

Prolegomena to a theory of word accent

Harry van der Hulst

1 Introduction¹

Based on much earlier work, in van der Hulst (2022) I lay out a unified theory of *word prominence*, which separates the location of word accent from rhythmic structure. In my previous work on word prominence (going back to van der Hulst 1984), I have rejected the metrical model (Liberman and Prince 1977) and replaced it by an approach that represents rhythm as ‘secondary’, i.e. as being assigned *after* word accents have been determined (at the lexical level). Rhythm arises at a ‘post-grammatical’ level, possibly as part of phonetic implementation (see van der Hulst 2011). In this chapter, I will not discuss the assignment of rhythm (but see van der Hulst 2014 for an extensive account). However, I will locate the rhythmic module in the overall architecture of phonology more precisely in section 3. A second goal of my 2022 article is to consider both languages in which the location of word accent is mainly *phonologically-driven* as well as languages in which *morphological structure* plays a decisive role. In the present chapter I will focus on phonologically-driven accent (section 4) and only briefly discuss morphologically-driven accent location (section 5), referring to a more in-depth account to van der Hulst (2022, in prep.). Here, as in my previous work, I also separate the issue of *locating* loci of prominence from specifying the *phonetic realization* that creates the perception of salience, taking the term ‘stress’ to refer to the realization of accent. I contend that both phonetic correlates of accent and rhythm arise in phonetic implementation.

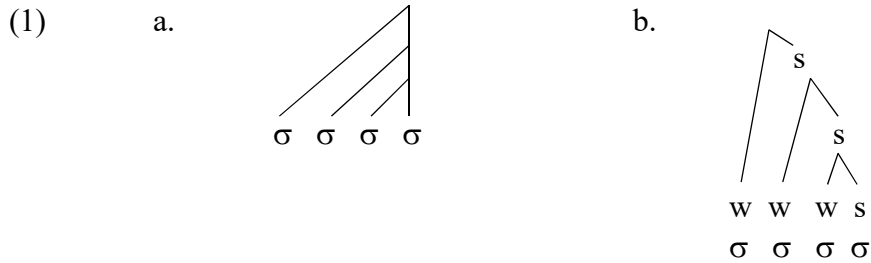
In section 2, I will discuss the central notion of accent in detail, making various distinctions in the usage of this term that are adopted in this chapter. Section 3 outlines the overall organization of phonology that I presuppose. Section 4 outlines a formal theory of phonologically-driven accent assignment, while section 5 explains the notion of morphologically-driven accent, i.e. systems in which lexically specified *diacritic* accents play a major part. Section 6 offers a summary and conclusions.

2 Different kinds of accents

In this section, I first identify the notion of *domain accent* with ‘head of the domain’. (When the accentual domain comprises the whole word, the head represents the *word accent*; see section 3 for refinement.) I propose that the syllables that make up accentual domains are universally organized (i.e. in all words in all languages) into a recursive dependency structure that designates one syllable as the head of the domain. In more familiar parlance, a dependency

¹ This chapter draws on some sections in ‘A unified theory of morphological and phonological accent’ that appeared in in Bogomolets, Ksenia and Harry van der Hulst. eds. 2022. *Word prominence in languages with complex morphology*. Oxford: Oxford University Press, 567-625. The present account differs in some terminological decisions and contains improvements of the model. It was written in 2023 on invitation for an edited volume that never materialized

structure (D-structure) is called a ‘metrical structure’. A simple metrical structure for a string of four syllables in which the last syllable is the head can be represented as in (1a) or (1b):²



In (1a) the vertical line identifies the head of the domain. In this chapter, I will use both notations, depending on which one is more convenient in the examples that will be discussed, but they are intended to be fully equivalent (i.e. notational variants).

In addition to the notion of domain accent, we also need accents as properties of syllables, which I call *syllabic accents*. Syllabic accents are *potential* domain accents and they have two sources. First, syllabic accents can be predictably based on phonological ‘weight’ of syllables. If, in a language the location of the word accent is ‘weight-sensitive’ this means that certain syllables play a role in constructing the dependency structure that locates the domain accent. Phonological weight can be determined by properties of the syllable rhyme (such as vowel length, syllable closure) or of its nuclear head (such as bearing a high tone or dominating a high-sonority vowel), and perhaps rarely by onset properties.³

When weight-determined syllabic accents interfere with the assignment of a dependency structure that comprises the whole domain (as in 1), the domain accent can be pulled away from the ‘edge’ of the domain and fall on a syllable with a syllabic accent, but in the absence of an accented syllable, the domain head will be on a (non-accented, i.e., light) syllable the left- or right ‘edge’ of that domain. As discussed in detail in section 4, when the accentual domain contains more than one syllable with a syllabic accent (i.e. more than one heavy syllable), a *resolution procedure* that precedes D-structure formation, will designate one syllabic accent as the ‘winner’, which, then, is the one that determines the left- or right headed dependency structure. In section 4, I will discuss this resolution procedure (in terms of a notion ‘licensing’) and also the fact that in the absence of any syllabic accent, a domain accent is determined by the ‘default’ D-structure, such as the right-headed structure in (1). In section 4, I will account for the distinction between so-called *bounded* and *unbounded* accent systems. In the former, accent is assigned in an accentual domain with reference to an *accentual window* that is located on the left or right side of the accentual domain (here ignoring ‘extrametricality’). It is important to keep the distinction between the notions *accentual domain* and *accentual window* in mind, as well as the fact that in unbounded systems the accentual window is identical to the accentual domain (modulo extrametricality).

