŋkʉɾɑnsə]. Such shifts are blocked if the non-initial stress is already realised with accent 2 as in *sjokolade* ‘chocolate’ [ʂuku²lɑːdə] (see Kristoffersen 2000:165-166, 272-273).

[¹ɑnɑnɑs] ‘pineapple’ and *brokkoli* [¹brɔk.kuli] ‘broccoli’.[129] This strengthens the assumption that accent 1 is lexically marked.

Lastly, marking of extraprosodicity raises an interesting issue for words with penultimate stress and final closed syllables, which constitute another exceptional stress pattern. Kristoffersen (2000:159) accounts for them by assuming extraprosodicity of the final syllable. However, does the metrical extraprosodicity affect the tonal accent in the sense that the final syllable would also be invisible for assignment of tonal accent, leaving accent 1 as the only option? This prediction seems to be confirmed, which supports the view that accent 1 operates in tandem with other types of special lexical marking, as demonstrated in *¹hallik* ‘pimp’, *¹fenrik* ‘second lieutenant’, *¹fosfor* ‘phosphor’, *as¹parges* ‘asparagus’, *ap¹pendiks* ‘appendix’.[130]

<u>Representation of accent 1</u>

As for the representation of accent 1 in the grammar, I follow in LWSJ in using the abstract diacritic (ˣ) in the lexical representations, leaving the exact phonetic details aside. That is, the lexical representations do not specify the exact tonal value of the accent but is left for the phonetic implementation. The lexical representation for *lava* [¹lɑːʋɑ] ‘lava’ and *paprika* [¹pɑːprɪkɑ] ‘sweet pepper’ would thus be /lɑ̊vɑ/ and /pɑ̊prikɑ/ respectively. This marking in Tromsø Norwegian is interpreted phonetically as a falling contour spanning across maximally a disyllabic foot, notated as H*L as we saw in section 2.1.2. This gives us the following autosegmental representations, using the established convention:

[129] Another telling example of this is the two possible pronunciations of *apokope* ‘apocopy’, [ɑpu²kuːpə]/[ɑ¹puːkupə] where (regular) penultimate stress comes with accent 2, while (irregular) antepenultimate stress gives accent 1.

[130] There is one exception to this that I am aware of, *²harpiks* ‘resin’, where the final syllable has to be invisible for the stress assignment algorithm, but visible for the tonal accent algorithm.

(3-9) *Accent 1*

```
H*L              H* L
| |              |  |
(σ σ)Ft          (σ  σ)Ft σ
la va   [¹lɑːʋɑ] – 'lava'      pa pri ka   [¹pɑːprɪkɑ] – 'sweet pepper'
```

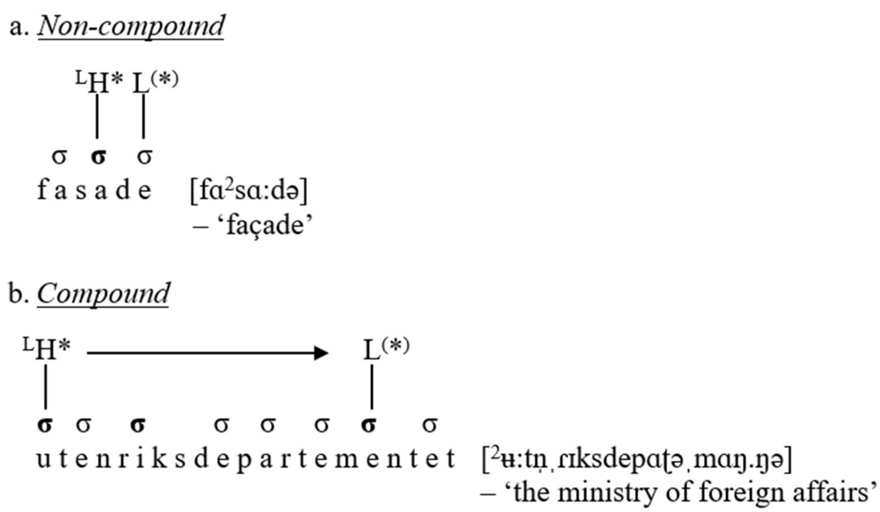
Note that lexical specification of tonal accent in Tromsø Norwegian applies *only* to polysyllabic roots, which stands in contrast to LWJS' account for Urban Eastern Norwegian, where also monosyllables could be specified with accent 1. Recall that the evidence they provided for this marking in monosyllables in Urban Eastern Norwegian was their accent-1 inducing powers in compounds. In Tromsø Norwegian, tonal accent is generally neutralised to accent 2 in compounds so there is no reason to assume that monosyllables have any kind of marking for tonal accent at all. As a consequence, monosyllables will be assigned accent 1 by default as accent 2 is blocked due to the by now well-known size requirement, in which case, both tones in accent 1 are linked to the same syllable, forming a falling contour. Thus, lexical marking of tonal accent in TN is only available if stress, understood to be a relational notion between strong and weak, is also available.

<u>What is accent 2?</u>

When it comes to the locus of accent 2, we have seen that it tends to be placed higher structurally or appears later in the derivation in the accounts that do not see it as underlying. Morén-Duolljá for instance places it in the recursive foot domain while LWJS leaves it to the post-lexical sphere in their lexical phonology. The basic insight though is that accent 1 and accent 2 are not the same kind of objects and that accent 2 is ordered after accent 1. I take this intuition to be correct, and in this thesis, accent 2 will be considered a tonal accent that is assigned by default to polysyllabic domains in case any lexical marking (i.e. accent 1) is unavailable. The prosodic prerequisite that stress cannot be final for accent 2 to be licit is naturally applicable. I further suggest that accent 2 takes *whole words* as its *domain*. The notion of 'domain' refers to where tonal processes take place, such as anchoring to TBUs and spreading (see section 1.3.2). The notion of 'whole word' is here understood to be any size morphological structure with at least one root such that it occupies a single syntactic slot in a given phrase, i.e. it behaves like a single constituent on a sentential level. We are forced to take the word as a whole into consideration as accent 2 can appear in compounds with monosyllabic first members and thus straddle the compound internal morpheme boundary between the first member and what follows. Consequently, it is potentially bigger than the structures proposed by previous prosodic accounts, such as the recursive uneven trochee (Morén-Duolljá 2013) and the syllabic trochee (Kaldhol and Köhnlein 2021).

The insertion of default accent 2 is phonetically interpreted as a late high tone followed by a fall in Tromsø Norwegian, as we saw in section 2.1.2. However, this fall is sensitive to the distinction between stressed and unstressed syllable in seeking out a stressed one if there is any. The notation we chose for this was $^{L}H{*}L^{(*)}$, which gives us the following autosegmental representations of *fasade* – 'façade' and *utenriksdepartementet* – 'the ministry of foreign affairs', a non-compound and a compound respectively:[131]

(3-10) *Accent 2*



The accentual melody of accent 2 as a whole is anchored to the primary stressed syllable ($^{L}H{*}$) but it also has an anchoring point to the right ($L^{(*)}$), which is more mobile. It is realised minimally over two consecutive syllables (recall the disyllabic requirement), but if the domain contains more than one stressed syllable, the right-most anchoring point will seek out the right-most stress, as shown in (3-10)b. This is accompanied by a high-tone plateau that surfaces

[131] Note, however, that *fasade* can be seen as morphologically complex (cf. our discussion in this chapter on why accent 1 is underlying).

between primary stress and the last secondary stress, which we can interpret as H-spreading. Thus, the accentual melody stretches across whole words, like a tonal hammock, which clearly means that accent 2 in Tromsø Norwegian is potentially bigger than a disyllabic foot. In section 2.1.2, we saw that accent 2 in TN was classified as connective. On the assumption that the /e/-ending in (3-10)a is some kind of inflectional ending, its function as a connective bridge between morphemes becomes apparent.

4 Syntactic structure

As the aim of the current project is to shed light on the interaction between linguistic tone and internal word structure in Tromsø Norwegian, we also need to understand what the internal word structure looks like. In section 1.4, the empirical ground from the morphosyntactic perspective was delimited to structure below any extended projections in the morphosyntax, an area that houses word-formation processes that are traditionally known as compounding and derivation. The central question for the current chapter then, is to understand and outline how the morphosyntactic structure building proceeds as well as how it interacts with PF, thus providing us with the necessary tools for an analysis of the data presented in section 2.2.

In section 1.2.1, we established that a constructivist approach to morphologically complex words in Norwegian was the approach that best fit the empirical facts. The constructivist view holds that there is no separation between word-formation and sentence-formation as they are both handled by syntax. This entails that there is no principled difference between the two processes, both being products of the same syntactic operation for structure building: Merge. With this in mind, the syntactic framework that is used in this thesis (Distributed Morphology) was presented in section 1.2.2, a framework that is explicitly constructivist.

Before we turn to the details of the syntactic structure and the communication with PF, we will first have a look at what characterises structures that are formed below any extended projections in the morphosyntax. For convenience, I sometimes use the term 'compound' and 'compounding' to refer to all of them. This will be the topic of section 4.1. Section 4.2 is dedicated to a review of some earlier constructivist approaches to compounding, allowing us to settle on one. However, in order to account for the data, some addendums to the DM framework are needed. More specifically, I look at what role the *stem* should play in grammar. This is discussed in section 4.3. In the last section of this chapter, section 4.4, I provide the outline for this thesis of how the communication between morphosyntax and PF operates.

4.1 What is a compound?

The traditional understanding of the term 'compound' can be loosely defined as the creation of new lexemes by adjoining two or more lexemes, with the caveat that the term 'lexeme' here does not necessarily refer to citation forms (Bauer 2009:343-345). This definition has the advantage that it is general enough to encompass what traditionally has been known as compounds but it does not say anything about the criteria that we are to use to know that we have a 'new lexeme'. For instance, it is not clear if there is a significant difference in terms of lexemeness between what is supposedly a compound and what is a phrase in Norwegian in (4-1):

(4-1) a. *ei tomflaske*
'an empty bottle'

b. *ei tom flaske*
'an empty bottle'

A slightly more specific definition is given by Harley (2009), who says that a compound is "a morphologically complex form identified as word-sized by its syntactic and phonological behaviour and which contains two or more Roots." A root here is understood from the perspective of DM where roots are acategorial syntactic building blocks, stripped of functional information such as number and definiteness (we will get back to the root in section 4.3.1). One issue with Harley's definition, and for the DM framework more generally, is that it is not always straightforward what qualifies as a root. As seen in section 1.2.2, DM recognises two types of morphosyntactic building blocks: i) roots and ii) functional items. However, the existence of bound roots (so-called *cran*-morphs[132]) as in (4-2) and certain derivational suffixes with root-look behaviour as in (4-3) calls the DM ontology into question.

(4-2) a. *solbær* – SOL + BÆR (sun + berry)
'black currant'

b. *tyttebær* – TYTTE + BÆR? (tytte + berry)
'lingonberry'

(4-3) *katt-e-aktig*
cat-LE-aktig
'cat like'

In (4-2)a, we have a compound that clearly corresponds to the definition as we are dealing with two roots with independent meanings while in (4-2)b, it is not clear what kind of object *tytte*-

[132] This term stems from the lexical item 'cranberry'.

is as it is used only in this context and has no independent meaning. Similarly, the adjectival derivational suffix *–aktig* in (4-3) would, by virtue of its function, be classified as a functional item (see Eik 2019:55-56 for more examples). Yet, such derivational suffixes occur in constructions with linking elements (LE), which is a typical trait of compounds (Bauer 2009:346). These data demonstrate that the distinction between roots on one hand and derivational suffixes on the other is perhaps not as clear as our theoretical framework would like it to be. Some roots and some derivational suffixes seem to occupy a space located somewhere in between the two building block categories recognised by DM.

Even though Harley's definition points at syntactic and phonological criteria for compounds, it is still an open question what they are. As pointed out by Lieber and Štekauer (2009:4-14), the term 'compound' is a notoriously difficult notion to define as there seems to be no unique set of characteristics for compounds cross-linguistically. Even within the same language, it is not clear what separates compounding from derivation (and phrases), as we saw for Norwegian above. That is to be expected, however, if both types of word-formation take place in the same zone of the morphosyntactic structure, i.e. below any extended projections. In what follows, I describe properties of these structures in Norwegian from the perspectives of semantics (section 4.1.1), syntax (section 4.1.2) and phonology/prosody (section 4.1.3). The criteria for each linguistic subdiscipline are not necessarily intentionally equivalent.

4.1.1 Semantic properties

The most common compound type in Norwegian by far is *endocentric* compounds (Eik 2019:22), a class of compounds characterised by having one member of the compound act as head while any other members act as modifiers (non-head). Norwegian endocentric compounds are semantically right-headed, which implies that the member to the right determines what we are talking about whereas remaining material on the left, the non-head, gives further specification about the head. Thus, the structure in (4-4)a *barne-genser* 'child sweater' is a hyponym for 'sweater'.

(4-4) a. *barne-genser*
'child sweater'

b. *lese-hest*
(lit. 'read horse') 'a person who reads a lot',

Another important type of compound from a semantic point of view is *exocentric* compounds, which are not hyponyms of either element of the compound, as in (4-4)b. Consequently, it is not possible to deduce the meaning of an exocentric compound based on the meaning of its members. That is, a *lesehest* is not a type of horse.[133]

The distinction between endocentric and exocentric compounds is an important one for semantics as it cuts right into the notion of *listedness*.[134] As compounding is a very productive process in Norwegian, it is clear that having them all listed in the lexicon is not possible. From the perspective of lexicography and of memory, it is tempting to classify compounds as those items that are semantically opaque. Only these items would then need to be stored or listed while everything else would be derived by regular combinatorial rules. Seen from this perspective, this would mean that exocentric compounds are the real compounds while endocentric ones would fall on the outside.

However, the semantics of compounds is not easily thrown into one box or the other because transparency of meaning in compounds operates on a more gradual scale. That is, the endocentric compound in (4-4)a, *barne-genser*, has the conventionalised meaning we see in (4-5)a, indicating that it is listed. However, other interpretations are also available given the right context. The list a-e given below is by no means exhaustive.

(4-5) *barne-genser* 'child sweater'

a. Sweater meant for a child due to size.
b. Sweater made by children.
c. Sweater made from children.
d. Sweater that looks like it was meant for a child because of the design.
e. Sweater with pictures of children.

Allen (1978) proposes two principles for meaning formation in endocentric compounds. The *first* principle is what she calls "Variable R". In her approach, each element in a compound

[133] Note that an endocentric (or 'literal') interpretation is available for these constellations, but it is the exocentric interpretation that is the conventionalised one.

[134] There are also other compound types that cross-cut with these two major types, such as *synthetic* compounds and *coordinative* compounds. The reader is referred to Bauer (2009:350-354) for an overview. See also Eik (2019:22-30) for Norwegian examples.

comes with a set of semantic features that are hierarchically organised. The variable relationship that exists between compound elements (as we see in (4-5)) is disambiguated as the result of the interaction between the feature hierarchies. More specifically, the feature set of the first element "plugs into" one of the available features slots for the second element. Which available slot that is chosen is not arbitrary; it tends to be a feature slot that is salient or dominant. In the case of 'sweater', features like OWNER and MATERIAL are dominant while SMELL is not.

The *second* principle that Allen proposes is the IS A-condition. The IS A-condition is formal way of rendering the headedness property already described for endocentric compounds. The general formulation of the condition is ambiguous between a syntactic and a semantic interpretation (Allen 1978:105).

(4-6) In the compound $[\,[\,\ldots.]_X\ [\ldots.]_Y\,]_Z$, 'Z is a Y'

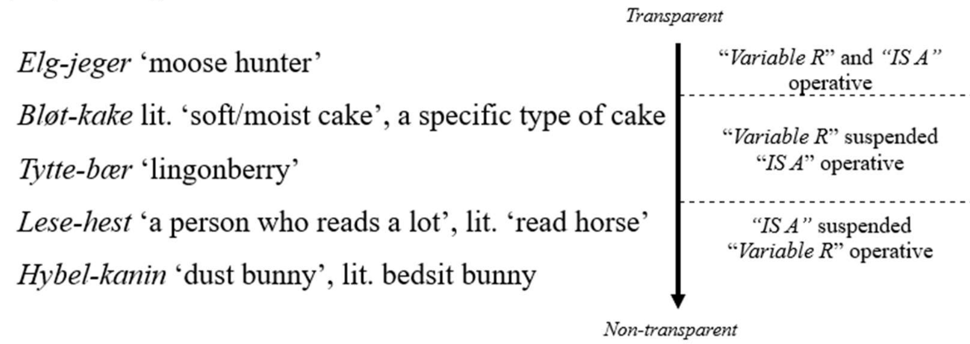
The condition is general enough to capture both semantic and syntactic headedness (we will get back to syntactic headedness in section 4.1.2). In a noun-noun compound such as *solbær* sun+berry 'black currant' with the semantic representation $[\,[\mathrm{SOL}]\ [\mathrm{BÆR}]\,]_Y$, the IS A-condition states that Y is a BÆR ('berry'). For endocentric compounds, the "Variable R" condition and the IS A-condition hold, but given the unpredictability of how the feature hierarchies "plug into" each other for "Variable R", the exact interpretation of endocentric compounds is subject to pragmatic negotiation. They are nevertheless transparent.

Following the assumption that only opaque compounds are listed, it means that for these, one of the conditions proposed by Allen does not hold.[135] By suspending these two conditions on the semantics of compounds, one at a time, we are in a position to derive different degrees of opacity. Given that endocentric compounds where both conditions hold are the most transparent ones, the next point on the scale would be compounds that have a head but where the Variable R condition has been suspended. That is, where the relationship between the non-head and the head is unclear. A third step on the scale would be compounds that do not

[135] Presumably, they cannot both be inert at the same time. To my knowledge, there is no compound that is without a head and that at the same time also lacks modifying semantics between the compound members.

have a (semantic) head, i.e. the IS A-condition is suspended, but where there is a modifying relationship between the compound's elements. This scale is shown below:

(4-7) *Compound semantics scale*



It is thus possible to identify certain discrete steps on a scale that is otherwise continuous. At the top, we have the transparent compounds where the possible meanings can be inferred from the elements. As we saw in (4-5), some meanings are conventionalised, but not necessarily fixed. Moving down the scale, we get to compounds where Variable R has been suspended while the IS A-condition holds, which entails that it is difficult to establish what kind of relationship there is between the head and the non-head element. This happens when the non-head gives very vague semantics (like in *bløt-kake* where the adjective *bløt* hints at a type of cake, which is soft or moist[136]) or when the non-head has no meaning in itself (like *tytte-*).

The last step on the scale is where we find the most opaque compounds. For these compounds, the IS A-condition has been suspended while Variable R holds. Consequently, there is no semantic head and the compounds are from this perspective exocentric. Thus, *lese-hest*, which literally means "read/ing horse" is not a horse and a *hybel-kanin* is not a bunny. However, there is still a semantic relationship between the non-head and the head and this relationship can have varying degrees of obviousness. In the case of *lese-hest*, the relationship is easier to establish than in the case of *hybel-kanin*.

As for derivational suffixes, the DM ontology forces us to classify them as functional items, as they serve grammatical functions. With this in mind, the expectation is that they should not

[136] Possibly because of all the whipped cream that is needed for this kind of cake.

add much to the semantics. That is certainly true for some derivational suffixes, but there are other suffixes that come with significant semantic contributions in addition to their grammatical function. This means that they show properties of being both roots and functional items. For instance, the derivational suffix *–skap* in Norwegian (cognate with English *–ship*) is a nominalising suffix that attaches to certain roots, thus showing its functional side. However, it also comes with (somewhat abstract) semantics, relating to properties or relations between people (Faarlund et al. 1997:106).

(4-8) a. *brorskap* – brotherhood/fraternity
b. *naboskap* – relation between neighbours
c. *vennskap* – friendship

As we see in (4-8), the suffixation of *–skap* does more than merely serving a grammatical function (deriving nouns) seeing that it is accompanied by certain semantics. To what extent the IS A-condition and Variable R apply to the constructions at hand is a question that will be left open here as this depends on how we define the semantics of *–skap*. However, the semantic addition represented by such suffixes should be not underplayed.

4.1.2 Syntactic properties

The right-headedness we saw for the semantics of Norwegian endocentric compounds is also applicable to syntax.[137] That is, the member to the right, which we identify as the head, determines the syntactic distribution of the compound as a whole. Thus, if the head is a noun, then entire compound is a noun. In the previous section, we saw that Allen formalised this through the IS A-condition, repeated here:

(4-6) In the compound $[\,[\ldots.]_X\ [\ldots.]_Y\,]_Z$, 'Z is a Y'

[137] The IS A-condition is more generalisable in syntax as it also encompasses many non-endocentric compounds. For instance, the verb-noun compound *lese-hest* (see (4-7)) is a noun.

For Norwegian, there are two properties that follow from this condition: category (its syntactic distribution) and grammatical gender. A syntactically endocentric compound has the same category and grammatical gender as its head.

(4-9) a. [$[\text{tom}]_A$ $[\text{flaske}]_N$ $]_x$ X is an N
empty bottle

b. [$[\text{barn}]_N$ e $[\text{genser}]_M$ $]_x$ X is M
child LE sweater

In an adjective-noun compound as in (4-9)a, the IS A-condition states that X is a noun. The compound will thus have the syntactic distribution of a noun and not of an adjective. Similarly, in the noun-noun compound (4-9)b, the IS A-condition states that X is masculine and not neuter.[138]

Compounding as a word-formation strategy in Norwegian is applicable to the major lexical categories N, V, A and P, which puts Norwegian more on the permissive side of what combinations that are possible. Phrases and sentence fragments are also allowed in compounds but preferrably as non-heads (see Eik (2019:35-56) for a more complete overview). An example of this was shown in (1-20) in section 1.2.1, repeated as (4-10) here:

(4-10) *Det du-tror-det-ikke-før-du-får-se-det-store huset* (from Eik 2019:54)
the you-believe-it-not-before-you-get-see-it-big house
'the you-won't-believe-it-until-you-see-it-big house'

In this compound, the non-head is phrasal while the head is an adjective meaning that the compound structure as a whole is an adjective.

Two other syntactic properties pertaining to compound structures were mentioned in section 1.2.1 but are repeated here for completeness' sake. Compound structures do not allow *extraction* or external modification of compound internal elements (4-11), while they do allow *coordination/ellipsis* (4-12):

[138] The structurally subordinate role of the non-head is also reflected in the fact that compounds generally only allow global inflection as determined by the head. Inflection on the non-head, as in *tungt-vann* 'heavy water' or *varmt-vann* 'warm water' (with neuter inflection *–t* on the adjective) is rare (see also Eik 2019:39).

(4-11) *Extraction/external modification*

a. **Hva$_i$ er det ei t$_i$-kake?*
'What$_i$ is that a t$_i$ cake?'

b. *Det er ei umodent$_j$ eple$_j$-kake.
'That is a unripe$_j$ apple$_j$ cake'

c. **Populær$_j$ forfatter$_j$-skap*
'Popular$_j$ author$_j$ship'

d. **Hvilken forfatter$_i$ er det t$_i$-skap?*
'Which author$_i$ is that t$_i$-ship?'

(4-12) *Coordination/ellipsis*

a. *barn-e-~~psykiatri~~ og ungdom-s-psykiatri*
child-LE and adolescent-LE-psychiatry
'child and adolescent psychiatry'

b. *best-e-fedre og ~~best-e-~~mødre*
best-LE-fathers and mothers
'grandfathers and grandmothers'

c. *mann-~~kaker~~ og kone-kaker*[139]
man and wife cookies
'gingerbread man and woman'

d. *venn-~~skap~~ og fiend-skap*
friend and enemy-ship
'friendship and enmity'

In (4-11)a, an effort to apply *wh*-topicalisation to a compound structure results in ungrammaticality. Similarly, (4-11)b shows that it is not possible to modify a compound internal element from outside.[140] The data in (4-11)c-d show that the same restriction also applies to derivational suffixes. As shown in (4-12), we see that coordination/ellipsis works with derivational suffixes and with traditional compound structures. This is in principle possible for both heads and non-heads, but it seems to be much more common to coordinate non-head material and elide the head.

[139] This compound is from a children's book, *Klatremus og de andre dyrene i Hakkebakkeskogen*, by Thorbjørn Egner.

[140] Note though, that it would be grammatical if the modifying adjective was part of the compound, forming a phrasal non-head with the first noun: *det er ei "umodent eple"-kake* (a cake made from unripe apples).

A final syntactic property to note is that the compound elements are sometimes glued together with the help of linking elements. The linking element, if one is present, usually takes the shape of *–s–* or *–e–* and is governed by structural and lexical factors pertaining to the non-head (see Eik 2019:185-200). A few examples of this have already been shown earlier in this chapter, but the point is repeated here for convenience:

(4-13) a. *barn-e-hage* (*barn* + *hage*)
child-LE-garden
'kindergarden'

b. *dag-s-lys*[141] (*dag* + *lys*)
day-LE-light
'daylight'

c. *katt-e-aktig* (*katt* + *-aktig*)
cat-LE-like
'cat like'

d. [*rød-vin*]-*s-flaske* ((*rød* + *vin*) + *flaske*) (cf. *vin-flaske* 'wine bottle')
red-wine-LE-bottle
'red wine bottle'

In (4-13)a-c, the choice of linking element depends on idiosyncractic properties of the non-head, while in (4-13)d, the appearance of the linking *–s–* is triggered by a combination of the structural complexity of the non-head and the declension class of its right-most member.[142]

4.1.3 Phonology/prosody

We have seen that Norwegian compounds have the syntactic and semantic head to the right, but the situation is different when it comes to prosody. Prosodically, in both UEN and TN, compounds have the head on the left, meaning that the leftmost member is the more prominent

[141] Note that the light source in this case is limited to the sun.

[142] Even though the linking *–s–* appears to be the same in (4-13)a and (4-13)d, we may in fact be dealing with two separate items. The purely lexical linking *–s–* (as in (4-13)a) can trigger shortening of the vowel in the non-head (see also my assessment of LWJS account of tonal accent in section 3.2.2.2) while the same is not true for the partially structural *–s–* in (4-13)d.

one.[143] This happens regardless of the internal structure of the compound, as shown in (4-14) below (compound stress shown in bold):

(4-14) *Compound stress* (example taken from Kristoffersen 2000:189)

a. [[***høst***-*makrell*]-*fiske*]
autumn-mackerel-fishing
'fishing of autumn mackerel'

b. [***høst***-[*makrell-fiske]*]
'mackerel fishing in autumn'

This kind of flattening of the structure is in contrast to what has been reported for closely related languages within the Germanic family that seem to show a greater sensitivity to constituency within compounds, such as English (Liberman and Prince 1977, Cinque 1993), German[144] (Hall 2011:292-294, but see also Giegerich (1985) and Benware (1987) for an alternative view on stress placement in German compounds), Dutch (Langeweg 1987), Danish (Rischel 1972) and Finland Swedish (Bruce 2007).[145] For these languages, the internal structure of compounds can be reflected by the prosodic characteristics, thus mirroring the semantics. However, in Norwegian, no such distinction is expressed through prosodic means, adding to the ambiguity we already know exists for compounds.

[143] There are *lexical* exceptions and *dialectal* exceptions to this rule. For the lexical exceptions, Kristoffersen (2000:185) and Christiansen (1946-1948:197-198) mention compounds such as *sko-maker* [sku^{1}mɑ:kəɾ] 'shoemaker', *kors-feste* [kɔʂ^{1}fæstə] 'cross-fasten' = 'crucify' and *pepper-mynte* [pɛp.pəɾ^{2}myntə] 'peppermint' where compound stress falls on the right member. They also mention *lang-fredag* [lɑŋ^{1}fre:dɑg] 'long Friday' = 'Good Friday', but my feeling is that this pronunciation is dated. A more systematic exception to the rule assigning prominence to the left in compounds is found in coordinative compounds such as *Østerrike-Ungarn* 'Austria-Hungary', where stress falls on the rightmost member. As for the dialectal exceptions, they can have stress on the rightmost member in compounds, but the rules for that vary (Christiansen 1946-1948:198-206, Kristoffersen 2016:155). See also Abrahamsen (2003, 2005) for stress placement in compound structures in Sunnmøre Norwegian.

[144] Note that southern German varieties are reported to have initial stress in compounds (Wiesinger 1996).

[145] Standard Swedish on other hand behaves like Norwegian (i.e. UEN and TN) in having leftmost stress (or prominence) in compounds (Riad 2014: 126-129).

Compound structures in Norwegian are also characterised by having a tonal accent, which is anchored to the stressed syllable in the leftmost member. Assignment of tonal accent in morphologically complex structures has been explored at length in section 2.2. The reader should recall, however, that derivational suffixes behave as roots in TN in that they are able to host a tonal event in accent-2 domains. In the previous sections on semantic and syntactic properties, we have seen that there is no clear boundary between traditional compounds (root + root) on one side and derivational suffixes on the other, in spite of traditional terminology and DM ontology. Whatever the exact nature of derivational suffixes, we are dealing with structures behaving like roots in many respects.

4.2 What is the syntactic structure of compounds?

There are various approaches to what the syntactic structure of compounds looks like, differing along dimensions such as the nature of the head, direction of branching etc. The central question however is how the left and right members of compounds combine. Given the privileged status of the right member in the sense that it is the syntactic head, this limits the analytical possibilities for material on the left (the non-head), which is naturally excluded as head of the construction. Thus, the positions we are left with syntactically for the non-head are specifier, complement and adjunct. In this section, I review some of the earlier approaches. However, in light of the discussion in section 1.2.1 and the shortcomings of lexicalism, only non-lexicalist approaches are considered. I start with discussing Lieber (1992) in section 4.2.1 where the non-head is analysed as a specifier. I then move on to Johannessen (2001) in section 4.2.2 and to Harley (2009) in section 4.2.3, which both consider the non-head to be the complement. Section 4.2.4 is dedicated to Eik (2019) where the non-head is seen as an adjunct.

4.2.1 An X-bar approach

Lieber (1992) points out that certain properties are unexpected under the assumption that there is a strict separation between syntax and morphology. For instance, phrasal compounds such as *over the fence gossip* indicate that syntactic phrases can be the input to morphological processes. To bridge the gap between syntax and morphology, she argues that both are governed by the same rules and principles. She adopts a general X-bar template, which she considers to be a primitive applicable for all domains of morphosyntactic structure building.[146] The template consists of i) the *head*, the core of the unit, from which form and characteristics of the unit is derived, ii) the *complement*, which is an argument required by the head, iii) the *modifier*, which restricts reference of the modified item and iv) the *specifier* (p. 33-40).[147] Lieber's approach is grounded in the Principles and Parameters tradition of generative grammar where language variation is seen as a trivial question of parameter setting. Parameters are here understood to be binary such that for a given property, it is either present or absent. The parameters, or Licensing Conditions, that Lieber suggests (p. 35) are predicated on the general X-bar template where the central pivotal point is the position of the head with respect to the other constituents in the template (see (4-15) below).

(4-15) *Licensing conditions*

a. Heads are initial/final with respect to complements and adjuncts

i. Theta-roles are assigned to the left/right

ii. Case is assigned to the left/right

b. Heads are initial/final with respect to specifiers

c. Heads are initial/final with respect to modifiers

In sum, there are three parameters that will be set in each language, and when set, the idea is that they will apply at all levels in the structure. If morphology and syntax converge on the same statements of direction of headedness, there is no need for a separate word formation component in grammar. For English, Lieber ends up with the following Licensing Conditions (p. 54):

[146] This view puts Lieber in the non-lexicalist camp but note that her approach differs from the constructivist position discussed in section 1.2.1 in that she operates with word class affiliation in lexical entries (p. 22).

[147] Lieber does not give a characterisation of specifiers.

(4-16) *Licensing Conditions: English*[148]

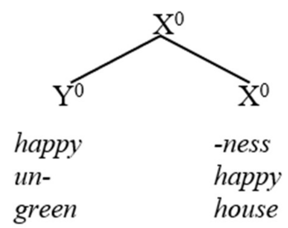
a. Heads are **initial** with respect to complements.

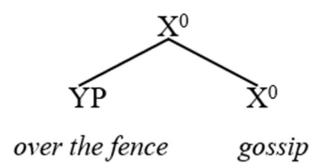
b. Heads are **final** with respect to specifiers.

c. Heads are **final** with respect to modifiers.

She further proposes an important adjustment to the X-bar template whereby she allows the head-level to be *recursive* (p. 35-37) with the consequence that heads can be structural sisters of phrases. The relevant configurations she derives for compound structures are as follows:

(4-17) a. *Compounds/derivations* b. *Phrasal compounds*





Both structures in (4-17) follow from the statements in (4-16) that heads are *final* with respect to specifiers/modifiers. Both structures are also examples of recursion of the head X˚. As for the possible lexical content in the various structural positions at the sub-word level, we can see from the representations in (4-17) that heads can be realised as roots (e.g. *house*) or as derivational suffixes (e.g. -*ness*).[149] Specifiers/modifiers on the other hand can be realised as prefixes (e.g. *un*-), as roots (e.g. *green*) or as phrases (e.g. *over the fence*).

One interesting aspect of Lieber's analysis is that it recognises the fact that structures with derivational suffixes have a lot in common with what has traditionally been classified as compounds (i.e. compounds with two independent roots). We already saw this in our discussion about the properties of compound structures in section 4.1. This would thus follow naturally from the morphosyntactic analysis proposed by Lieber.

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[148] Corresponding syntactic bracketing (ternary branching is allowed): [$_{XP}$ Spec [$_{\bar{X}}$ [Mod] [X˚] [Comp]]]

[149] Lieber (p. 56-57) also discusses cases where the head is realised as a prefix that takes a root complement (setting (4-16)a where heads precede complements), resulting in left-headed structures (e.g. *de-bug*, *en-rage*).

There are, however, some issues with Lieber's proposal. First, Lieber herself points out that it is not obvious how to classify something as a specifier or as a modifier (p. 38-39). Recall that in the parameters that she proposed in (4-15), there is one parameter for specifiers and another one for modifier, but it is not clear how we can decide which is which. She concludes that *happy* in *happiness* is a specifier because the relationship between *happy* and *–ness* is not one of restrictive modification (p. 55) but that is an argument based on elimination instead of identification. If we cannot identify specifiers based on structural properties, it is not clear to me how we would proceed to determine the setting of parameter (4-15)b.

Another problem that was pointed out by Stump (1993) is that analysing *happy* as a specifier in *happiness* implies that the suffix *–ness*, which is the head of the construction in Lieber's approach, is then subcategorised for its specifier. A similar thing in (phrasal) syntax would be if a verbal predicate was subcategorised for its subject, something which is unheard of. The relationship between the two elements *happy* and *–ness* is in Lieber's approach turned upside down compared to what is generally assumed to be the case, namely that *happy* is subcategorised for *–ness* as its nominalisation suffix.

4.2.2 Linker Phrase

Another approach assuming that word-internal structures have specifier and complement positions is Johannessen (2001). We saw in section 4.1 that compounds in Norwegian are assumed to have the syntactic and semantic head to the right. That is, the right-most element is the element that determines syntactic features such as lexical category and gender as well as semantic features (through the IS A-condition). Johannessen's approach to compounds differs quite radically from this in that she assumes that the syntactic head is in fact not the right-most element, but rather linking elements. Recall that Norwegian compounds sometimes surface with linking elements such as –s– or –e–, shown below:

(4-18) a. *dyr-e-hage* (*dyr* + *hage*)
animal-LE-garden
'zoo'

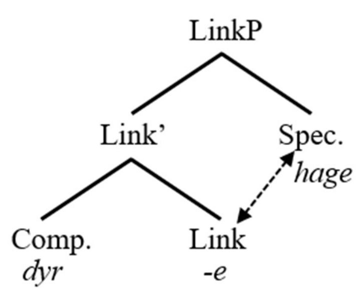
b. *dag-s-lys* (*dag* + *lys*)
day-LE-light
'daylight'

c. *tom-∅-flaske* (*tom* + *flaske*)
empty-LE-bottle
'empty bottle'

Instead of assuming that the right-most element is the head in these constructions, Johannessen assumes that it is the linking element that is the formal head of the construction. With this kind of approach, the morphological exponent of the head would be phonetically realised as in (4-18)a and (4-18)b (but it is also possible to have a null-morpheme as the head of the compound as in (4-18)c). This linking element, following general principles from X-bar theory, projects, thus creating a Linker Phrase (LP).

To capture the insight that the right-most element in compounds plays an important role in deciding morphosyntactic behaviour, Johannessen suggest a phrase structure that is the mirror image of what is usually assumed to be the case in Norwegian. The basic X-bar template in Norwegian is a right-branching one with the specifier on the left (as shown in (4-17) above). Johannessen's proposal for the structure of compounds is a left-branching one with the specifier on the right:

(4-19) *Linker Phrase structure*



The idea behind the left-branching structures for compounds is that the right-most element appears in a structurally higher position than the head, thus being able to transfer its morphosyntactic and semantic features. Consequently, a case of spec-head agreement through the c-command relation (as indicated by the arrow) is established. This agreement relation is the reason for why the identity of the formal head is obscured in compounds. The "transfer" of features to the head (and as a consequence to the compound as a whole) gives the impression that it is the rightmost element that is the head while in reality it is the linking element. Johannessen also suggests that it is weakening of the spec-head agreement that gives rise to lexicalised meanings and idiosyncratic behaviour in compounds. The idea is that the features of the specifier (i.e. the right member) are of lower status than that of the head (i.e. the linker), and a failure to "transfer" the features of the specifier results in loss of transparency. Consequently, the compound seizes to abide by the IS A-condition while morphosyntactic features of the compound, such as grammatical gender and lexical category, are not necessarily dictated any longer by the rightmost member.[150] Another interesting feature of Johannessen's analysis is that the left-branching structure she proposes for compounds mirrors (at least in a templatic way) the fact that synthetic compounds[151] have a verb-object order, which is the opposite from that found in phrases. In synthetic compounds, the order is OV (*sjakk-spiller* 'chess player') while in phrases the order is VO (*spille sjakk* 'play chess').

There are however a few problems with Johannessen's analysis.[152] As noted by Eik (2019), Johannessen does not elaborate on the fact that specifiers in compounds are placed on the right in her analysis while specifiers in the rest of the language are placed on the left. In addition, specifiers are generally assumed to be optionally filled as they have a modifying function. However, in this case, it seems clear that the specifier position in the compound structure suggested by Johannessen (4-19) *has* to be filled. If the specifier position is left empty, there is no compound.

[150] For instance, *vin* 'wine' is a masculine noun in Norwegian and in compounds such as *rød-vin* 'red wine', following Johannessen's analysis, it is able to transfer its features to the head of the compound (in this case, a linker element with a null morpheme). The compound retains the semantics and the morphosyntactic features of the rightmost element. In *brenne-vin* (lit. burn-wine) 'liquor', the rightmost element is not able to transfer its features, resulting in a non-transparent compound (*brennevin* is not a type of wine) in addition to morphosyntactic changes: *brenne-vin* is a neuter noun.

[151] Synthetic compounds are compounds where the left member is a verb and the modifying member to the right is interpreted as an argument of the verb (see Bauer 2009:353-354): e.g. *bus-driver*, *home-made*.

[152] In all fairness, the main topic of Johannessen (2001) is not about the structure of compounds, but rather on the question of wordhood of compound internal members. Are they words or stems? Consequently, she has not elaborated on the structural analysis itself.

Second, it is not clear what kind of syntactic entity the Linker Phrase is. It does not have its own syntactic distribution but is parasitic on the distribution of its specifier through the spec-head agreement that is established. This casts doubt on whether it should be treated as a syntactic primitive at all on a par with syntactic phrases that are based on the lexical categories such as NP, VP and AP.[153]

4.2.3 Compounds are Root Phrases

Harley (2009) proposes a DM analysis (see section 1.2.2 for DM) where compounds are Root phrases (√P). In particular, she suggests that roots project and can take complements. The structure that is created is a √P, a configuration that forms the foundation for compound formation, which is characterised by incorporation of the modifier into the compound head root. Harley finds evidence for head roots merging directly with modifiers from so-called *one*-replacement in PP-modified NPs, which fails in case the PP is an internal argument of the NP.

(4-20) a. ?*That student of chemistry and this one of physics sit together.
b. That student with short hair and this one with long hair sit together.

Using *one*-replacement as a diagnostic, she argues that PP *with long/short hair* hand is merged *after* categorisation of the root √STUD, accounting for why *one*-replacement of the head noun only is licit. The PP *of chemistry/physics*, on the other hand, is an argument of the root √STUD, which merges directly with the root *before* the whole structure is categorised as a noun. This blocks *one*-replacement of the head noun only. She extends this further to synthetic compounds (e.g. *chemistry student*) by showing that incorporation is felicitous as long as the modifier (in this case the internal argument) is the first thing that is merged with the root of the head.

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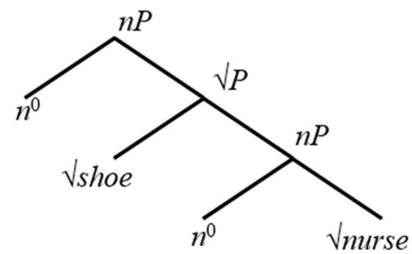
[153] On a sidenote, the lexicalisation path that Johannessen suggests, whereby weakening of the spec-head agreement results in idiosyncrasy, is an interesting one. However, it also predicts that lexicalised compounds could in principle also change word class behaviour. Apart from a handful exocentric compounds such as $[\textit{far}_{\mathrm{V}}\text{-}\textit{vel}_{\mathrm{Adv}}]_{\mathrm{N}}$ 'farewell' (see Eik 2019:24 for more examples), this kind of category change is exceedingly rare in Norwegian.

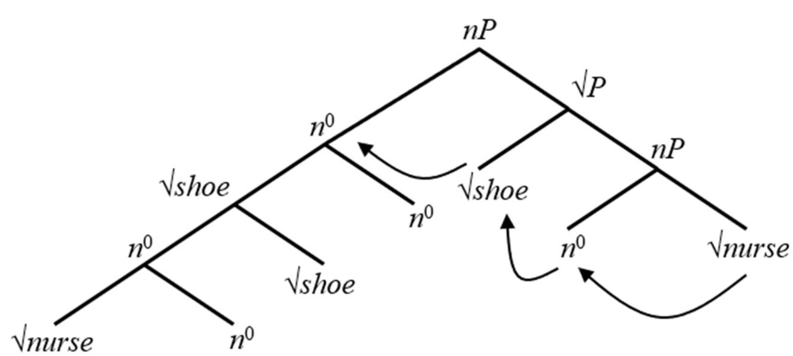
She extends the analysis to other types of compounds where there is no semantic selection between the compound elements. In her approach, a compound is formed by first building the left member (the modifier) before building the right member (the head) on top of this. She provides the derivation of *nurse shoe* as an illustration:

(4-21) *Compound as Root Phrase*



The first step is merging the left member with a categorising head *n.* The resulting structure is then merged with the root of the right member, resulting in a √P, which is then later on merged with its own categorising head *n*. In order to derive the correct word order, Harley proposes a head-to-head incorporation for all the instances of Merge (including categorising heads). Each incorporation step involves left-adjunction and pied-piping, resulting in a surface word order that is the opposite from that of the order in which they were merged.

(4-22) *Compound head-to-head movement and incorporation*



A by-product of the head-to-head movement is the creation of the non-head *n*P, *nurse*, which is in principle a type of object that is a possible host for functional projections such as Num and D, thus predicting that compound internal inflection should be possible. However, compound internal members generally do not carry inflection (e.g. **nurses-shoe*), something that Eik (2019:70-74) also points out for Norwegian. Harley suggests that the DP, if present, may contain some Case checking head, thus pre-empting the need for Case checking via incorporation into a root. Consequently, the incorporation process does not apply to these configurations and compound internal inflection is blocked.

As pointed out by Eik (2019:145-146), there are a number of problems with Harley's analysis if applied to Norwegian. Harvey only accounts for compounds with a uniform branching direction (right-branching) while left-branching compounds are left unaccounted for. As a consequence, the part of the distribution of linking elements in Norwegian that is structurally governed does not follow.

A potential problem for Harley is the nature of the head incorporation. For instance, the first step in the derivation is to merge the left member of the compound with a categorising head, thus creating the noun *nurse*, labelled as *nP*. The root √*nurse* is then incorporated into the categorising head *n* by left-adjunction. Harley assumes that this incorporation takes place due to requirements for Case checking. This is not an implausible assumption given that categorising heads such as *n* are syntactically active elements (e.g. they can be selected). However, it is not clear to me how Case checking motivates the next head movement in the derivation in (4-22), where the unit $[\sqrt{nurse}+n^0]_{n^\circ}$ moves and incorporates into the node containing the root √*shoe*. This seems to go beyond the power that roots in DM are assumed to have.

Lastly, why the merger between an *n*P and a root results in a √P instead of a recursive *n*P structure is also not explained.[154] The motivation for this choice is obviously there for synthetic compounds where we would want the verbal/nominal ambiguity of the head not to have any interference from the internal argument. However, for non-synthetic compounds, there is simply no evidence for this choice.

4.2.4 Non-heads as adjuncts

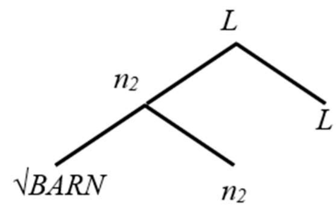
So far, we have seen analyses where the non-head in compounds was treated like a specifier or as a complement. Eik (2019) proposes instead a DM analysis where compounding is seen as

[154] This is part of a more general issue concerning the syntactic properties of roots. According to Harley, roots project and take complements. Borer (2014) points out, however, that these assumptions are problematic.

an instance of adjunction. She combines this with the idea that syntactic objects can be constructed in separate workspaces before they are combined with each other. For instance, for the compound *barn-dom-s-venn* 'childhood friend', she assumes that there is one workspace where the root √*venn* 'friend' is merged with a categorising head *n*. In a different workspace, the root √*barn* 'child' is also merged with a categorising head *n*. A functional item, L (the linking element) is merged on top of the nominaliser merged with √*barn*. We now have two different syntactic objects:

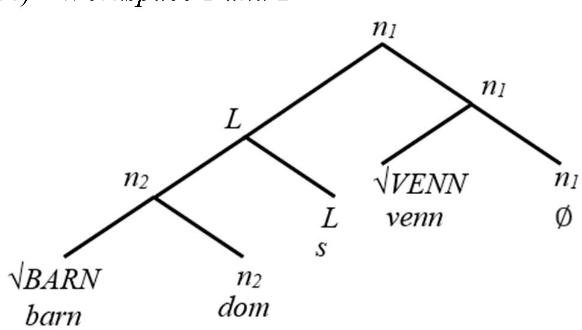
(4-23) a. *Workspace 1*

b. *Workspace 2*



These two syntactic objects are in the next step put together by adjoining the object in workspace 2 to the object in workspace 1. When Vocabulary Insertion applies, the nodes are filled with phonological content. Note that L and categorising heads may be phonologically null.

(4-24) *Workspace 1 and 2*



In this way, the right-hand member of the compound is now the head of the compound, both syntactically and semantically. Eik points out that by having the adjunction site relatively low in the nominal spine (at *n*), additional functional projections on top of the compound such as number or definiteness marking will take scope over the compound as a whole and not only the right-hand element. This keeps the intuition that compounds are lexical in nature: they "feel" word-sized. Another advantageous feature of Eik's analysis is that the adjuncts in compounds behave like adjuncts in general: i) they are optional, ii) there is no upper boundary on how many adjuncts you can have and iii) they do not interfere with argument structure.

There is one important distinction, however, with respect to other adjuncts and that is the presence of the linking element. More typical adjuncts like adverbials and PPs do not require a linking element appearing between the adjunct and the anchoring point. The role of the projection of the linking element L in Eik's analysis is to provide procedural semantics, an instruction to how elements should compose. Having a compound such as *tekopp* 'tea cup' with a syntactic representation without the linking element as a mediator for the semantic interpretation, would semantically be "something which is tea and cup" at the same time. The functional projection of the linking element provides the necessary instruction to "disambiguate" the structure such that one element is seen as the head while the other is seen as a modifier[155] (cf. Allen's IS A-condition and "Variable R", section 4.1.1). Thus, the linking element is always there.

Eik also grapples with the apparent block on compound internal inflection (e.g. **nurses shoe*) and considers the option that the non-head is simply not categorised, leaving heads in the extended projection of *n*, such as D or Num, irrelevant. Based on evidence from root vowel allomorphy in nominal stems and verbal stems when they occur as non-heads in compounds (as shown in (4-25) below), she concludes that the non-head must be categorised (p. 210-213).

(4-25) a. *tenke-tank*
think-tank
'tank for thinking'

b. *tanke-tank*
though-tank
'tank for thoughts.

On the assumption that such allomorphic pairs have the same underlying root, we are forced to conclude that they are necessarily categorised when they appear as the left-hand member in a compound. If not, the verbal or nominal semantics would not follow. In (4-25)a, the root vowel

155 This is reminiscent of the idea presented in Delfitto and Melloni (2009) where the linking element is analysed as an element inducing asymmetry in compounds, thus saving an otherwise illicit structure. See also section 5.2.

/e/ in the left-hand member expresses that we are dealing with a verb, hence the verbal semantics while in (4-25)b, the root vowel /a/ in the left-hand member expresses that we are dealing with a noun, hence the nominal semantics. Eik takes this to mean that left-hand members in general are categorised even in cases when there is no overt categorising suffix. The (near) absence of inflectional morphology compound internally is ascribed to pragmatic factors and not to a systematic blocking effect in the grammatical system (Eik 2018:217-220).

Eik provides a system for compound building in Norwegian that is flexible enough to handle a lot of the variation we find. She argues convincingly that non-heads in compounds should be analysed as adjuncts, thus accounting for their unboundedness, optionality as well as their invisibility to the overall argument structure. This view is further supported by the fact that all endocentric compounds can be paraphrased with the non-head appearing in an adjunct phrase:

(4-26) a. *eple-kake*
‘apple cake’

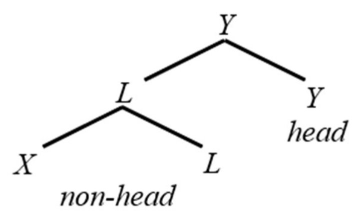
b. *kake av/med eple*
‘cake of/with apple’

When it comes to derivational suffixes, Eik treats them purely as phonological expressions of categorising heads, i.e. functional items. Their root-like behaviour that we saw in section 4.1 is thus left accounted for in Eik’s analysis. As noted for Lieber (1992) in section 4.2.1, analysing derivational suffixes as roots (or heads) does not come without problems as it entails a situation where the root (in this case derivational suffixes) is subcategorised for a specific structural position to be filled. In Lieber’s analysis, this position would be the specifier, a structurally *higher* position. To the extent that we can establish a direct parallel to Eik’s analysis, a derivational suffix as root would require an *adjunct* position to be filled in her model. Heads are, however, never subcategorised for their specifiers, let alone their adjuncts. In the next section, I outline the syntactic approach adopted in this thesis and tentatively suggest how derivational suffixes fit in.

4.2.5 The view adopted in this thesis

I will follow Eik (2019) and assume that compound structures in the default case are formed by left-adjunction of the non-head to the head. Crucially, the non-head and the head are built in separate syntactic workspaces. The adjunction of the non-head to the head is assisted by a functional head, a Linker Phrase L, which is part of the non-head structurally. This head L is there to establish asymmetry in the structure, establishing which part is the head and which part is the non-head. Consequently, it is necessary for both syntactic and semantic reasons. The phonological content of the head L, which may also be null, depends on lexical and structural factors. The templatic structure for compounds in the default case is then as follows (adapted from Eik 2019:163):

(4-27) *Basic compound structure*



In (4-27), X and L form a complex object together headed by L, an object that is adjoined to Y. The L head is necessary to establish asymmetry between X and Y, such that X is syntactically and semantically the non-head, while Y is the head. Both X and Y may be complex objects.

One thing to note about the structure in (4-27) is that the non-head is adjoined to the head *before* any functional categories in the extended projection of the head are merged (e.g. definiteness, number etc). The adjunction site for the non-head in compounds is thus relatively low, and Eik (2019:167-169) gives various reasons for why this should be so. For instance, in nominal compounds, adjoining the non-head directly to the categoriser of the head captures the fact that any added inflectional categories such as number or definiteness takes scope over the nominal compound as a whole. Another argument, not mentioned by Eik, but that supports her analysis, comes from *morphological mergers* (see section 1.2.2.2) in adjectives and the lack of such mergers in adjectival compounds. Norwegian has, just like English, two ways of realising the comparative form of adjectives:

(4-28) a. Synthetic: *rik-ere* 'richer'
b. Analytic: *mer nervøs* 'more nervous'

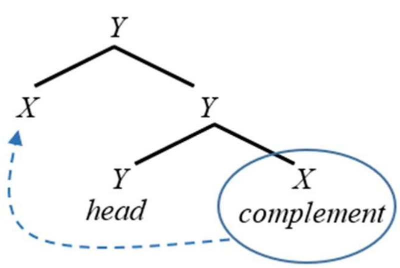
When to use one or the other is subject to various factors, but the synthetic form is more frequent in short (monosyllabic) adjectival roots (Faarlund et al. 1997:350-359). Embick and Noyer (2001) analyse the formation of synthetic comparatives in English as *Local Dislocation*, a type of morphological merger that applies on the PF branch in DM (see section 1.2.2.2) whereby the precedence relation between two syntactic terminals can be swapped if they are adjacent in the linear string: $[_{DegP}$ X $[_{AP}$ A$]]$ → [A+X]. This can also be applied to (4-28)a where the two morphemes *rik* and -*ere* turn out to be adjacent in the linearised string. However, this kind of morphological merger is dispreferred in adjectival compounds:

(4-29) a. Synthetic: **farge-rik-ere* 'colourfuller' (lit. colour richer)
b. Analytic: *mer farge-rik* 'more colourful'

This is accounted for under the current assumption that the non-head *farge* is adjoined to the head *rik* before the comparative is merged, thus blocking the synthetic form to surface as linear adjacency is not obtained.

As for derivational suffixes, I tentatively suggest that they are similar to compounds, as represented in (4-27), when it comes to geometric properties of the structure, but they are not structurally identical. There is no L head present in structures with derivational suffixes as the semantic interpretation and syntactic distribution are consequences of selectional requirements. That is, the head (i.e. the derivational suffix) takes the non-head as its complement. Consequently, the asymmetry between the elements is an inherent part of how the structure is formed. They do, however, appear to be cases of adjunction due to phonological requirements of the head whereby the non-head is linearised to the left of the head. What was analysed as a specifier in Lieber's account in section 4.2.1 is then actually a complement. I conjecture the following structure:

(4-30) *Derivational suffixes*



The derivational suffix heads the structure and imposes its syntactic distribution. The exact nature of the head (root or functional item) and hence its internal structure may depend on the suffix under consideration, but I leave that question open.[156] The complement, even if it is structurally subordinate to the head, ends up being linearised *before* the head due to phonological properties of the head. This can happen in two ways: i) either there is movement in the syntax (as illustrated in (4-30)), whereby the complement is adjoined to the projection of the head (much like in the compound structure in (4-27), just without any mediating L head) or ii) there is some PF movement of the types discussed in section 1.2.2.2. Both options make structures with derivational suffixes look and behave like compounds along many parameters (see section 4.1).

4.3 Roots vs stems

A hallmark of natural languages is the principle of arbitrarity, stating that there is no necessary sound-meaning connection (de Saussure 1916/1971:100-102). Another related property is "duality of patterning" (Hockett 1960), a principle that enables combinatorial structures on two distinct levels: meaningless sounds can be combined into meaningful morphemes and words, which themselves can be combined further, a property we can refer to as compositionality, another hallmark of language. However, the fact that compositionality is not a property that goes all the way down (to the level of individual segments) implies that there is a cut-off point somewhere in the structure. Thus, we have a level in the structure which is directly associated to meaning, making it a natural primitive for any theory dealing with semantics or word-formation. In DM, this is taken care of by the two types of morphemes that are recognised: roots and functional items (see section 1.2.2).

In what follows, I argue that we need to be able to store more than roots and functional items. More specifically, there is a need to recognise the *stem* as an intermediate type of object that can be stored, even though such objects have no natural place in constructivist frameworks like DM. I start by looking into the nature of roots in section 4.3.1 in order to understand better what kind of objects they are and what they contain. I then move on to arguments for operating with stems as stored objects in section 4.3.2.

[156] See Lowenstamm (2010) and Creemers et al. (2018) for specific proposals for derivational affixes as roots.

4.3.1 Roots

In the introduction to DM in section 1.2.2, roots are stated to be acategorial syntactic building blocks that are devoid of extra-syntactic content. There is, however, very little consensus concerning the nature and identity of roots. How much information do we actually find in them?

Following Marantz' (1995) ideas about the "pure" Lexicon (i.e. a "pure" list 1 in DM terms), only features that have an effect on the syntactic computation are assumed to be stored in the root nodes drawn from list 1. This may include features such as [±count] or [±animate], which are relevant for the syntactic computation. These features also have semantic relevance, and it is an open question whether the syntactic computation and the semantic interpretation at LF share the very same feature or if we are dealing with two separate but matching features. However, it is not clear to what extent a purely syntactic feature such as grammatical gender is stored in the root. Grammatical gender is usually assumed to be an inherent part of a given nominal root, as it does not have any basis in phonology nor in semantics. Yet, as pointed out by Acquaviva (2009), marking grammatical gender as a feature in roots (e.g. through diacritics) is tantamount to marking them as nouns. This goes against our assumption that roots are devoid of precisely that kind of content.

As for other syntactic properties, it is not clear what roots are capable of doing. As we saw in our review of Harley's (2009) analysis of compounds in section 4.2.3, she allows roots to select complements and to project, but this kind of root behaviour is rejected in the work by Borer (2005a/2005b/2013).

Marantz' proposal also raises another broader and more central issue: how are roots individuated and distinguished from each other? If features pertaining to the phonological or semantic representation are absent from a root bundle containing the features [+count] and [+animate] drawn from list 1, how do we make sure that /kæt/ is inserted into the structure and not /dɒg/? Recall from section 1.2.2.1 that the vocabulary insertion (VI) process in DM is characterised by competition according to the subset principle, where the item that best satisfies the feature bundles represented in the terminal nodes in syntax is the winner. However, the vocabulary items /kæt/ and /dɒg/ are not differentiated by their syntactic properties and would thus be equal candidates for insertion into the relevant syntactic structure. Furthermore, it is also conceivable that [kæt] is inserted into a root node at PF while the semantic content DOG is accessed at LF. To solve this, Marantz argues that VI is not governed by competition but is rather driven by free choice, allowing the speaker to choose which vocabulary item that is inserted in a given context. According to him, the speaker's Encyclopaedic knowledge about complete derivations and representations (which includes phonology and syntax) ensures that PF and LF are synchronised. VI governed by competition is thus not needed.

Marantz points out that his proposal predicts that there should be no true cases of root suppletion, that is, cases where a root has two phonologically unrelated realisations, whose distributions are governed by precisely morphosyntactic feature bundles (i.e. they compete). Harvey (2014) reports that there are indeed cases of root suppletion in Hiaki, an Uto-Aztecan language spoken in Sonora and Arizona. For instance, the root √RUN in this language is realised by two phonologically unrelated forms that surface in different environments, depending on the number feature of the subject. If the subject is singular, the phonological realisation is [vuite] while if the subject is plural, the phonological realisation of the very same root is [tenne]. These two forms are very distinct from each other phonologically and insertion of one of the forms blocks the other one and vice versa. For example, the form [tenne] necessarily appears in [+plural] contexts, blocking the insertion of [vuite], which is the singular form. Now, if the syntactic derivation is devoid of any features that do not have syntactic relevance, then the form [tenne] will not only block [vuite] in [+plural] contexts but also any other verb occurring in the plural by virtue of being more specified for the given syntactic root nodes.[157] This means that roots need to be differentiated from each other in list 1. That is, they must be identifiable somehow already in syntax, but the nature of the root content is disputed.

One way to distinguish roots from each other is to assume that they have some underspecified phonological content, which gives enough room for contextual adjustments. This view is advocated by Borer (2005a/2005b/2013) on the basis of roots in Semitic languages and stem vowel alternations in Germanic: *sing/sang/sung/song*. Using root allomorphy as evidence for roots being differentiated by their phonological content is not unproblematic when root suppletion is taken into account. As argued by Harley (2014), the suppletive root √RUN in

[157] Harley provides a list of other verbs with root suppletion. Naturally, the suppletive plural forms of these verbs would be equally good candidates for insertion in this case.

Hiaki discussed above shows that the root does not contain phonological information. The allomorphs [vuite] and [tenne] are simply too different.

Another way roots can be individuated is on the basis of their semantics. Arad (2003) allows roots to have a semantic core that is underspecified. Also Pfau (2009:83-86) argues that some access to semantic/conceptual features must be available at an early point in the derivation, guiding the choice of elements drawn from list 1. The opposing view also has proponents. Acquaviva (2009) argues that roots have no meaning by themselves. Meaning is a function of the morphosyntactic structure in which they occur. Harley (2014) also argues against root individuation based on semantics because of cases of "semantic suppletion". This happens when a root takes on so many different meanings across morphosyntactic environments that it is meaningless to try to pin down a semantic core. Citing Aronoff (2007), some of the relevant data point she uses is the Hebrew root kbʃ ~ 'press', which can take on meanings ranging from 'pickled fruit' to 'highway'. They are simply too different to be an inherent property of the root.

What roots contain and how they are individuated is thus still an open discussion. Given that the morphosyntactic computation is insensitive to features that are extra-syntactic, I adopt the view that roots are in fact devoid of such content. Although I will treat roots as if they were already identified in the syntax, I do recognise that there is a need for a method to individuate roots. Both Acquaviva (2009) and Harley (2014) offer potential solutions to the problem, but this is outside the scope of this thesis.

4.3.2 Stems

The notion of *stem* used in traditional sense can be defined as an intermediate form to which inflectional endings are added (Aronoff 1994:31). The justification for operating with the stem as a descriptive unit comes from the fact that in some languages with inflection, lexical items of a given inflected lexical category may contain elements that show up *only* when there is inflection but are otherwise absent. Crucially, these "ghost" like elements cannot be part of the inflection itself, nor are they part of the root.[158] A few examples of this is found in Table 28 below, displaying the declensions of the Latin nouns *cor* ‘heart’ and *tempus* ‘time’ (both belong to the neuter 3rd declension):

Table 28 – Latin noun declension[159]

		cor**,* ‘heart’ (n.) stem ***cord-	***tempus**,* ‘time’ (n.) stem ***tempor-***	Case endings
Sing.	Nom.	cor	tempus	
	Gen.	cord**is**	tempor**is**	**-is**
	Dat.	cord**ī**	tempor**ī**	**-ī**
	Acc.	cor	tempus	
	Abl.	cord**e**	tempor**e**	**-e**
Plur.	Nom.	cord**a**	tempor**a**	**-a**
	Gen.	cord**um**	tempor**um**	**-um**
	Dat.	cord**ibus**	tempor**ibus**	**-ibus**
	Acc.	cord**a**	tempor**a**	**-a**
	Abl.	cord**ibus**	tempor**ibus**	**-ibus**

If we first look at the declension of *cor* in Table 28, we see that for the parts of the paradigm where there are no (overt) inflectional endings (in the nominative and accusative singular), the realisation of the lexeme is *cor*. However, when we do find overt morphology for the number and case marking (all the other forms), there is a *–d–* that surfaces between the root word and the inflectional ending. We could hypothesise that this *–d–* is part of the inflectional ending, but then we would expect to see that for all neuter nouns of the same declension paradigm. However, as the declension of *tempus* shows, the *–d–* must belong to *cor*. The lexical item *tempus* undergoes other types of mutations for the forms in the paradigm that have overt inflectional morphology. We thus identify *cord–* and *tempor–* as stems, both of which are

[158] Note that this use of the notion “root” is meant in the traditional descriptive way and not in the sense of DM as discussed in the previous section.

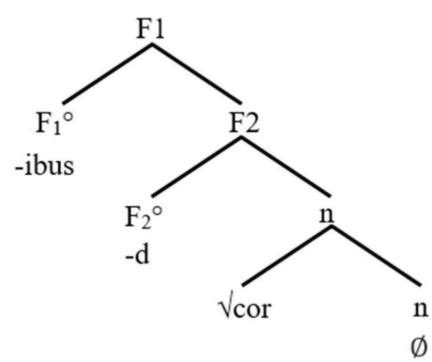
[159] The vocative has been omitted.

visibly different from what we can refer to as the citation form (the nominative singular). Thus, the stem is an intermediate form that serves as a springboard for further inflection.

Apart from being a term used in traditional morphological descriptive work (see for instance Bloomfield 1933:207-246), it is not unheard of in other linguistics disciplines. In phonology for example, both Lexical Phonology (Kiparsky 1982) and Stratal OT (Kiparsky 2000) recognise the stem-level as a domain for cyclic phonological computation. Kiparsky's (2018) L-phonemes is also another example from phonology, where the recognition of an intermediate structure puts order to otherwise anomalous phonological typologies. However, the place of the stem in grammar is a point of contention as it is unclear what role it plays. This is perhaps due to the fact that we have no direct access to the stem as it never occurs on its own. It is always accompanied by inflectional endings. Does this mean that the stem is stored or derived?

In a root-driven framework like DM, stems have no privileged ontological status. Only allowing roots and functional items as building blocks in morphosyntax, the stem can only be defined in terms of either i) root allomorphy, to which we will return in section 4.3.2.1, or of ii) structural properties. This latter possibility is pursued by Galani (2005), who proposes that the stem is a complex head that is the result of Local Dislocation after vocabulary insertion (see section 1.2.2.2). Although Galani works on the morphosyntax of verbs in Modern Greek, her way of deriving the stem can be adapted to our Latin case above. Assuming that the "intrusive" element *–d–* in the Latin stem *cord-* and the case ending are the realisations of two separate functional projections, we can hypothesise the following structure for Latin nouns (the actual nature of the functional projections need not concern us yet):

(4-31) *Hypothesised structure for Latin* cor–



The root √cor is merged with an abstract categorising head *n* before the derived noun is further merged with the functional heads $F_2°$ and $F_1°$. As discussed in section 1.2.2.2, Local

Dislocation is a morphological type of merger that takes place after vocabulary insertion. Given that the appearance of the stem form is dependent on the presence of inflectional affixes (number and/or case), we can assume that F1° is required to have an overt phonological exponent in order for Local Dislocation to take place and that overt phonological material in F1° is also the trigger for the process. Local Dislocation is defined as a process that is sensitive to adjacency and precedence relations between constituents. Using the notation a*b to denote a requirement that "a precedes b", the syntactic structure above gives us [F_2° * [√cor * n]] where the head of F2° precedes the root, which again precedes the categorising element. Local Dislocation is a morphological operation, which converts the precedence relations to [[√cor + F_2°] * n] where F_2°'s relation to [√cor * n] has been exchanged for a relation of adjunction to the left-peripheral element of [√cor * n], namely √cor. This process is what Galani refers to as stem formation, resulting in a complex head [√cor + F_2°], realised phonologically as [kord].

A consequence of this approach, as Galani points out (p. 197), is that there is no need to store stems as they can be derived in a rather indirect way. In this view, stem formation is merely an accidental by-product of morphological operations in the PF branch of the DM grammar. However, even though stems technically can be derived as Galani describes, it is not clear that this solution can be applied to every language. In the morphosyntax of verbs in Modern Greek, Galani reports that the theme vowel, which forms a stem with the verb root, carries aspect features. This means that the head that undergoes Local Dislocation (F_2°) contributes to the semantics of the construction. It is compositional. The "intrusive" *–d–* we see in the Latin declension of *cor* on the other hand is an idiosyncratic property of this root and does not contribute to the semantics. Aronoff (1994:31-35) has pointed out that stems do not necessarily have any semantics that are different from their root, which indicates that one cannot easily derive one from the other. Put differently, both need to be stored.

An alternative solution that does not rely on the structure in (4-31) undergoing any morphological changes (i.e. Local Dislocation) could be that the movement is syntactic. The correct order of the morphemes would thus be obtained by successive head movement and adjunction. However, this does not account for the fact that everything that is included in F_2° appears to form an indivisible chunk to the exclusion of what is in F1°. The actual phonological content of what is dominated by F_2° depends on what is in F1°. This brings us to an argument made by Bermúdez-Otero (2013) that allomorph selection is not a root level operation but belongs to the stem-level. This will be the topic of section 4.3.2.1. I then turn to Marvin's (2002) proposal that the stem is a domain for semantic and phonological interpretation in section 4.3.2.2. Both Bermúdez-Otero and Marvin argue that we need the stem.

4.3.2.1 Stem storage

Bermúdez-Otero (2013) investigates theme vowels in Spanish and in particular, how these relate to the root/stem distinction. Nominal and adjectival stems in Spanish typically fall into one of three inflectional classes based on the theme vowel they surface with: [-a], [-o] or [-e]. The *a*-class is the default for feminine stems while the *o*-class is the general default. Apart from these generalisations, there is a lot of idiosyncrasy resulting in effectively there not being any predictive factors, neither phonological nor semantic. This can for instance be exemplified by the fact that *mano* 'hand' falls into the *o*-class by virtue of taking [-o] as the theme vowel, but the noun belongs to the class of feminine nouns in spite of not having [-a] as the theme vowel. This has led most linguists working within the framework of DM to assume that 'misbehaving' lexical items such as *mano* come with a diacritic to account for the idiosyncratic root-to-stem derivation. That is, there is a rule that make sure that feminine nouns are associated with the theme vowel [-a] but certain roots such as *man-* are subcategorised for the *o*-class. Bermúdez-Otero refers to this as the *root-driven* approach, alluding to the fact that in DM, the unit for storage is either a root or a functional morpheme (presumably, the theme vowel spells out functional heads). He contrasts this with his own *stem-driven* approach where he argues that stems are stored with the theme vowel.

He assumes an interactionist and constraint-based stratal model of phonology. Stratal approaches to phonology (Kiparsky 1982, Booij and Rubach 1987, Halle and Vergnaud 1987, Kiparsky 2000) generally recognise three distinct levels in the phonological derivation, which we can label the stem-level, word-level and post-lexical level. The three levels are distinguished by different phonological processes. Stratal models differ along various dimensions, but all of them agree that the stem-level is internally cyclic. That is, each addition of morphology that is associated with the stem-level will cause the application of stem-level phonological processes. Another point of agreement between stratal models is that they all agree that the root itself does not constitute a cyclic phonological domain. However, root-to-stem derivations do trigger phonological cycles. Given the architecture of stratal models, there will also necessarily be a stem-to-word derivation, which is subject to other phonological processes, but this also entails that stems are intermediate levels of representation that actually never make it to the surface.

Bermúdez-Otero argues that in Spanish, it is necessary to allow for storage of stems (i.e. root + theme vowel). More specifically, he argues that phonologically conditioned allomorph selection of Spanish stems does not take place in the first cycle (the root-to-stem derivation) but rather in the second cycle (the stem-to-word derivation). In order for stem allomorphy to be resolved in a non-initial cycle in the phonological derivation, there has to be a least two forms that are carried over into the second cycle. In other words, Bermúdez-Otero argues that there are (at least) two phonological exponents competing at the stem-level and that the choice between them is determined by phonology.

This approach enables him to give an account of a classic puzzle of Spanish morphophonology. Spanish exhibits a stress-driven diphthongal alternation between [e, o] and [je, we] where the former occurs in unstressed position while the latter occurs in stressed positions (Bermúdez-Otero 2013:24). Even though the alternation tracks a derived phonological property (stress), participation in the alternation is subject to lexical idiosyncraticity (p. 8). Some lexical items participate in the alternation and others not. For instance for the verb *contar* 'to count/tell', a verb that participates in the alternation, we have the following paradigm for the simple present indicative:

Table 29 – Conjugation of Spanish contar

contar			
1p, sg	kwénto	1p, pl	kontámos
2p, sg	kwéntas	2p, pl	kontájs
3p, sg	kwénta	3p, pl	kwéntan

In Table 29, the stress is marked with acute accents and we can clearly see that when the root vowel /o/ is stressed, it surfaces as [we], while in unstressed positions it surfaces as [o].

The process of diphthongisation can also be used as a diagnostic to separate stem-level affixes from word-level affixes. Given that diphthongisation tracks stress, an apparent overapplication of diphthongisation indicates that a given affix belongs to the word-level. That is, a diphthong derived at the stem-level is retained when word-level suffixes are added, even if the phonological conditions are not met (i.e. stress), at least not on the surface. Thus, we find alternations like (p. 61):

(4-32) a. [bjéxo] – ‘old’ (stem-level, normal application)
b. [bexéθ] – ‘old age’ (stem-level, normal application)
c. [bjexísimo] – ‘very old’ (word level, overapplication)

In the first two cases, (4-32)a and (4-32)b, we see that a normal application of the stress-conditioned alternation takes place, but in (4-32)c, diphthongisation has taken place even though there is no surface stress on the relevant vowel. The assumption is, as already mentioned, that diphthongisation takes place on a phonological cycle (on the stem-level) *before* the stress-shifting suffix *–isimo* is added. The stress-induced vowel mutation is retained for subsequent steps in the derivation, also when stress is shifted.

However, the same kind of diphthong preservation is not seen in deverbal derivatives like *contable* ‘countable’, which is subject to two cycles in the stem-level phonology. First as a verb stem and then as a derived adjective (p. 35):

(4-33) $[_{\mathrm{A}}\ [_{\mathrm{V}}$ kont-a] βl-e]

We already know from Table 29 that the verb *contar* participates in the diphthongal alternation. The data in (4-32) also shows us that allomorph selection takes place at the stem-level. The problem with the form in (4-33) is that we have two cycles of stem-level phonology, so there is a problem in identifying which one of these two cycles hosts the allomorph selection. Bermúdez-Otero concludes that a root-based approach will have to pick the first one of these cycles as the locus of allomorph selection. This is because root-based approaches only allow lexical storage of acategorial roots and functional heads. Consequently, allomorphy in the root itself must necessarily be determined in the first cycle because waiting any longer for allomorph resolution would imply that lexical storage includes more than acategorial roots and functional heads. Bermúdez-Otero goes on to show that that gives the wrong predictions (p. 59):

(4-34) Input structure: $[_{\mathrm{Stem}}\ [_{\mathrm{Stem}}$ √KONT-a] βl-e]
First cycle: *kwénta*
Second cycle: **kwentáβle* (correct form: *kontáβle*)

In the first cycle where the verbal stem is created, stress is assigned to the penultimate syllable thus creating the environment for diphthongisation. The problem is that the diphthong is preserved also in the next cycle, where the derived adjective is created through suffixation of *-ble*, resulting in the erroneous *kwentáβle* instead of *kontáβle*.

Bermúdez-Otero refers to this as "the problem of the missing cycle" (p. 65-67) because it appears that the input structure never undergoes the first cycle effects (i.e. diphthongisation) in (4-34).

This gets even more mysterious when we take into account other first cycle effects such as syllabification in hiatus. When a high vocoid is followed by a more sonorous segment, the high vocoid is syllabified in hiatus if the high vocoid is assigned stress, e.g. [í.a]. If these conditions are not met, the default way for realising this sequence is as a diphthong, e.g. [ja]. Bermúdez-Otero provides examples such as (p. 68):

(4-35)	a. *Hiatus*	b. *Diphthong*
	[am.plí.a] 'extend.3SG'	[ám.plja] 'ample.F'
	[a.βa.dí.a] 'abbey'	[a.βa.θjál] 'abbey related'

Stress here is represented by acute accents, and the split between hiatus and diphthong is clear. When the high vocoid is stressed like in (4-35)a, we get a hiatus, whereas an unstressed high vocoid is realised as a diphthong as in (4-35)b. In other words, the difference is clearly stress-induced.[160] What makes the data in (4-35)a very interesting (in particular the verb *ampliar* 'enlarge'), is that stress-induced hiatus is preserved in deverbal derivatives based on the adjectival suffix *–ble*:

(4-36)	Morphological structure:	[$_A$ [$_V$ ampli-a] βl-e]
	Phonetic/phonological:	[am.pli.á.βle]

The adjectival suffix does not attract stress itself but shifts stress over to the theme vowel of the verbal stem. Thus, the high vocoid is no longer in a position where it should be syllabified in hiatus and we should expect to see the form *[am.pljá.βle]. However, that is not what we find. Instead, we find that the effects of earlier cycles of stress are still visible in later derivations in

[160] Bermúdez-Otero (p. 68) does mention that there are a few exceptions where there is a non-alternating unstressed [i] in tautomorphemic contexts, but he notes that they are highly restricted. In addition, the exceptions also display a lot of variation within and across speakers.

the form of a hiatus. This is in stark contrast to the other stress-induced phenomenon we looked at in (4-34) where we dealt with the diphthongal alternation.

"The problem of the missing cycle" is thus a problem that only applies to derivatives like *contable* but not to *ampliable*. Bermúdez-Otero asks (p. 71): "Why is the stress-conditioned hiatus of [ampl**ía**] cyclically transmitted to deverbal [ampl**iá**βle], whereas the stress-conditioned diphthong of [k**wé**nta] is not cyclically transmitted to deverbal [k**o**ntaβle]?" He goes on to conclude that it is the starting assumption that is wrong: the root-driven approach to domains for phonological cycles.[161] The solution, according to Bermúdez-Otero (p. 33-34), is to take a stem-driven approach instead and assume that lexical entries contain stems, that is roots + thematic vowels. The thematic vowel that the root (or any suffix) selects is always there in the underlying representation, but will not always surface due to a regular phonological process that deletes stem-final vowels.

Thus, when it comes to the items that are stored for the verb *contar*, from which we get both /kwént/ and /kont/, both stems are stored alongside each other (p. 72). This means that there will be one stem stored with the diphthong and another stem stored with a monophthong. They both pass through the first cycle, but only one of them survives the second cycle.

[161] In a defence for the root-driven approach, Myler (2015) argues that "the problem of the missing cycle" is due to a systematic difference in the phonology of nouns (and adjectives) on one hand and verbs on the other. In particular, he argues that the domain that results from the combination of roots with a verbal categoriser does not go through a stress cycle. This means that "the problem of the missing cycle" is not a problem at all because the paradox disappears. He also argues that the syllabic status of the high vocoid /i/ is not cyclically transmitted, and that also this can be ascribed to the different morphosyntactic behaviours associated with each of the lexical categories. I will not assess Myler's proposal in this thesis. A root-driven approach with sensitivity to lexical categories seems to be compatible with the data on a synchronic level, but it does not account for diachronic development as nicely as Bermúdez-Otero's stem-level approach. In particular, the fact that the verb CONTAR 'to count' has two allomorphs, /kwent-a/ and /kont-a/, while the historically related noun CUENTO 'story' only has one /kwent-o/ is not a problem for the stem-driven approach because alternating stems are only stored if there is evidence for an alternation. For a root-driven approach, the asymmetry remains mysterious because it does predict that CUENTO, by virtue of being built on the same root as CONTAR, should have two available allomorphs.

(4-37) Input structure: $[_{\text{Stem}} [_{\text{Stem}} \begin{Bmatrix} kont\!-a \\ kwent\!-a \end{Bmatrix}]\ \beta\text{l-e}]$

First cycle: $\begin{Bmatrix} kónta \\ kwénta \end{Bmatrix}$

Second cycle: *kóntaβle*

Bermúdez-Otero argues that the transition from the first to the second cycle is governed by phonology. The two competitors are evaluated against a set of ranked Optimality Theoretic constraints, where the more harmonic candidate is the winner of this competition (in this particular case, the non-diphthongised one wins because it avoids a violation of the constraint that prohibits complex nuclei, *ComplexNuc, p. 63-64). A consequence of this approach is that allomorph selection (at least in the case of Spanish) is not a root-level phenomenon, but a stem-level phenomenon that is driven by phonology. Crucially, the stems that enter in competition with each other already have this specified in their lexical entries (p. 72-73). That is, each stored stem is subcategorised for the phonological domain in which they come in competition with the other. In the case of the verb *ampliar* (see (4-35)a), only one stem is stored (p. 77), which entails that the deverbal derivative *ampliáβle* has no choice but to inherit the phonologically regular hiatal syllabification [í.a] from the stem.

4.3.2.2 Stems as domains for semantic and phonological interpretation

Another piece of evidence for the relevance of stems comes from Marvin (2002). Marvin explores the stress and internal structure of words in Slovenian and English. A central pillar in Marvin's work is Phase Theory (Chomsky 2000/2001, see section 1.1.2 for more details), and more specifically, the Phase Impenetrability Condition (PIC) (Chomsky 2001), repeated here:

(4-38) In the structure $[_{ZP}$ Z … $[_{HP}$ α [H YP]], the domain of H is not accessible to operations at ZP; only H and its edge are accessible to such operations.

The idea in Phase Theory is that the syntactic derivation proceeds in steps defined by particular points in the syntactic structure building (i.e. phasal heads). These points trigger Spell-out of the hitherto built structure, a function that involves interpretation at the interfaces PF and LF of the relevant structure. Phase Theory thus provides a tool for mediating the communication between morphosyntax on one side and the interpretative interfaces on the other. A stipulated effect of the PIC (as stated in (4-38)) at the interfaces is a (partial) cementation of semantic and phonological properties for structures that have undergone Spell-out. Adopting the DM framework (see section 1.2.2), Marvin argues that if the syntactic derivation on a phrasal level proceeds in phases, we should expect to find evidence that the derivation of words also proceeds in phases. After all, DM holds that word formation takes place in syntax (i.e. there is no pre-syntactic generative engine).

Marvin follows Marantz (2001) in assuming that categorising heads are phasal heads, which trigger Spell-out. In particular, when a given root is merged with a categorising head, the root of the structure in question, by virtue of being the complement of the categorising head, will be subject to Spell-out, and as a consequence, also subject to phonological and semantic interpretation at PF and LF (p. 21-23). This latter point is important because, as Marvin argues for, it means that words are also subject to the PIC in (4-38), not only phrases.[162] A simple illustration of what Marvin proposes is based on the two possible pronunciations and two possible meanings of *twinkling*[163] (Marvin 2002:36-39):

(4-39) a. *twinkling* [ˈtwɪŋkəlɪŋ] – ‘the event of twinkling’
b. *twinkling* [ˈtwɪŋklɪŋ] – ‘a short instant’

Arguably, both (4-39)a and (4-39)b contain the same root and the same affix but they differ in their phonology and in their semantics and Marvin argues that this is due to their differing syntactic structures. In (4-39)b, the categorising n head surfacing with the phonological form [ɪŋ] is attached directly to the root triggering Spell-out of the root. Even if the suffix has a predictable meaning, being attached directly to the root opens up for unpredictable semantics due to the idiosyncratic properties of roots (their interpretation depends on the context). In (4-39)a on the other hand, the categorising n head surfacing with the phonological form [ɪŋ] is *not* attached directly to the root, but to a structure where the root has already been categorised by being merged to a *v* head. The *v* head being a categorising head will naturally trigger the Spell-out of its complement (the root itself), so by the time the *n* head is merged, the semantics and

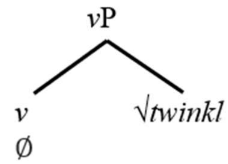
[162] A natural conclusion that can be drawn from this observation is obviously that the relevancy for the PIC at the phrase *and* word level supports the claim that the two domains are essentially the same, i.e. syntax is responsible for word-formation.

[163] Another near minimal pair that illustrates the same properties is *lightning vs lightening.*

phonology of the root has already been negotiated at the earlier Spell-out cycle triggered by the *v* head. The relevant syntactic structures are shown below:

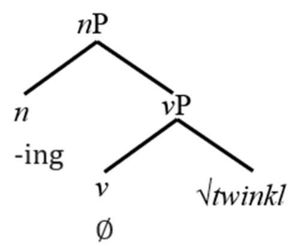
(4-40) *twinkling* – 'the event of twinkling'

a.



⇨Syllabification and schwa insertion within *v*P - /twɪŋkəl/

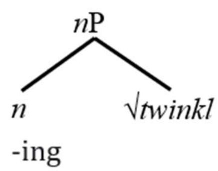
b.



⇨ There is a PIC boundary between *n*P and *v*P so *n*P cannot influence the phonology of the root - twɪŋkəlɪŋ

⇨Syllabification and schwa insertion within *v*P - /twɪŋkəl/

(4-41) *twinkling* – 'a short instant'

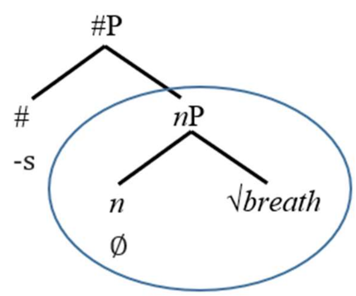


⇨Syllabification within nP. No schwa insertion necessary - /twɪŋklɪŋ/

The two relevant structures that we are comparing are (4-40)b and (4-41). If we start with (4-41), the categorising head *n* attaches directly to the root, triggering Spell-out of the root. The root is interpreted phonologically, resulting in syllabification without the need for epenthetic segments. Given that we are dealing with the bare root, Marvin also points out that semantic idiosyncrasy is still possible, thus accounting for the non-transparent semantics. In (4-40)b on the other hand, the same categorising head *n* attaches to a structure that has already been categorised (see (4-40)a) and Spelled-out so the phonology and the semantics are already fixed. The schwa insertion we see in (4-40)b is, judging the by the surface phonological string, not necessary because syllabification would have worked fine without it but as the epenthetic schwa stems from an earlier cycle, the merger of the *n* cannot change it due to the PIC. Marvin argues that in such cases, we find transparent semantics. That is, the semantics of (4-40)b contains the semantics of (4-40)a and the addition of the nominal categoriser is completely compositional.

Now we might ask in what way this constitutes an argument for the stem-level. Marvin does not use the term "stem" explicitly in her thesis, but if we conceive of stems as intermediate levels of representation, it is clear that her approach includes a notion of stemhood but indirectly. If categorising heads are also phasal heads triggering Spell-out of roots (and other complement structures), thus enforcing phonological and semantic interpretation of the syntactic object in question, it also means that the root itself does not constitute a domain for cyclic phonology or semantics. It is in fact the *categorised* root that is the smallest domain for interpretation at PF and LF. Because the categorising heads are merged relatively close to the roots, the PF and LF computation will also take place before other functional heads such as number and definiteness are merged. It is the syntactic configuration of root + categorising head we can refer to as the stem-level, because it serves as an intermediate level of representation on top of which other functional projections are added, as shown in

(4-42) *The stem as domain for PF and LF*



⇨Phonology and semantics of √breath negotiated inside *n*P - /brεθ/. This is the nominal stem to which other functional projections are added (e.g. number: *breaths*).

The circled domain in (4-42) is Spelled-out intermediately, before other relevant functional morphemes are added. It is this domain we can refer to as the stem-level, characterised by cemented semantics and phonology due to the PIC.

4.4 Syntax-PF communication

As discussed in section 1.1, there is a controversy concerning the nature of communication between syntax and phonology. We distinguished between two main camps: *direct approaches* (section 1.1.2) and *indirect approaches* (section 1.1.3). The direct approaches advocate that domains for phonological interpretation are handed off to PF directly from syntax, while the indirect approaches argue that there is an intermediate structure between the two components that mediate the communication between them. In the current work, a direct approach to the syntax-phonology interface is assumed. More specifically, the communication between syntax and phonology is assumed to be governed by the principles of Phase Theory (cf. the research questions in section 1.4). In what follows, I clarify what is meant by the notion of *phase* in this thesis. Section 4.4.1 is dedicated to defining phasal heads. I then turn to section 4.4.2 where I discuss how the geometry of the syntactic structure itself may be a phasal source.

4.4.1 Phases

Generative grammar has traditionally assumed that when a numeration is pulled from the lexicon and is manipulated by syntax, syntax will finish its *entire* job before the syntactic object is sent to the PF and LF interfaces for interpretation. That is, during a linguistic derivation, the Spell-out function applies only once, encompassing the syntactic object as a whole. The idea of a single Spell-out has later been challenged. Phase Theory (Chomsky 2000/2001), discussed in section 1.1.2, formally recognises that Spell-out may happen more than once during a syntactic derivation. This idea has generally been accepted in the literature, albeit in different forms. The original proposal in Chomsky (2000/2001) was that there were two phases in syntax: *v*P and CP, both of which were assumed to be loci of phasal heads, triggering a Spell-out of their complements. Later work has argued that other phrasal categories in syntax can be ascribed phasehood contextually (see Bošković (2005) for the DP and den Dikken (2007) for the TP). It has also been argued that Spell-out points related to syntactic phasal heads can be delayed if the derivation up until that point still has unchecked features, resulting in Spell-out of a domain that is larger than it would be under "normal" circumstances features (Newell and Piggott 2014). A similar view is found in Šurkalović (2015), where every operation of Merge can potentially trigger Spell-out of the syntactic object given that all features have been checked.

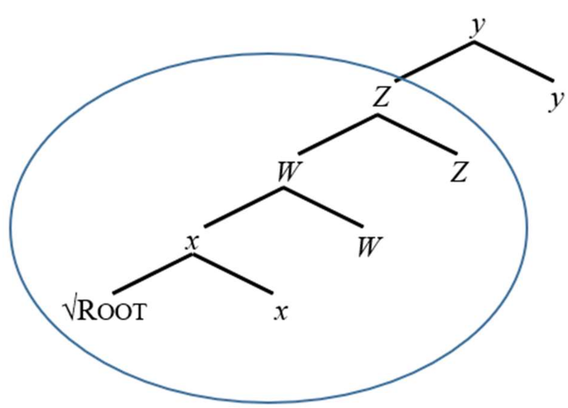
When it comes to phases at the sub-word level, we saw already in section 4.3.2.2 that proposals have been made (i.e. Marvin 2002).[164] Most work dealing with phases at the sub-word level has aimed at accounting for allomorphy. Bobaljik (2012) shares the view with Marvin (2002) that categorising heads such as *n* and *v* are phasal, thus triggering Spell-out of their complement. However, Bobaljik (2012:152-154) allows Spell-out to be delayed if there is

[164] See also Lowenstamm (2010).

a rule of exponence that spans across two Spell-out domains (i.e. vocabulary insertion is dependent on a higher domain-external node). In this way, he is able to account for root suppletion in adjectives such as *good–better–best* where assuming a Spell-out already at the first cycle would predict that there would be no suppletion. That is, letting the root √GOOD undergo Spell-out due to the merger with an adjectivalising phasal head *a* would result in insertion of the phonological form [gʊd], thus blocking the suppletive root of the comparative and the superlative due to the PIC.

The view that categorising heads are phasal and thus trigger Spell-out is also held by Embick (2010), but he formulates a structural condition on Spell-out such that it only applies to domains that already contain a phasal head (p. 51-56).[165] This means effectively that the first phasal head that is merged in a given derivation is not accompanied by a Spell-out. When the second phasal head is merged, however, this triggers Spell-out of everything that is in the domain of the phasal head below. The relevant structure is shown in (4-43), where both *x* and *y* are phasal heads while W and Z are non-phasal heads.

(4-43) *Spell-out domain* (adapted from Embick 2010:52)[166]



The first step in the derivation is merging the root with the phasal head *x*, but as there is no phasal head in the complement of *x*, no Spell-out applies. Subsequent steps in the derivation merge non-phasal W and Z. When the second phasal head *y* is merged, this triggers a Spell-out

[165] Embick uses the term "cyclic" instead of "phasal".

[166] Note that this structure represents the structure of a complex head, after affixation (Embick 2010:51-52).

of everything that is in the domain of *x*: the root, *x* itself, W and Z (p. 53).[167] By putting the root in the same Spell-out domain as the non-phasal heads W and Z, Embick predicts that we should be able to find allomorphy (and PIC effects) within that domain (this is reminiscent of Bermúdez-Otero's approach discussed in section 4.3.2.1 where allomorph selection is delayed until the second Spell-out cycle). For instance, the different ways of forming the past tense of English verbs can be subsumed under this approach. With the requirement that the phasal head *v* is not phonologically overt (p. 54), both T and the root can show contextual allomorphy.[168] The former through the various past tense allomorphs {-d, -t, -∅} and the latter through root allomorphy {*sing/sang, bring/brought*}.[169] The phasal head *y* on the other hand never shows root-determined allomorphy according to Embick (p. 56-58).

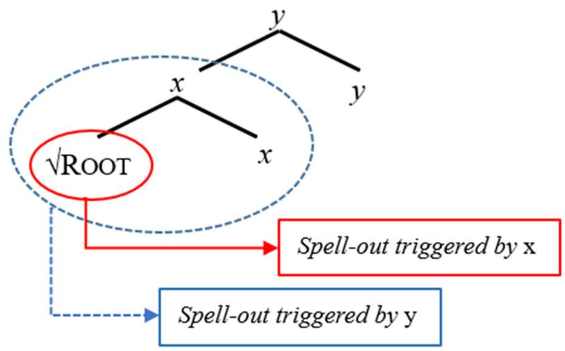
In the current work, I follow (Marvin 2002) in assuming that categorising heads are phasal heads and trigger Spell-out of their complement without delay. This means that a root that is merged with a categorising root *x* will undergo Spell-out with subsequent interpretation at the interfaces. This is the inner cycle shown in (4-44). When another phasal head *y* is merged on top, this will trigger Spell-out of *y*'s complement: the node that contains the lower phasal head *x* and the root. This is represented by the outer cycle in (4-44).

[167] The phasal head *y* is subject to Spell-out when a structurally higher phasal head is merged.

[168] *Linear* locality (in addition to the cyclic one) is an important constraint on allomorphy in Embick's work (p. 49-50). Non-local allomorphy is therefore predicted not to be possible, but Ganenkov (2020) reports that such patterns do exist.

[169] A complicating factor for working out the size of the Spell-out domain is the possibility that different properties may require different domain delimitations. Moskal (2015) observes that aspect and number can condition suppletion in verbal and nominal roots respectively, while tense and case do not. These two latter inflectional categories, however, commonly condition suppletion in functional items.

(4-44) *Spell-out at sub-word level*



Note, however, that this assumption is made for convenience for the work at hand. As per our assumptions in section 3.2.4, only one lexical accent is stored, which means that no "tonomorphy" (allomorphy for tonal accent) is possible. As for allomorphy on a more segmental level, it is not dealt with in this thesis, but to the extent that that is necessary, the analysis that will be presented here should be easily adapted to accommodate that.

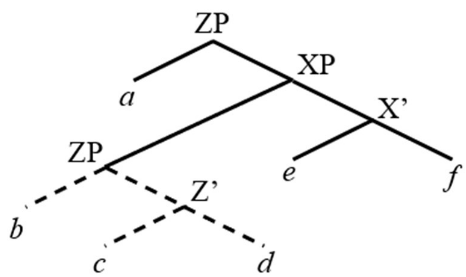
4.4.2 Multiple Spell-out

Multiple Spell-out refers to a specific proposal by Uriagereka (1999) where the basis for Spell-out is found in the configuration of the syntactic geometry itself. This differs from the view in Phase Theory, discussed in the previous section, where phases are determined by designated syntactic heads (perhaps in combination with feature checking). Urigareka's Multiple Spell-out is not incompatible with this, however.

A simple way to understand his proposal is to see it as a question of syntactic branching: a branching structure on the non-recursive side of the tree must by necessity have been assembled in the syntax separately. More specifically, if there are any left-branching structures in a right-branching language like English or Norwegian, Uriagereka argues that they have been built *before* they can be put into the right-branching structure, i.e. that they have already undergone Spell-out. In a similar fashion, if there are right-branching structures in a left-branching language such as Japanese, the right-branching structure has been built and

Spelled-out before it is merged in the left-branching structure.[170] In practice, the essence of the proposal is that complex specifiers and adjuncts are not in the spine of the syntactic tree and therefore, they have to be built in a separate syntactic workspace. The relevant syntactic geometry for Spell-out is shown in (4-45):

(4-45) *Configuration for Multiple Spell-out*



In the syntactic structure in (4-45), the recursive branching direction is to the right, appearing with black branches. This is the spine of the tree. The tree also contains a left-branching structure labelled YP in the specifier position of XP, appearing with broken line branches. This structure is internally right-branching, containing the syntactic terminals *b*, *c* and *d*. Since YP is a constituent that branches outside of the spine of the tree, the claim is that this constituent has to be built separately with all that is implied: the structure has already been Spelled-out and has been interpreted at both PF and LF before it is merged further up in the structure. It is thus the geometry of the tree itself that triggers Spell-out.

As for the interfaces PF and LF, the general assumption is that all syntactic information is stripped away such that the interfaces are only dealing with their own primitives: phonological primitives in the case of PF and semantic primitives for LF. However, Uriagereka argues that some syntactic information must remain even after Spell-out and he compares the Spelled-out structure to lexical compounds as both types of structures are "frozen" somehow (but for different reasons). Both types of structures have syntactic terms that are interpretable, but that

[170] Abstracting away from proposals about a universal branching direction (Kayne 1994).

are generally not accessible to movement, ellipsis and other syntactic processes.[171] Another point of similarity between Spelled-out structures of this type and lexical compounds is that both behave like simplex "words" (see discussion in section 4.1.2), making them fit to be merged further up with other structures. This means that the category label of the Spelled-out structure has to be found in the syntactic information that is retained, just like for lexical compounds.

If Spelled-out structures are indeed a kind of "frozen" object, we should expect this to be reflected in their syntactic behaviour. That is, complex specifiers and adjuncts are predicted to have properties that are different from non-complex specifiers and adjuncts, a prediction that Uriagereka shows is supported empirically. I will not go into detail about all the evidence he presents but concentrate on some of them. In particular, he argues that the division between what is in the spine of the tree and what is not derives the so-called 'superiority' effects we see in the formation of questions (Chomsky 1973):

(4-46) a. Who saw what?
b. *[What]$_t$ did who see t]?

(4-47) a. Which professor saw which student?
b. [Which student]$_t$ did which professor see t?

In the syntax of questions where we are dealing with multiple *wh*-phrases, it has long been observed that the subject *wh*-phrase is favoured over the object *wh*-phrase for movement to C. Hence, the grammaticality contrast between (4-46)a and (4-46)b. However, this grammaticality asymmetry does not apply in (4-47)a and (4-47)b in spite of the apparent similarities between (4-46) and (4-47) in terms of superficial syntax. Both involve interrogatives with two *wh*-phrases built on the arguments of a transitive predicate. Yet, there is an asymmetry in that moving the object *wh*-phrase to C in (4-47)b is just as licit as moving the subject wh-phrase. The superiority effect we see in (4-46) disappears.

[171] The analogy to lexical compounds is not 100% with respect to all syntactic processes. For instance, lexical compounds in Norwegian generally allow coordination/ellipsis as we saw in section 4.1.2. Nevertheless, lexical compounds do exhibit frozenness in that movement or extraction is not allowed.

Uriagereka argues that this difference falls out from properties of the syntactic geometry in (4-46) and (4-47). In (4-46), the two *wh*-phrases are both simple *wh*-phrases located in the spine of the tree (they are in the same *command unit* to use Uriagereka's term) and economy conditions on syntactic movement will favour the subject *wh*-phrase because it is closer to C. Consequently, moving the object *wh*-phrase will result in ungrammaticality. In (4-47) on the other hand, both *wh*-phrases are complex *wh*-phrases meaning that they are internally branching, so the geometric situation is similar to that for the YP in (4-45). The two *wh*-phrases are Spelled-out separately before they are plugged in with the rest of the structure and are thus not in the command unit (the spine of the tree), making both of them eligible for movement as they are equidistant to C as far as syntax is concerned.

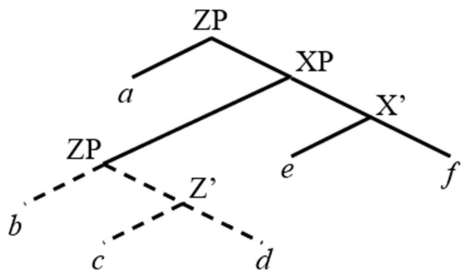
The approach also accounts straightforwardly for the unavailability of extraction from complex specifiers (4-48)a and adjuncts (4-48)b (Sato 2012):

(4-48) a. *Who$_t$ did [$_{DP}$ pictures of t] please you?
b. *Which house$_t$ did you talk to her [$_{PP}$ before she bought t]?

The bracketed constituents are internally complex (i.e. branching outside the spine of the tree). According to Uriagereka, these constituents have to be Spelled-out before they are merged with the rest of the structure, an operation that turns them into "frozen" units. The ungrammaticality of extraction in these cases comes about as direct result of this property.

When it comes to the triggering mechanism behind Spell-out of branching constituents that are outside the spine of the tree, Uriagereka links it to requirements at the interfaces. More specifically, he argues that Spell-out of these structures arises as a last resort option to satisfy interface conditions at PF. If we see a syntactic structure as a mobile, the pieces that it consists of relate to each other in a fixed way, but they are not linearised with respect to each other. It is precisely the linearisation of the syntactic terminals that is required at PF, and he defines linearisation and precedence at PF in terms of (asymmetric) c-command. That is, if α (asymmetrically) c-commands β, α precedes β. Mapping of the syntactic structure to linear order is straightforward as long as the tree is branching only in one direction, but we run into trouble with structures like the one in (4-45) (repeated here):

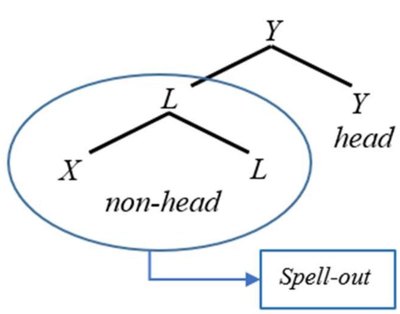
(4-45) *Configuration for Multiple Spell-out*



On the assumption that the structure as a whole undergoes Spell-out, we are unable to establish a command relation between terminals that do not c-command each other such as the ones dominated by YP on one side and those dominated by X' on the other. As a consequence, the PF requirement for linear order cannot be derived, and the derivation crashes. The problem is solved by Spelling-out and linearising nodes in YP before it is merged further up in the structure. YP will then behave like a single unit with syntactic terminals that have already been ordered with respect to each other. In this way, the problem with the relative order of terminals in YP and in X' disappears. The essence of Uriagereka's proposal for Multiple Spell-out is that it applies as a necessity in order to save an otherwise crashing derivation due to PF not being able by itself to establish precedence. This makes Spell-out and the syntactic effects we saw in (4-46), (4-47) and (4-48) epiphenomena of the requirement for order at PF.

Although Uriagereka concentrates on Spell-out at the phrase level, I will, for the study at hand, assume that it also applies to processes below the word level. More specifically, I adopt his idea that complex objects that are constructed outside of the spine of the tree have to be Spelled-out before they are merged with the rest of the structure. This has consequences for the basic compound structure (repeated in (4-49) below) that was adopted in section 4.2.5.

(4-49) *Basic Compound Structure + Spell-out*



The assumption was that the head and the non-head are built in separate syntactic work spaces before the non-head is adjoined to the head, assisted by a functional head, a Linker Phrase L, which is part of the non-head structurally. The non-head, by virtue of being a complex structure built outside the spine of the tree, is subject to Spell-out before adjunction takes place. Thus, in addition to phasal heads being a source to Spell-out, as discussed in section 4.4.1, the syntactic configuration itself may also trigger Spell-out.

5 Compound analysis

In this chapter, I present the details of the formal analysis of tonal accent in compounds in Tromsø Norwegian proposed in this thesis. As will be shown, given the theoretical foundation laid in the previous chapters, the system that emerges is a system where tonal accent is largely a function of function of syntactic structure (this includes phases), reducing the need for lexical (or idiosyncratic) tonal accent to a minimum, only found in a subset of items in the lexicon. This preserves the intuition that tone in the phonological grammar of Norwegian is regular, but it is irregular in the lexicon (Haugen 1967). Naturally, phonological restrictions such as sensitivity to the number of syllables do apply, but the primary conditions are set by phases in the morphosyntactic structure (i.e. domains) and by marking of lexical items. Tonal accent in Norwegian thus straddles the syntax-phonology divide by having a foot in both camps: it is a phonological phenomenon that may function as the exponent of morphosyntactic derivation.

As the current work deals with how the distribution of tonal accents interacts with morphosyntactic structure in a generative framework, the analysis needs first of all to account for the syntax-phonology connection. How do phonological domains come about and how do they affect tonal accent distribution? Second, in light of the "double nature" of tonal accents, the analysis should also provide implications for the distribution of tones within the domains. That is, there should be a connection to relevant TBUs.

The following analysis accounts for the following in Tromsø Norwegian (see section 2.2 for a more detailed description):

- *Default tonal accent:* compounds are accent 2 by default.
- *Exceptional phonology and semantics:* a small subset of compounds allow both tonal accents, but this alternation is also accompanied by differences in semantic interpretation.

What interests us here is what the correspondence is between syntactic structure on one hand and its tonal (and semantic) interpretation on the other. This does not entail that there is a one-to-one mapping between the two as the relationship may be obscured by restrictions and requirements that are specific to the phonological component.

As for the assumptions regarding the morphosyntactic structure building process, these have been explored in detail in the previous chapters but are repeated here:

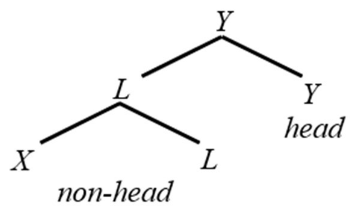
- *Syntax all the way down:* the approach to structure building that is adopted in this thesis is in lines with Distributed Morphology (Halle and Marantz 1993, Embick and Noyer 2001/2007) where word formation takes place in the syntax. There are two basic pieces of syntactic primitives: roots and functional morphemes. Categories are not inherent properties of roots but are expressions of structure. That is, roots are categorised by merging with categorising heads that may or may not be overtly realised. See section 1.2.2 for a more detailed discussion.
- *Roots vs stems:* the notion of stem, defined as a structure with a root and some additional functional projection, is not a primitive in Distributed Morphology. However, as shown in section 4.3.2, there are arguments for operating with an intermediate stage (i.e. the stem) in the derivation, located between the root level and the word level (Marvin 2002, Bermúdez-Otero 2013). It is the stem and not the root that is the smallest domain for semantic and phonological interpretation.
- *Compounds as adjuncts:* this thesis follows Eik (2019) in assuming that compounds consist of two main parts, a *formal head* (the right-most member) governing morphosyntactic category and distribution and a *non-head* (all the material to the left of the head), providing modifying information. The non-head is assembled in a separate syntactic workspace and is adjoined to the head through the aid of a Linker Phrase. This linker phrase may be phonologically null but provides important instructions for semantic interpretation as it introduces asymmetry in the morphosyntactic structure. This has been laid out in detail in chapter 4.
- *Phases and Spell-out:* this thesis adopts view that the Spell-Out function can be called several times during the morphosyntactic derivation, either due to phasal heads (Marvin 2002) or to geometric configurations in the syntactic structure, such as complex specifiers or adjuncts (Uriagereka 1999). The claim is that these syntactic objects are built in separate syntactic workspaces before they are merged into the main structure. They thus constitute separate domains for interpretation at the interfaces.

The analysis makes a distinction between two types of compounds based on their structural properties, which again may have an effect on their phonological form and their semantic content. The first type is what I will refer to as *stem compounds*, which is the typical type of compound for accent 2. Its structure will be the topic of section 5.1. The second type is *root compounds*, which, due to their structural properties, have exceptional tonal accent (i.e. accent 1) and idiosyncratic semantics. They will be treated in section 5.2.

5.1 Stem compounds

The syntactic structure of compounds was discussed in chapter 4, where we saw that compounds consisted of two main parts: a head and a non-head. Furthermore, following Eik (2019), it was assumed that the non-head is adjoined to the head through the help of a Linker Phrase. The Linker Phrase is there to establish asymmetry in the structure so as to guide the semantic interpretation, but does not necessarily have any phonological content. We thus arrive at the following basic structure for stem compounds (repeated from (4-27)):

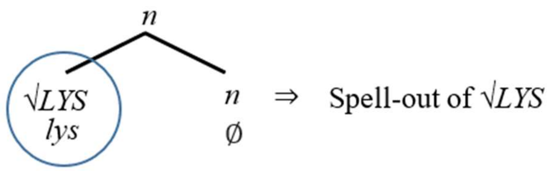
(5-1) *Basic compound structure*



In the structure in (5-1), the node labelled X merges with L to form a constituent that corresponds to what is known as the non-head. This structure again adjoins to Y, which is the formal head of the entire syntactic object, to form a left-branching structure, illustrating what we know as a compound. The compound as a whole has the same syntactic properties as the head, reflected by using the same label for both. Both X and Y may themselves be complex structures. The structure in (5-1) is what I label as the representation of a *stem compound*. The basic characteristic of stem compounds is that the head and the non-head are stems (i.e. categorised, see section 4.4.1) and not just bare roots.

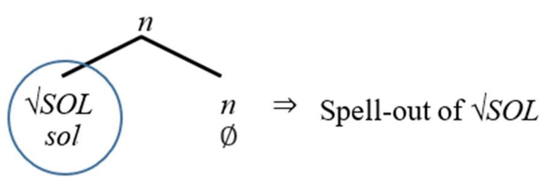
Let us start by observing the derivation of a compound that gets tonal accent 2 by default such as *sollys* [^{2}su:lˌly:s] 'sun light', thus revealing the link between syntactic structure on one side and tonal accents on the other. According to our assumptions on how compounds are assembled, the head and the non-head are created in separate syntactic workspaces before the latter adjoins to the former. The *first* step in the derivation is shown in *Workspace I* below. The root √LYS is merged with an abstract nominal categoriser *n*. The resulting object is what will be the head of our compound.

Step 1: *Workspace I*



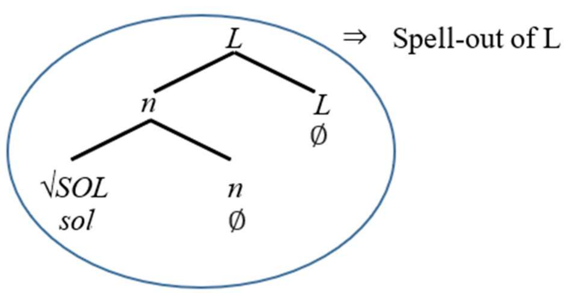
We have also assumed that categorising heads also act as phasal heads such that the complement of the phasal head in *Workspace I* is shipped off to LF and PF for semantic and phonological interpretation. This means that the root √LYS is subject to Spell-out but not the head *n* that triggers the process. The *second* step in the derivation is to build the non-head, and this takes place in a separate syntactic workspace, *Workspace II*. This is where the root √SOL is merged with an abstract nominal categoriser *n*:

Step 2: *Workspace II*



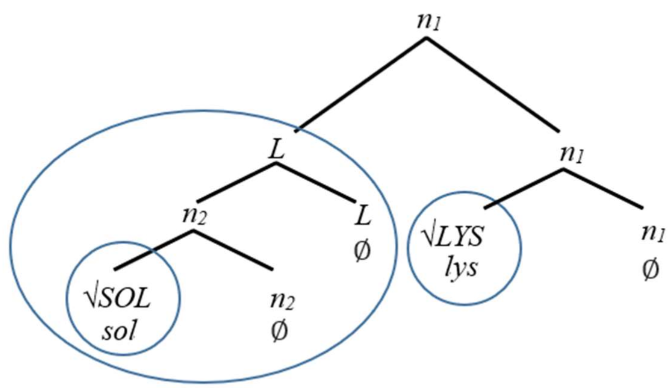
Just like in step 1, the complement of the head *n*, √SOL, is sent off to the interfaces for interpretation. Continuing in the same workspace, *Workspace II*, we get to the *third* step, which is the merger of *L*, an abstract Linker. This projection paves the way for subsequent adjunction to the compound head.

Step 3: *Workspace II*



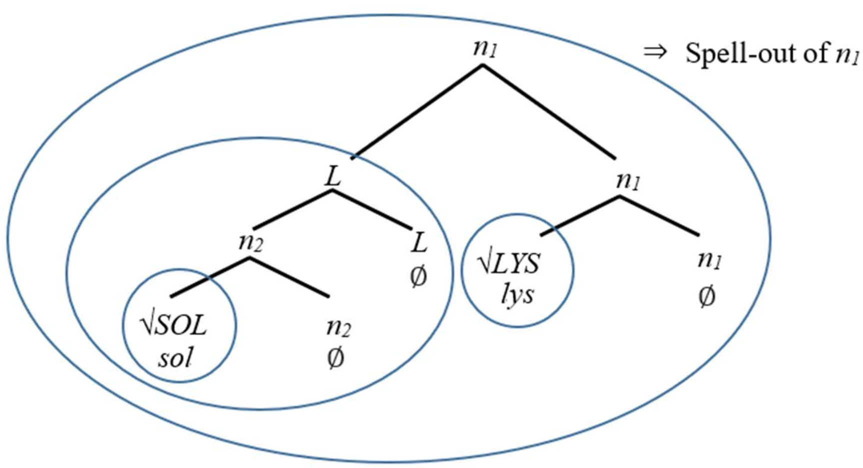
The *L* head is not a phasal head, so it does not in itself call the Spell-out function. However, following Uriagereka's (1999) Multiple Spell-out approach, the syntactic object in *Workspace II* is an object that is constructed outside the spine of the tree (e.g. adjuncts, complex specifiers). In order for syntactic terminal nodes of such objects to be properly linearised with respect to the 'main' tree, they have to be subject to Spell-out. However, in this case, it is not only the complement of *L* that is Spelled-out, but the entire structure including the *L* projection. When the object in *Workspace II* has been Spelled-out, it is ready to be plugged into the main structure. This leads us to the *fourth* step in the derivation, where the non-head from Workspace II is adjoined to the head from *Workspace I*:

<u>Step 4:</u> *Workspace II is added to Workspace I* (indexes added)



With this fourth step, what constitutes the compound structure itself has been completed in the morphosyntax. This does not exclude the potential for adding functional structure on top of it, such as number and definiteness (realised as suffixes), but this does not add to the completeness of the compound structure per se, as defined in (5-1). However, there is a step 5 in the derivation:

<u>Step 5:</u> *Workspace I, final Spell-out*



In step 5, everything that is found under the topmost n_1 node is Spelled-out. That is, the entire compound structure itself. Spell-out in this case is presumably triggered by a functional phasal head higher up in the structure (not shown in step 5).[172] The merging of such a functional head on top of the compound structure we have built so far will result in Spell-out of the complement of the head, i.e. the top n_1 in step 5.

As for the interfaces LF and PF, these are assumed to be cemented due to the Spell-out function that applies during the derivation (represented by the circled areas in the steps above). Let us start by looking at the semantic interpretation. The first Spell-out that occurs in our derivation is in step 1 when the head root is merged with the abstract nominalising head, establishing nominal semantics of the root. The second Spell-out is found in step 2 where the non-head root merges with an abstract nominalising head, thus establishing nominal semantics also of this part of the compound. In the third round of Spell-out, in step 3, the abstract Linker head is Spelled-out dragging along the syntactic object n_2, which has in fact already been Spelled-out. Subjecting n_2 to a new round of Spell-out does not alter anything in its semantics or phonology, due to the Phase Impenetrability Condition (PIC) (Chomsky 2001).

What happens is that the derived nominal semantics of n_2 will be contained in the semantics of the L node, resulting in a layered (or compositional) structure of meaning. This process can be illustrated by looking at the lexical entries of the two main parts of the compound:

(5-2) a. √*LYS*
⇓
√*LYS* in the context of *n* ⇔ *lys* 'light' (n)

b. √*SOL*
⇓
√*SOL* in the context of *n* ⇔ *sol* 'sun' (n)
⇓
R ('sun', x) ⇔ *sol-* 'sun' (nominal compound stem)

According to our assumptions about roots (see section 4.3.1), the roots we start out with in (5-2) are acategorial and without extra-syntactic content. When these roots are merged with categorising heads (in this particular case we are dealing with nominalising heads), they are Spelled-out, resulting in interpretation of the roots at the interfaces. This interpretation is

[172] The head in question could be the D head. Following Borer (2005:63-85), the D layer is always present in the structure even when it is phonetically null, as it is for instance with bare nouns.

sensitive to the structural context in which the root is located. Semantically, both √*LYS* and √*SOL* are interpreted as nouns in the context of *n*, giving us the lexical entries *lys* 'light (n)' and *sol* 'sun (n)' respectively.

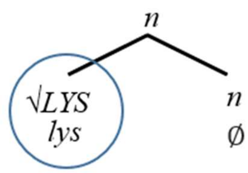
The branch containing the nominalisation of √*SOL* is further expanded with the Linker projection *L*, followed by Spell-out of everything that *L* dominates. This is shown in the third step in (5-2)b. The semantic interpretation of *L* at the relevant interface, albeit very abstract, is one where a relation *R* is established between the elements contained in L (as represented by the surface form *sol*) and an unspecified variable *x*, external to *L*. Due to the PIC, the nominal semantics of the root √SOL are contained in the semantics of *L*.

The variable *x* is valued when *L* adjoins to the n projection heading the root √*LYS*. Put differently, the semantics of the *L* node forces the non-head of the compound to function as a modifier of the compound head. The exact semantic relationship between the two main parts of the compound is subject to the 'Variable R' relation as described by Allen (1978) (see section 4.1.1). By virtue of the PIC, the nominals semantics that were assigned at the Spell-outs throughout the derivation will have to stay also for the compound as a whole.

Turning now to the phonological side of the equation, this is also cemented during the derivation due to the Spell-out function. As already mentioned, roots are devoid of phonology so their phonological identity is unknown in the syntactic derivation, but this identity is revealed each time a syntactic object is interpreted at PF due to Spell-out. That is, syntactic root nodes are filled with phonological content *after* the syntactic derivation. This process is referred to as *vocabulary insertion* (VI) and when it happens after syntax, it is referred to as *late insertion* in the literature (see also section 1.2.2). The VI process is governed by the subset principle, which states that phonological exponents of morphosyntactic structure cannot contain more features than what is found in the corresponding morphosyntactic structure itself. In other words, vocabulary items (VIs) are allowed to be underspecified with respect to the features of the syntactic terminals into which they are inserted (thus allowing for syncretism), but they cannot be overspecified.

In step 1 earlier, we opened a workspace, *Workspace I*, where the root √*LYS* was merged with an abstract nominal categoriser, *n* (repeated here):

Step 1: *Workspace I*



⇒ Spell-out of √*LYS*

(5-3) √*LYS* in the context of *n* ⇔

Lexical entry, PF
- segmental make-up, /lys/.
- no underlying tonal accent.

When the root √*LYS* is shipped off to PF for interpretation, there are two main factors that contribute to the outcome. The *first* factor concerns the matching of features between the morphosyntactic terminals on one hand and VIs on the other, in accordance with the subset principle as described above. The system scans for the best fit and finds a lexical entry (or VI), which contains the segmental string /lys/. This is also the locus of any underlying tonal accent, but in accordance with our assumptions on tone in Tromsø Norwegian, lexical tone is only a property of *polysyllabic* words (or roots, following the terminology for the present discussion) (see section 3.2.4). The segmental string /lys/ that is found in the lexical entry of the root √*LYS* in the context of *n* is monosyllabic. Consequently, there is no lexical tone stored for this VI.

The *second* factor contributing to the outcome of the Spell-out of step 1 in PF concerns operations and requirements that are exclusive to PF. The ones that are relevant to us are listed in (5-4) below:

(5-4) *PF operations*[173]
- Stress/quantity
- tonal accent

[173] The listed operations are the ones that are relevant for the discussion at hand. There are other types of operations that are PF internal along the segmental axis (e.g. assimilation) and the prosodic axis (e.g. syllabification). The list is in other words not meant to be exhaustive.

The segmental string /lys/ that is identified as the best fit for the Spell-out of the root √*LYS* in the context of *n* is itself the input to phonological processes characterised by the operations in (5-4). I will discuss each of them in turn. As mentioned in section 2.1, the Norwegian stress system is characterised by *culminativity* (i.e. only one per domain) and *obligatoriness* (i.e. at least one per domain), which are properties that hold in lexical words. Further, Norwegian has a two-way bimoraic surface requirement on stressed syllables: stressed syllables are heavy and heavy syllables are stressed. Stress is generally attracted by heavy syllables, but in case stress is assigned to a syllable that is not heavy in the underlying representation, the phonology will make it heavy via prosodic expansion by adding a mora. There are two modes of prosodic expansion that are available to satisfy the bimoraic requirement: vowel lengthening or consonant gemination. This entails that the PF operation concerning quantity in (5-4) goes hand in hand with stress. For the case in (5-3) above, stress-induced quantity is obtained through vowel lengthening such that the result is /ly:s/.[174]

Moving on to tonal accent, it bears a very close relationship to stress in that tonal accent in Norwegian is an inherent part of the stress realisation system (see section 2.1). Tonal accent is also characterised by culminativity and obligatoriness but for tonal accent, these properties are manifested in a domain that differs from the one we have for stress. This is because there is an asymmetric dependency between stress and tonal accent where the presence of tonal accent on a given syllable S implies that S is stressed, but stress on S does not necessarily entail that there is a tonal accent associated to it.[175] This entails that the domain for tonal accent is bigger than the domain for stress.[176] With our assumptions about tone as discussed in section 3.2.4, the phonological computation assigns a default tonal accent in case there is no underlying (lexical)

[174] The lexical item *lys* [¹ly:s] does have a coda consonant, which could be assigned Weight-by-Position (Hayes 1989:258). However, the fact that the vowel is lengthened in this case shows that the coda /s/ is somehow prosodically ‘invisible’. According to Kristoffersen (2000) it is extrametrical while Rice (2006) takes it to be in the onset position of a following syllable that is otherwise empty. The expansion type that is chosen for any given root seems to be idiosyncratic (Kristoffersen 2000:157-158)

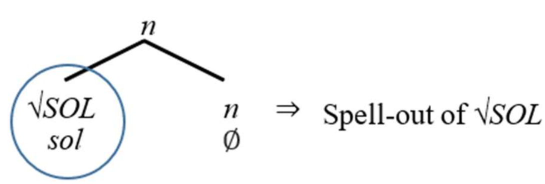
[175] The definition of stress here is the one that we used in section 2.1: the abstract property of being prominent.

[176] In his work on Swedish, Riad (2014:120) ties this directly to designated prosodic categories. He posits that stress is a property of the minimal prosodic word, ω-min, while tonal accent is a property of the maximal prosodic word ω-max.

tonal accent available. We have already mentioned that underlying tonal accent is a property only of polysyllabic roots in Tromsø Norwegian. The abstract diacritic ($^{\times}$) we adopted to use in lexical entries to mark accent 1 is not available for the string /lys/. Thus, the string, by virtue of being monosyllabic, is assigned *default* tonal accent 1. With the conclusion that the domain of tonal accent is bigger than the domain of stress, I will assume that assignment of default tonal accent does not kick in until later on in the derivation. More specifically, I take it to be a rule that is specified to apply at a point where precedence relations between vocabulary items are established. Recall that in the current framework, linear order is not a syntactic property but is considered to be a PF operation (see section 1.2.2.2). Thus, assignment of default tonal accent is put into action when morphemes in morphologically complex words are linearised with respect to each other (see also Pak (2008) for layering of phonological processes). This means that the PF computation in step 1 does not assign any tonal accent to the string /ly:s/ as no precedence relations are imposed.[177]

Continuing with step 2, the procedure will be identical to step 1 as far as PF is concerned.

<u>Step 2:</u> *Workspace II*



(5-5)	√*SOL* in the context of *n*	⇔	<u>Lexical entry, PF</u> - segmental make-up, /sul/. - no underlying tonal accent.

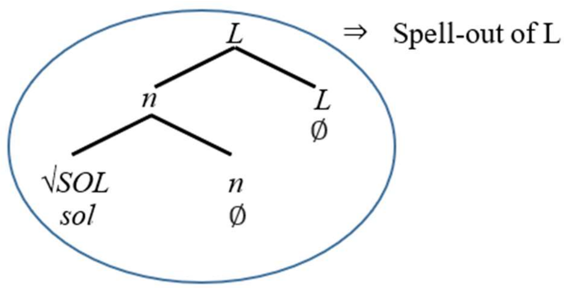
First, the system identifies the string /sul/ as the best fit for the Spell-out of the root √*LYS* in the context of *n*, in accordance with the subset principle. The string is then subjected to the PF

[177] The assumption that assignment of default tonal accent takes place relatively late in the phonological computation finds parallels in previous work on Scandinavian tone. LWSJ (see section 3.2.2.2) assume that default tonal accent, be it accent 1 or accent 2, is assigned post-lexically (see also Riad (2014:127) for Swedish) while Kristoffersen (2000:286-292) argues that L-insertion for Urban Eastern Norwegian is post-lexical.

operations listed in (5-4), making sure that the output of the phonological computation respects the PF requirements at this level. Bimoraicity is obtained by vowel lengthening, giving us /su:l/ (just like for *lys* in step 1, the coda consonant is not given Weight-by-Position). Due to the monosyllabicity of the string, lexical tonal accent is not available. Consequently, the string may be subject to assignment of default tonal accent at a later stage.

In step 3 of the morphosyntactic derivation, the Linker *L* is merged to the complex containing the root √*SOL* and the nominalizing head *n*, where the former has already been Spelled-out. The resulting object is a left-branching structure that needs to be Spelled-out prior to being plugged into the main structure, as per our assumptions.

<u>Step 3:</u> *Workspace II*



Before we turn the PF specifics of step 3, a note on the phonological nature of *L* is apt. The Linker *L* have various phonological exponents in Norwegian, such as –*s*, –*e*, –∅, –*a* and –*er*, with the three first ones being by far the most common (see Eik 2019:57-70 for a more detailed description). Which linking element that is chosen in a given compound, is conditioned by idiosyncratic and morphological properties of the non-head. If we look at the idiosyncratic side of the equation, Eik (2019:190-191) suggests to account for this by operating with root-sensitive Spell-out rules:

(5-6) *Spell-out of L* (adapted form Eik (2019:191)[178]

$L \Leftrightarrow$ *–s* / {√*FRED*, √*ARBEID*, √*SPORT*…}

$L \Leftrightarrow$ *–e* / {√*DYR*, √*BARN*, √*JUL*…}

$L \Leftrightarrow$ –∅ / {√*SOL*, √*VIN*, √*HUS*…}

The rules in (5-6) determine the phonological exponent of *L* as a function of the root context. In particular, *L* is realised as *–s* in the context of the root √*FRED*, as *–e* in the context of the root √*BARN*, as –∅ in the context of the root √*VIN* and so on.[179] The Spell-out rules are obscured if the non-head is morphologically complex, the details of which are outside the scope of this thesis. The interested reader is referred to Eik (2019:185-200).

When the structure in step 3 undergoes Spell-out, the starting point for the PF computation is scanning the vocabulary for the VI that best fits the morphosyntactic context, just as for the steps we have hitherto described. The Spelled-out object in this case is defined in terms of the 'Variable R', due to the presence of the *L* head.

(5-7) *R* ('sun', *x*) ⇔

Lexical entry, PF
- *L* realised as /∅/.
- no underlying tonal accent

As the lexical entry in (5-7) states, the lexical entry of *L* is sensitive to the variable that has already been identified, namely the noun *sol* 'sun'. That is, the phonological exponent of *L* depends on the identity of the non-head of the compound, and not the head, represented as *x* in

[178] The meaning of the roots read from left to right, line by line: 'peace', 'work', 'sport', 'animal', 'child', 'Christmas', 'sun', 'wine' and 'house'.

[179] Note that the phonological representation of the exponents may be more complex than the purely segmental ones in (5-6). According to the analysis proposed by Kaldhol and Köhnlein (2021) (see section 3.2.3.2), the linking *–s–* has the power to induce accent 1 when it appears in compounds, suggesting that its phonological representation may contain more information. The linking *–s–* also causes segmental mutations in the stem to which it attaches, such as vowel shortening and voicing assimilations (Kristoffersen 2000:77-78).

(5-7). This is thus a specific instance of the root-sensitive Spell-out rules for *L* that were shown in (5-6). In the context of the (nominalised) root √*SOL*, the phonological realisation of *L* is ∅.

When it comes to the PF operations listed in (5-4) (stress/quantity and tonal accent), we are now in a situation where a subpart of *L* has already been subjected to Spell-out. Consequently, the PF requirements at this stage have already been met at the first Spell-out, through the stress-induced addition of a second mora to the vowel (making it long). With our assumptions concerning the PIC as a cementation effect of interpretations at the interfaces, no significant changes in the phonology of the inner Spell-out domain are predicted to be possible. There are, however, phonological operations that ostensibly ignore the PIC. Stress assignment in Norwegian for instance, is recognised to be a *cyclic* operation (or rule) that (re)apply at every relevant step (as defined by levels in Lexical Phonology (Kiparsky 1982) or by phases in Phase Theory (Chomsky 2000, 2001) in the derivation (Kristoffersen 2000:168-181).[180] If stress is shifted from one cycle to the next, this can be interpreted as a violation of the PIC. However, such an interpretation entails that there is *deletion* of metrical structure at the beginning of every new cycle. For the sake of simplicity, I will assume that reassignment of stress rather involves *building* of metrical structure elsewhere and that there is still stress “left” behind in earlier position. For Norwegian, this residual stress is most notably signalled by the presence of segmental “echoes” such as long vowels and geminates.[181] Thus, if stress is reassigned during

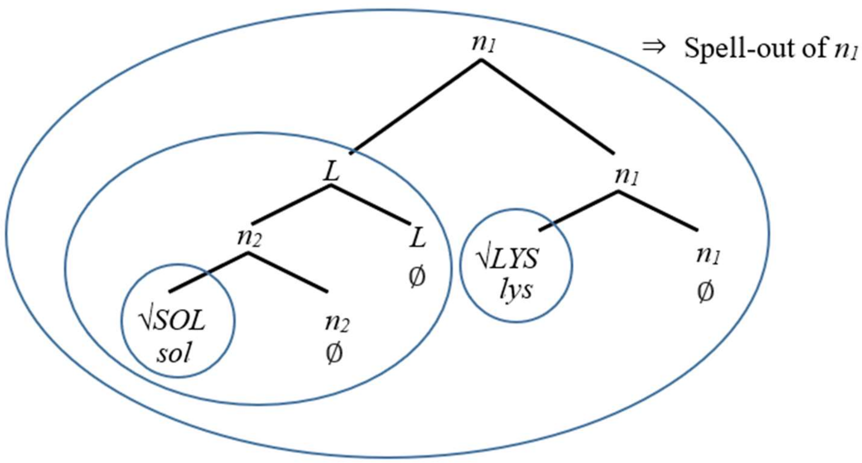
[180] By virtue of being tightly connected to stress, prosodic expansion (i.e. mora insertion) is also taken to be a cyclic operation (Kristoffersen 2000:203-208).

[181] Segmental “echoes” from the prosodic expansion resulting from stress on earlier cycles are not necessarily there. For instance, the first vowel in the root in alternations such as *drama* [¹drɑːmɑ] ‘drama’ vs. *dramatisk* [drɑ¹mɑːtisk] ‘dramatic’ loses its length as stress is shifted when the adjectival suffix *–isk* is added. Kristoffersen (2000:203-208) operates with a Mora Delinking rule that applies at the post-cyclic level (i.e. the *word level* in Lexical Phonology) to remove such stress “echoes” from surface forms. There is, however, alternative explanation available, if we focus on the role tonal accents have in realising (primary) stress. Distinctions in segmental length are difficult to hear if the relevant syllable is not also hosting a tonal event (Kristoffersen 2000:190-191). This indicates that a segment that is phonologically long may lose its length phonetically if it is not supported by tone.

the derivation, it does not necessarily represent a violation of the PIC.[182] As for the Spell-out point including *L* in step 3, the PF computation does not add any (overt) material, nor does it change the properties of the already Spelled-out root. The PIC is in other words respected.

The last point in the derivation that is interesting from the PF perspective is step 5 (step 4 has been skipped as it provides no new information for PF), where the compound structure as a whole is Spelled-out.

Step 5: *Workspace I, final Spell-out*



When the top n_1 node is Spelled-out in step 5 (presumably triggered by a higher functional phasal head not shown here), we are in a situation where both parts of the compound have been through earlier Spell-outs. This means that the two parts of the compound have been interpreted at the interfaces independently from each other. There is in other words no separate lexical

[182] There are cases where the Spell-out of the non-head (categorised root + *L*) changes the phonology of the root, which does indicate that the PIC can be violated. For instance, the nominalised root *dag* [¹dɑ:g] 'day' forms the basis of the non-head in the compound *dag-s-lys* [¹dɑksly:s] 'daylight' but its vowel is shortened and the coda consonant is devoiced, demonstrating that its phonological properties are not fossilised in the first phase. One way around this is to allow stem storage in the spirit of Bermúdez-Otero (see section 4.3.2.1) where the choice between the two allomorphs of *dag* {dɑ:g/dɑk} does not take place on the first cycle but on the second. Another way, proposed by Embick (2010, 2014), is to let inactive material (i.e. Spelled-out and no longer identifiable as a particular morpheme) in the inner cycle (or phase) still be visible to certain PF operations when the outer cycle is triggered. This allows for allomorphy.

entry for n_1 and it thus inherits the segmental information from each of its members in accordance with the PIC. This includes segmental length induced by stress assignment.

As for the operations that are internal to PF (stress/quantity and tonal accent), everything that is contained in the structure in step 5 has already undergone Spell-out, but cyclic operations such as stress assignment will reapply. A characteristic trait of compounds in Norwegian is that stress falls on the compound-initial member (there are a handful of exceptions to this where compound stress is final, see section 4.1.3).[183] In terms of phasal structure, this can be understood to be a rule that specifies that prominence falls on the left when two (or more) adjacent domains are Spelled-out together. Prior to Spell-out in step 5, the two phasal domains centred on *L* and the root √*LYS* are not ordered. Spelling them out together, forces PF to linearise them with respect to each other and in this process, more prominence is given to the domain that comes first. That is, prominence falls on the phase centred on *L*, which inherits the stress assignment from its sub-domain(s). Consequently, the string /su:l/ that was derived from step 2 will be assigned stress in the Spell-out in step 5. Note, however, that the requirement for bimoraicity has already been met in step 2, so no further prosodic expansion applies.

Another consequence of linearisation is that default tonal accent is assigned. Recall from section 3.2.4 that we assumed accent 1 to be the lexical tonal accent. This means that only accent 1, with the abstract diacritic (ˣ), can be found in the lexical entries of vocabulary items. When the top n_1 node is Spelled-out in step 5, the diacritic (ˣ) for underlying tonal accent is impossible to find because n_1 does not have a lexical entry that could host it. We are left with default tonal accent as the only alternative to meet PF requirements. Given the size of the domain and its metrical structure (shown in (5-8) below), the PF computation will assign accent 2, resulting in the surface representation [²su:lˌly:s],

(5-8) *Metrical structure for accent-2 domains*

(**X** x) *Line β*
(x x) *Line α*

[183] Bye (2004:30) observes that there does not seem to be any variety of Norwegian and Swedish that by rule stresses the second member in compounds that have three or more constituents. That is, stress in compounds is initial or final, never medial, and he speculates that it might have to do with learnability.

Line *α* represents the situation we have *before* the non-head and the head of the compound are Spelled-out together while line *β* represents the effects of PF stress assignment in step 5. We thus have a strong beat followed by a weak beat, and this is implemented as accent 2 by default.

The representation of accent 2 in (5-8) also gives us a connection to the distribution of the tones within the domain. More specifically, it provides us with relevant TBUs (see section 2.1.3). Recall from section 2.1.2 that accent 2 in Tromsø Norwegian was assumed to have two tonal events: i) a late H ($^{L}H^{*}$) that aligns with primary stress and ii) a Low tone ($L^{(*)}$) that seeks out other stressed syllables if there is any. The tones map onto the structure in line *β* such that $^{L}H^{*}$ falls on the strong beat ***X***, while $L^{(*)}$ falls on the following weak beat *x*. This gives us the basic properties of accent 2. Moreover, not committing to specific categories for the lines in the metrical representation in (5-8) also enables us to subsume accent 2 in simplexes in the same analysis. Line *β* can also represent the disyllabic trochee that licenses accent 2 in simplexes such as *kirke* [²çiɾkə] 'church'.[184]

Finally, a few words on tonal accent in compounds for Norwegian in general are in order. In section 2.2.2, we saw that the distribution of tonal accent in compounds in Urban Eastern Norwegian is governed by properties of the compound-initial member. Thus, the compound *kino-kultur* [¹çi:nukʉlˌtʉ:ɾ] 'cinema culture' has accent 1 in UEN because that is the tonal accent of the compound-initial member *kino* [¹çi:nu] 'cinema' in isolation. The compound *elite-kultur* [ɛ²li:təkʉlˌtʉ:ɾ] 'elite culture' on the other hand has accent 2 because *elite* [ɛ²li:tə] 'elite' has accent 2 in isolation. Thus, UEN allows both accent 1 and accent 2 in compounds. This surface contrast in compounds, however, is generally not found in Tromsø Norwegian. In TN, compounds are routinely neutralised to accent 2 regardless of what the properties of the compound-initial member is. How can we account for this difference?

I will assume that what we are dealing with here is expiration of lexical tone. Building the compound *kino-kultur* with the same procedure as has been used in this chapter, both roots √*KINO* and √*KULTUR* are each merged with a nominalising head *n*, triggering Spell-out of the roots. In the lexical entry for √*KINO*, we find the segmental string /çinu/ along with the abstract diacritic (ˣ) for accent 1. This diacritic makes sure that √*KINO* surfaces with accent 1 in

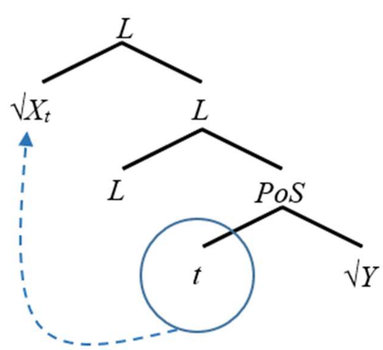
[184] See also Riad (1998b) for a similar proposal, although he operates with designated categories.

non-compound derivations involving the root. This is the case for both varieties, UEN and TN. In order to build the compound, the nominalised root √*KINO*, which ends up being linearised first at the end of the whole derivation, is further merged with an *L* head, thus paving the way for subsequent adjunction to the compound head. However, before adjunction can take place, the non-head structure consisting of the root, *n* and *L* is Spelled-out. I conjecture that it is precisely in this Spell-out that lexically specified tone expires in the TN phonology while UEN keeps it for later cycles. The result is that the compound *kino-kultur* surfaces with accent 1 in UEN, while the loss of lexical tone during the derivation in TN means that default accent 2 is inserted, establishing the neutralisation pattern.

5.2 Root compounds

In the previous section, we had a look at stem compounds, which were characterised by having stems (i.e. categorised roots) entering a compound relationship. This type of compound contrasts with what I will label a *root compound*, where two bare roots appear together under a Linker Phrase *L*. The basic structure for root compounds is shown below (structure adapted from Delfitto and Melloni 2009):

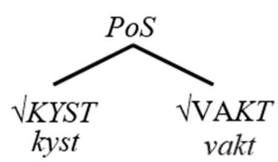
(5-9) *Basic structure for root compounds*



Following Delfitto and Melloni (2009), the structure in (5-9) has two roots elements {X Y} that are subject to Parallel Merge, creating a Point of Symmetry (PoS) as we are dealing with two roots of equal structural complexity as far as syntax is concerned. Consequently, none of them can project to the next level in the structure and the identity of the node containing the two of them remains unknown (for convenience labelled *PoS*). The exact identity of the node need not concern us here. The crucial point here is that even though syntax can deal with such structures, such objects are filtered out at the interfaces LF and PF because they are not able to process them. If there is no hierarchy between X and Y, scope relations and linear order are impossible to establish at the interfaces and the derivation crashes. The situation is resolved by merging a Linker Phrase on top of the structure so as to give space for one of the roots to move. Adjoining √*X* to *L* breaks the PoS, saving the derivation from crashing after Spell-out. The result is a simple right-branching structure. The properties of the root compound structure are necessarily different from the stem compound structure, and this will have consequences for the semantic and phonological characteristics, which are idiosyncratic (discussed in section 2.2.2).

Let us now move on to a sketch of the derivation of such a compound, *kystvakt* [¹çystʋɑkt] 'Coast guard', to see how tonal accent in this case relates to morphosyntactic structure. As illustrated in the basic structure for root compounds in (5-9), all syntactic terminal nodes are located in the spine of the tree. In other words, we only need *Workspace I* for the syntactic structure building. The *first* step in the derivation is shown below, where the root √*KYST* and √*VAKT* are merged:

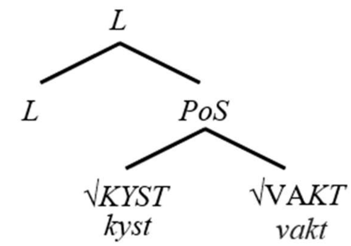
Step 1: *Workspace I*



Since we are dealing with two roots of equal structural complexity as far as syntax is concerned, none of them can project to the next level in the structure. Hence the *PoS*. Such configurations are problematic for the interfaces because they are uninterpretable. For instance, if a PF property such as linear order is a function of syntactic domination (Kayne 1994), the two roots in step 1 cannot be linearised with respect to each other. Consequently, the syntactic object in step 1 would be filtered out at Spell-out because it cannot be externalised.[185] The *PoS* is partially resolved by merging a Linker Phrase *L*, permitting asymmetry to arise between the two roots. This is what takes place in step 2.

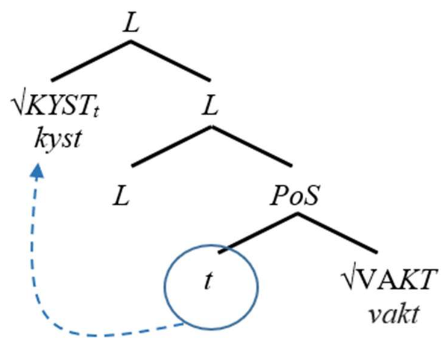
[185] The *PoS* also causes problems for LF as scope relations between the two roots cannot be established.

Step 2: *Workspace I*



The merger of the Linker Phrase *L* does not itself solve the situation, but it opens up a pathway for the derivation to be saved in that objects can adjoin to *L*. In particular, one of the roots under the *PoS* can move and adjoin to *L*, thus breaking the symmetry.[186] This is shown in in step 3:

Step 3: *Workspace I*



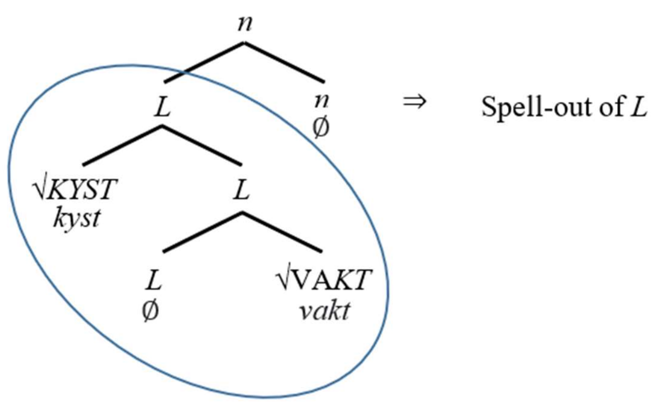
In step 3, the root √*KYST* is moved and adjoined to *L*, leaving only a trace *t* in its original position. By adjoining one of the roots to *L*, an asymmetry is established between them in that the root √*KYST* appears in a structurally higher position. This breaks the *PoS*, making sure that the derivation can be interpreted at the interfaces. Hypothetically, a third root could have been merged into the structure that would do the same job as far as the requirements of *L* are concerned, but the *PoS* would still persist.

[186] Delfitto and Melloni assume that the movement in compounds is feature driven such that one of the roots is attracted by the *L* head. I assume instead that syntax does not need any justification for moving any of its units. Movement (i.e. internal merge) is licit for the language faculty as a whole as long as the derivation converges at the interfaces.

Note that Spell-out has not yet applied to the structure or any subparts of it. According to our assumptions, Spell-out only applies if we merge a phasal head into the structure, triggering Spell-out of the complement of the phasal head, or if syntax has created complex structures outside the spine of the tree, such as complex specifiers or adjuncts. None of these conditions has so far been met, which means that the syntactic object that will be shipped off to the interfaces for interpretation in case of root compounds is relatively big compared to what we had for stem compound in section 5.1.

The final step in the derivation of the root compound, step 4, is merging a categorising head *n*, which triggers Spell-out of its complement. This is the only Spell-out we have during the derivation of the compound:

<u>Step 4:</u> *Workspace I* (structure simplified)



With this fourth step in the morphosyntactic derivation, the root compound has been completed (the structure has been simplified by removing the trace *t* and the *PoS*). Even though the compound has been built in only one working space, we still have two main parts: a head and a non-head. These two are identified purely on structural grounds. In the morphosyntactic representation of the compound above, *kystvakt* [¹çystʊɑkt] 'Coast guard', the root √*KYST* is identified as the non-head by virtue of being adjoined. This means that the in-situ root √*VAKT* qualifies as the head of the compound. The functional Linker Phrase *L* acts as a mediator between the two, providing instructions about the semantic interpretation.

When it comes to operations that apply at the interfaces LF and PF, the root compound is very different from the stem compound we discussed earlier. For stem compounds, we had several Spell-outs during the morphosyntactic derivation, which implies a stepwise procedure for structure building at the interfaces. Lexical entries are accessed and kept for each Spell-out, resulting in a compositional outcome. That is, interpretations that have been undertaken at point *P* are conserved at point *P+1* and each of them can be identified. In the derivation of the root compound that we just saw, the Spell-out we have in step 4 is the only one we have during the derivation of the compound. Consequently, lexical entries for LF and PF are accessed only once.

The semantic interpretation takes the whole *L* complex as its domain and interprets it in the context of the nominalising phasal head *n*:

(5-10) *L* (√*KYST*, √*VAKT*)

⇓

R (√*KYST*, √*VAKT*) in the context of *n* ⇔ *Kystvakt* 'Coast guard' (n)

When accessing the semantic lexical entry, LF receives an instruction from syntax in the shape of a function with two variables, of which one is the head and the other is the non-head.[187] These characteristics are, as mentioned already, determined on purely structural grounds. Thus, the domain contains both roots in addition to an *L* node that gives information about the hierarchical relationship that exists between the two roots. What makes the lexical entry in (5-10) different from any corresponding lexical entry we saw for stem compounds is that the two roots are not interpreted individually, but together. Being in the same Spell-out phase entails that they are able to "see" each other, allowing them to be associated with a special meaning because they are in the same syntactic context (the same *locality* domain (Marantz 1997)). Thus, the Spell-out of the *L* complex in the context of n is stored as *kystvakt* 'Coast guard' (a country's maritime security organisation). The only semantic aspect that is already an inherent part of the *L* complex is *L* itself, interpreted as the "Variable R" relation (Allen 1978), instructing how the head and the non-head in the compound relate to each other.

When it comes to the phonological interpretation, it goes hand in hand with the semantic one in that the *L* complex is seen as a whole:

[187] The notational convention I adopt here is one where the first variable represents the non-head while the second represents the head.

(5-11) *L* (√*KYST*, √*VAKT*) in the context of *n* ⇔

Lexical entry, PF
- segmental make-up, /çystʋɑkt/
- underlying tonal accent ($^{\times}$)

In the phonological computation, the lexical entry that is accessed as the best fit for the Spell-out of the *L* complex in the context of *n* in accordance with the subset principle contains two things. First, it contains the segmental string /çystʋɑkt/ stored as a whole. In other words, we are not dealing with a situation where the strings associated with the syntactic terminals are concatenated. This would imply access to each one of them separately, and that is not possible as we have a single Spell-out domain. Furthermore, accessing them separately would predict that no tonal accent, the second ingredient in the lexical entry, could be stored as this is only applicable to polysyllables (see section 3.2.4). The tonal accent is marked in the lexical entry with the diacritic ($^{\times}$).

The string is then subjected to PF operations in order to make sure that the output of the phonological computation respects the requirements for bimoraicity and tonal accent. Both of these are functions of stress, and I will discuss them briefly before I return to the general stress properties of root compounds in more detail. For now, it suffices to say that stress falls on the initial member. Starting with the bimoraicity surface requirement for stressed syllables, the phonological computation does not need to expand prosodically any of the segments because the syllable that is stressed (either by rule or by lexical marking) is bimoraic already by virtue of having two consonants in the coda (the string /çyst/ has a VCC rhyme, which counts as heavy). Consequently, no mora is added in the prosodic structure, i.e. there is no visible segmental trace of stress.

As for tonal accent, this is also very straightforward. Tonal accent is an inherent part of the stress realisation system in Norwegian and in case there is none underlyingly, the phonological computation will provide a default tonal accent depending on the number of syllables in the relevant domain. Seeing that the lexical entry in of the root compound that we have derived already contains the abstract diacritic ($^{\times}$) for tonal accent (see (5-11)), the phonological computation makes use of that one instead of providing the default tonal accent for polysyllabic domains. The outcome of the phonological computation is thus [^{1}çystʋɑkt] with accent 1.

Now, returning to the general stress properties of root compounds, in my analysis they differ from the ones found in stem compounds (in section 5.1) due to their different derivational pathways. During the derivation of the stem compounds, we saw that stress was assigned to both heads and non-heads throughout the derivation. Thus, even though the head of stem compounds ends up not carrying the stress at the compound level, "echoes" from stress assignment early in the derivation can still be found in the shape of segmental length (vowel length in particular). In root compounds on the other hand, the derivation results in a single Spell-out, which entails that stress is assigned once to the string as a whole. This is also in lines with our observation that the lexical entry has to be polysyllabic (i.e. contain both roots) in order for lexical marking of tonal accent to be possible. However, it also entails that the head in root compounds does not constitute its own domain for PF operations. Thus, the head of the compound has not been privileged prosodically by being stressed at any point in the derivation, and we would expect this to have consequences. Bakken (1998:97-101) has pointed out that lexicalisation of compounds diachronically in Norwegian has often been accompanied by phonological changes on the segmental level. Such changes are seen as a consequence of loss of juncture between the relevant roots. Translated into our framework, it reflects a change from stem compound (i.e. head and non-head are separate Spell-out domains) to root compound (i.e. one single Spell-out domain), thus showing signs of lexicalisation and of the development of specialised meanings.[188] Segmental changes related to this are predicted to affect those aspects of segmental structure and distribution that are stress-induced. We thus expect to see for instance vowel shortening and vowel reduction particularly in the compound head as it ceases to be a stress domain. This has certainly been the case in a number of historic compounds whose compoundhood has been more or less opacified (not only by changes local to the root vowel in the head). We find for instance reduction to schwa in the diachronic development of *forkle* [^{2}fɔɾklə] 'apron' (from *for* [^{1}fɔɾ] 'fore' + *klede* [^{2}kleːdə] 'cloth') and *barsel* [^{1}bɑʂ.ʂəl][189]

[188] Note however, that lexicalisation does not necessarily imply a change in and simplification of syntactic structure. As pointed out by Eik (2019:224-234), even the most transparent of compounds in common use generally have a conventionalised meaning. For instance, compounds like *sommer-fugl* 'butterfly' (lit. summer bird) have a highly conventionalised meaning that native speakers know about, but its interpretation is malleable according to the context, a factor that indicates that it is still a stem compound.

[189] This is also possible with accent 2 according to *Det norske akademis ordbok (The Norwegian Academy Dictionary)*, available at www.naob.no.

‘childbirth’ (from *barnsøl*: *barn* [¹bɑːɳ] ‘child’ + *s* + *øl* [¹œl] ‘beer’, originally referring to a celebration after the birth of a child). Similarly, we also find shortening of diphthongs/long vowels in some historic compound heads, such as in *bryllup* [²brʏl.lʉp] ‘wedding’ (from Old Norse *brúð* [bɾuːð] ‘bride’ + *hlaup* [l̥œʏp] ‘jump, race’), or complete loss of the relevant root vowel, as in *åttring* [²otɾiŋ] ‘a row-boat with 4 pairs of oars (from *ått*(*e*) ‘eight’ + *æring* (derivative of *åre* ‘oar)). Another effect that seems to be prosodically induced is loss of /h/, a segment that occurs only in simple onsets in i) word-initial position or in ii) stressed syllables (Vogt 1942:12, Kristoffersen 2000:49-50).[190] Thus, /h/ is subject to licensing factors and removing them can lead to /h/-loss. This has happened in *fjøs* [¹fjøːs] ‘barn’ (from *fe* ‘cattle’ + *hus* ‘house’), where the compound head ceased to be a stress cycle, putting the prosodically licensed /h/ in a vulnerable position.[191] The resulting hiatus was resolved through glide formation (Iversen 1990:27), provoking further integration of the roots (i.e. coalescence) with subsequent development of a new non-decomposable root.[192]

In the case of *kystvakt*, there is possibly one segmental change that applies to the structure as a whole: simplification of intervocalic consonant clusters. A pronunciation where the consonant cluster /stv/ (an otherwise non occurring cluster in monomorphemic words (Kristoffersen 1991:60-62)) is reduced to /sv/ seems to be acceptable: [¹çysʋɑkt]. This can be accounted for under the current approach as the two roots of the compound undergo their first Spell-out *together*. This gives room for PF to manipulate the segmental string as if the domain were monomorphemic. Crucially, this kind of evidence for the lack of separate stress cycles for heads and non-heads in root-compounds relies on there not being a corresponding cluster simplification (or it should at least be less acceptable) in the *stem*-compound version of *kystvakt* [²çystʋɑkt] (see section 5.1). Future research will show if this is true.

[190] Already in Old Norse, non-initial /h/ was prone to deletion (Faarlund 2004:10, 15).

[191] This process is also found at the phrasal level where especially functional items (e.g. pronouns such as *han* ‘he’) can undergo /h/-dropping due to lack of phrasal prominence, at least in some varieties (Kristoffersen 1997). The process is also found diachronically (Seip 1955:162).

[192] We find potentially parallel developments in (farm) names such as *Mjøs* (**Míð-hús*) and *Njøs* (**Ný-hús*) (Bakken 1998:261, footnote 38)

As for other segmental stress-related evidence that are local to the compound *head*, they seem to be missing. This is not necessarily a problem for the view presented here as stress-related diagnostics for the missing stress cycle could be absent for other reasons. Reduction to schwa of the root vowel in the compound head for instance could be blocked for phonotactic reasons. Schwa in Norwegian is not found in *closed* syllables (Kristoffersen 2000:21). The presence of the coda consonants /kt/ can then be seen as a shield against erosion of the quality of the root vowel /ɑ/.

The other stress-related diagnostic, vowel length, is not applicable in this case because the root vowel in the compound head is already short in non-compound contexts: *vakt* [^{1}ʋɑkt], not *[^{1}ʋɑːkt]. However, there are cases where the root vowel in a lexical item is long in non-compound contexts while it is shortened when the lexical item is the compound head. In for instance the simplex form *dag* [^{1}dɑːg] 'day', the vowel is long but it is shortened in the compound construction *middag* [^{2}mid.dɑg] 'dinner (lit. mid-day)' in Tromsø Norwegian.[193] We find the same kind of vowel shortening in the kinship terms *mor* [^{1}muːɾ] 'mother' and *far* [^{1}fɑːɾ] 'father' when they occur in compounded kinship terms such as *mormor* [^{1}muɾmuɾ] 'maternal grandmother' and *morfar* [^{1}muɾfɑɾ] 'maternal grandfather'. This shortening is seen in both head and non-head position. Such alternations are accounted for if there is a derivational difference between roots that undergo Spell-out separately (i.e. vowels can be lengthened) and roots that undergo Spell-out together (i.e. vowels are not lengthened). The former may apply in what has been labelled stem-compounds in this thesis, while the latter applies in root-compounds.

However, to what extent a loss of juncture necessarily engenders changes at the segmental level seems to depend to a large degree on semantic factors and psychological factors. As argued by Hesselman (1952:288), compound-internal melodic reductions and changes depend on the strength of the form-meaning associations of its members. If this association is weak in the mind of the speakers, segmental changes are more likely to apply whereas a strong association opposes such changes. There is thus no guarantee that a missing stress cycle on the compound head will be reflected in the segmental phonology. If this is true, it means that in our case, *kystvakt*, where we would expect changes most notably in the compound head (i.e. *vakt*)

[193] The same construction in UEN is further reduced to [^{1}mid.dɑ], with loss of the coda consonant. It also has accent 1 instead of accent 2.

in the form of for instance vowel reduction due to the loss of a stress cycle, the form-meaning associations for both members, *kyst* and *vakt*, could be strong enough to resist any such changes. That is, the identity of the morphemes in the root compound *kystvakt* remains clear in the mind of the speakers, in spite of them both being part of the same lexical entry, as shown in (5-11).

6 Extensions: Prefixes

As stated in section 1.4, the current thesis deals with internal word structure below any extended projections in the morphosyntax, and how this relates to tonal accent in Tromsø Norwegian. In this chapter, I show that the analysis developed for compounds in the preceding chapters can be extended to another word formation strategy recognised in the traditional approaches to morphology, namely prefixation. The term *prefix* itself seems to lack any deep grammatical content (Fábregas and Krämer 2020), but the *bona fide* working definition that will be adopted here is a lexical item that linearises to the left of a base on which it is phonologically and syntactically dependent. As mentioned in section 1.4, prefixation falls under the more general umbrella term *affixation*, and it is common to distinguish between affixation that is derivational and affixation that is inflectional, depending on the formal syntactic and semantic properties of the affix in question. Derivational affixes are affixes that change the meaning of the unit to which they attach and possibly also the lexical category. Inflectional affixes on the other hand never change the lexical category of their host, and generally appear as a grammatical necessity and not for meaning contribution.

When it comes to prefixes in Norwegian, they all fall into the derivational group, but only in the sense that they change the meaning of the base to which they attach. They may be sensitive to the lexical category of their host, but they do not change it (see Faarlund et al. 1997:90-97 for an overview of Norwegian prefixes). Given the constructivist framework that has been adopted in this thesis (i.e. Distributed Morphology, see section 1.2.2), we expect word formation strategies that have similar syntactic configurations and are operative in the same part of the morphosyntactic derivational hierarchy to share properties when it comes to tonal accent. As we will see, prefixes act like compound constructions in some respects. This chapter is organised as follows: in section 6.1 I provide a description of the tonal accent properties of the most common prefixes. This data also includes a few derivational *suffixes* as there is some interaction between prefixes and suffixes when both are present. The description will be based on Tromsø Norwegian, but reference will also be made to Urban East Norwegian in some cases. Section 6.2 is dedicated to an analysis that deals with prefixes only, while section (6-9) focuses on how we can account for the interaction between prefixes and suffixes using the same tools.

6.1 Prefix data

The prefix overview provided by Faarlund et al. (1997:90-97) for Norwegian contains an array of native and borrowed prefixes of which not all are equally productive. For instance, the prefix *and–* (from Old Norse *and–* 'against', cognate with Greek αντι- (Orel 2003:18)) is not much in use except for in a couple of words such as *andsynes* 'opposite, in front of' and *andføttes* 'lie with feet in opposite directions.' Most speakers of Norwegian would probably not be able to identify this prefix and its meaning. The prefixes that are presented in what follows, are more frequent but their productivity naturally varies. The classification that has been chosen here is based on their grammatical behaviour in a broad sense, taking into account both morphosyntactic and phonological properties. The proposed classification may seem counterintuitive as some prefixes have a behaviour that straddles the categories, but the purpose of the classification is to tease out some important generalisations.[194] In section 6.1.1, I present prefixes that carry stress and whose prosodic properties may be sensitive to a verbal/nominal split. I then move on to section 6.1.2, where I present prefixes, mostly in adjectival contexts, that are stressed or unstressed depending on the presence or absence of a derivational suffix.

6.1.1 Prefixes in non-derived contexts

Starting with a set of prefixes that are inherited from Old Norse (though these are not the only ones, see Conzett 2016:285-289), we find the semantically negative prefixes *u–* (cognate to English *un–*), *mis–* (Eng. cog. *mis–*) and *van–* (Eng. cog. *wan–* (obsolete)).[195] In

[194] The proposed classification excludes prefixes that are always unstressed such as *be–* and *er–*, both of which have come from (Low) German (Torp and Vikør 2014:302). Kristoffersen (2000:180-181) notes only one exception to this, *béarbeide* 'to process', where stress is on the prefix.

[195] Even though they are all semantically negative, they can have a slightly different focus sometimes: *u–* can be a purely negative prefix, but also carries a pejorative meaning sometimes (e.g. *usunn* 'unhealthy' or *udyr* 'beast'); *van–* can denote a lack or deficiency (e.g. *vantro* 'disbelief'); *mis–* often means that something is done in an erroneous way (e.g. *misbruke* 'abuse'). Examples and definitions are taken from NAOB, *Det norske akademis ordbok* (The Norwegian academy's dictionary), accessible at www.naob.no. As noted by Faarlund et al. (1997:91-93), there are cases where more than one prefix can be used with the same base without change in meaning (*ufør* vs. *vanfør* 'disabled') while in other cases there is a change in meaning (*ustelt* 'ungroomed' vs. *vanstelt* 'badly groomed').

morphosyntactic contexts where these prefixes attach to an otherwise morphologically simplex root, the resulting prosodic pattern for the prefix-base complex is one where primary stress, realised as accent 2, falls on the prefix. The tonal accent of the base form when it occurs in isolation does not play any role, as it is overwritten in the prefixed forms. The following data reflects the situation in both Tromsø Norwegian and Urban Eastern Norwegian (IPA is given for the former).

Table 30 – negative prefixes

Prefix	Base form		Prefixed form	Gloss
u-	*sann*	[^{1}saɲ]	[^{2}ʉː͵saɲ]	'untrue'
	dyr	[^{1}dyːɾ]	[^{2}ʉː͵dyːɾ]	'beast'
	vane	[^{2}ʋɑːnə]	[^{2}ʉː͵ʋɑːnə]	'bad habit'
mis-	*bruk*	[^{1}brʉːk]	[^{2}mis͵brʉːk]	'abuse (n)'
	foster	[^{1}fustər]	[^{2}mis͵fustər]	'monstrosity'
	tenke	[^{2}tæŋkə]	[^{2}mis͵tæŋkə]	'suspect (v)'
van-	*makt*	[^{1}mɑkt]	[^{2}ʋɑn͵mɑkt]	'powerlessness'
	tro	[^{1}tɾuː]	[^{2}ʋɑn͵tɾuː]	'disbelief'
	styre	[^{2}styːɾə]	[^{2}ʋɑn͵styːɾə]	'mismanagement'

As can be seen from the data in Table 30, the prefixes carry the primary stress realised as accent 2. There is, however, secondary stress in the base form as suggested by the presence of long vowels (see section 2.1). Thus, prosodically, they have a lot in common with compounds (see section 2.2.2).

There is also a syntactic property that groups prefixed words with compounds, namely the appearance of linking elements (see section 4.1.2). In three-member left-branching compounds, we often find a linking *–s–* between the non-head and the head. Prefix-base complexes behave the same way:

(6-1)	a.	i. *vin-glass*	'wine glass'
		ii. [*hvit-vin*]-**s**-*glass*	'white wine glass
	b.	i. *vær-data*	'weather data'
		ii. [*u-vær*]-**s**-*data*	'bad-weather data'
	c.	i. *makt-følelse*	'sense of power'
		ii. [*van-makt*]-**s**-*følelse*	'sense of powerlessness'
	d.	i. *kreditt-problem*	'credit problem'
		ii. [*mis-kreditt*]-**s**-*problem*	'discredit problem'

The appearance of the linking –*s*– in (6-1) is connected to the morphological complexity of the non-head, and in this respect, the current set of prefixes behave like regular root words syntactically.[196]

The prosodic properties of prefixes may in some cases also depend on the lexical category of the base. This is what we find for the prefix *for*–[197], which can be stressed or unstressed with accompanying alternations in tonal accent. More specifically, *for*– is stressed when it is attached to a non-derived nominal stem, in which case it is accompanied by accent 2. If *for*– is attached to a verbal stem, the prefix is unstressed (i.e. the stress falls on the base) and the prefix-base

[196] As for other syntactic properties, they have in common with other Norwegian prefixes that they do not change the lexical category of their host, but they do show some sensitivity to what kind of base they go with. They can all be combined with nouns (*udyr* 'beast', *mistak* 'mistake/error', *vanmakt* 'powerlessness') but they split paths for adjectives and verbs. Both *u*– and *van*– can be combined with adjectival roots (*ufin* 'rude', *vanfør* 'disabled'), while *mis*– seems to be limited mostly to derived adjectives. Faarlund et al. (1997:93) say that *mis*– can be combined with adjectives, but the handful of adjectives they list with the prefix *mis*– are all derived adjectives, either through adjectival suffixes (*mismodig* 'sad') or through conversion of past participles (*misfornøyd* 'unhappy', from the verb *fornøye* 'amuse'). When it comes to verbal roots, we find both *mis*– and *van*– (*mistenke* 'suspect' and *vanskjøtte* 'neglect'), but *u*– is not possible (this is probably due to the fact that its Old Norse predecessor was not used with verbal roots (Conzett 2016:289)). However, *u*– does go with the past participle forms when used as adjectives (**uhøre* 'unhear' vs. *uhørt* 'unheard').

[197] It is possible to distinguish two prefixes with this phonological form: one that comes from Low German *ver*- and *vor*-, and another one that comes from Old Norse *fyrir* 'for, before'. Most of the data presented here goes back to the former type.

complex gets accent 1. This alternation is found in both TN and UEN (IPA given for the former).

Table 31 – the prefix for- *in nouns and verbs*

Prefix	Base form		Prefixed form	Gloss
for-	*bruk*	[¹brʉːk]	[²fɔɾˌbrʉːk]	‘consumption (n)’
	bruke	[²brʉːkə]	[fɔɾ¹brʉːkə]	‘consume (v)’
	fall	[¹fɑl]	[²fɔɾˌfɑl]	‘decay (n)’
	falle	[²fɑl.lə]	[fɔɾ¹fɑl.lə]	‘decay (v)’
	bund	[¹bʉn]	[²fɔɾˌbʉn]	‘federation (n)’
	binde	[²biɲ.ɲə]	[fɔɾ¹biɲ.ɲə]	‘connect (v)’
	hold	[¹hɔl]	[²fɔɾˌhɔl]	‘relation (n)’
	holde	[²hɔl.lə]	[fɔɾ¹hɔl.lə]	‘relate (v)’
	svar	[¹sʋɑːɾ]	[²fɔʂˌʋɑːɾ]	‘defence (n)’
	svare	[²sʋɑːɾə]	[fɔ.¹ʂʋɑːɾə]	‘defend (v)’
	bud	[¹bʉːd]	[²fɔɾˌbʉːd]	‘prohibition (n)’
	by	[¹byː]	[fɔɾ¹byː]	‘prohibit (v)’

As we can see in Table 31, the alternations in tonal accent perfectly match the shift in stress and in lexical category. It should be noted though that deverbal nouns preserve the tonal accent from the verbal root, e.g. *forbindelse* [fɔɾ¹biɲ.ɲəlsə] ‘connection’, so they do not pattern with non-derived nominal stems.[198]

[198] In addition to secondary derivatives, there are also other exceptions to the pattern. The prefix may be unstressed in both the noun and the verb, e.g. *forakt* [fɔ¹ɾɑkt] ‘contempt (n)’ vs *forakte* [fɔ¹ɾɑktə] ‘contempt (v)’, or stressed in both, e.g. *forslag* [²fɔʂˌlɑːg] ‘suggestion’ vs. *foreslå* [²foːɾəˌʂloː] ‘suggest’ (note the different form of the prefix in the latter verb).

Interestingly, in UEN, we find a similar behaviour in a class of lexical items that we can refer to as verbal particles.[199] Norwegian has, just like the other Germanic languages (see Dehé 2015 for an overview), verbal particles which are homophonous with adverbs and prepositions, and which combine with verbal roots to form particle verbs. The semantics of the particle itself may be bleached or shifted, such that the meaning of the particle-verb construction as a whole may be anywhere on a scale from transparent to opaque. In Norwegian for instance, the semantic contribution of particles may range from transparent meanings (directional *ut* such as in *gå ut* 'go out') to shifted meanings that may be more or less productive (aspectual *ut*[200] such as in *lese ut* 'finish reading something (telic)'). In some cases, the particle-verb construction takes on an idiomatic (or even totally opaque) reading such as *kle ut* (lit. dress out) 'put on a costume'. Norwegian also has an additional complication in that the position of the particle with respect to the verb varies. This is reminiscent of what is called separable verb particles in German and Dutch where the morphosyntactic context dictates if the particle can be separated from the verb or not (see Stiebels 1996:38-39 for German). However, the position of particles in Norwegian is governed by a complex interaction between phonology, prosody, syntax and semantics (for further details, see Svenonius 1996, Faarlund et al. 1997:83-87, Kristoffersen 2000:288-289, Aa 2015, Tengesdal and Lundquist 2021). What is important for our purposes is that the particle is sometimes realised as a prefix, in which case it always carries primary stress, unlike the prefix *for–* discussed above. However, we find the same kind of alternation in tonal accent where verbal stems come with accent 1 while nominal stems come with accent 2. This "change" comes in addition to sporadic melodic adjustments signalling their category affiliation. This is shown in Table 32 below:

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[199] The particles are also found in non-derived nominal constructions, but to my knowledge, they are dependent on there being a corresponding verbal one while verbal particle constructions do not necessarily imply that there is a non-derived nominal one. Hence, *verbal* particle.

[200] The same aspectual meaning seems to be found also in *slite ut* 'wear out', *sove ut* '≈ sleep in', *regne ut* 'calculate', *finne ut* 'find out, discover' along with constructions involving the particle *opp* 'up' resulting in the same telic semantics: *spise opp* 'eat up', *drink up* 'drink up' and *skrive opp* 'write down' (See Faarlund et al. 1997:642). In some cases, the particle changes the argument structure of the verb. For verbs that are ambitransitive such as *lese* 'read', the addition of any verbal particle makes the particle-verb construction obligatorily transitive (Faarland et al. 1997:666).

Table 32 – particles, Urban Eastern Norwegian

Prefix	Base form		Prefixed form	Gloss
av-	*tale*	[^{2}tɑ:lə]	[^{1}ɑ:ʋˌtɑ:lə]	‘agree (v)’
	tale	[^{2}tɑ:lə]	[^{2}ɑ:ʋˌtɑ:lə]	‘deal, contract (n)’
ut-	*tale*	[^{2}tɑ:lə]	[^{1}ʉ:ˌtɑ:lə]	‘pronounce (v)’
	tale	[^{2}tɑ:lə]	[^{2}ʉ:ˌtɑ:lə]	‘pronunciation (n)’
	føre	[^{2}fø:ɾə]	[^{1}ʉ:tˌfø:ɾə]	‘export, execute (v)’
	førsel[201]	[^{1}fœʂ.ʂəl]	[^{2}ʉ:tˌfœʂ.ʂəl]	‘export (n)’
inn-	*ta*	[^{1}tɑ:]	[^{1}inˌtɑ:]	‘eat, take in (v)’
	tak	[^{1}tɑ:k]	[^{2}inˌtɑ:k]	‘eating, intake (n)’
mot-	*ta*	[^{1}tɑ:]	[^{1}mu:ˌtɑ:]	‘receive (v)’
	tak	[^{1}tɑ:k]	[^{2}mu:ˌtɑ:k]	‘reception (n)’
på-	*stå*	[^{1}sto:]	[^{1}po:ˌsto:]	‘claim (v)
	stand	[^{1}stɑn]	[^{2}pɔ:ˌstɑn]	‘claim (n)’
an-	*gripe*	[^{2}gɾi:pə]	[^{1}ɑŋˌgɾi:pə]	‘attack (v)’
	grep	[^{1}gɾe:p]	[^{2}ɑŋˌgɾe:p]	‘attack (n)’

As we can see, the tonal accent of particle constructions in Urban Eastern Norwegian is sensitive to the lexical category, clearly demonstrated by “minimal” pairs such as *avtale* (v) [^{1}ɑ:ʋˌtɑ:lə] and *avtale* (n) [^{2}ɑ:ʋˌtɑ:lə], where the only factor that distinguishes between them is the tonal accent. It should be noted though, that deverbal nouns preserve the tonal accent from the verbal root, e.g. *utføring* [^{1}ʉ:tˌfø:ɾiŋ] ‘the act of exporting’.

[201] This lexical item can be argued to have a nominalising suffix *–sel*. It is found in a number of lexical items where the root appears to be a verbal stem. However, the semantics of roots suffixed with *–sel* do not appear to include the event itself. Thus, *brensel* ‘fuel, firewood’, which seems to be based on the verbal root *brenn(e)* ‘burn’ (the nominal root would have a change in the root vowel, *brann* ‘fire’) and the suffix *–sel* does not entail any events of fire or burning.

One systematic exception to the lexical category sensitive tonal accent distribution in UEN is found in cases with disyllabic particles, which all surface with accent 2 regardless of the lexical category of the base. This is shown in Table 33 below:

Table 33 – disyllabic particles

Prefix	Base form		Prefixed form	Gloss
under-	*slå*	[¹ʂlɔ:]	[²ʉn.nəˌʂlo:]	'embezzle (v)'
	slag	[¹ʂlɑ:g]	[²ʉn.nəˌʂlɑ:g]	'embezzlement (n)'
over-	*ta*	[¹tɑ:]	[²o:ʋəˌʈɑ:]	'take over (v)'
	tak	[¹tɑ:k]	[²o:ʋəˌʈɑ:k]	'upper hand (n)'
gjennom-	*gå*	[¹go:]	[²jɛn.nɔmˌgo:]	'undergo (v)'
	gang	[¹gɑŋ]	[²jɛn.nɔmˌgɑŋ]	'passage (n)'

In Tromsø Norwegian on the other hand, there is no tonal accent opposition that mirrors the alternation in lexical category for particles. In this variety, we find neutralisation in the direction of accent 2 for all the data in Table 32 (this also includes the disyllabic particles in Table 33). Thus, the only parameter that tells nouns from verbs for Tromsø Norwegian is if there is any melodic adjustment giving away the lexical category such as in *innta* vs. *innta<u>k</u>*. Consequently, *avtale* [²ɑ:ʋˌtɑ:lə] and *uttale* [²ʉ:ˌtɑ:lə] are ambiguous in Tromsø Norwegian in that they can be interpreted both as a noun and as a verb.

6.1.2 Prefixes cooccurring with suffixes

As seen in the previous section, negative prefixes carry stress realised as accent 2 when attached to simple adjectival. Some more examples are given in (6-2) below (IPA for TN):

(6-2) a. *uekte* [²ʉ:ˌæktə] 'unathentic'
b. *ufin* [²ʉ:ˌfi:n] 'rude'
c. *ujevn* [²ʉ:ˌjæʋn] 'uneven'
d. *ulik* [²ʉ:ˌli:k] 'different (lit. un-like)'
e. *vanfør* [²ʋɑnˌfø:ɾ] 'disabled'

However, this pattern gets more complicated if we look at *derived* adjectives where stress sometimes fall on the base word instead of on the prefix. Derivational adjectivalising suffixes, most commonly *–(l)ig*, appear to affect stress placement such that it falls on the morpheme to its immediate left. This "shift" in stress placement is also accompanied by a "shift" to accent 1 and is found in both TN and UEN, as shown in Table 34 (IPA given for TN):[202]

Table 34 – unstressed negative prefixes

Prefix	Base form		Suffix	Derived form	Gloss
u-	*føl* 'feel'	[¹fø:l]	*-som*	[ʉ¹fø:lsɔm]	'insensitive'
	såre 'wound'	[²so:ɾə]	*-bar*	[ʉ¹so:ɾbɑ:ɾ]	'invulnerable'
	lykke 'luck'	[²lyk.kə]	*-lig*	[ʉ¹lyk.kəli]	'unhappy'
	venn 'friend'	[¹ʋæn]	*-lig*	[ʉ¹ʋænli]	'unfriendly'
	syn 'vision'	[¹sy:n]	*-lig*	[ʉ¹sy:nli]	'invisible'
	fare 'danger'	[²fɑ:ɾə]	*-lig*	[ʉ¹fɑ:li]	'harmless'
	lov 'law'	[¹lɔ:ʋ]	*-lig*	[ʉ¹lɔ:ʋli]	'illegal'
mis-	*tenke* 'think'	[²tæŋkə]	*-som*	[mis¹tæŋksɔm]	'wary'
	tenke 'think'	[²tæŋkə]	*-lig*	[mis¹tæŋkəli]	'suspicious'
van-	*vitt*[203] 'wit'	[¹ʋit]	*-ig*	[ʋɑn¹ʋit.ti]	'insane'
u-+mis-	*tenke* 'think'	[²tæŋkə]	*-lig*	[ʉmis¹tæŋkəli]	'unsuspicious'
	kjenne 'know'	[²çɛɲ.ɲə]	*-lig*	[ʉmis¹çɛɲ.ɲəli]	'unmistakeable'

[202] It should be noted though, that the pattern is highly variable across the Norwegian language area, with prosodic size and dialect group being relevant factors (Faarlund et al. 1997:92). For instance, Eastern Norwegian varieties (*austnorsk*, see section 1.4) are more likely to have stress on the prefix and accent 2. Some of the derivatives in Table 34 are possible with stress on the prefix also in TN, but that also entails accent 2 (e.g. *ufarlig* pronounced as [²ʉ:ˌfɑ:li]). Hovdhaugen (1970) states that an unstable and variable pattern normally represents a change in progress, but Kristoffersen (2000:197, footnote 38) points out that the variability seems to be relatively stable.

[203] This root appears in various phonological forms depending on the morphosyntactic context. In the non-affixed form, the root vowel is /e/, *vett* [¹ʋɛt] 'sense', and this is kept in the denominal adjective *vettig* [²ʋɛt.ti] 'sensible'. In the prefixed derivative, however, the root vowel is /i/, *vanvidd* [²ʋɑnˌʋid] 'insanity', with an additional change from /d/ to /t/, probably due to influence from Danish. In the negative denominal adjective, we

As can be seen from the data in Table 34, when primary stress falls on the base instead of on the prefix (or group of prefixes), the result is accent 1, which stands in contrast to the prosodic properties of the derivatives we had in (6-2). The prerequisite for accent 1 in such constructions is actually the combination of stress placement (i.e. not left-aligned) with the presence of a prefix *and* a suffix. Thus, the absence of a derivational adjectivalising suffix combined with the presence of a prefix (as in (6-2)), *or* the presence of a derivational adjectivalising suffix combined with the absence of a prefix (as in (6-3) shown below) result in accent 2. The whole "paradigm" is shown in (6-4).

(6-3) a. *følsom* [^{2}fø:lsɔm] 'sensitive'
b. *sårbar* [^{2}so:ɾˌbɑ:ɾ] 'vulnerable'
c. *synlig* [^{2}sy:nli] 'visible'
d. *lovlig* [^{2}lɔ:ʋli] 'legal'
e. *tenkelig* [^{2}tæŋkəli] 'imaginable'

(6-4) a. *lykke* [^{2}lyk.kə] 'luck'
b. *ulykke* [^{2}ʉ:ˌlyk.kə] 'accident, misfortune'
c. *lykkelig* [^{2}lyk.kəli] 'happy'
d. *ulykkelig* [ʉ^{1}lyk.kəli] 'unhappy'

We also find the same kind of alternation for the prefix *for–*. Recall from section 6.1.1 that *for–* carries primary stress realised as accent 2 for nominal stems (e.g. *forsvar* [^{2}fɔʂˌʋɑ:ɾ] 'defence') while in verbal stems, the base carry the primary stress realised as accent 1 (e.g. *forsvare* [fɔ.^{1}ʂʋɑ:ɾə] 'defend'). In denominal adjectives involving the prefix *for–*, stress is "shifted" away from the prefix to the base, and the tonal accent "shifts" too. This is true for both TN and UEN. Data is given in Table 35 below (IPA given for TN):

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find /t/ again: *vanvittig* [ʋɑn^{1}ʋit.ti] 'insane'. The form *vittig* [^{2}ʋit.ti] with the meaning 'witty' does exist, but that is a borrowing from German and thus not part of the same paradigm. However, the Norwegian root and the German root are cognates.

Table 35 – the prefix for- *in denominal adjectives*

Prefix	Nominal form	Suffix	Derived adjective	Gloss
for-	*forskjell* [²fɔʂˌʂɛl]	*-lig*	[fɔ¹ʂɛl.li]	‘difference/different’
	forbilde [²fɔɾˌbildə]	*-lig*	[fɔɾ¹bil.lədli]	‘role model/exemplary’
	forsett [²fɔʂˌʂæt]	*-lig*	[fɔ¹ʂætli]	‘intention/intentionally’
	forsvar [²fɔʂˌʋɑ:ɾ]	*-lig*	[fɔ¹ʂʋɑ:li]	‘defence/defendable’

Earlier we have seen that secondary derivatives such as deverbal nouns (e.g. *forbindelse* [fɔɾ¹bin.nəlsə] ‘connection’ or UEN *utføring* [¹ʉ:tˌfø:ɾiŋ] ‘the act of exporting’) do not conform to the distribution of tonal accent determined by lexical category because they keep the one they have inherited from the embedded verb. The data we see in Table 35 on the other hand, shows that secondary derivatives do not always inherit tonal accent from the embedded domain.

We find the same kind of pattern if we look at constructions with verbal particles. Recall from the previous section that verbal particles realised as prefixes carry primary stress. In UEN, the lexical category of the construction determined tonal accent (verbs: accent 1, nouns: accent 2) while there was no sensitivity to lexical category in TN where constructions with verbal particles were assigned accent 2. We see, however, stress “shifts” of the type described above for verbal particle constructions in both varieties. That is, stress, realised as accent 1, falls on the base in deverbal/denominal adjectives (IPA in Table 36 given for TN).[204]

[204] We actually find the same pattern in a set of deverbal nominals derived through suffixation of *–else*, e.g. *innflytelse* [TN: iɲ¹fly:təlsə] ‘influence’ (from *inn* ‘in’ + *flyte* ‘flow, float’ + *–else*) and *opplevelse* [TN: up¹le:ʋəlsə] ‘experience’ (from *opp* ‘up’ + *leve* ‘live’ + *–else*) but this is maybe less common than for adjectival derivatives formed with *–(l)ig*.

Table 36 – unstressed verbal particles in deverbal/denominal adjectives

Prefix	Base form		Suffix	Derived form	Gloss
på-	*stå* ‘stand’	[^{1}stɔː]	*-lig*	[po^{1}stɔː.əli]	‘insistent’
mot-	*ta(k)* ‘take’	[^{1}tɑː]	*-lig*	[mu^{1}tɑːkəli]	‘responsive’
ut-	*føre* ‘lead’	[^{2}føːɾə]	*-lig*	[ʉt^{1}føːli]	‘elaborate (a)’
	holde ‘hold’	[^{2}hɔl.lə]	*-lig*	[ʉt^{1}hɔl.ləli]	‘tolerable’
opp-	*nå* ‘reach’	[^{1}noː]	*-lig*	[up^{1}noː.əli]	‘attainable’
an-	*gripe* ‘seize’	[^{2}gɾiːpə]	*-lig*	[ɑn^{1}gɾiːpəli]	‘attackable’
	ta(k) ‘take’	[^{1}tɑː]	*-lig*	[ɑn^{1}tɑːkəli]	‘presumably’
	svar ‘answer’	[^{1}sʊɑːɾ]	*-lig*	[ɑn^{1}sʊɑːli]	‘responsible’
til-	*fall*[205] ‘case’	[^{1}fɑl]	*-ig*	[til^{1}fɛldi]	‘random’

This prosodic pattern with derived adjectives is in fact even more general. For instance, we find that stress and tonal accent are “shifted” in some derived adjectives where the non-head is a regular root and not a prefix (at least not in the classical sense). In addition to this, there are also cases which are not readily morphologically decomposable, but where we still see a “shift” in stress and tonal accent. This is shown in Table 37 below (IPA given for TN). The two first examples are morphologically decomposable; the rest is not.

[205] This nominal root undergoes certain mutations in morphologically complex forms. With the particle *til*–, it changes to *felle*. Suffixation of –*ig* requires an epenthetic /d/.

Table 37 – unstressed non-prefixal items[206]

Unsuffixed form		Suffix	Derived adjective	Gloss
høytid	[²hœjˌti:]	*-lig*	[hœj¹ti:dəli]	'solemn'
selvfølge	[²sælˌfœlgə]	*-lig*	[sæl¹fœlgəli]	'of course, selv-evident'
edru	[²æ:drʉ]	*-lig*	[e¹drʉ:.əli]	'moderate
alvor	[²ɑlˌʋo:ɾ]	*-lig*	[ɑl¹ʋo:li]	'serious'
vilkår	[²ʋilˌko:ɾ]	*-lig*	[ʋil¹ko:li]	'arbitrary'
eventyr	[²æ:ʋənˌty:ɾ]	*-lig*	[æʋən¹ty:li]	'adventurous'
hovmod	[²ho:ʋˌmu:d]	*-ig*	[hoʋ¹mu:di]	'proud'

Thus, the general picture that arises is that adjectivalising suffixes such as *–lig* do have an effect on stress placement in that stress seems to be pulled to (or retained on) an object that is found on its immediate left. If this stress ends up being left-aligned in the word, it is realised with accent 2 (with the exception of particle verbs in UEN which take accent 1, see Table 32) while the elsewhere case (i.e. stress not left-aligned) is covered by accent 1.

6.2 Towards an analysis

In this section, I present the details of the analysis of tonal accent in structures containing prefixes in Tromsø Norwegian and I will focus on negative prefixes, such as *u–*. Constructions with prefixes have a lot in common with compounds in that we can distinguish between two main parts. The prefixed lexical item is modified by the prefix in the same way the head in compounds is modified by the non-head. Exactly how the phonological content of the syntactic node that corresponds to the prefix ends up being realised as such (i.e. a bound morpheme linearised to the left of the base) need not concern us here. However, the fact that it is realised as a prefix, hints at a type of modification that is much more constrained than the one we see between the head and the non-head in compounds. This difference notwithstanding, in this

[206] The meanings of the unsuffixed forms are as follows: *høy-tid* 'holiday' (lit. high time), *selv-følge* 'self-evidentiality (lit. self-consequence), *edru* 'sober', *alvor* 'gravity', *vilkår* 'condition, term', *eventyr* 'adventure' fairy tale' and *hovmod* 'pride'.

section I show that structures containing prefixes have many structural similarities with stem compounds (discussed in section 5.1), and that this is also reflected in their phonological behaviour. Thus, in spite of the prefixes being dependent on a base (i.e. they cannot be separated from it), they still enjoy a certain degree of phonological independency.

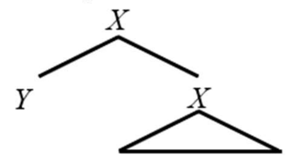
The data that needs to be accounted for is quite straightforward. Abstracting away from the phonological dependency that prefixes have on their base, prefixes have, as we have seen in section 6.1, a phonological behaviour that is similar to non-heads in stem compounds. Prefixes are able to carry primary stress, in which case it is realised as accent 2 in TN (see section 6.1.1), e.g. *ufin* [²ʉː.ˌfiːn] 'rude'. That is a property that is typical of categorised roots (i.e. stems) when they occur as non-heads in compounds.

As for the assumptions regarding the morphosyntactic structure building process, these are largely the same as for the compounds), which have been explored in detail in chapter 5. However, additional assumptions and points of clarifications are apt as we are dealing with a slightly different type of structure. These address properties pertaining to the prefixes that have been chosen for this analysis (i.e. negative prefixes), their nature and their position with respect to the base. Our assumptions concerning the derivational process itself remain pristine.

- *Prefixes are adjuncts*: Di Sciullo (1997) argues that prefixes are adjuncts, as they do not change the syntactic distribution of the base to which they attach. Thus, in a configuration $_X$[Y X] where the merger between Y and X is still projected as X, Y is an adjunct. The syntactic configuration is shown in (6-5) below.[207] Consequently, since the prefix-base constellation *uvær* [²ʉː.ˌʋæːɾ] 'bad weather' has the same syntactic distribution as the noun *vær* [¹ʋæːɾ] 'weather', the prefix *u–* is an adjunct.

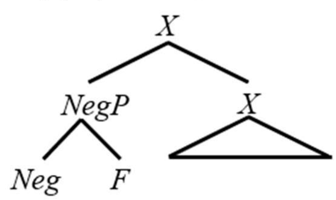
[207] Di Sciullo operates with different attachment heights with respect to the head and the projection of the head, reflecting the scope the prefix has on the semantics of the head. I assume an adjunction site that is outside the categorisation of the root (*u–* attaches to adjectival and nominals stems) but inside (at least some of) the functional projections of the head. For instance, *u–*prefixation blocks suffixal comparative formation in adjectives: *redd–reddere* 'afraid–more afraid' but *uredd–*ureddere* 'fearless-more fearless' (cf. *mer uredd*). This is also what was assumed for compounds (see section 4.2.5).

(6-5) *Prefix-base template*



- *Negation is a complex constituent*: I follow De Clercq (2013) in assuming that negation is a complex constituent that is inserted into the structure. De Clercq operates with a negative nanospine that can be of different sizes, depending on the scope the negation has in each particular case. For the case at hand, negation with prefixes such as *u*– represents what De Clercq labels Q^{Neg}-markers, the smallest type of negation, that take scope in Quantifier Phrases, a functional projection she assumes dominates Adjective Phrases. For adjectives in particular, this means that *u*– imposes a scalar interpretation of the adjective and restricts the denotation of the adjective to the outer (negative) end of the scale. As *u*– can also be used as a prefix in nominal contexts in Norwegian, I assume that *u*– plays a similar role there. For ease of exposition, the label Neg is used here instead of Q^{Neg}. The structure is shown in (2) below:

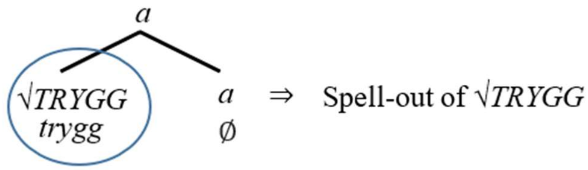
(6-6) *Structure of prefixal negation* u–



When it comes to the content of the syntactic nodes inside the *NegP*, this is outside the scope of this thesis. However, a possibility is that one part corresponds to negation while the other is a functional head F linked to the imposed scalar interpretation of the head element. For further details, the reader is referred to De Clercq (2013).

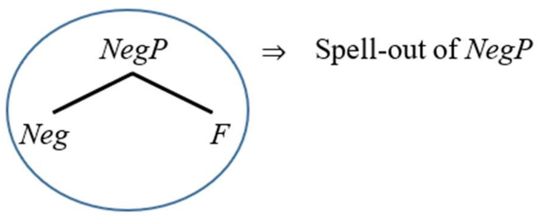
With the proposed syntactic structure of prefix-base complexes as in (6-5) in mind, let us start by observing the derivation of the lexical item *utrygg* [²ʉːˌtryg] 'unsafe', which receives accent 2. Just like for stem compounds, the derivation takes place in two separate syntactic workspaces due to the internal complexity of the negative adjunct. The first step is shown in *Workspace I* below, where the root √*TRYGG* is merged with an abstract adjectival categoriser *a*, thus creating the head of the prefix-base complex.

Step 1: *Workspace I*



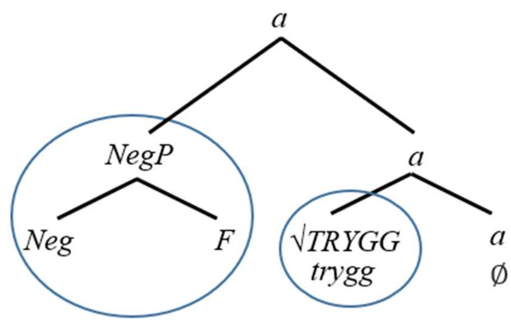
According to our assumptions concerning phasal Spell-out, the abstract categoriser *a* triggers Spell-out of its complement, which in this case means that the root √*TRYGG* is shipped off to the interfaces PF and LF for interpretation. The phasal head *a* is not included in this Spell-out domain. The second step of the derivation takes places in a separate syntactic workspace, *Workspace II*, where the elements of the prefixal negation are assembled:

Step 2: *Workspace II*



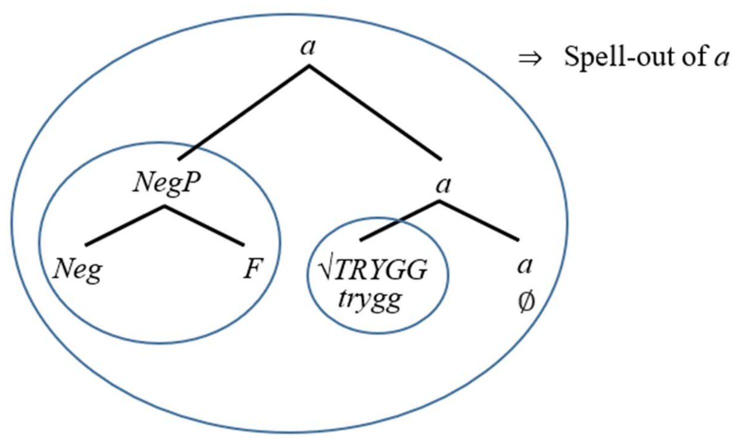
In step 2, we see the merger between the two abstract functional heads to form *NegP*, a type of negation that imposes scalar interpretations on the head that it modifies. None of the syntactic items in step 2 is a phasal head triggering Spell-out. However, as the syntactic object *NegP* is constructed outside the main spine in *Workspace I*, it needs to undergo Spell-out so as to make it eligible for adjunction to the main spine. This is in accordance with Uriagereka's (1999) Multiple Spell-out. The Spell-out in step 2 thus applies to the entire structure. When the object in *Workspace II* has been Spelled-out, it is ready to be plugged into the main structure. This leads us to step 3, where the syntactic object in *Workspace II* is adjoined to the one in *Workspace I*:

Step 3: *Workspace I*



Following Di Sciullo (1997), the label of the resulting structure is inherited from the head. With this step, what constitutes the prefix-base complex itself has been completed in the morphosyntax. This does not exclude the potential for adding relevant functional structure on top of it, such as number and degree, but this does not add to the completeness of the structure per se, as defined in (6-5). There is however, a step number 4 where everything under the topmost *a* is Spelled-out:

Step 4: *Workspace I, final Spell-out*



In step 4, everything that is found under the topmost *a* node is Spelled-out. That is, the entire prefix-base complex itself. Spell-out in this case is presumably triggered by a functional phasal head (possibly the D head) higher up in the structure (not shown in step 4). The merging of such a functional head on top of the prefix-base complex we have built so far will result in Spell-out of the complement of the head, i.e. the top *a* in step 4.

The derivation of the prefix-base complex has striking similarities with the derivation of stem compound structures, as discussed in section 5.1. Both types of structure Spell-out heads and modifiers separately before they are merged and undergo a Spell-out together. Just like for the stem compounds, I assume that prefix-base complexes are also subject to the PIC (see section 4.3.2.2). That is, the interpretations at the interfaces triggered by the "outer" Spell-out of the topmost *a* in step 4 do not change the interface interpretations that have already applied at the "inner" Spell-outs (as discussed in section 5.1, reassignment of stress conceptualised as *building* of metrical structure does not represent a violation of the PIC). Thus, the similarity in derivational history between the two types of structure is also reflected in their semantic and phonological properties, to which we now turn.

Starting with the semantic interpretation, the first relevant point is in step 1 where the head root is merged with the abstract adjectivalising head, establishing adjectival semantics of the head root. The second relevant point is in step 2 where negation is merged with some functional head F, establishing the semantics of the prefix *u*–, negation in a scalar context. These are shown in the lexical entries below:

(6-7) a. √*TRYGG*
⇓
√*TRYGG* in the context of *a* ⇔ *trygg* 'safe (a)'

b. *Neg* + F
⇓
R ('(scalar) negation', x) ⇔ *u*– 'un–'

The root √*TRYGG* is devoid of content (see discussion about roots in section 4.3.1), but when it is merged with the categorising head, it is shipped off to the interfaces for interpretation. This interpretation is sensitive to the structural context in which the root is located. Semantically, the root √*TRYGG* is interpreted as an adjective in the context of *a*, giving us the lexical entry trygg 'safe (a)'.

As for negation, I assume that we are not dealing with a root here, but with an operator along with quantifiers (e.g. *three*, *most*) and conjunctions (e.g. *and*, *or*). Operators naturally differ with respect to what they do and how many arguments they take. Here I include negation in the group of tripartite structures, which consist of the relevant operator itself and two arguments.[208] The operator identifies the relation between the two arguments, which are known as the

[208] Note that this is about negation in natural language. Logical negation on the other hand is a monadic function, taking only one argument.

restrictor (the first argument) and the nuclear scope (the second argument). We can thus classify negation as a functional item. The *Neg* operator is then merged with a functional projection F, which acts as the restrictor argument, providing instructions as to the nature of the negation. This complex constituent has to be Spelled-out because it is located outside the spine of the (main) tree. At the LF interface, this is interpreted as a Relation *R*, which we already know from compounds (see section 4.1.1 and chapter 5).[209] The tripartite structure of the negation and the structure of the Relation *R* are very similar, but not isomorphic. In the former, the negation defines the relation whereas in the latter, negation is part of the first variable of the Relation *R* together with F. The first argument of the Relation *R* is thus negation in combination with the functional head F (the restrictor). Our assumption is that F imposes a scalar interpretation. The second variable *x* is unspecified at this point because its input is external to the current Spell-out domain. In other words, the scope of the negative scale remains underspecified until *x* is valued.

This brings us to the third and last relevant step, step 3, where the two pieces of the structure are Spelled-out together. Due to the PIC, the semantic interpretation that has taken place in earlier Spell-out cycles will have to stay also for the prefix-base complex as a whole. The underspecified semantic structure of the negation plugs into the semantic structure of the adjective *trygg*, taking scope over it, with the result that the prefix-base complex denotes a set of degrees at the outer end of the scale of *trygghet* 'safety' (illustration adapted from De Clercq 2013:32):

(6-8) *Semantic scale for negative* u–

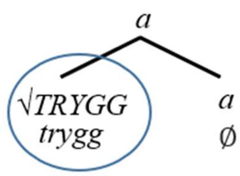
Turning now to the PF interface, the same assumptions as for the stem compounds apply here. They are repeated briefly here. I assume a *late insertion* model where syntactic terminals are filled with phonological content *after* each step in the syntactic derivation. Vocabulary insertion is furthermore governed by the subset principle, allowing vocabulary items to be

[209] The Relation *R* in this case may be argued to be different from the one we saw for compounds, as there is no *L* head for prefixes. A different label would perhaps be pertinent here, but that is outside the scope of the thesis.

underspecified with respect to the features of the syntactic terminals. Finally, operations in PF are divided between cyclic and non-cyclic operations, where the former are allowed to be "overwritten" throughout the derivation.

In step 1 in the derivation of *utrygg*, we opened a workspace, *Workspace I*, where the root √*TRYGG* was merged with an abstract adjectival categoriser, *a* (repeated here):

<u>Step 1:</u> *Workspace I*



⇒ Spell-out of √*TRYGG*

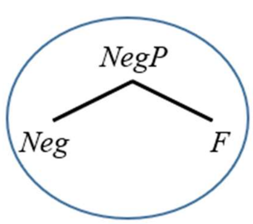
(6-9) √TRYGG in the context of a ⇔

<u>Lexical entry, PF</u>
- segmental make-up, /tryg/.
- no underlying tonal accent.

First, the system identifies the string /tryg/ as the best fit for the Spell-out of the root √*TRYGG* in the context of *a*, in accordance with the subset principle. The string is then subjected to PF operations to make sure that the output of the phonological computation respects the stress-induced bimoraicity requirement. In the string /tryg/, bimoraicity is obtained by giving the coda consonant Weight-by-Position so no vowel lengthening is necessary in this case.

The next step in the derivation that is relevant for PF is step 2 where the negative operator is merged with the functional head F. PF starts by scanning the vocabulary list for the VI that best fits the morphosyntactic context, just like for the previous step. The structure in step 2 is repeated below, and is followed by the lexical entry:

<u>Step 2:</u> *Workspace II*



⇒ Spell-out of *NegP*

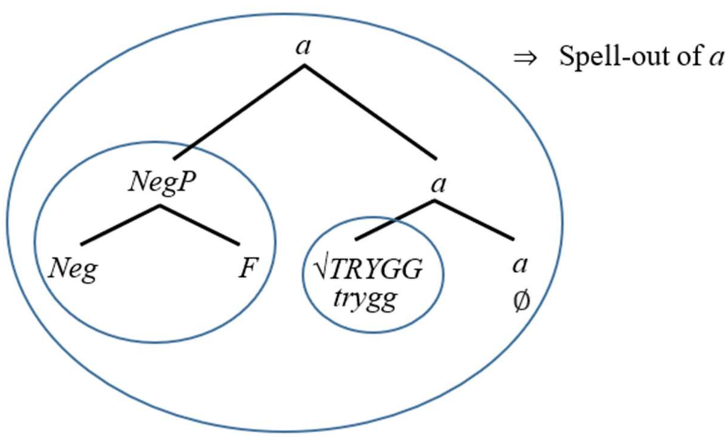
(6-10) *Neg* + F ⇔

<u>Lexical entry, PF</u>
- segmental make-up, /ʉ-/.
- no underlying tonal accent.

In the lexical entry in PF, the segmental string /ʉ-/ is identified as the best fit for the morphosyntactic context in accordance with the subset principle.[210] An interesting observation here is that the segmental string /ʉ-/ seems to be very simple phonologically, but it corresponds to two syntactic terminal nodes (i.e. the combination of *Neg* and F). It is this internal complexity that makes it a Spell-out domain with everything that follows in terms of PF operations. As there is only one syllable with only one segment, stress assignment and subsequent prosodic expansions to meet the bimoraicity requirement is given. In the string /ʉ-/, the vowel is in a stress-cycle and is lengthened: /ʉ:-/.[211]

The last part of the derivation that is relevant for PF is found in step 4 (repeated below), where the prefix-base complex has been assembled and Spelled-out as a whole (due to some phasal head higher up in the structure):

Step 4: *Workspace I*



[210] I assume the lexical entry also contains instructions for PF to realise the vocabulary item as a prefix.

[211] The English cognate *un–* shows a parallel phonological independence by resisting nasal place assimilation (e.g. *un-predictable*, **um-predictable*). This has been analysed through representational means, such as granting *un–* Prosodic Word status (Booij and Rubach 1984), and assuming that nasal place assimilation only applies within Prosodic Words but not across Prosodic Word boundaries. A derivational account has been suggested by Newell (2005) where *un–* constitutes its own numeration with the consequence that it will be Spelled-out before it is adjoined to the main spine.

The Spell-out of the prefix-base complex in step 4 puts us in a situation where both parts of the complex have already been subjected to Spell-out. This means that the two parts of the complex have been interpreted at the interfaces independently from each other. There is in other words no separate lexical entry for the topmost *a* and it thus inherits the segmental information from each of its members in accordance with the PIC. This includes any segmental length induced by stress assignment. However, following our assumptions, PF is still allowed to build metrical structure elsewhere in case the structural conditions have changed (apparent reassignment of stress) as long as it does not delete previously built metrical structure.

Turning now to stress assignment for the derived object in step 4, we can see that the prefix-base complex has the same Spell-out structure as stem compounds. That is, two adjacent Spell-out domains contained in a larger one. As mentioned in the analysis for stem compounds (see section 5.1), a characteristic trait of Norwegian compounds is that they always have initial stress, regardless of the internal syntactic structure. This is also the stress assignment rule we find in prefix-base complexes (looking away from different stress patterns in derived adjectives discussed in section 6.1.2), with the perhaps counterintuitive result that the most prominent part of the prefix-base complexes under discussion is the prefix.

The remaining PF operation that we will discuss in relation to step 4 is assignment of tonal accent. According to our assumptions, only polysyllabic words have the potential for being lexically specified for tonal accent through the abstract diacritic (ˣ) (phonetically implemented as accent 1). In none of the lexical entries related to the base adjective or the prefix is there any underlying tonal accent so the structure in step 4 cannot "inherit" one either. The Spell-out domain that encompasses both the prefix and the base adjective is polysyllabic so in principle it is eligible for underlying tonal accent. However, that would presuppose a separate lexical entry for the topmost *a* node in step 4. Instead, we get assignment of default tonal accent for polysyllabic domains later on in the derivation: accent 2. Consequently, the output of the phonological computation is [^{2}ʉːˌtryg].

6.3 Suffixal influence

The analysis developed in the previous section for prefixed words puts them in the same category as compound structures prosodically speaking. More specifically, prefix-base constructions in TN are stressed on the initial element (i.e. the prefix) and this stress is realised as accent 2. Thus, prefixes can, in some sense, behave like roots. There are, however, cases where a prefix, which is in principle stressable, does not carry stress. This was shown in 6.1.2 where derived adjectives in particular have stress, realised as accent 1, on the base word instead of on the prefix. We thus have a prosodic pattern that does not readily follow from the analysis of the negative prefix *u–* in section 6.2. The relevant "paradigm" is repeated in (6-11) below:

(6-11) a. *lykke* [^{2}lyk.kə] 'luck'
b. *lykkelig* [^{2}lyk.kəli] 'happy'
c. *ulykke* [^{2}ʉˌlyk.kə] 'accident, misfortune'
d. *ulykkelig* [ʉ^{1}lyk.kəli] 'unhappy' (cf. *uekte* [^{2}ʉˌæktə] 'illegitimate')

It is this alternation I intend to analyse in this section, because it represents a puzzle as the derived adjective in (6-11)d has two unexpected properties. First, it has an unexpected stress placement as the prefix *u–* in general is able to carry stress (see Table 30 in section 6.1.1). Second, it has an unexpected tonal accent because, according to our assumptions, accent 1 has two sources: i) lexical marking in polysyllabic domains or ii) default accent for monosyllabic domains (see chapter 3). Default accent 1 in (6-11)d is excluded because we are dealing with a polysyllabic domain while lexical marking is excluded because the constituent parts of (6-11)d are each compatible with accent 2. Thus, it would not be clear in which morpheme accent 1 would reside as it does not show up in any other parts of the "paradigm". Consequently, the question is how we can derive accent 1 in these polysyllables seeing that both sources to accent 1 seem to be blocked. A possible solution to the puzzle would be to say that when *u–* appears in an adjectival context, it is unstressed and induces accent 1 (a behaviour reminiscent of the prefix *be–* discussed in LWJS' analysis in section 3.2.2.2). This would only work under the assumption that derived and non-derived adjectives do not take the same *u–*. However, positing two different lexical entries for prefixes mirroring their prosodic properties would lead to a whole generalisation going under the radar. As we have seen, the pattern where stress "shifted" away from the left edge is realised with accent 1 goes beyond the realm of prefix-base complexes (e.g. *høytid* [^{2}hœjˌti:] 'holiday' vs. *høytidelig* [hœj^{1}ti:dəli] 'solemn' and *alvor* [^{2}ɑlˌʋo:ɾ] 'gravity' vs. *alvorlig* [ɑl^{1}ʋo:li] 'serious').

This section is organised as follows: in 6.3.1, I briefly present a few earlier analyses of the alternation. I then move on to section 6.3.2 where I give the details of the current proposal, showing that the alternation falls out from general assumptions we have already made in this thesis about assignment of tonal accents. We will see that the key to the puzzle lies in the prosody that the adjectivalising suffix *–lig* imposes on its complement. This also hints at a version of accent 1 that is stress-induced, a notion that we will see can also be applied to roots with final stress. Finally, in section 6.3.3, I discuss other potential sources to accent 1 apart from the ones that have been discussed hitherto.

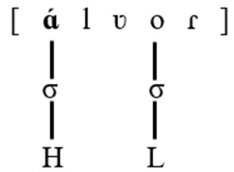
6.3.1 Earlier analyses

The variety of Norwegian that has received most attention in phonology is Urban Eastern Norwegian (Kristoffersen 2000:8-10) and the analyses that are discussed in this section are no exception. The phonetic details in these accounts only apply to that variety. As a reminder to the reader, accent 1 in UEN is realised as LH while accent 2 is realised as HLH (see also section 2.1.1). In what follows, we will abstract away from the final H and see the contrast as L vs HL. The phonetic details aside, the phonology behind them when it comes to the alternation in question is, as far as I know, the same for all tonal varieties of Norwegian. This section is organised as follows: section 6.3.1.1 considers accounts that have proposed a separation of tone from stress, allowing the two phonological tiers to be mis-aligned. In section 6.3.1.2, we return to Kristoffersen (2000), which was discussed in section 3.2.2.1, but for the completeness for the topic at hand, I briefly present the specifics of his view on the alternation. It will also be clearer how the analysis advocated in this thesis differs from Kristoffersen's account. A general characteristic of these earlier accounts of the alternation is the assumption that accent 2 is somehow at the core of it, but that it fails to surface or is contorted for various reasons.

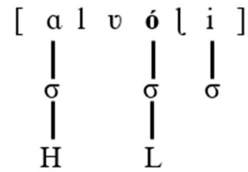
6.3.1.1 Tone/stress separation

The tonal accent alternation has been analysed in some approaches as a case of separation of tone and stress. The central claim in these approaches is that although stress and tone are very tightly connected in Norwegian, they are in principle independent from each other such that stress can be displaced from tone through attachment of stress shifting affixes. This view has been advocated by Withgott and Halvorsen (1984), Aslaksen (1991) and Kristoffersen (1993), albeit from slightly different angles. However, for alternations such as *alvor* [^{2}ɑlˌʋoːɾ] 'gravity' vs. *alvorlig* [ɑl^{1}ʋoːli] 'serious', they all posit that accent 2 (i.e. HL) is underlying in both forms. Abstracting away from their respective underlying representations, the surface form of the noun *alvor* [^{2}ɑlˌʋoːɾ] has the L of the accent 2 melody linked to the post-stress syllable while the stressed syllable hosts the initial H as shown in (6-12)a below.

(6-12) a.



b.



When the adjectivalising suffix *–lig* is added in (6-12)b, the stress shifts one syllable to the right, but the alignment of the tones stays the same. In this way, the underlying accent 2 is contorted in the adjective, such that it appears on the surface to be accent 1, i.e. the stressed syllable is linked to an L tone. As for surface accent 1 in derived adjectives with prefixes (e.g. *ulykkelig* [ʉ^{1}lyk.kəli] 'unhappy'), it is only discussed by Aslaksen (1991) and Kristoffersen (1993). They provide a slightly different derivation but the basic insight is the same: an accent 2 domain is established but with stress shifted such that it coincides with the L instead of the initial H.

<u>Assessment:</u>

Withgott and Halvorsen (1984), Aslaksen (1991) and Kristoffersen (1993) account for the alternation on the assumption that stress and tone can be separated from each other such that stress can shift without affecting the alignment the tones have with their respective TBUs. The result is that surface accent 1 sometimes corresponds to underlying accent 2. This may well be true for Urban Eastern Norwegian, but there are reasons to believe that it cannot be the correct analysis for Tromsø Norwegian. Recall from section 2.1.2, that the H in the accent 2 melody ^{L}HL in Tromsø Norwegian has the ability to span across several syllables, a behaviour most notably seen in compounds. This behaviour is not seen in the H of the accent 1 melody HL in Tromsø Norwegian. Thus, if some cases of surface accent 1 are underlyingly accent 2, we should expect to see H-spreading (see section 2.1.2) also for a subset of *surface* accent 1 (i.e. contorted accent 2). To test this prediction, adding a nominalising suffix such as *–het* will indicate if spreading takes place or not. Recall from section 2.2.2 that nominalisations based on *–het* generally inherits their tonal accent from the complement of *–het*. For instance, because *hemmelig* [^{2}hæm.məli] 'secret (a)' is accent 2, its *het*-nominalisation will also be accent 2: *hemmelighet* [^{2}hæm.məliˌheːt] 'secret (n)'. In TN, a H-tone plateau is found from the initial stressed syllable up until and including the adjectivalising suffix *–lig* (see (6-13)a below), indicating H-tone spreading (see also section 2.1.2). Now, if the tone/stress separation approach described above is right in positing an underlying accent 2 in the derived adjective *alvorlig* in (6-12)b, we should expect to see H-spreading in the *het*-nominalisation *alvorlighet* [ɑl^{1}ʋo:liˌhe:t] 'soberness', with the formation of a H-tone plateau that includes the suffix *–lig*, just like in (6-13)a. However, that is not what we find. Instead, we find that the H tone is realised on only one single syllable (the other syllables being L by default, see (6-13)b). This indicates that at least for TN, operating with an underlying accent 2 that surfaces as accent 1 in derived adjectives in a similar fashion to (6-12)b, is not warranted.

(6-13) a. b.

Another weakness with the tone/stress separation approach as described above is that it requires two separate derivational pathways to account for the entire data set. That is, one for derived adjectives *without* prefixes (e.g. *alvorlig*, as shown above) and one for derived adjectives *with* prefixes (e.g. *ulykkelig*). Aslaksen (1991) and Kristoffersen (1993) assume that the phonological conditions at the start of the derivations are different for the two, and they are thus required to posit two separate mechanisms to derive the same surface phonology in terms of tonal accent. It is questionable if we need all that machinery.

6.3.1.2 A morphological constraint on accent 2

In section 3.2.2.1, we reviewed the tonal accent account proposed by Kristoffersen (2000). Recall that Kristoffersen assumes that accent 2 is underlying in the shape of a floating H tone in the lexical representations of some roots and affixes. However, accent 2 is also subject to a number of constraints in Kristoffersen's account, of which the most important one for our purposes is the *morphological constraint* (p. 260). This constraint blocks accent 2 in morphologically complex words unless the trochee that hosts accent 2 is found at the left edge of the relevant domain (i.e. the prosodic word). Thus, deriving the correct stress pattern is crucial in order to account for what is for Kristoffersen the missing accent 2.

In what follows, I will go through the derivation of *ulovlig* [ʉ¹lɔːʋli] 'illegal' according to the system proposed by Kristoffersen (p. 196-199, 270-272). In the relevant lexical item, there are three morphemes involved: the stem *lov* 'law' and the two affixes *u–* and *–lig*, which Kristoffersen classifies as accent-2 inducing non-cohering affixes.[212] This means that they are both treated as prosodic words (i.e. they form their own stress domains) and that they both are lexically specified with an underlying H-tone, /ᴴ*u–*/ and /ᴴ*–lig*/ (the hallmark of accent 2 in UEN).[213] However, an explanation for the anomalous stress pattern is to be found in the properties of the suffix *–lig*. Looking first at the morphosyntactic position, Kristoffersen argues that the adjectivalising suffix *–lig* attaches to the root *lov* before negative prefixes such as *u–* because the negation represented by *u–* is a negation of the derived adjective. Thus, he takes the semantic structure into consideration. He also adds that in most cases, the stem that is derived from first applying prefixation of *u–* does not exist, e.g. **ulov*.[214]

As for the prosodic properties, he puts *–lig* in a group of non-cohering suffixes that he labels *prestressing*.[215] When *–lig* is suffixed to *lov* to derive *lovlig* [²loːʋli] in the first cycle, stress

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[212] A distinction can be made between cohering and non-cohering affixes (see Kristoffersen 2000:43-45 for more details) where the latter is used for affixes that are morphologically dependent in the sense that they have to be linearised adjacent to their stem, but they are prosodically independent in the sense that they form a prosodic domain on their own (see for instance the analysis of *u–* in section 6.2). Cohering affixes on the other hand is used for affixes that are morphologically and prosodically dependent on their stem, and therefore form one prosodic domain with it.

[213] The root *lov* has, according to Kristoffersen (p. 265-267), a compound stem that is lexically specified for accent 2 because it takes accent 2 in compounds (cf. *lov-paragraf* [²lɔːʋpɑɾɑˌgɾɑːf] 'section of law').

[214] It is true that it is not an established word that would be found in dictionaries, but I have no problems accepting it as a real word in the right context. It follows the rules for word formation in Norwegian and it can be assigned a meaning. The view advocated in this thesis is that prefixation has many similarities with compounds and only a small fraction of compounds that are licit (and in common use) are listed in dictionaries.

[215] Here we also find other adjectival suffixes such as *–ig*, *–bar* and *–som*. He also adds that being non-cohering, they are stressable but that they are extraprosodic unless they are incorporated into the prosodic structure when a suffix with similar properties attaches to their right. This puts stress on the inner suffix. The suffix *–som* for instance is prestressing, *virksom* [²ʋiɾksɔm] 'effective' vs. *uvirksom* [ʉ¹ʋiɾksɔm] 'idle', but is stressed if its extraprosodicity is overridden by attachment of another prestressing suffix: *sparsom* [²spɑːʂɔm] 'sparse' vs. *sparsommelig* [spɑː¹ʂɔm.məli] 'economical'. As far as I know, *–lig* itself is never stressed by virtue of always being the outermost suffix.

falls on the lexical stem in accordance with the prestressing requirement of the suffix. However, when *u–* is added in the second cycle, primary stress does not fall on the prefix as in *usann* [^{2}ʉ:ˈsɑɲ] 'untrue' and *uvær* [^{2}ʉˌʋæ:ɾ] 'bad weather' but it is retained on the lexical stem, thus producing *ulóvlig* and not ***ú****lovlig*. These steps are shown in the derivation in (6-14) below (adapted from Kristoffersen 2000:198). Note that he treats all three morphemes as separate prosodic words:

(6-14)	*Input*	x	x	x
		[[[u]]	[[lov]	[lig]]]
	1st cycle	x	x	
		x	x	x
		[u]	[lov	lig]
	2nd cycle		x	
		x	x	
		x	x	x
		[u	lov	lig]

On the assumption that *–lig* attaches on the first cycle while its prestressing effect shows up (or is retained) on the second cycle, Kristoffersen concludes that the suffix must therefore be able to extend its prosodic influence *beyond* the cycle on which it is added, as we otherwise would get initial stress.[216] He formalises this as a compound stress rule triggered by the suffix *–lig* whereby the *rightmost* prosodic word is stressed (as opposed to the more normal compound stress rule where stress is *leftmost*, p. 181-196). This rule applies on the second cycle. With the stress firmly anchored in a non-initial position in the word, the morphological constraint on the distribution of accent 2 in derived words kicks in. Any H-tones that are not left-aligned or not primary stressed are subject to delinking rules (p. 270-272). In this way, Kristoffersen is able to derive the fact that *ulovlig* [ʉ^{1}lo:ʋli] 'illegal' surfaces with accent 1 as the underlying H-tones in the lexical representations of the affixes, /^{H}*u–*/ and /^{H}*–lig*/, are delinked. At the same time, his system allows the non-negated version of the adjective, *lovlig* [^{2}lo:ʋli] 'legal', to surface

[216] Kristoffersen shows the derivation of *utilrådelig* [ʉtil^{1}rɔ:d(ə)li] 'inadvisable', which contains two prefixes, the verbal particle *til–* and negative *u–*. Thus, the prosodic influence of *–lig* works for at least two cycles.

with accent 2 as the H-tone in the suffix /^{H}*–lig*/ can link to the root *lov* in accordance with the locality restriction of H-linking (see (3-2) in section 3.2.2.1) while.

Assessment:

Kristoffersen successfully captures the tonal accent alternation by identifying that the culprit is the suffix *–lig* with its inherent prosodic properties. The central tool in Kristoffersen's account is the morphological constraint on accent 2, which blocks it from appearing in morphologically derived words unless it is left-aligned. He classifies *–lig* as prestressing, meaning that stress is assigned to (or retained on) the immediately preceding unit (usually the lexical stem itself). If the assigned stress foot is left-aligned, accent 2 is licensed and can surface faithfully. However, if a morphosyntactic process adds material to the left of the stressed lexical stem through prefixation, stress is not shifted to the left, but retained where it was prior to prefixation. The result is that stress is no longer left-aligned with the consequence that accent 2 is no longer licensed.

A problematic aspect concerning Kristoffersen's account is that his assumption concerning the morphological derivation (*–lig* attaches to the stem before prefixation of *u–*) is such that it forces him to allow the adjectivalising suffix to exert its influence beyond the cycle on which it attaches. It is likely that the phonological component on cycle C_n has access to the result of its operations on cycle C_{n-1} (e.g. that it can see the stresses that were assigned), but it is more dubious whether phonology can save information for cycle C_{n+1} (or C_{n+2}) in working memory. As for the remaining assumptions, Kristoffersen's analysis of tonal accent was discussed in detail in section 3.2.2.1. The specifics of the analysis of the tonal accent alternation above just add to the general impression expressed in my assessment in section 3.2.2.1. He assumes that accent 2 is lexically marked but develops a very elaborate system to prevent it from surfacing. A simpler and more economic system would be preferable.

A second issue with his account is the formulation itself of the morphological constraint on accent 2. One has to be careful when formulating the constraint so as not to violate the principle of modularity as discussed in section 1.1. After all, PF does not know what a morphologically derived word is. Translated into our framework, a possible formulation of the distributional constraint on accent 2 in morphologically derived words could be based on Spell-out domains. Presumably, PF is able to *see* stresses that have been assigned (this is not the same as remembering them), such that accent 2 is not possible if there is a stress domain on its left. For instance, in a Spell-out domain D_n that contains three stresses {X Y Z} that stem from D_{n-1}, the presence of X in the domain will block accent 2 if stress on D_{n+1} is assigned to Y.[217] Even though such a constraint could do the job, it would be completely *ad hoc*. It would not be clear why the phonological computation would operate with such a constraint in the first place.[218]

6.3.2 The current proposal: stress-induced accent 1

In this section, I present the analyses of the alternation in stress/tonal accent we find in "paradigms" as in (6-15) and other word pairs, as in (6-16).

(6-15) a. *skikk* [^{1}ʂik] 'custom'
b. *uskikk* [^{2}ʉːˌʂik] 'bad custom'
c. *skikkelig* [^{2}ʂik.kəli] 'proper, decent'
d. *uskikkelig* [ʉ^{1}ʂik.kəli] 'indecent, naughty'

(6-16) a. *alvor* [^{2}ɑlˌʋoːɾ] 'gravity (n)'
b. *alvorlig* [ɑl^{1}ʋoːli] 'serious'

What is proposed here is that the alternation does not stem from any underlying tonal accents, but rather results from an interaction between domains created in morphosyntax and prosodic requirements that apply at PF. This may in some cases give rise to a *stress-induced* version of accent 1, which emerges at the stem-level. We will see that the stress-induced version of accent 1 is similar to the lexical version in that they are both preserved throughout the derivation. Put in other words, accent 1 can be triggered in polysyllabic domains at a relatively late stage in the derivation without being lexical. This stands in contrast to what we have seen so far.

[217] Accent 2 anchored to Z is excluded for the same reason.

[218] A potential motivation for the constraint could be that the configuration blocks accent 2 from encompassing all relevant stress domains (i.e. Spell-out domains), which could be argued to be its purpose or function in varieties of Norwegian with connective accent 2 (see section 3.2.4). However, it would not be applicable to varieties with non-connective accent 2.

As for the assumptions regarding the morphosyntactic derivation, these are the same as for compounds and prefix-base complexes, which have been explored in detail in chapter 5 and in section 6.2. I will, however, add the assumption that the syntactic derivation is not obliged to mirror the semantic structure, thus allowing so-called bracketing paradoxes to arise where the structural analysis for the semantics of a word is incompatible with the structural analysis for the phonology of the same word. Syntax is thus free to merge lexical items in structural positions where they do not "belong" from a semantic point of view as long as the derivation converges at both interfaces.

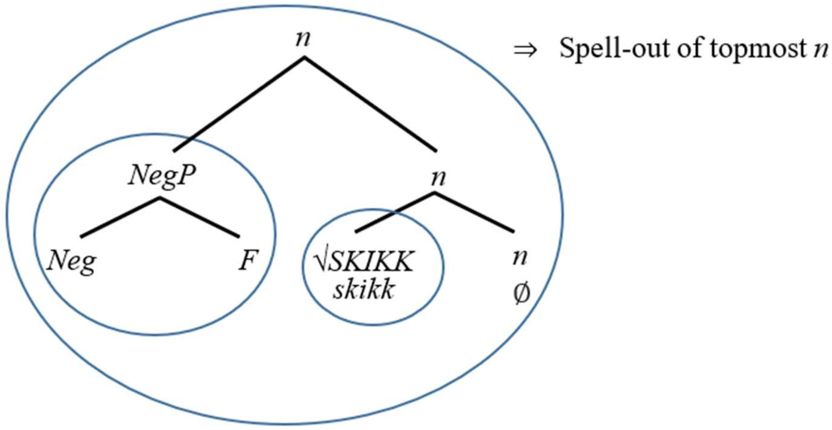
The remainder of this chapter is organised as follows: section 6.3.2.1 is dedicated to the analysis of *uskikkelig* [ʉ¹ʂik.kəli] 'indecent, naughty'. This also includes the "partial" derivations of the "paradigm" members *uskikk* [²ʉːˌʂik] 'bad custom' and *skikkelig* [²ʂik.kəli] 'proper, decent', thus demonstrating that the prefix and the suffix behave as expected (i.e. no underlying tone). We will see that the unexpected accent 1 in *uskikkelig* falls out from uncontroversial assumptions about assignment of tonal accent in Norwegian. The analysis is extended in section 6.3.2.2, subsuming the alternation we find in cases without prefixes, such as *alvor* [²ɑlˌʋoːɾ] 'gravity (n)' and *alvorlig* [ɑl¹ʋoːli] 'serious'. This can be done if we grant phonology the power to divide Spell-out domains. Thus, even though the two structures appear to be two different beasts, we find the same mechanism behind the unexpected accent 1 in both cases.

6.3.2.1 Analysis of prefix-suffix interaction

6.3.2.1.1 Derivation of *uskikk*

The syntactic derivation of prefix-base complexes was shown in section 6.2 (the reader is referred here for more details), but I will for convenience briefly repeat the main points here. The vocabulary item *uskikk* [²ʉːˌʂik] 'bad custom' consists of the negative prefix *u–* and the noun *skikk* 'custom'. The two parts are constructed in separate syntactic working spaces and undergo separate interpretations at the interfaces due to Spell-out. Afterwards, the syntactic object representing the negation *u–* is adjoined to the syntactic object representing the noun *skikk*, before the entire prefix-base complex is subjected to Spell-out (presumably triggered by a higher functional phasal head). The resulting morphosyntactic structure with the relevant Spell-out domains is shown in (6-17) below:

(6-17) *Uskikk* (final Spell-out)



As for the interpretation at the interfaces (see chapter 5 for more thorough explanations), they are fossilised at the inner Spell-outs in (6-17) due to the PIC. In the semantic component, the root √*SKIKK* receives its nominal interpretation due to the abstract nominal categoriser phasal head *n* while the semantics of the negation is established as scalar negation. Pairing the two in the same Spell-out domain (the topmost *n* in (6-17)) results in a prefix-base complex that denotes a set of degrees at the outer end of the scale of *uskikk* 'bad custom' (the scalar interpretation in this case is based on desirability).

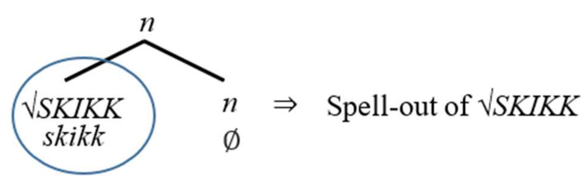
In the phonological component, the two strings that are identified as the best fits for the two inner Spell-out domains in (6-17) in accordance with the subset principle, are /ʉ-/ and /ʂik/, none of which is lexically marked for tonal accent. The two strings are then subjected to a set of PF operations (stress and possibly prosodic expansion) in order to comply with requirements that are internal to PF. The stress cycle on the string /ʉ-/ results in vowel lengthening thus meeting the stress-related requirement for bimoraicity, while the coda consonant in /ʂik/ receives Weight-by-Position, obliterating the need for any segmental lengthening. In the outer Spell-out domain (the topmost *n* in (6-17)), PF assigns stress to the left (i.e. on the prefix) but generally inherits the phonological interpretations of the strings from the inner Spell-out. The PF requirement for tonal accent comes relatively late in the process (see section 5.1), and as we have no lexical marking, PF assigns a default tonal accent, which in this case is accent 2. Consequently, the output of the phonological computation is [^{2}ʉːˌʂik].

6.3.2.1.2 **Derivation of *skikkelig***

The vocabulary item *skikkelig* [²ʂik.kəli] ‘proper, decent’ consists overtly of the suffix *–lig* and the lexical root *skikk* ‘custom’.[219] A natural assumption in this case concerning the morphosyntactic structure would be that the adjectivalising head realised as *–lig* is merged directly to the root √*SKIKK*. However, given that adjectivehood is overtly realised through the adjectivalising suffix, it is more reasonable to assume that we are dealing with a truly derived adjective (in accordance with the terminology that has been used about these lexical items in this chapter). To be more specific, adjectives formed with *–lig* are deverbal or denominal adjectives meaning that the morphosyntactic structure of *skikkelig* is more complex than the overt morphophonology indicates. The root √*SKIKK* is first categorised as a noun before it is categorised as an adjective.

Let us observe what the derivation of *skikkelig* [²ʂik.kəli] ‘proper, decent’ looks like. In order to build the structure, we only need one syntactic workspace. The first step in the derivation is shown in *Workspace I* below, where the root √*SKIKK* is merged with an abstract nominal categoriser *n*.

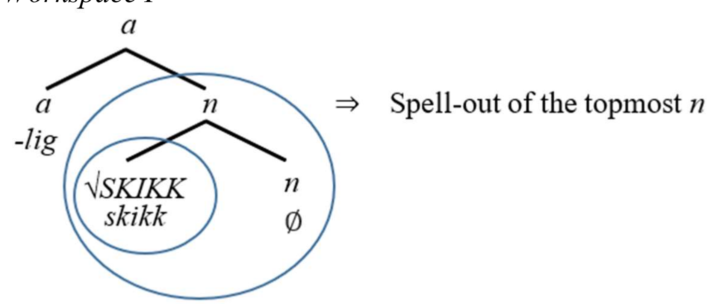
Step 1: *Workspace I*



[219] Many adjectives derived through *lig*-suffixation contain a medial vowel /e/ that seems to have two origins. If the adjective is derived from a verb, the vowel can be argued to be the infinitive suffix *–e* and is thus underlying. In nominal cases, the medial /e/ can be argued to be epenthesised to break up consonant clusters because it does show some sensitivity to the segmental surroundings. A non-homorganic transition from the lexical root to the suffix is more likely to have the medial /e/ than homorganic transitions. Compare: *van-lig* ‘common, normal’, *fest-lig* ‘festive, fun’, *hus-lig* ‘domestic’ but *folk-e-lig* ‘vernacular’, *skrekk-e-lig* ‘terrible’, *ekteskap-e-lig* ‘marital’. The presence of the medial vowel /e/ in *skikkelig* can thus be attributed to the tendency to avoid non-homorganic consonant transitions when the adjectivalising suffix *–lig* is involved. Note that this is only a tendency as there are numerous exceptions to this: *boklig* ‘bookish’, *saklig* ‘factual’, *språklig* ‘linguistic’, *daglig* ‘daily’. All the listed exceptions happen to have long vowels in the lexical root, which suggests that syllable structure might also play a role.

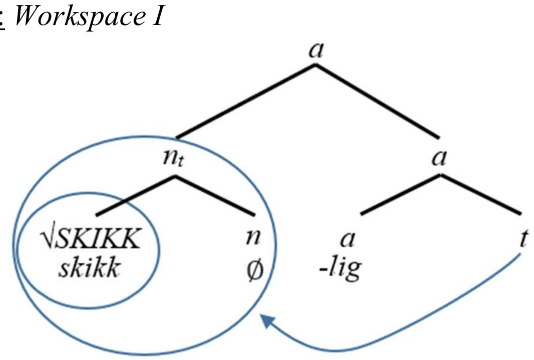
As per our assumptions, the abstract nominal categoriser is a phasal head that triggers Spell-out of its complement, which is then shipped off to the interfaces for interpretation. The second step in the derivation is where the structure in step 1 is merged with the adjectival categoriser *a*.

Step 2: *Workspace I*



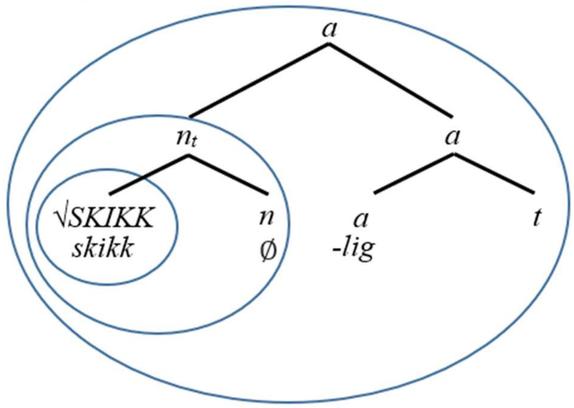
Merging the adjectival categoriser *a* on top of the structure assembled in step 1 results in phasal Spell-out of the complement of *a*, (i.e. all the material under the topmost *n* node) as *a* is assumed to be a phasal head. Note that the phasal head itself is outside the Spell-out domain that it triggers. Also note that the adjectival categoriser overtly realised by the suffix *–lig* appears to the left of the base in a structurally higher position while it is linearised to the right. In order to get the correct linearisation, I assume that head movement applies (Travis 1984), targeting the topmost *n* node and left-adjoining it to the *a* head. Whether this happens early (i.e. for morphosyntactic reasons in the syntax) or late (i.e. for phonological reasons in PF) is outside the scope of this thesis. Here I assume for expository purposes, however, that this movement takes place in syntax. This is shown in step 3:

Step 3: *Workspace I*



There is a fourth and final step in the derivation where the entire adjectival structure undergoes Spell-out, presumably due to some phasal head higher up in the structure (e.g. the D head). This Spell-out step is shown in step 4 below:

Step 4: *Workspace I*



⇒ Spell-out of the topmost *a*

Turning now to the semantic interpretation, it follows the Spell-out structure. Due to the PIC, it results in a layered structure of meaning, where the innermost LF interpretations are contained inside the outer ones. Looking at the lexical entries for the relevant points in the derivation gives us the following semantic path:

(6-18) √*SKIKK*
⇓
√*SKIKK* in the context of *n* ⇔ *skikk* 'custom (n)'
⇓
Skikk (n) in the context of *a* ⇔ *skikkelig* 'proper, decent (a)'

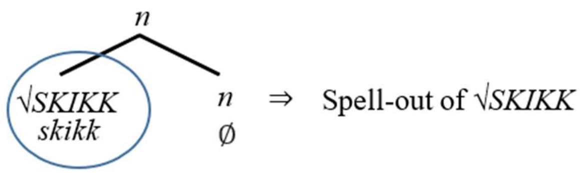
As is assumed in this thesis, roots are acategorial and category affiliation is expressed structurally. In the first Spell-out, the root √*SKIKK* is interpreted as a noun in the context of *n*, giving us the lexical entry *skikk* (n). The nominal structure based on the root √*SKIKK* is then subjected to the second Spell-out that applies in the derivation. Because its structural context is *a*, this gives us the lexical entry *skikkelig* (a). With this procedure, the nominal semantics are contained inside the adjectival semantics.[220]

Turning now to the phonological interpretation, we will first focus on the Spell-outs that are related to step 1 (the root) and to step 4 (the whole structure), and then we will come back to

[220] Only the two inner Spell-outs are discussed for the semantics. The third Spell-out that applies (i.e. the topmost *a* node) is not of relevance here as it depends on properties of the phasal head that triggers this Spell-out.

the intermediate Spell-out that applies in step 2. In step 1, repeated below, the root √*SKIKK* is merged with an abstract nominal categoriser:

<u>Step 1:</u> *Workspace I*



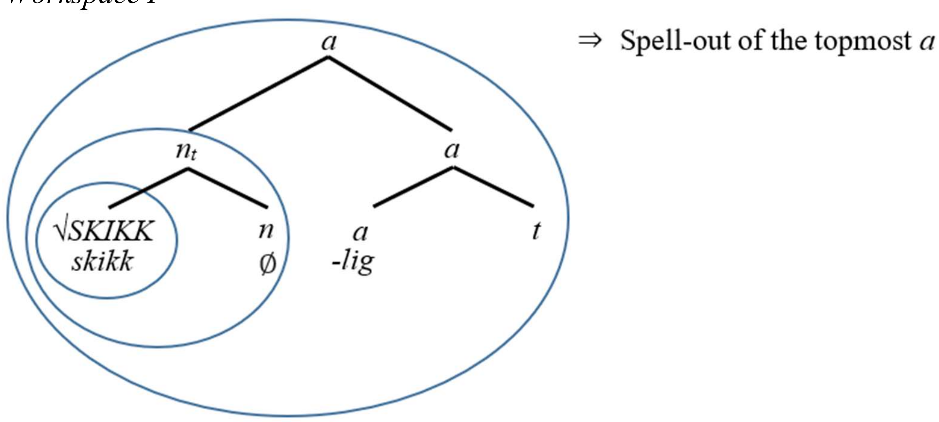
(6-19) √*SKIKK* in the context of *n* ⇔

<u>Lexical entry, PF</u>
- segmental make-up, /ʂik/.
- no underlying tonal accent.

When the root in question is interpreted at LF, the lexical entry is accessed (see (6-19)) where we find its phonological information. The entry is realised by the segmental string /ʂik/ and it contains no underlying tonal accent. The string is then subjected to operations that are specific to PF, such as assignment of stress and possibly prosodic expansion as a function of stress. We have only one syllable in this case, so the syllable is trivially assigned stress. The coda consonant receives Weight-by-position, thus satisfying the bimoraicity requirement of stressed syllables.

Jumping to step 4, repeated below, the entire denominal adjective is Spelled-out. Crucially for PF, this Spell-out also contains the adjectivalising suffix –*lig*:

<u>Step 4:</u> *Workspace I*



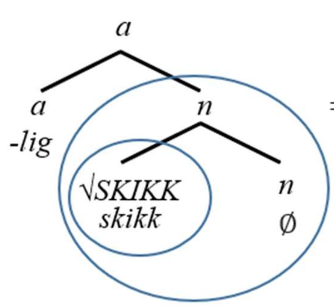
(6-20) *a* ⇔

Lexical entry, PF
- segmental make-up, /li/.
- no underlying tonal accent.

In the lexical entry of the *a* head (see (6-20)), we find the segmental string /li/. There is no underlying tonal accent associated with this string. We have not assumed that the phasal head *a* constitutes its own Spell-out domain so the PF operations concerning stress/quantity do not apply to the segmental string /li/ separately.[221] However, the lexical entry in (6-20) adds a syllable that becomes visible to PF in the outer Spell-out domain in step 4, thus possibly changing the conditions for PF internal operations. When stress is assigned, it still falls on the root √*SKIKK* itself (it is in fact the only stressable syllable in our approach), but the addition of the suffix *–lig* creates a polysyllabic domain, something that is taken into account when default tonal accent 2 is assigned later on in the derivation. The outcome of the phonological computation is thus *skikkelig* [^{2}ʂik.kəli].[222]

Now, considering the phonological effects of the *intermediate* Spell-out domain in the derivation of *skikkelig*, it would appear that the Spell-out in step 2, repeated below, has no phonological impact.

Step 2: *Workspace I*



⇒ Spell-out of the topmost *n*

[221] This is in contrast to Kristoffersen (2000:196-199) who classifies it as a suffix that is non-cohering (i.e. it forms its own stress domain).

[222] As discussed in footnote 219, I assume that the medial /e/ is an epenthetic vowel that breaks up non-homorganic consonant clusters in contexts with *lig*-suffixation. The presence or absence of this /e/ does not influence the assignment of stress/tonal accent in any case.

It is true that in the case of *skikkelig*, the Spell-out domain triggered by the *a* head appears to be phonologically vacuous, but that is not necessarily always the case. I suggest that this intermediate Spell-out domain is the locus of a few exceptional patterns we see in some derived adjectives. These include segmental deviations as well as unexpected tonal accent (i.e. accent 1). Consider the data in Table 38 below (IPA given for TN):

Table 38 – exceptional derived adjectives

Base form		**Suffix**	**Derived form**		**Gloss**
kropp 'body'	[¹krɔp]	*-lig*	*kroppslig*	[²krɔpʂli]	'bodily'
rett 'law, court'	[¹ræt]	*-lig*	*rettslig*	[²rætʂli]	'legal'
barn 'child'	[¹bɑːɳ]	*-lig*	*barnslig*	[²bɑːɳʂli]	'childish'
munn 'mouth'	[¹mʉɲ]	*-lig*	*muntlig*	[²mʉntli]	'oral'
uke 'week'	[²ʉːkə]	*-lig*	*ukentlig*	[²ʉːkəntli]	'weekly'
vesen 'being (n)'	[¹ʋæːsn̩]	*-lig*	*vesentlig*	[¹ʋæːsn̩tli]	'significant'
egen 'own'	[²eːgən]	*-lig*	*egentlig*	[¹eːgəntli]	'really'

The data reveals that the derived adjectives have segmental additions, /s/ or /t/, that are neither part of the lexical root, nor part of the suffix. In *egentlig* (marked in grey), we get an additional change in tonal accent, accompanying the /t/-epenthesis. The representation of the Spell-out in step 2 provides us with an obvious mechanism to deal with these idiosyncratic mutations. When an intermediate structure containing an already categorised root is interpreted phonologically in the context of *–lig*, there is a separate lexical entry in PF that is accessed. This means for instance that when a root such as √*UKE* ('week') is categorised first as a noun, giving the string /ʉkə/ at PF, and when this nominal is Spelled-out again in the context of –l*ig*, PF identifies the string /ʉkent/ as the best fit in accordance with the subset principle. This may at first sight seem like a violation of the PIC, but note that the phonology produced in the inner Spell-out in step 2 remains intact also for the outer Spell-out. The outer Spell-out in step 2 is phonologically vacuous in most cases, but if it is not vacuous, it is additive. A non-vacuous intermediate Spell-out of this type will always involve additional segments (e.g. *ukentlig*) but tonal accent can also be added (e.g. *egentlig*).[223] Having argued that we sometimes introduce phonological information on an intermediate level of representation, we are now in a position to see how accent 1 can surface in lexical items such as *uskikkelig*.

6.3.2.1.3 Derivation of *uskikkelig*

In the previous sections, we have seen that the prefix *u–* and the suffix *–lig* cannot be specified with lexical tonal accent (i.e. accent 1) because they do not induce accent 1 in the structures of which they are part. In addition, the root √*SKIKK* itself is monosyllabic, exempting it from being a licit carrier of lexical tonal accent. With these facts in mind, it is unexpected that the combination of these three in one lexical item, *uskikkelig* [ʉ^{1}ʂik.kəli] 'indecent, naughty', surfaces with accent 1. If accent 1 surfaces if and only if it is lexically marked or the domain is monosyllabic, then accent 1 in *uskikkelig* should be impossible. Moreover, this is not a general ban on accent 2 if there is any unstressed material to the left, as demonstrated by data such as *sjokolade* [ʂuku^{2}lɑːdə] 'chocolate' and *apokalypse* [ɑpukɑ^{2}lypsə] 'apocalypse'. The pattern is restricted to a subset of morphologically derived words (mostly adjectives, see 6.1.2), and I will show that it arises as a result of the interaction between morphosyntactic structure, prosodic requirements and distributional restrictions on tonal accents.

When it comes to the morphosyntactic structure of prefixed derived adjectives such as *uskikkelig*, there are two possible alternatives, which differ by the order of attachment of the affixes, as shown in (6-21) below (the structures are simplified for expository reasons):

(6-21) a. b.

[223] Recall that accent 1 can express *presence* of linguistic tone (it can be lexically marked). Put differently, it has a representational existence and can therefore be added just like any other epenthetic unit. Accent 2 on the other hand does not have this privilege.

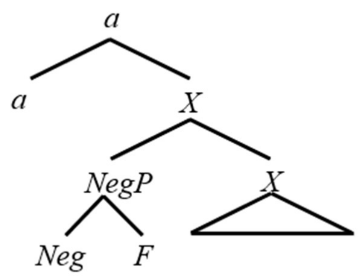
As we saw in section 6.3.1.2, Kristoffersen opted for (6-21)a, where the negative constituent *u–* takes scope over the derived adjective as a whole and not just the root. However, this structure is riddled with issues for the phonological analysis. As discussed in section 6.3.1.2, by having *–lig* attach to the stem before prefixation of *u–*, we are forced to grant the adjectivalising suffix the power to exert its prosodic influence beyond the cycle on which it attaches. In practice, this means granting PF a working memory, a consequence that is not uncontroversial. Moreover, the morphological constraint on accent 2 that he proposes is *ad hoc* seeing that it is detached from any other generalisation we can make about the distribution of tonal accents in Norwegian.

By contrast, if we adopt the structure in (6-21)b, there is a way to get around the issues that (6-21)a poses for the phonological analysis. On the assumption that the abstract adjectivalising head a realised as *–lig* is a phasal head that is merged after the negative prefix *u–*, its prosodic influence will follow directly from the morphosyntactic configuration. When the phasal head *a* is merged, its complement will be shipped off to the interfaces for interpretation. This complement is exactly the domain in which *–lig* is able to exert its influence. Note that *–lig* is not part of this Spell-out, thus giving a straightforward explanation for Kristoffersen's observation that *–lig* must be able to affect prosodic properties beyond its cycle. It is simply not part of it.

When it comes to the prosodic properties of *–lig*, it was shown in section 6.1.2 that *–lig* does have an effect on stress placement in that stress seems to be pulled to (or retained on) an object that is found on its immediate left. However, a consequence of the proposed syntactic structure in (6-21)b is that the suffix does not cause any stress shift as such, even though it appears to do that on the surface. The prestressing effect is in other words only apparent. Rather, the suffix imposes *final* stress in its complement, which is a type of prosody we already know excludes accent 2. Even if the syllable that carries primary stress ends up not being *word final*, the argument that is made here is that during the phonological interpretation of the intermediate Spell-out domain where stress is final, a *stress-induced* accent 1 is established, which is as resilient to change as lexical accent 1. More specifically, it can be preserved even if the configurational requirements for accent 2 are met (i.e. the syllabic trochee) either through PF operations (e.g. linearisation) or through morphosyntactic operations (e.g. addition of morphemes). Note, however, that the effectiveness of the prosodic package that *–lig* sends into its complement domain presupposes that a choice for stress assignment can be made. The operation is nevertheless bound by earlier assigned stresses.

Combining the raw structure in (6-21)b with the structure proposed for negated prefix-base complexes in section 6.2 gives us the following structure for negative derived adjectives:

(6-22) *Structure for negative derived adjectives*

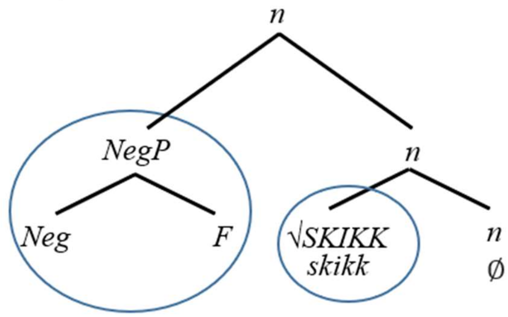


In the structure in (6-22), the X stands for any lexical category (*n*, *v*, *a*). As defined in section 6.2, *NegP* stands for the negative prefix *u–*, and being an adjunct, it is not obligatory in the structure. Crucially, *NegP* is lower than the abstract adjectivalising head *a*.[224]

With this in mind, let us observe the derivation of *uskikkelig* [ʉ^{1}ʂik.kəli] 'indecent, naughty'. Since we have seen significant parts of the derivation of substrings of the entire structure in the previous paragraphs (see sections 6.3.2.1.1 and 6.3.2.1.2 and section 6.2), I do not start from scratch but fast-forward to the crucial point in the derivation. Our starting point will be equivalent to step 3 from section 6.2. The reader is referred there for the details of step 1 and 2.

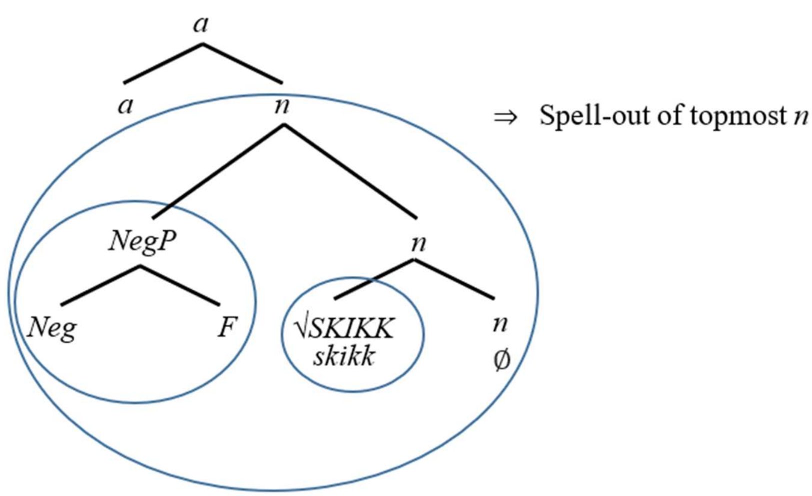
[224] The observant reader has perhaps noticed that the structure in (6-22) is at odds with the semantic structure. In a derived adjective like *ulovlig* [ʉ^{1}lo:ʋli] 'illegal', negation takes scope over the adjective as a whole whereas the structure in (6-22) suggests that it only takes scope over the base to which it attaches. This is reminiscent of so-called bracketing paradoxes known in the literature from English where the semantic and phonological structures are incompatible. In the adjective *unhappier*, the intended meaning is 'more unhappy' and not 'not happier'. One solution to such bracketing paradoxes was suggested by Newell (2005) where adjuncts such as *un–* can be inserted late in the derivation, thus allowing intrusive adjunction sites. Another solution was proposed by Pesetsky (1985) whereby the interpretation of *unhappier* was treated on a par with Quantifier Raising. As morphosyntactic order does not always reflect scope relations, the assumption is that scope relations ca be reversed in LF. As we have already assumed that negation is a tripartite operator just like quantifiers (see section 6.2), I tentatively suggest that the scope relations between negation and the adjectivalising head reflected in (6-22) can receive the same treatment.

<u>Step 3:</u> *Negation adjoined to* n



In step 3, negation, defined as a complex constituent, has been adjoined to the spine of the tree. The syntactic object that results from this contains two substructures that have already been Spelled-out: the root √*SKIKK* (phasal Spell-out due to phasal head *n*) and negation (constitutes its own phase due to adjunct status). In step 4, the structure is merged with an abstract adjectivalising head *a*, resulting in phasal Spell-out of the complement of *a*:

<u>Step 4:</u> *Merger of phasal* a



This step is identical to step 4 in 6.2, except that in this case we know what kind of phasal head that triggers the Spell-out. Further steps in the morphosyntactic derivation involves left-adjunction of everything that the topmost *n* dominates to *a*, with subsequent Spell-out of the entire adjectival structure. These final steps were illustrated in section 6.3.2.1.2 and will not be explored in detail here.

The crucial point in relation to step 4 happens at the PF interface (the LF interface will not be discussed here, but see more details in sections 6.3.2.1.1 and 6.3.2.1.2 and footnote 224). When the topmost *n* node is Spelled-out in step 4, PF has already identified the segmental strings associated with the lexical entries and has also taken care of stress and bimoraicity. Due to the PIC, the segmental parts remain intact. However, when the prefix and the base are Spelled-out together in the same domain, the *a* head has the opportunity to shape certain prosodic properties in the Spell-out domain by virtue of being the responsible trigger. Here I propose that the *a* head discharges a prosodic requirement into its complement (i.e. what is contained under the topmost *n* node), whereby stress falls on the right (i.e. the right one of the two inner Spell-out domains) instead of falling on the left (which is the default rule for complex structures). This is paramount to a rule that imposes final stress, albeit on a suprasyllabic level and *before* linearisation brings the prefix and the root to the left of the suffix. More specifically, if a Spell-out domain D_n in the context of the phasal head *a* contains two stresses {X Y} that stem from D_{n-1}, PF is instructed by a to stress Y. For step 4, this means that the root √*SKIKK* is assigned stress instead of the negation, resulting in the intermediate segmental string /ʉ'ʂik/. The advantage with respect to Kristoffersen (section 6.3.1.2) is that there is no need to grant suffixes such as *–lig* the power to exert prosodic influence beyond its own cycle.[225] Also note that at this point in the derivation, the *a* head has not yet any PF identity. That is, there is no segmental string associated with it because it has not been Spelled-out. However, there is no need to know that the *a* head will be realised as *–lig* because this not necessarily a property that is unique to this lexical item. It seems to be a more general property of the *a* head in denominal/deverbal adjectives as we see the same behaviour in similar suffixes (*–bar*, *–som*, –*ig*).[226]

Now that the stress pattern has been sorted out, the tonal accent that is assigned falls out directly from the stress. As should be well-known by now, accent 2 is distributionally restricted compared to accent 1. In order to be realised, it requires a disyllabic trochee. This excludes accent 2 from monosyllabic domains and from polysyllabic domains with final stress. The

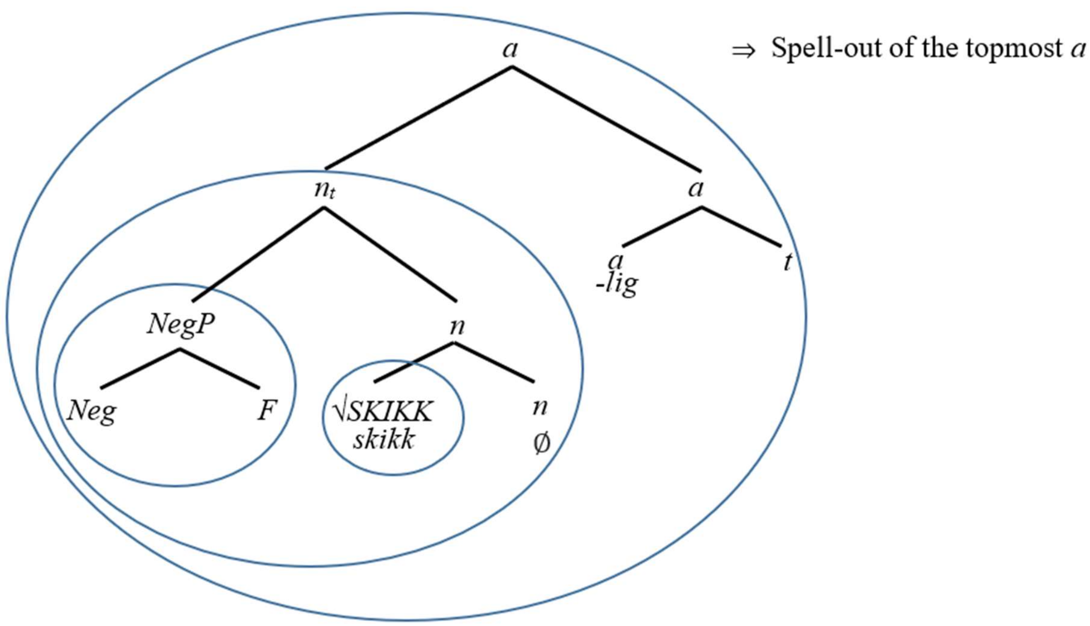
[225] There is also no need for the stipulation that suffixes such as *–lig* are extraprosodic on their own cycle, as Kristoffersen (2000:197) does. The "extraprosodicity" follows directly from our analysis

[226] Some examples are *umiddelbar* [ʉ^{1}mid.dəlbɑ:ɾ] 'immediate', *utvilsom* [ʉ^{1}tʋi:lsɔm] 'undoubtedly', *uverdig* [ʉ^{1}ʋæɖ.ɖi] 'undignified'. The adjectivalising suffixes are in any case not equally productive. Sometimes they occur together, as in *sparsom* [^{2}spɑ:ʂɔm] 'sparse' vs. *sparsommelig* [spɑ:^{1}ʂɔm.məli] 'economical' while a negated derived adjective can have a different adjectivalising suffix than the non-negated form, as in *brukbar* [^{2}bɾʉ:kˌbɑ:ɾ] 'useful' vs. *ubrukelig* [ʉ^{1}bɾʉ:kəli] 'useless'.

proposal here is that the Spell-out above creates an intermediate stem-level string with final stress: /ʉˈʂik/. In such cases, the argument here is that PF does not wait for later stages in the derivation where default tonal accent is assigned (see section 5.1), but assigns a tonal accent to the string immediately. It is forced to assign accent 1 because accent 2 is not a licit candidate due to the stress pattern. The intermediate output form from the phonological computation is thus [ʉ¹ʂik], exhibiting a case of stress-induced accent 1.

Even though the string [ʉ¹ʂik] does not correspond to any existing lexical item, this does not cause the derivation to crash at this point in any of the computational domains (i.e. syntax, phonology, semantics). The only thing that is different with respect to the derivation of *uskikk* in section 6.3.2.1.1 is the stress pattern that arises due to the phasal head that is triggering the Spell-out. The next step in the derivation is head movement (Travis 1984), whereby the topmost *n* node is left-adjoined to the *a* head in order to get the correct linearisation. This is also what we did in section 6.3.2.1.2 in the derivation of the non-negated version of the same adjective, *skikkelig*. Subsequent merger of a phasal head on top of *a* triggers Spell-out of the entire adjectival structure. This is shown in step 5:

Step 5: *Spell-out after head movement and adjunction*



Due to the PIC, the purely segmental properties of the PF interpretation of each Spell-out remains intact also for the outer Spell-outs. The Spell-out domain in step 5 also undergoes a stress cycle, where the stress trivially falls on the root √*SKIKK*, as this is the only stress point that is inherited from any immediately preceding cycle. It is also during this Spell-out that the segmental string /–li/ is identified in the lexical entry of the *a* head. With head movement having applied, the structure also reflects that stress is no longer word final. The additional syllable represented by the string /–li/ ends up being linearised as a post-stress syllable, thus creating, at least on the surface, a disyllabic trochee, which is the required environment for default accent 2. We could therefore expect *[ʉ²ʂik.kəli], with accent 2, to be a possible outcome of the phonological interpretation. However, as indicated by the *, this is not what we find.

The proposal here is that an instance of accent 1 that arises as the result of stress assignment at this intermediate level of representation, a stress-induced accent 1, is as resilient to change as lexical marking of accent 1. From the discussion hitherto in this chapter, it is clear that accent 1 in *uskikkelig* [ʉ¹ʂik.kəli] cannot be the result of lexical marking, as it never appears in any of the morphologically less complex word forms in the paradigm. The two affixes, *u–* and *–lig* do not induce accent 1 on their own, but the combination of them does, due to the anomalous stress assignment that applies in the intermediate Spell-out domain. One of the core assumptions in this thesis is that only accent 1 can be stored in lexical representations and that this lexical marking is able to survive and percolate in the Lexical Phonology as affixes are added (see chapter 3). What cases like *uskikkelig* [ʉ¹ʂik.kəli] show us, is that accent 1 must have more sources than stemming either from lexical marking or from monosyllabic domains. Here we have a stress-induced accent 1, and it is also able to percolate in word formation processes because PF treats it as if it were lexically marked.[227] The creation of the disyllabic domain by suffixation of *–lig* notwithstanding, accent 1 survives precisely because PF preserves it due to the PIC. Thus, the phonological form of the entire adjectival structure comes out as [ʉ¹ʂik.kəli].[228]

At first sight, introducing the existence of a type of accent 1 that is stress-induced at the stem-level (i.e. an intermediate level) may seem like an *ad hoc* solution to something that

[227] Naturally, TN compound formations where the non-head is a derived adjective that receives accent 1 when it occurs on its own are neutralised to accent 2. For instance, the stress-induced accent 1 in *ufarlig* [ʉ¹fɑːli] 'harmless' is neutralised to accent 2 in *ufarliggjøre* [ʉ²fɑːliˌjøːɾə] 'to render harmless'. However, the compound does inherit the stress position internal to the non-head.

[228] As discussed earlier, I assume that the medial /e/ is epenthesised to break up a consonant cluster that is illicit in this context.

appears to be something local to adjectives. However, there are two ways in which this points to something that is more general in the phonology of Norwegian as whole. *First*, it suspends the need for positing otherwise unmotivated constraints on the distribution of tonal accents. Recall from section 3.2.2.1 and section 6.3.1.2 that Kristoffersen (2000) operated with a morphological constraint on accent 2, preventing it from surfacing in morphologically derived words like *uskikkelig* if it is not left-aligned. In the present proposal, however, accent 2 is not an option simply because the phonology assigns accent 1 to the relevant domain due to it being finally stressed. Final stress in Norwegian is universally connected to accent 1 and is a hard-wired property of the phonology of Norwegian. This is uncontroversial.

Second, the present proposal also allows us to make a connection to another part of the lexicon, which has not been discussed in detail in this thesis. If we look at nominal paradigms, adding the plural ending *–er* to monosyllabic nouns creates the prosodic structure that is necessary for accent 2: the disyllabic trochee. Thus, we find alternations in tonal accent between the singular form, where monosyllables receive accent 1 by default, and the plural form, where the derived disyllables receive accent 2 by default, as in (6-23) (see section 2.2.2 for nominal paradigms). This contrasts with polysyllabic nouns with final stress where accent 1 is found both in the singular form and in the plural form as in (6-24) (IPA given for TN):

(6-23)	a. *bil* [^{1}bi:l]	~	*biler* [^{2}bi:lɑ]	‘car/s’
	b. *kopp* [^{1}kɔp]	~	*kopper* [^{2}kɔp.pɑ]	‘cup/s’
(6-24)	a. *kafé* [kɑ^{1}fe:]	~	*kafeer* [kɑ^{1}fe:.ɑ]	‘café/s’
	b. *nasjon* [nɑ^{1}ʂu:n]	~	*nasjoner* [nɑ^{1}ʂu:nɑ]	‘nation/s’

The pattern from the nominals is reminiscent of the situation we see in derived adjectives as adding the adjectivalising suffix *–lig* to monosyllabic roots paves the way for assignment of accent 2 as in (6-25), while polysyllabic stems with final stress are assigned accent 1, as in (6-26). The latter group also includes the derived adjectives under scrutiny:

(6-25)	a. *syn* [^{1}sy:n]	~	*synlig* [^{2}sy:nli]	‘vision/visible’
	b. *skikk* [^{1}ʂik]	~	*skikkelig* [^{2}ʂik.kəli]	‘law/legal’

(6-26) a. *appetitt* [ɑpə^{1}tit] ~ *appetittlig* [ɑpə^{1}titli] 'appetite/-sing'
b. *person* [pæ^{1}ʂu:n] ~ *personlig* [pæ^{1}ʂu:nli] 'person/al'
c. **usyn* [ʉ^{1}sy:n] ~ *usynlig* [ʉ^{1}sy:nli] 'invisible'
d. **uskikk* [ʉ^{1}ʂik] ~ *uskikkelig* [ʉ^{1}ʂik.kəli] 'naughty, indecent'

The generalisation is that both plural *–er* and adjectivalising *–lig* supply an additional syllable, thus creating the potential for assignment of default accent 2. However, if what precedes the suffixes is a unit with final stress and by necessity accent 1, the additional syllable that the suffixes provide seems to be invisible for the algorithm that assigns default tonal accent.[229] This invisibility makes sense if accent 1 in negated derived adjectives is stress-induced and conserved the same way as accent 1 in words with lexical final stress. Even though the substrings /ʉ^{1}ʂik/ from *uskikkelig* and /ʉ^{1}sy:n/ from *usynlig* do not correspond to any existing word, not recognising this intermediate Spell-out would result in letting the parallelism between nouns and derived adjectives go under the radar. Note, however, that stress-induced accent 1 of the type discussed here presupposes that PF can make a choice for stress placement in the relevant Spell-out domain. In monosyllables (e.g. *syn*) and in disyllabic domains that have already undergone a cycle (e.g. *lýkke*), no such choice can be made.

If final stress at the stem-level (i.e. the intermediate Spell-out containing /*u+skikk*/) is a potential source for accent 1, it also calls into question the lexical representations of words with final stress. More specifically, do we need to posit that the underlying lexical representations of words with final stress contain the abstract diacritic (ˣ) for accent 1? As I have argued in preceding paragraphs, accent 1 can be stress-induced at the stem-level in derived adjectives. Given the parallelism between nominal paradigms and derived adjectives as described above, localising accent 1 to the stem-level in nouns with final stress should also be possible, thus

[229] An interesting alternation is found in word pairs such as *heder* [^{1}he:dər] 'honour' vs. *hederlig* [^{2}he:dəli] 'honourable' and *under* [^{1}ʉndər] 'wonder' vs. *underlig* [^{2}ʉndəli] 'strange', which appear to have a lexically marked accent 1 in their base. There is evidence, however, that the bases are monosyllabic and that the schwa is epenthesised in order to repair sonority violations. We find schwa in nominal contexts (e.g. *hed**e**r* 'honour (n)') and it alternates with zero in verbal contexts where an infinitival *–e* is attached, thus pre-empting the need for sonority violation repairs (e.g *hedr**e*** 'honour (v)'). If the schwa is epenthesised after default tonal accent has been assigned, this will automatically explain why *heder* [^{1}he:dər] comes with accent 1. Accent 2 in the corresponding denominal adjectives is thus perfectly regular and represents no violation of the PIC.

unifying the analysis of the two word-classes. More specifically, the analysis above hints at a system where words with final stress are underlyingly stored as such, perhaps through diacritic marking of moras (e.g. /kafe$_{\mu\mu}$/), but without any abstract diacritic (ˣ) for accent 1. When a root such as √*KAFE* is merged with an abstract nominalising head *n*, resulting in Spell-out of the root, the lexical entry for PF contains the segmental string /kafe$_{\mu\mu}$/, along with specific instructions for PF on where to assign stress. PF assigns stress to the last syllable with subsequent prosodic expansion targeting the vowel of the syllable in question. This is also accompanied by immediate assignment of accent 1, not because it is part of the underlying representation, but because it is the only possible one given the prosodic environment. It is a stress-induced accent 1. This means that we can simplify the lexical representations of words with final stress by removing the abstract diacritic (ˣ) for tonal accent and rely solely on the phonological computation in PF. In words with final stress, PF inserts accent 1 at the stem-level (i.e. intermediate Spell-out), a level which I have argued is needed anyway in order to account for the "unexpected" tonal accent in *uskikkelig* [ʉ^{1}ʂik.kəli] 'indecent, naughty'. As the present analysis shows, this tonal accent then turns out to be completely regular.[230]

We thus arrive at the following representation of the metrical structure of domains with stress-induced accent 1 (shown in (6-27) below): [231]

[230] This can probably be extended to infinitives ending in Latinate *–ere*, e.g. *presen^{1}tere* 'present', *admini^{1}strere* 'administer', *deko^{1}rere* 'decorate', *eksi^{1}stere* 'exist' etc. As discussed in 3.2.2.2, LWJS took Latinate *–ere* to be accent-1 inducing, but we are probably dealing with stress-induced accent 1 triggered by final stress in the verbal roots. Thus, the morphological decomposition is not *present-**ere*** but rather *present**er**-e*, where stress falls on the last syllable of the root (this syllable is after all present throughout the paradigm, e.g. past tense *present**er**-te*, and not just in infinitives) and the final *–e* is the regular infinitival ending.

[231] Note that the representation is simplified in the sense that line α can consist of more beats than two. The crucial point is that the strong beat falls on the rightmost unit in line β, regardless of the number of beats preceding it. However, line α has to consist of *at least* two beats in order for phonology to have a choice as to where prominence is added.

(6-27) *Representation of stress-induced accent 1*

*x (**X** x)	*Line γ'*
(x **X**) x	*Line γ*
(x **X**)	*Line β*
(x x)	*Line α*

Stress-induced accent 1 is thus a domain where stress falls on the final unit, as represented by line β, and where the addition of more units at a later stage does not alter the already established metrical structure and its corresponding tonal accent. The result is thus as in line γ, which remains faithful to the effects of the final stress in line β, instead of the restructuring version in line γ'. The representation in (6-27) also abstracts away from specific category labels, and this enables us to subsume morphologically derived domains with final stress and simplexes with final stress under the same analysis.[232]

Finally, the proposed merging order of the affixes when stress-induced accent 1 is observed (*u–* before *–lig*), also sheds some light on a few other minor observations. One such observation comes from the semantics of some of these derived adjectival structures, shown below:

(6-1) a. *uhyggelig* [ʉ^{1}hyg.gəli] 'uncanny, eerie'
b. *uhyggelig* [^{2}ʉ:ˌhyg.gəli] 'not nice/friendly'
(6-2) a. *usannsynlig* [ʉsɑn^{1}sy:nli] 'unlikely (intensifier)'
b. *usannsynlig* [^{2}ʉ:sɑnˌsy:nli] 'unlikely, improbably'

The lexical item *uhyggelig* usually has the pronunciation and meaning we see in (6-1)a. The pronunciation in (6-1)b on the other hand is not really in use, but any native speaker of

[232] Interestingly, the representation of stress-induced accent 1 also finds support in compounds where stress does not fall on the initial member. Some examples were mentioned in footnote 143 in section 4.1.3, such as *sko-maker* [sku^{1}mɑ:kəɾ] 'shoemaker' and *kors-feste* [kɔʂ^{1}fæstə] 'cross-fasten' = 'crucify', which are both accent 1 (*pepper-mynte* [pɛp.pəɾ^{2}myntə] 'peppermint' is an exception to this). Given that *feste* [^{2}fæstə] 'fasten' has accent 2 in isolation, it appears that such compounds have a stress-induced accent 1 (*-maker* in *sko-maker* does not appear as an independent word but if it did, it would most likely pattern with similar words, such as *baker* [^{2}bɑ:kəɾ] 'baker' and *lærer* [^{2}læ:ɾəɾ] 'teacher', which have accent 2). Similarly, in Norwegian varieties where non-initial compound stress occurs more systematically (see Christiansen 1946-1948:197-206 and Abrahamsen (2003, 2005), it seems to be realised consistently as accent 1.

Norwegian would ascribe a different meaning to it. However, for the lexical item *usannsynlig*, it is the pronunciation and meaning in (6-2)b that is most common, while the pronunciation in (6-2)a is more likely when the intended meaning is as an intensifier.[233] The common denominator for these two adjectives is that we find transparent semantics when we have initial stress realised with accent 2, and more opaque semantics when we have non-initial stress realised with accent 1. Even if the semantics of derived adjectives have not been discussed, a potential explanation for the observations in (6-1) and (6-2) is that they have different merging orders for the affixes. If *u–* attaches before *–lig* (the configuration for stress-induced accent 1), the negative prefix and the lexical root can influence each other semantically because they are put inside the same Spell-out domain, thus paving the way for more opaque semantics. If *–lig* attaches before *u–* (initial stress with accent 2), the semantics come out completely transparent.

The final observation is allomorphy in the adjectival suffix, where the derived adjective based on the root √*BRUKE* 'use' is realised as *brukbar* [²bɾʉːkˌbɑːɾ] 'useful' whereas is negated form is realised as *ubrukelig* [ʉ¹bɾʉːkəli] 'useless'. Thus, we have allomorphy in the adjectival suffix depending on the presence/absence of negation, which can only be accounted for if *u–* attaches before the abstract adjectivalising head. That is, negation needs to already be merged in the structure to be able to influence the allomorph selection for the abstract adjectivalising head. Even if this observation and the one discussed in the preceding paragraph are marginal, they strengthen the idea proposed in this chapter, that syntax is free to merge lexical items in structural positions where they do not "belong" from a semantic point of view. However, as we have seen, it may have consequences for the phonological interpretation.

6.3.2.2 Formal compounds: *alvor* vs *alvorlig*

In the previous section, we saw that the adjectivalising suffix *–lig* imposed final stress in its Spell-out complement if the complement contained two adjacent stress domains stemming from earlier but separate Spell-out cycles. The phonological effect was stress realised with accent 1 on the root of the adjective. There are a few other cases involving *–lig* where we find the same

[233] E.g. *det regnet usannsynlig mye* 'it rained an improbable amount' (lit. 'it rained improbably much').

alternation in tonal accent but where the morphosyntax does not provide the required structural configuration, i.e. two adjacent stress domains. Some examples are repeated here:

(6-3) a. *edru* [²æ:drʉ] 'sober' vs. *edruelig* [e¹drʉ:.əli] 'moderate'
b. *alvor* [²ɑlˌʋo:ɾ] 'gravity' vs. *alvorlig* [ɑl¹ʋo:li] 'serious'
c. *hovmod* [²ho:ʋˌmu:d] 'pride' vs. *hovmodig* [hoʋ¹mu:di] 'proud'
d. *vilkår* [²ʋilˌko:ɾ] 'condition, term' vs. *vilkårlig* [ʋil¹ko:li] 'arbitrary, random'

The words that do not contain the adjectivalising suffix appears to be morphologically simplex (e.g. *edru* is one single morpheme, not two), so the analysis developed for *uskikkelig* in the preceding section is not readily available.

However, with an additional assumption on what PF can do, we can subsume the analysis of cases like *alvorlig* [ɑl¹ʋo:li] 'serious' under the same umbrella. Albeit the fact that *alvor* [²ɑlˌʋo:ɾ] 'gravity' is a morphological simplex, the proposal here is that PF can sometimes split lexical items in two. This means that it is a simplex form from the point of view of morphosyntax, but the phonological computation treats it as if it were a compound, by assigning two stresses to the string.[234] Such structures are referred to as *formal compounds* in the literature (Kristoffersen 2000:187-188) and evidence for their existence shows up in contexts where prominence is realised on an unexpected syllable. For instance, both *alvor* [²ɑlˌʋo:ɾ] 'gravity' and *lykke* [²lyk.kə] 'luck' have the same tonal accent and stress pattern, but it is only in the former that stress seems to be "mobile": *alvorlig* [ɑl¹ʋo:li] 'serious' but *lykkelig* [²lyk.kəli] 'happy', not *[ly¹ke:li]. If *alvor* consists of 2 stress domains while *lykke* has only one, we can easily account for this kind of alternation.[235]

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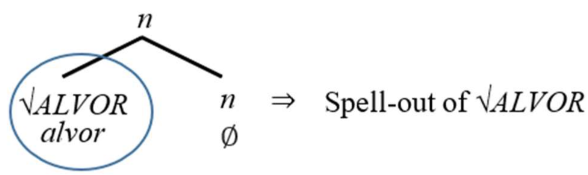
[234] Exactly why PF splits up morphological simplexes in two stress domains and which ones is beyond the scope of the thesis but phonological size and vowel qualities could be relevant factors.

[235] The "alternative" prominence, or secondary stress, can also show up in compounds. Recall from section 2.2.2 that TN generally neutralises the tonal accent contrast in compounds to accent 2, realised phonetically as ᴸHL. The final L preferably associates to the last stress domain in the compound. Words such as *atlas* [¹ɑtˌlɑs] 'atlas', *albatross* [¹ɑlbɑˌtrɔs] 'albatross', *alvor* [²ɑlˌʋo:ɾ] 'gravity', *arbeid* [²ɑɾˌbej] 'labour', *eventyr* [²æ:ʋənˌty:ɾ]

We start off with an acategorial root √*ALVOR* that is merged with an abstract nominalising head *n* in the syntax. As before, the abstract nominalising head *n* is a phasal head that triggers Spell-out of its complement, as shown below.

<u>Step 1:</u> *Workspace I*



(6-4) √*ALVOR* in the context of *n* ⇔

Lexical entry, PF
- segmental make-up, /ɑlʊɔɾ/.
- no underlying tonal accent.

What is of most interest to us here is what happens at the PF interface when the root is Spelled-out. In the lexical entry of the root √*ALVOR* in the context of *n*, PF finds the segmental string /ɑlʊoɾ/ without any lexical tone, as shown in (6-4). When PF assigns stress to the string, the string is split into two stress domains, such that both syllables are assigned stress. This means that both syllables have to adhere to the bimoraicity requirement. In the first syllable /ɑl/, the coda consonant receives Weight-by-Position while in the second syllable /ʊoɾ/ the coda consonant is extraprosodic. The result is that the first syllable stays as it is while in the second syllable, the vowel is lengthened so as to satisfy the bimoraicity requirement. As there is no tonal accent in the lexical entry, no tonal accent is assigned at this point.

‘fairy tale’, *herberge* [^{2}hæ:ɾˌbæɾgə] ‘hostel’, *idrett* [^{2}i:ˌdɾɛt] ‘sports‘, *leksikon* [^{1}lɛksiˌkun] ‘encyclopaedia’, *maraton* [^{1}mɑɾɑˌtɔn] ‘marathon’, *mareritt* [^{2}mɑ:ɾəˌɾit] ‘nightmare’, *monitor* [^{1}muniˌtuɾ] ‘monitor’, *vilkår* [^{2}ʊilˌko:ɾ] ‘term’ and *ydmyk* [^{2}y:dˌmy:k] ‘humble’ all have initial stress when they appear on their own. If they are in compound final position however, the accent 2 final L can associate with the last heavy syllable of these words (this kind of final prominence is also observed in some Dutch compounds (Booij 1995:116-117)). This corroborates the findings of Domahs et al. (2008) for German, which indicated the presence of a foot at the end of words with antepenultimate stress, such as German *Lexikon*. Analysing them as formal compounds allows us to account for this behaviour.

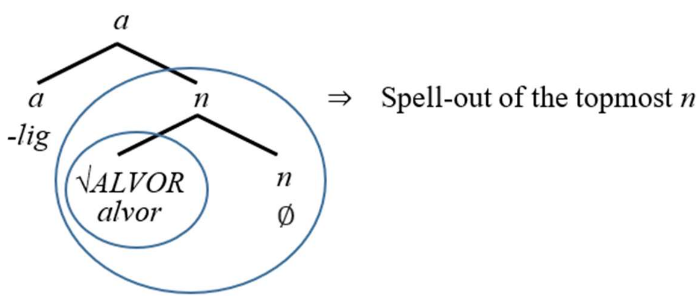
Crucially, PF is not able to see anymore that the syntactic object that has just been interpreted phonologically is a morphological simplex. From the point of view of PF, the only legible stress related information that remains from the morphosyntactic representation in step 1 is not (6-5)a but (6-5)b (the bracketing shows stress domains):

(6-5) a. {ɑlʋoɾ}

b. {ɑl} {ʋoɾ}

By splitting the morphological simplex in two stress domains at PF, we have the structural configuration that is required for the alternation in tonal accent to arise: two adjacent stress domains. Depending on what is merged to the structure in the next step, we get either stress on {ɑl} or on {ʋoɾ}, with the tonal accent tagging along. If we merge the adjectivalising head *a* as shown in step 2, this will trigger a Spell-out of the two stress domains in (6-5)b together.

Step 2: *Workspace I*



Recall that even though the morphosyntactic representation in step 2 treats the inner Spell-out domain as one single unit, PF has split it up into two adjacent stress domains. When this structure is returned to PF again via the Spell-out of the topmost *n* triggered by the *a* head, the phonological computation will only see its own work. With the instruction to assign stress to the right when two adjacent stress domains are Spelled-out together in the context of *a*, PF will stress the domain {ʋoɾ}. Since accent 2 is blocked in domains with final stress, accent 1 is assigned by default, thus deriving the intermediate PF form [ɑl^{1}ʋoːɾ]. On the assumption that stress-induced accent 1 at the stem-level is as resilient to change as lexically marked accent 1, the tonal accent remains intact after head movement of the topmost *n*, left-adjunction to *a*, finished by a final Spell-out where the adjectivalising suffix receives its phonological form.

6.3.3 Further issues

It was argued above that stress-induced accent 1 at the stem-level is a general property of the phonology of Norwegian as it applies to structurally different but prosodically similar environments. In nominal paradigms, stress-induced accent 1 is assigned as a consequence of lexical marking of final stress whereas in derived adjectives, it arises in intermediate domains if final stress is imposed by suffixes such as *–lig*. Both cases however, represent instances of accent 1 emerging during the derivation at the stem-level, i.e. they are not lexical. We might, however, expect to see other sources to accent 1 than the ones discussed in this thesis. For instance, there may be suffixes with similar prosodic properties to *–lig*, that are operative in other parts of the lexicon. This issue is discussed in section 6.3.3.1. Finally, there may also be suffixes that appear to be accent-1 inducing. That is, their mere presence in the structure is enough for PF to assign accent 1. This is the topic of section 6.3.3.2.

6.3.3.1 Other suffixes like *–lig*?

So far in this chapter, we saw that the adjectivalising suffix *–lig* had a special prosodic requirement in that stress is final in its Spell-out complement, resulting in stress falling on the unit that immediately precedes *–lig*. Affixes do fall into different classes depending on their prosodic requirements (or lack thereof) and behaviour (see Kristoffersen 2000:170-181 for Norwegian and Riad 2014:197-210 for Swedish). Here I wish to draw the attention to an observation made by Riad that the infinitival suffix *–a* in Swedish is what he calls posttonic (p.229, footnote 6), that is, it prefers to immediately follow the stressed syllable. This means that it is in the same prosodic class as Swedish *–lig*. The same claim can be made about the infinitival suffix *–e*[236] in Norwegian, and by adapting the syntactic structure that we assumed for *uskikkelig* in section 6.3.2.1.3, we can derive the alternation in tonal accent between nouns and verbs that are prefixed with *for–* (described in section 6.1.1). There is a stressed and an unstressed version of the prefix, depending on whether it attaches to a noun or to a verb. Crucially, the tonal accent goes hand in hand with the alternation in stress. In nouns, the stress

[236] Some varieties of Norwegian use *–a* to mark infinitives while others have zero marking (the apocope dialects).

falls on the prefix and is realised with accent 2. In verbs on the other hand, the stress falls on the lexical root and is realised with accent 1. Some of the data is repeated below:

Table 39 – The prefix for-

Prefix	Base form		Prefixed form	Gloss
for-	*bruk*	[¹brʉːk]	[²fɔɾˌbrʉːk]	'consumption (n)'
	bruke	[²brʉːkə]	[fɔɾ¹brʉːkə]	'consume (v)'
	fall	[¹fɑl]	[²fɔɾˌfɑl]	'decay (n)'
	falle	[²fɑl.lə]	[fɔɾ¹fɑl.lə]	'decay (v)'
	hold	[¹hɔl]	[²fɔɾˌhɔl]	'relation (n)'
	holde	[²hɔl.lə]	[fɔɾ¹hɔl.lə]	'relate (v)'

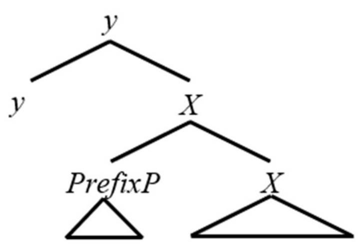
As the data in Table 39 indicates, accent 1 does not reside in any of affixes as both the prefix *for–* and the suffix *–e* are compatible with both tonal accents. It is thus similar to our analysis of *uskikkelig* in section 6.3.2.1.3. On the assumption that the root and the prefix form two separate but adjacent Spell-out domains, the phonological contrast between the nouns and the verbs falls out automatically from the nature of the phasal head that triggers Spell-out of the root and the prefix together. Phasal heads in the nominal extended projection (perhaps the D head) do not come with any specific prosodic requirements, fixing default stress on the left. If infinitival *–e* realises a phasal head located in the verbal extended projection, requiring stress to the right in its Spell-out complement, stress on the lexical root along with accent 1 would be a case of stress-induced accent 1 at the stem-level (as in section 6.3.2.1.3 and 6.3.2.2).[237] Other cases involving what appears to be the prefix *for–* but with roots that do not exist, such as

[237] In our analysis of denominal and deverbal adjectives in section 6.3.2.1.3, it was pointed out that a medial /e/ sometimes showed up between the lexical root and the adjectivalising suffix. In deverbal adjectives, this /e/ can be argued to be the infinitival marker. If both infinitival *–e* and adjectivalising *–lig* conspire to put stress on what is in practice the lexical root, this can explain why the combination of them, that is *–elig*, always attracts stress to the syllable preceding them. This pattern is so robust that some accounts of stress in Norwegian takes *–elig* to be a separate suffix (Standwell 1972, Johnsen 2008).

forskjell [^{2}fɔʂˌʂɛl] ‘difference’ vs. *forskjellig* [fɔ^{1}ʂɛl.li] ‘different’, are perhaps analysed as a type for formal compound, as in section 6.3.2.2.

This indicates that the syntactic structure proposed for negative prefixes perhaps should be more general, as in (6-32), where *y* is a phasal head.[238]

(6-6) *Generalised prefix structure*



However, if we put all the prefixes in the same box, we end up throwing the baby out with the bath water. Some prefixes are always stressed, regardless of nominal or verbal context. This is the case with so-called particle constructions where the particle is realised as a prefix on a nominal or verbal root. Interestingly, the phonological contrast between nouns and verbs for particle constructions is still retained in Urban Eastern Norwegian, but instead of being distinguished by stress and tonal accent in tandem, the contrast resides only in the tonal accent: verbs are realised with accent 1 while nouns are realised with accent 2. This goes against the generalisation noted for the prefix *for–* above. Some of the data are repeated below:

[238] Even with the more general structure in (6-6), there are still stress/tonal accent alternations that do not fit very neatly. These often involve 2-member compound structures with short monosyllabic first members: *selvfølge* [^{2}sælˌfœlgə] ‘implicitness’ vs. *selvfølgelig* [sæl^{1}fœlgəli] ‘of course’ and *høytid* [^{2}hœjˌti:] ‘holiday’ vs. *høytidelig* [hœj^{1}ti:dəli] ‘solemn’. I leave these for future research.

Table 40 – verbal particles

Prefix	Base form		Prefixed form	Gloss
ut-	*tale*	[^{2}tɑ:lə]	[^{1}ʉ:ˌtɑ:lə]	‘pronounce (v)’
	tale	[^{2}tɑ:lə]	[^{2}ʉ:ˌtɑ:lə]	‘pronunciation (n)’
an-	*klage*	[^{2}klɑ:gə]	[^{1}ɑŋˌklɑ:gə]	‘accuse (v)’
	klage	[^{2}klɑ:gə]	[^{2}ɑŋˌklɑ:gə]	‘accusation (n)’

In spite of having the same stress pattern (initial stress), the words in Table 40 are distinguished by tonal accent alone. This means that infinitival *–e* is not always immediately posttonic. There is no doubt however, that there has been a phonological split between nouns and verbs historically when it comes to stress (Fischer-Jørgensen 1993). Given the behaviour of the prefix *for–* in Norwegian and Riad’s claim about Swedish infinitival *–a*, it is not unreasonable to ascribe the diachronic origin of the contrast between nouns and verbs to properties of verbal suffixal morphology. Verbs such as *anklage* [^{1}ɑŋˌklɑ:gə] ‘accuse’ probably had stress on the lexical root at some point in history (Kock 1886)[239], giving stress-induced accent 1 as expected with our system: [ɑŋ^{1}klɑ:gə]. A later change shifted the stress to the particle while at the same time retaining the original stress-induced accent 1, thus giving birth to the system in Table 40 above. How to derive this system synchronically without giving the phonological computation direct access to morphosyntactic categories is still a puzzle, but recognising that the infinitival suffix (or any other functional head in the verbal extended projection such as tense) may have something to do with it is perhaps a good first step.

6.3.3.2 Head movement

On the assumption that morphosyntactic structure has a strict branching direction and that relative scope is (largely) mirrored by the structure, we need a way to make sure that nouns like *skikk* ‘custom’ is linearised to the left of the adjectivalising suffix *–lig*, even though the suffix

[239] Note that Kock (1886) dealt specifically with *stød* (glottal accent) and stress in Danish. The glottal accent in Danish however, largely has the same distribution as accent 1 in Norwegian and Swedish (see Wetterlin and Lahiri 2012 and references therein), indicating a considerable commensurability.

is hierarchically higher than the noun. In section 6.3.2.1.2, the assumption we made was that there was head movement, raising the noun and left-adjoining it to the suffix. In the original conception of head movement in the work by Travis (1984), head movement was assumed to be a syntactic operation. However, later work has called this into question for various reasons (see Dékány 2018 for an overview), such as lack of semantic effects. This points to head movement being part of the phonological computation instead. In Distributed Morphology for instance, it has been suggested that PF is responsible for certain movement operations and structural adjustments (Embick and Noyer 2001).

The question whether head movement of the type in *skikkelig* in section 6.3.2.1.2 is executed in syntax or in PF is outside the scope of this thesis. However, I would like to draw the attention to a contrast that may find its answer in where head movement takes place. A comparison between the two adjectivalising suffixes *–lig* and *–isk*[240] indicates that they are not equally visible for the algorithm that assigns tonal accent. This is shown in Table 41 below (IPA given for TN):

Table 41 – comparison between -lig *and* -isk

Base form		**Suffix**	**Derived adjective**		**Gloss**
syn	[^{1}sy:n]	*-lig*	*synlig*	[^{2}sy:nli]	'visible'
u+syn	N/A	*-lig*	*usynlig*	[ʉ^{1}sy:nli]	'invisible'
selv+følge	[^{2}sælˌfœlgə]	*-lig*	*selvfølgelig*	[sæl^{1}fœlgəli]	'of course'
menneske	[^{2}mɛn.nəskə]	*-lig*	*menneskelig*	[^{2}mɛn.nəskəli]	'human (a)'
legeme	[^{2}le:gəmə]	*-lig*	*legemlig*	[^{2}le:gəmli]	'bodily'
drama	[^{1}drɑ:mɑ]	*-isk*	*dramatisk*	[drɑ^{1}mɑ:tisk]	'dramatic'
karisma	[kɑ^{1}rismɑ]	*-isk*	*karismatisk*	[kɑris^{1}mɑ:tisk]	'charismatic'
panikk	[pɑ^{1}nik]	*-isk*	*panisk*	[^{1}pɑ:nisk]	'frantic'
anekdote	[ɑnɛk^{2}du:tə]	*-isk*	*anekdotisk*	[ɑnɛk^{1}du:tisk]	'anecdotal'

[240] This suffix is cognate with German *–isch*, English *–ish*, Latin *–icus* and Greek *–ικός*. It has two variants in Norwegian, *–sk* and *–isk*, where the former is the oldest one, deriving adjectives from Germanic roots. The latter was borrowed from Low German, and is usually found in loanwords (Faarlund et al. 1997:115-116).

Considering their stress properties, it is clear from Table 41 that *–isk* is prestressing (grey rows) while the prestressing nature of *–lig* only shows up if there are more stress domains. Thus, *usynlig* in has two stress domains to the left of *–lig* while *menneskelig* has only one. In his description of affixes, Kristoffersen (2000:197) classifies *–lig* as an extraprosodic suffix. The justification for this is that in his account, the suffix triggers a version of the Main Stress Rule that puts stress on the right. In spite of being on the right itself, it escapes stress. Hence its extraprosodicity. Interestingly, Kristoffersen (2000:177-178) does not classify *–isk* as extraprosodic, but tentatively suggests that the suffix calls for a syllable-based trochee for main stress assignment, as opposed to a mora-based trochee, thus explaining why stress falls on the syllable immediately preceding the suffix. This means that the suffix provides the second syllable needed for the syllabic trochee.

As for tonal accent, our analysis above has demonstrated that *–lig* does not come with any particular preference and may even provide the second syllable necessary for accent 2 to be realised (as in *synlig* in Table 41). By contrast, it appears that *–isk* induces accent 1 (*anek²dote* vs. *anek¹dotisk* in Table 41) but it is questionable whether we actually need to bestow any suffix with that power.[241] Lahiri et al. (2005) have suggested that the Latinate infinitive marker *–ere* induces accent 1, but as discussed briefly in section 6.3.2.1.3, it is perhaps more reasonable to see that as a result of final stress on the verbal root. Thus, apart from *–isk*, there are few other candidates to join the group of accent-1 inducing suffixes.[242]

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[241] There are as far as I know three exceptions to this: *nordisk* [²nuɖ.ɖisk] ‘Nordic’, *jordisk* [²juɖ.ɖisk] ‘earthly’ and *malerisk* [²mɑːlərisk] ‘picturesque’. Interestingly, the last one is also an exception to the otherwise pre-stressing tendency we find for the suffix *–isk*.

[242] An interesting candidate is the superlative suffix /–st/ in Urban Eastern Norwegian that seems to induce accent 1 (Wetterlin 2006:112) or alternatively block accent 2 (Kristoffersen 2000:261). Interestingly, accent 2 does show up when an inflectional /–e/ is added, resulting in paradigms such as:

i)	*vanlig*	[²ʋɑːnli] – ‘common’	Positive
ii)	*vanligere*	[²ʋɑːnliərə] ‘more common’	Comparative
iii)	*vanligst*	[¹ʋɑːnlikst] – ‘most common’	Superlative, indefinite
iv)	*vanligste*	[²ʋɑːnlikstə] – ‘most common’	Superlative, definite/plural

The alternation in the superlative seriously weakens the potential status of /–st/ as accent-1 inducing.

If we assume that *–isk* does not induce accent 1, an interesting asymmetry between the two suffixes emerges when we summarise their properties: a) *–lig* is extrametrical for stress, but visible for tone (i.e., it allows accent 2 to use it) b). *–isk* is visible for stress (syllabic trochees) but invisible for tone (i.e., does not allow accent 2 to use it).[243] In the current framework however, this contrast could be derived by assuming that both suffixes are extrametrical (i.e., not part of the Spell-out they trigger) but with different stress requirements for their Spell-out complements (*–isk* is indeed prestressing on a syllabic level, while *–lig* only plays a role when there are two adjacent stress domains). The asymmetry they show for tonal accent could potentially be an effect of when head movement applies for each of them. If head movement and linearisation takes place in syntax, the syllable of the suffix will be available before the relevant parts are Spelled-out together, enabling accent 2 as in *synlig* [^{2}sy:nli] 'visible'. If movement and linearisation are delayed until PF, the syllable of the suffix will not be available when the relevant parts are Spelled-out together, thus blocking accent 2, as in *panisk* [^{1}pɑ:nisk] 'frantic'.[244]

It should be noted though that assuming different points of linearisation associated with the two suffixes also come with problems when other parts of the phonology are considered. If head movement and linearisation can occur in two points (one early point in syntax and one late point in PF) and assignment of tonal accent mirrors that, we should expect to see other phenomena correlate with that. Some processes seem to go against that. Syllabification of sonorants for instance, is sensitive to the phonological and morphosyntactic context (Kristoffersen 2000:215-224). Lexical roots that arguably have final consonant clusters that violate the Sonority Sequencing Principle (Clements 1990) such as /sykl/ will have a syllabic sonorant (or schwa epenthesis in some varieties) in order to avoid a sonority violation unless a

[243] If we follow the assumption in Kristoffersen (2000:177-178) that *–isk* does call for a syllabic trochee for main stress, an interesting paradox arises with respect to tonal accent. Accent 2 must have a syllabic trochee in order to be realised, yet a suffix that has been argued to trigger the construction of precisely a syllabic trochee shuns accent 2, as the data in (6-34) show.

[244] The adjectivalising suffix *–isk* may also co-occur with mutations on the stem as in *drama~drama[*t*]isk* 'drama~dramatic' or *analyse~analy[*t*]isk* 'analysis~analytic' where a [t] appears from /s/ or from Ø. This effect could be located at the intermediate Spell-out that applies in denominal/deverbal adjectives. See discussion in section 6.3.2.1.2.

vowel initial suffix can adopt it as an onset. Thus, we get [^{1}syk.kl̩]~[^{1}syk.kəl] for the noun *sykkel* 'bike (n)' but [^{2}syklə] for the verb *sykle* 'bike (v)' with the infinitival –*e*. If accent 2 and syllabification of the sonorant as an onset in *sykle* is a result of head movement in syntax, then the surface form of derived adjectives such as *syklisk* [^{1}sy:klisk] 'cyclic' comes as a surprise because the syllabification of the sonorant suggests early head movement (i.e., in syntax) while the tonal accent suggests late head movement (i.e., in PF, under the assumption that suffixes cannot be lexically marked for tonal accent). It is clear in any case that empirical claims about the nature of head movement needs a careful investigation of all the relevant facts.

7 Conclusion

In this dissertation, I have investigated the interaction between linguistic tone and internal word structure in Tromsø Norwegian. As stated in chapter 1, linguistic tone here is defined as the two contrastive tonal accents that exist in tonal varieties in Norwegian in general, while internal word structure here refers to word structure below any extended projections in the morphosyntax. Chapter 1 also gave an outline of the aims and scope of this dissertation and set the topic into the larger theoretical context. This included the formulation of the *research questions* for this dissertation and *predictions* stemming from hypotheses concerning the nature of the syntax-phonology interface, both of which we will return to shortly. In order to say anything about these however, it has been necessary to find out i) what the tonal accents are expressions of, ii) what the morphosyntactic structure looks like and iii) how these two aspects of linguistic representation relate to each other. These issues were dealt with in the following chapters. Chapter 2 provided a description of the phonetic realisation of the tonal accent and their relation to other parts of the phonology, as well as an overview of their distribution in the lexicon. Chapter 3 focused on the nature of the contrast between the tonal accents and their locus in the grammar. Chapter 4 dealt with the morphosyntactic properties of morphologically complex structures below any extended projections in addition to outlining the details of the communication at the interface between morphosyntax and phonology. Chapter 5 offered an analysis of some of the morphologically complex structures, traditionally known as compounding, while chapter 6 showed how this could be extended to account for patterns observed in morphologically complex structures derived through derivational affixation.

The questions and issues addressed in this dissertation fall into two broad themes: i) One theme is about Norwegian in particular and involves the notions of domains, tonal accents and morphologically complex words. These form the basis of the research questions. ii) The other theme concerns the nature of the syntax-phonology interface in generative grammar, and in particular, the predictions given by the two competing interface theories: *Indirect Reference Hypothesis* (IRH) and the *Direct Reference Hypothesis* (DRH) (see sections 1.1.2 and 1.1.3). I will start with the research questions in section 7.1 before I look at the interface theory predictions in section 7.2. Section 7.3 is dedicated to open issues.

7.1 Research questions

As has been demonstrated throughout this dissertation, both phonological and morphosyntactic factors are relevant for tonal accent distribution, and the task here has been to understand how these two governing factors relate to each other, thus engendering the synchronic distribution of the tonal accents. With this in mind, a set of research questions (RQ) were formulated in section 1.4 (repeated here):

I. To what extent is a derivational approach to delimiting domains for phonological computation able to account for the distribution of tonal accents in Tromsø Norwegian?
II. If a derivational approach is possible, what does that tell us about the nature of the tonal accents in the phonological grammar?
III. Are compounds special in any sense that grants them a special status in phonology?

In light of the assumptions and discussions in the previous chapters, we are now in a position to give an answer to each of the three RQs.

7.1.1 *RQ1: To what extent is a derivational approach to delimiting domains for phonological computation able to account for the distribution of tonal accents in Tromsø Norwegian?*

As a means of approaching this question, we defined as a first step what the empirical ground was in terms of morphosyntax. More specifically, this dissertation only deals with word structure within the confines of the stem, i.e. word structure below any functional extended projections in the morphosyntax. This delimitation was specified in section 1.4. As a consequence, the answer to RQ1 that this dissertation provides only applies to this morphosyntactic level. How word structure that includes heads located in extended projections fits in with this has not been explored.

In a second step, we clarified the relationship between the two tonal accents. Even though they seem to occupy the same space in the grammar by virtue of both being contrastive realisations of (primary) stress, we established in section 3.2.4 that accent 1 is the only one that can figure in underlying representations of lexical items.[245] Such lexical marking is taken care of through the abstract diacritic (ˣ). This diacritic provides instructions to realise the relevant lexical items with accent 1. The exact phonetic details of accent 1 will obviously depend on the variety of Norwegian in question. For Tromsø Norwegian, it is implemented as a HL contour spread over maximally two syllables. However, by keeping the lexical marking abstract, we facilitate comparison between accent systems across the entire Scandinavian dialect continuum. We also established that in case there is no lexical marking of tonal accent available, a default post-lexical tonal accent will be assigned according to phonological rules and restrictions. These are repeated here: i) default accent 2 is licensed only on syllabic trochees, which entails that ii) default accent 1 surfaces in monosyllabic domains and in polysyllabic domains with final stress. This means that all instances of accent 2 are post-lexical while instances of accent 1 may be lexical and post-lexical. However, lexical marking of accent 1 only appears in lexical entries which would otherwise be assigned default accent 2.

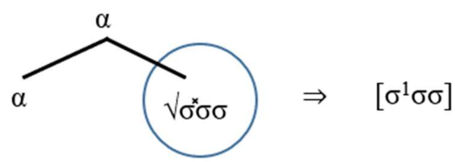
In a third step, we established how the morphosyntactic derivation is carried out and how it interacts with the interface components PF and LF. This was discussed in section 4.4. In particular, we argued that syntax takes morphemes as its smallest building block, which entails that word-formation takes place in the syntax (i.e. syntax-all-the-way-down). Furthermore, we argued that the communication between syntax and the interface components proceeds in phases. That is, certain morphemes or access points in the syntactic derivation are phasal in that they activate the Spell-out function, thus shipping off the structure that has hitherto been built to the interfaces for interpretation. These intermediate pieces of structure represent the domains in which phonological computation operates. What is argued for in this thesis is that the distribution of the tonal accents is connected to these domains.

Upon Spell-out of a phase, the interfaces start interpreting the Spelled-out domain by looking into any relevant lexical entry connected to the syntactic nodes. If the accessed lexical entry contains the abstract diacritic (ˣ), this is an instruction to PF to realise the relevant phonological string with accent 1. However, the properties of the diacritic may vary according to the variety

[245] Note that what can be lexically marked may be subject to dialectal variation. As discussed in section 3.2, UEN allows lexical marking in monosyllabic roots while Tromsø Norwegian only has lexical marking in polysyllabic roots.

of Norwegian in question. We will get back to this shortly. If there is no abstract diacritic in the lexical entry, a default tonal accent will be assigned to the domain in accordance with phonological rules and requirements later on in the derivation. In the most basic cases, we have a simple root, which may or may not have lexical marking. Recall that for Tromsø Norwegian, lexical marking only applies to roots that are polysyllabic. When such a root is merged with a categorising *phasal* head α, the root is Spelled-out and the result is the creation of a *stem*, which we recognised as the smallest domain for semantic and phonological interpretation.[246] It is during the phonological interpretation that the potential the abstract diacritic carries is realised. This is illustrated in (i) below where a polysyllabic root with lexical marking is Spelled-out:

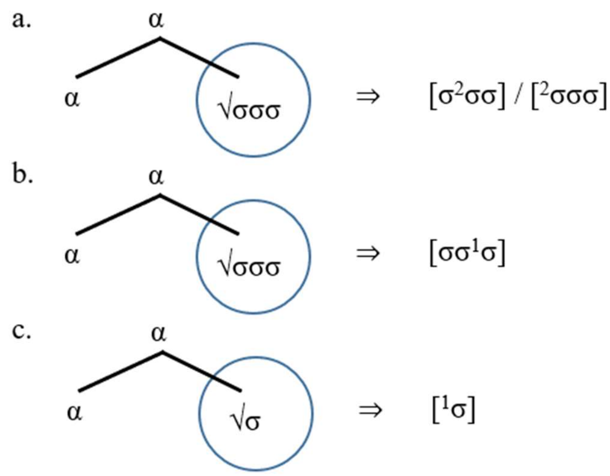
(i) *Polysyllabic root with lexical marking*



The abstract diacritic (ˣ) in the lexical entry provides instructions for the PF component to realise the primary stress in the string as accent 1. In (i) above, this falls on the penultimate syllable. The exact computation of stress placement however, need not concern us here as the main point is the effects that the abstract diacritic has on the tonal realisation of primary stress. In cases where the root in question has no lexical marking, PF assigns a default tonal accent to the string later on in the derivation according to PF internal considerations. Default accent 2 is assigned if metrification produces a syllabic trochee. This is shown in (ii)a below. Otherwise we find default accent 1, as shown in (ii)b and (ii)c:

[246] The term *stem* applies to any phasal derivational step in the morphosyntax that is located below any extended projection.

(ii) *Root without lexical marking*

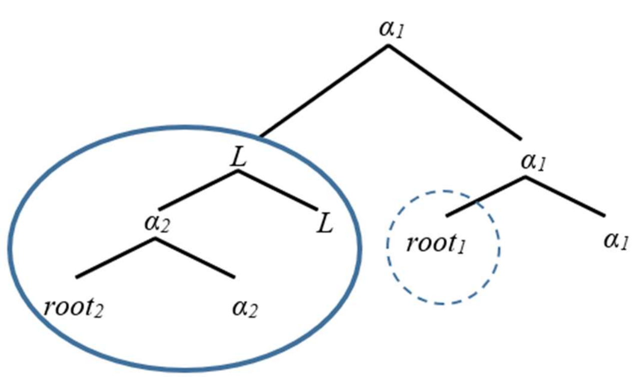


The common default tonal accent for polysyllabic roots with final stress and monosyllabic roots notwithstanding, there is an important difference between them. As we consider stress to be a relational notion between weak and strong syllables, this means that computation of stress takes place earlier in the derivation for polysyllabic roots with final stress than for monosyllabic roots. Computation of tonal accent follows suit by virtue of being an inherent part of the stress realisation system. This has the consequence that accent 1 arises earlier for roots with final stress than for monosyllabic roots. Operating with this derivational distinction allows us to account for the different behaviours we find for the two different types of roots under suffixation. When morphosyntax provides additional syllables that enable a metrification that could produce a syllabic trochee, the relatively early acquired accent 1 for roots with final stress remains intact while the late acquired accent 1 for monosyllabic roots changes. Thus, we find that the singular forms of nouns of these two root types both have accent 1 (*bil* [^{1}bi:l] ‘ car’, *kamel* [kɑ^{1}me:l] ‘camel’) while the plural forms diverge from each other tonally (*biler* [^{2}bi:lɑ] ‘cars’, but *kameler* [kɑ^{1}me:lɑ] ‘camels’). Under the assumptions made in this dissertation, the resilience of accent 1 in roots with final stress is compatible with two interpretations: either accent 1 comes about as a result of the presence of the abstract diacritic (ˣ) in the lexical entry, or it is induced by the stress properties at the stem-level (domains with final stress are accent 1 by necessity). The latter interpretation fits well with other areas of the phonological grammar of Norwegian where lexical marking cannot play a role, such as in adjectival formations involving the suffix *–lig*.

In what is generally known as compound formation, we have at least two roots that are combined to form a more complex morphosyntactic object. One of the roots is classified as the formal head (governing the syntactic distribution) while the remaining material is classified as the non-head (semantic modifiers). Norwegian compounds have stress on the initial member, but there is dialectal variation when it comes to the choice of tonal accent to realise this stress. Urban Eastern Norwegian allows both accent 1 and accent 2 in compounds (governed by properties of the compound-initial member) while Tromsø Norwegian generally neutralises the tonal accent contrast to accent 2 in compounds. However, some accent 2-compounds are also possible with accent 1, but the shift also changes the semantic interpretation, as in ^{1}*bydel* 'suburb (administration)' vs. ^{2}*bydel* 'town piece'. Accent 2 is connected to transparent semantics while accent 1 is connected to more idiosyncratic semantics. The idea that is pursued in this thesis is that the phonological (and semantic) differences between accent 1-compounds and accent 2-compounds in Tromsø Norwegian finds their origin in the Spell-out structure in the morphosyntactic derivation.

Starting with compounds with accent 2, they reflect a structure where the head and the non-head are Spelled-out separately from each other before they are put together. According to the assumptions in this thesis, the non-head in an accent 2-compound is a left-branching structure that has the projection of a linking element *L* on top, which enables the non-head to be syntactically adjoined to the head. The non-head however is built outside the spine of the tree, a configuration that requires it to undergo Spell-out prior to adjunction. The result is a structure with two adjacent domains that have both undergone interpretation at the interfaces but not yet with each other. A simplified representation of this is shown in (iii) below:

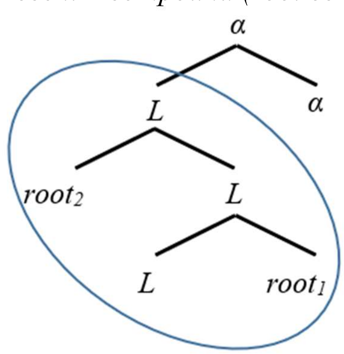
(iii) *Accent 2 compound (stem compound)*



When the structure in (iii) is subjected to a Spell-out due to some phasal head higher up in the structure, the two circled domains that have already been interpreted semantically and phonologically are put together into one domain. Prominence is added to the domain on the left (the Spell-out domain circled with solid lines), which makes the compound initial member the prosodic head. In Urban Eastern Norwegian, properties of the prosodic head govern the tonal accent of the entire compound, which means that the presence of any diacritic (ˣ) in the lexical entry of *root₂* will result in accent 1. Otherwise we get accent 2. However, in Tromsø Norwegian, compounds are generally neutralised to accent 2, which hints at dialectal differences when it comes to the properties of the diacritic (ˣ). More specifically, the neutralisation facts from Tromsø Norwegian indicate that lexical marking of tonal accent in this variety is not able to percolate upwards in the tree. Lexical tone does not survive the Spell-out of L. Consequently, the configuration in (iii), where the domain on the left is more prominent than the one on the right, is always interpreted as an accent 2-domain in Tromsø Norwegian.

As for compounds that do take accent 1 in Tromsø Norwegian, they arise in a context where the two roots in question have not been Spelled-out before they are put together. That is, the first time they undergo interpretation at the interfaces, they are in the same phase. This happens when two uncategorised roots are merged together before the structure is merged with a categorising phasal head. A simplified illustration of this is in (iv) below (recall from section 5.2 that the role of *L* in this is to repair an otherwise illicit syntactic structure):

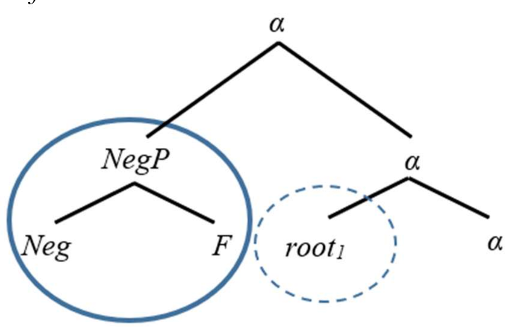
(iv) *Accent 1 compound (root compound)*



The lexical entries of the roots in question are thus not accessed separately, but rather the lexical entry of the circled syntactic object as a whole. For accent 1-compounds such as ¹*bydel* 'suburb (administration)', there is in other words a lexical entry that contains the diacritic (ˣ), which provides instructions to PF to realise the item with accent 1, making it parallel to lexical marking in simple roots. Furthermore, it accounts for the idiosyncratic semantics that are associated with this type of configuration as the roots are Spelled-out together, enabling them to influence each other semantically to a larger extent than what is possible in stem compound structures as in (iii).

This thesis has also shown that the derivational approach can also be extended to other types of morphemes at the stem-level (i.e. below any extended projections), such as prefixes. To be more specific, the native negative prefixes *u*–, *mis*– and *van*– have a phonological behaviour akin to non-heads without lexical marking in stem compounds. When the negative prefix is stressed, the prefix-base constellation as a whole is realised with accent 2. This behaviour falls out naturally if prefixal negation is a complex constituent that is adjoined to its base. However, before it can be adjoined, it needs to be Spelled-out by virtue of being a complex constituent that is built outside the spine of the tree. This results in a Spell-out structure that is similar to the one we have for stem compounds, as shown in (v) below:

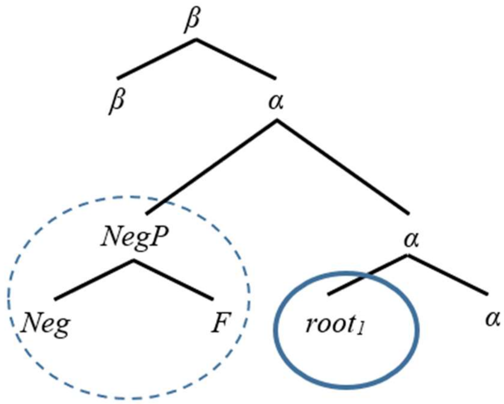
(v) *Prefix-base*



When the structure in (v) undergoes Spell-out due to some phasal head higher up in the structure, the phonological component adds prominence to the domain on the left (domain circled with solid line), resulting in stress on the prefix. The rhythmic pattern that arises, where the domain on the left is more prominent than the domain on the right, is interpreted as an accent 2-domain. This is a complete parallel to stem compounds.

Finally, the application of the derivational approach to prefixes also allows us to account for cases where there is interaction between prefixation/suffixation on one side and tonal accents on the other. We saw this in relation to adjective formation through suffixation of the adjectivalising morpheme –*lig*, where the presence of an unstressed negative prefix correlated with accent 1 while the absence of this prefix correlated with accent 2. We accounted for this by assuming the same kind of Spell-out structure as we have in (v), except that the phasal head that triggers Spell-out of the structure (which is –*lig* in these adjectives) comes with a prosodic requirement to its Spell-out complement: prominence is assigned to the right. Crucially, its effects are only visible if the relevant Spell-out complement has a domain that can meaningfully be said to be on the right. The relevant representation of this is shown in (vi) below:

(vi) *Prefix-base-suffix*



In the structure in (vi), β represents a phasal head that triggers Spell-out of its complement (i.e. the topmost α node and everything it dominates). The phasal head β comes with a prosodic requirement to its complement, such that prominence is assigned to the *right* (domain circled with solid line) instead of to the left. This means that the root itself is assigned primary stress and not the prefix, resulting in a domain with final stress. This rhythmic pattern is realised with accent 1, but this accent 1 is neither lexical nor is it a default option (as for monosyllables). I conjecture that this is a case of stress-induced accent 1, and it finds a possible parallel in simple roots that have final stress. Stress-induced accent 1 seems to be as conservative and resilient as lexical accent 1 in that morphologically added syllables, which enables the creation of syllabic trochees (and accent 2), do not have any effect. If there is only one domain inside the Spell-out complement of β (e.g. there is no NegP), the prosodic requirement of β is vacuously satisfied and default rules apply.

Summing up, the derivational approach that has been advocated for in this thesis shows promising results when it comes to accounting for the distribution of tonal accents in the relevant word structures we have looked at in Tromsø Norwegian. Some lexical marking is necessary, but that is limited to marking of accent 1 and only in roots (or lexical entries) that are polysyllabic. Any domain that has primary stress needs to have a tonal accent, and if the domain has no lexical marking of tonal accent 1 (or the lexical marking is unavailable), the phonological component has to complete the information provided by syntax and the lexicon through application of default rules.

7.1.2 *RQ2: If a derivational approach is possible, what does that tell us about the nature of the tonal accents in the phonological grammar?*

The place of the two contrastive tonal accents in the phonological grammar of Norwegian seems on the surface to be quite straightforward: they are both inherently connected to the realisation of primary stress. This means that any instance of primary stress has to be realised with one of the tonal accents, and that they are illicit outside of this context. Furthermore, they are in complementary distribution. These facts show that they somehow occupy the same space, which may give the impression that they *are* the same kind of phonological object. However, this does not mean that they really are of the same ontological status, something that is reflected in how the relationship between them has been treated in earlier accounts – covering the range from identity via containment to independence. Some of the earlier accounts were discussed in detail in sections 3.2.2 and 3.2.3.

All work on tonal accents in Norwegian acknowledges that some degree of division of labour is needed to account for the distribution. That is, part of the job is done by the lexicon through lexical specification while another part of the job is delegated to the computation system. In addition, some notion of dominance/precedence/hierarchy is necessary to resolve conflicting requirements that may arise. The current work is no exception to this. The role of the lexicon is preserved through the abstract diacritic ($^{\times}$), which we may find in polysyllabic lexical entries, and which represents the potential for accent 1. The fact that only accent 1 can be lexically specified shows that there is an asymmetry between accent 1 and accent 2, or a hierarchy. If a domain that could potentially host accent 2 is lexically marked for accent 1, accent 1 takes precedence. In cases where no lexical marking is available, a default tonal accent is assigned later on in the derivation, depending on the size of the relevant domain. As for the role of morphology, it provides additional syllables and thus changes the size of the domains, which may have consequences for which tonal accent that is assigned by default. What is more explicit in the current proposal however, is the prominent position that is given to the morphosyntactic derivation: it engenders domains for phonological computation, and consequently for tonal accents.

If the approach that has been advocated for in this dissertation is on the right track, it has important consequences for the representation of the tonal accents in Tromsø Norwegian, and potentially also for other tonal varieties of mainland Scandinavian. One point of contention concerning Scandinavian tonal accents is whether they are cases of linguistic tone proper or expressions of prosodic structures (see discussion in section 3.2). The view on the relationship between the tonal accents that has been adopted in this thesis for Tromsø Norwegian, is one of independence – their phonetic shapes are independent from each other. That is, they are not the same underlyingly, nor is one contained in or derived from the other. Any surface privativity is in other words a mere accident. Such a view, by its very nature, lends itself to an analysis where at least all non-lexical tonal accents are expressions of some other property rather than being linguistic tone proper. This has been more forcefully established by only permitting lexical specification of accent 1, which then represents true linguistic tone. Consequently, all other instances of tonal accent must be expressing something else.

The behaviour of the non-lexical tonal accents in Tromsø Norwegian points us in the direction of them being expressions of prosodic (or metrical) structure. However, they are not tied to any designated prosodic categories such as moraic trochees, recursive feet etc (see section 3.2.3 for such proposals). Rather, they are related to the stress properties that are assigned to/arise in domains defined derivationally in syntax. Starting with accent 2, which only shows in up post-lexical contexts, and thus appears as less multifarious than accent 1, it has a distribution that encompasses: i) simplex words lacking lexical marking where metrification has created a syllabic trochee, e.g. *sjokolade* [ʂuku^{2}lɑ:də] 'chocolate', and ii) compound-like structures lacking lexical marking where stress falls on the compound initial member, e.g. *sollys* [^{2}su:ˌly:s] 'sun light'. What these two have in common is a rhythmic pattern that we can describe as 'falling': a strong beat followed by a weak one. This can be represented in a metrical grid:

(vii) *Representation of accent 2*

(**X** x) *Line β*
(x x) *Line α*

Without committing to any specific categories, the beats in line α may be instantiated as syllables in simplexes (roots with or without additional morphology) or as non-head/head in compound structures, depending on the size of the structure that is handed off from syntax. Line α thus serves as input for the phonological computation, whose (default) result is the left-headed structure in line β. This is phonetically implemented as accent 2 in Tromsø Norwegian: a melody that we can analyse autosegmentally as ^{L}HL, where the ^{L}H, a late H, links to the strong beat and the L links to the weak one.

As for accent 1, its distribution and behaviour show that it is not a monolithic phonological object, as it encompasses: i) simplex polysyllabic words with lexical marking, e.g. *lava* [^{1}lɑ:ʋɑ] ‘lava’, ii) simplex monosyllabic words, e.g. *dag* [^{1}dɑ:g] ‘day’, iii) simplex polysyllabic words with final stress, e.g. *kamel* [kɑ^{1}me:l] ‘camel’, and iv) compound-like structures lacking lexical marking where stress falls on the final member, e.g. *usynlig* [ʉ^{1}sy:nli] ‘ invisible’. What these two last ones have in common is a rhythmic pattern that we can describe as ‘rising’: a weak beat followed by a strong one. This can be represented in a metrical grid:

(viii) *Representation of non-lexical accent 1*

*x (**X** x)	*Line γ’*
(x **X**) x	*Line γ*
(x **X**)	*Line β*
(x x)	*Line α*

Just like for the representation for accent 2 in (vii) above, there is no commitment to any designated categories. Line α may represent syllables in simplexes or non-heads/heads in compound structures, and serves as input for the phonological computation. However, in this case, the stress computation results in a right-headed structure due to properties of the lexical item itself (i.e. lexical marking of stress) or of properties of the phasal head. This is phonetically implemented as accent 1 in Tromsø Norwegian: a melody that we can analyse autosegmentally as HL, where the H links to the strong beat and the L immediately follows (preferably in a separate beat if there is one available). Should any other material be linearised and concatenated to the right of the structure, there is no shift to accent 2 (line γ’). Rather, the stress-induced accent 1 that is derived in line β is kept also for the next level (line γ).

In its lexical form, accent 1 is represented by the abstract diacritic (ˣ), and is found only in polysyllabic lexical entries, providing instructions to realise the stress in the relevant lexical items as accent 1. This potential for true linguistic tone (i.e. accent 1) marked in the lexicon is discharged as soon as a categorising phasal head triggers Spell-out of the relevant items. Consequently, the locus in which lexical accent 1 is realised, is at the stem-level, a locus that it shares with the stress-induced accent 1 discussed above. This leaves us with default accent 1 that is assigned to monosyllabic words later on in the derivation (i.e. not at the stem-level). Presumably, both default accent 1 and accent 2 are assigned at the same step in the derivation. However, by having the rule that assigns accent 1 apply *after* the rule for accent 2, which has already received a characterisation in (vii), we can treat default accent 1 as the true elsewhere case. Hence, no further clarification about its representation is needed.

Nevertheless, we are still left with a disjunctive representation of stem-level accent 1, having both a lexical source ($^{\times}$) and a rhythmic one (as in (viii) above). This may be considered a disadvantage of the current proposal, but there is no a priori reason to assume that accent 1 ought to be monolithic. Whether it is possible to unify the representations for accent 1 is left for future research.

7.1.3 *RQ3: Are compounds special in any sense that grants them a unique status in phonology?*

The type of data that has been analysed in this dissertation all fits into what we loosely can refer to as compounds or compound-like structures. As discussed in section 4.1, it is difficult to give an exact morphosyntactic definition of a compound that unambiguously separates it from other word formation processes such as derivation. The lack of a (good) morphosyntactic definition notwithstanding, there may still be a primitive unit within the phonological component that has special properties and on which we can put the label “compound”. That is, there may be something representational, a diacritic, which the phonological computation needs to be able to see in order to apply the correct phonological operations. Evidence for such a diacritic, and ultimately for a positive answer to RQ3 would be phonological operations that were compound specific, thus distinguishing compound phonology from “regular” word level phonology.

In this dissertation, the focus has been tonal accents, and as we have seen, tonal accents are a property of both simplex words and compound. However, the general neutralisation pattern we find in compounds in Tromsø Norwegian, favouring accent 2, points to a difference between simplexes and compounds that may be substantial from a phonological point of view. This could of course be due to factors that are independent from specifics of a representational compound tag. For instance, we hypothesised in RQ1 that the difference between Urban Eastern Norwegian and Tromsø Norwegian for compound accent was to be found in the (non)ability of lexical marking of tonal accent (represented here as the diacritic ($^{\times}$)) to survive the Spell-out of the L projection. In Tromsø Norwegian, lexical tone expires here. This in combination with the fact that compounds are necessarily polysyllabic would result in accent 2 being favoured in compounds.

The claim that the neutralisation we see in compounds is the result of a compound specific phonology gets more substance if we take assignment of primary stress into consideration. Recall that the tonal accents are inherently connected to stress. Under the assumption that there is a directional parameter for stress assignment, it can be argued that simplexes and compounds have different settings for that parameter. In simplexes, primary stress is computed from the right edge (Kristoffersen 2000:158) while in compounds, it is computed from the left edge (Kristoffersen 2000:192). Even though stress assignment in a given compound is parasitic on the computation of stress internally to its initial member, the stress assignment algorithm in compounds in combination with the neutralisation facts may still be considered to be different enough for there to be a compound specific phonology. Albeit the stress properties being an important observation, it is not clear to me that that constitutes sufficient evidence to posit compounds as a representational primitive. Prosodic left-headedness in compounds may also just reflect the preference Norwegian has for trochees, although on a suprasyllabic level (cf. the representation for accent 2 in RQ2 above). Besides, a representational account, although possible, would have some strange results. On the assumption that prefixes have the status of prosodic words (or can be promoted to prosodic words), a representational account would correctly classify compounds such as *sollys* [^{2}su:ˌly:s] 'sun light' together with prefix-base complexes such as *uskikk* [^{2}ʉ:ʂik] 'bad custom' and *usann* [^{2}ʉ:ˌsɑɲ] 'untrue'. They would be instantiations of the same type of phonological unit, due to their similar prosody. This is a similarity that is also reflected in the current analysis. However, the left-headedness is not found in *uskikkelig* [ʉ^{1}ʂik.kəli] 'indecent, naughty', indicating that the prefix does not have prosodic word status, even though the construction is at least as compound-y as the other two prefixed examples just mentioned. Furthermore, it has a non-lexical accent 1. Both the non-initial stress and the non-lexical accent 1 would be unexpected if there really was a compound specific phonology. In the current analysis, the prosodic properties of the prefix in question follow from properties of the morphosyntactic derivation. No stipulations about prosodic promotion/demotion are necessary.

Note however, that the claim that is being made here is based on the properties discussed in this dissertation and is for Norwegian only. This does not exclude the possibility that there are other phonological operations that provide evidence for compounds being special, nor does it exclude the possibility of compounds being special in other languages. This is beyond the scope of this dissertation, however.

7.2 Interface theory predictions

The second theme of this dissertation concerns the nature of the syntax-phonology interface in generative grammar. In this way, this present work is also a contribution to the ongoing controversy between the IRH and DRH. This issue was discussed in detail in sections 1.1.2 and 1.1.3, and leaving out particulars of specific proposals of the two competing interface theories, we teased out more general predictions inferred from their respective assumptions concerning what the phonological component is capable of. These predictions are repeated here:

A. New boundaries can be inserted in the phonological component *in addition* to the ones that are put in place by syntax (compatible with both IRH and DRH).
B. Boundaries that are put in place by syntax can be overwritten in the phonological component (compatible with the IRH, but *not* with the DRH).

In the current analysis, it has been argued that we find cases of prediction A in (Tromsø) Norwegian at the level of representation that has been investigated. These are known as formal compounds and are characterised by having the prosodic structure and behaviour of a compound (two stress domains) while lacking the morphological structure of a compound. In our analysis in section 6.3.2.2, the phonological component is able to split up a morphosyntactic domain, or rather, *insert boundaries* that are not there in the morphosyntax, thus creating formal compounds. Giving this ability to the phonological component is compatible with both the IRH and the DRH.

As for prediction B, the two competing interface theories diverge from each other. In IRH, the phonological component is granted the ability to *ignore* boundaries that have been installed by syntax while DRH claims that the phonological component has to respect them. Given the nature of the claims, the kind of evidence we need to choose between the two competing hypotheses are cases where a syntactically installed boundary is ignored by phonology. If we come by such evidence, we can overthrow the DRH in favour of the IRH, with the consequences that has for phonological theory. In contrast, the lack of such evidence does not overthrow the IRH in favour of the DRH, but rather strengthens the DRH.

Even though this may seem straightforward, any evaluation of prediction B is contingent on which syntactic theory we subscribe to. Furthermore, it is not obvious what constitutes conclusive evidence for a phonological breach of a syntactic boundary. All work on the interface between phonology and syntax/morphology assumes a hierarchical organisation of layers which are associated with different phonological operations (though some may apply at more than one level). Thus, some scale with discrete steps is required, where the first step corresponds to early/low level phonology and the last step corresponds to late/high level phonology. These layers, or steps, are nested inside each other. In addition, phonological operations have different ranges, some spanning across larger domains while others are strictly local. Consequently, we may find some operations pertaining to the sphere of late/high level phonology that breach a boundary installed at an earlier point. A potential example of this in the context of tonal accent is found in regular accent 2 compounds in Tromsø Norwegian, where the syntactic head and non-head form two separate domains before they are Spelled-out together (see section 5.1 for more details). When the syntactic object that consists of both parts is fed to PF for phonological interpretation, the assigned accent 2 spans across the entire compound, as if only the new boundaries that encompass the head and the non-head of the compound are visible, and not the old boundary between them. This may seem to be an example of erasure of previously built syntactic boundaries and, thus evidence for the IRH. However, on the assumption that phonology can see its own work from the immediately preceding step, such as where stress has been placed in the two constituents, and uses these two locations as anchoring points for accent 2 in the compound, we can still maintain that at least for this case there is no need to grant phonology the capacity to overwrite syntactic boundaries. Consequently, even though it appears that accent 2 in compounds in Tromsø Norwegian "sees" through the compound internal boundary, we are perhaps rather dealing with some basic form of phonological "memory". Further research can explore if granting phonology access to previous information may be damaging for other operations.

7.3 Open issues

The work in this thesis rests on a number of assumptions about how grammar works in general and about properties more specific to Tromsø Norwegian. Naturally, some assumptions have already withstood detailed scrutiny on a cross-linguistic level and are among what we can call standard assumptions. Others are more controversial, leaving a number of open issues, and I would like to address these in this very final part.

One issue that needs further refinement is the definition of a phase. A key component in the current analysis is *Phase Theory* (see sections 1.1.2 and 4.4) where specific points in the syntactic derivation trigger Spell-out of the hitherto built structure (i.e. the phase), shipping it off to the interfaces LF and PF for interpretation. A complete utterance may thus consist of a number of phases, where each corresponds to a subpart of the entire string. Even though the concept of the *phase* is widely accepted as a working tool, a point of contention concerns what counts as a phase and as an extension, how many there are. Due to the limited scope of this thesis in terms of morphosyntax, we have only looked at structurally low phases. That is, we have taken categorising heads such as *n* and *v* to be phasal heads that provide the context for the interpretation of roots and of already categorised roots. In addition, complex structures that are built outside of the spine of tree have also been assumed to constitute phases on their own. However, nothing has been said about how this relates to structurally higher phases such as *v*P and CP. In terms of number, it is particularly the assumption that categorising heads are phasal that adds to the phasal repertoire. With such a proliferation in the number of phases, resulting in phases "everywhere", we run the risk of invalidating the explanatory power of the concept. Exactly what constitutes a phase is left for future research.

An issue that is related to the phase is the PIC (see sections 1.1.2 and 4.3.2.2), which in the formulation adopted in this thesis points to fossilisation effects found in syntax, phonology and semantics, effects that all converge on precisely the phase. However, how strictly the PIC should be interpreted for phonology can be discussed. We have for instance partially exempted certain phonological operations such as assignment of stress from the PIC, meaning that stress does not display the same kind of fossilising effects that we find for segmental strings. That is, we have allowed stress to be reassigned at later phases, or cycles. Operating with stress assignment as a process that applies cyclically is uncontroversial. However, the assumption that was made for assignment of tonal accent and the PIC is less straightforward. We did assume that there is a PIC effect for accent 1 when it surfaces at the stem-level, thus encompassing both lexical and stress-induced accent 1 (default accent 1 is not included). This means that accent 1 at the stem-level is fossilised and kept even if later morphosyntactic additions may create the structural environment for default accent 2 (i.e. the potential for a trochaic pattern, see section 7.1.2 above). We saw this in for instance plural formation of noun stems with (lexical) final stress, e.g. *kameler* [kɑ^{1}me:lɑ] 'camels', and in derived adjectives that also involve prefixes, e.g. *uskikkelig* [ʉ^{1}ʂik.kəli] 'indecent, naughty'. In these cases, there is enough structure for accent 2, but according to our assumptions, accent 1 is kept due to the PIC. However, the PIC does not protect accent 1 in the prosodic head of compounds in Tromsø Norwegian (unless the compound as a whole is stored with accent 1 (cf. root compounds in section 5.2). Compounds are generally neutralised to accent 2, ignoring any lexical marking of accent 1 in the left-most member (i.e. the prosodic head). Thus, compounds in Tromsø Norwegian with *kamel* as its left-most member will surface with accent 2 in spite of any lexical marking. We hypothesised that the L projection in compounds blocked lexical marking of accent 1 in the prosodic head from percolating upwards in the tree, but this partially undermines the validity of the PIC from a phonological point of view. There is something to be said for fossilisation of accent 1 for certain structures, but how to reconcile the PIC with the neutralisation facts is left for future research.

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