² In this chapter, I mostly use a constituent-based representation that is augmented with (the nostalgic) S/W labels to indicate headedness. Other notational systems have been proposed, as shown in (1). I will here leave aside that D-structures do not necessarily express a *constituent structure*. See van der Hulst (in prep.) for discussion and comparisons. Dependency Phonology, as a general model, is introduced in Anderson and Ewen (1987).

³ See Goedemans (1993). While syllable weight usually is a binary choice (‘heavy’ vs. ‘light’), cases of scalar distinctions have been reported. Such cases require a ‘subroutine’ to determine which is the heaviest syllable within the accentual window; see Vaxman (2016).

Secondly, syllabic accents can also be ‘diacritic’, i.e. not based on phonological weight. For this reason, I will say that such syllables have ‘diacritic weight’. For the moment, I will assume here that diacritic syllabic accents behave with respect to the assignment of the dependency structure in precisely the same way as heavy syllables. The defining difference between phonological weight and diacritic weight is that the former is inherently present in the phonological content of syllables which means that phonological weight is ‘overt’, whether it is considered by metrical structure or not. Diacritic weight, on the other hand, is devoid of content and as such ‘covert’.⁴ Non-weight-based syllabic accents are used to mark *exceptions* in languages that have an otherwise fairly regular phonological determination of word accent. However, in languages that are said to have ‘free stress’, diacritic accents are the norm. Such languages, often called ‘lexical accent systems’, have accented and unaccented *morphemes*, with diacritic accent located on a specific syllable in the accented morphemes.⁵ When words end up with more than one diacritic accent a resolution procedure is required *before* a dependency structure can be assigned and also in this case a default D-structure is required to locate the word accent in words that only contain unaccented morphemes. Like true weight-based systems, lexical accent systems can be unbounded (in which case the accentual window equals the accentual domain) or bounded (in which the domain accent is determined within a two- or three-syllable window. (This is all very similar to what we have just seen for phonologically-driven accent systems). What sets lexical accent systems apart from phonologically-driven systems is that in the former two types of resolution (i.e., licensing) strategies can occur. Whereas in phonologically-driven system licensing is always ‘linear’, lexical accent systems can use linear licensing or ‘hierarchical’ licensing. In the latter case, I will see that accent placement is *morphologically-driven*. This notion will be central in section 5.

Apart from being lexically (diacritically) specified, it is also possible that non-weight accents are assigned by *morpho-lexical rules*, i.e., rules that applies in a specific morphological context. This includes cases in which specific morphemes are pre-, post-accenting or de-accenting. Morpholexical rules are part of the morphological operation that introduce affixes, comparable to the rule that turns /k/ into /s/ before certain suffixes in English. These rules account for *phonological allomorphy*.

In addition to syllabic accents, languages can also have *moraic accents*, which are marked ‘inside the syllable rhyme’ on either the head position in the rhyme or the dependent position. The term ‘mora’ is simply used here as a convenient label for those daughters of the syllable rhyme constituent that can bear an accent. (For the non-head rhyme this can depend on the sonority degree of a segment.) A familiar example of a language with moraic accents that can occur on the head or dependent mora is Lithuanian; see Halle and Vergnaud (1987) and Blevins (1993). Mora accents do not *directly* interfere with the construction of the dependency structure that comprises the whole accentual domain, *but* they can cause syllables to act as heavy with respect to word accent, in which this case moraic accents function to designate a syllable as having a syllabic accent. Like syllabic accents, mora accents are lexical, diacritic specifications or they can be assigned by morpho-lexical rules. I refer to van der Hulst (to appear) for examples

⁴ See van der Hulst (to appear) for a discussion of proposals to derive diacritic weight from segmental content specifications, specifically laryngeal specifications. In such proposals, it remains the case that diacritic syllabic accents are intrinsically without content, due to the fact that the alleged laryngeal specifications do not have their usual phonetic correlates, but rather seem to involve the ‘diacritic’ usage of phonological means.

⁵ In some cases, especially for root morphemes this location could be predictable (which requires the application of a phonologically-driven accent algorithm in the root domain).

and further discussion of the role that moraic accents play in so-called ‘restricted’ tone languages, where I critically discuss the idea that what I call moraic accents are often analysed as H tones, as in Blevins (1993) for Lithuanian and, for Serbo-Croatian, in Inkelas & Zec (1988).

It has long been observed (e.g. in Trubetzkoy 1939) that syllabic accents and moraic accents typically occur with different phonetic correlates. Syllabic accents feed directly into D-structure formation and can thus end up as word accents that are typically correlate with ‘stress’ properties (extra duration, intensity, etc.). Moraic accents, on the other hand, usually correlate with high pitch, which in some accounts means that they will be associated to a H tone, although it is also possible that such accents are directly interpreted as high pitch.⁶ Such languages are often called *pitch-accent languages*, although not every language thus named necessarily has moraic accents. A predominant pitch correlate can also occur in a language that is otherwise just like a stress-accent language (with or without syllabic accents), as demonstrated by the case of Nubi (Gussenhoven 2006). I refer to van der Hulst (2011, to appear) for an extensive discussion of these matters.

Given the distinction between diacritic syllabic and moraic accents, the question arises as to whether a language can make use of both. In the analysis of Bogomolets (2020, 2022), Arapaho has diacritic syllabic accents, but it also has lexically specified falling tones on some long vowels that are independent of the accentual system. In my view this falling tone can be specified as a moraic accent on the first mora. This means that in Arapaho we have to distinguish between syllabic diacritic accents, which are interpreted as stress, and moraic diacritic accents, which are interpreted as high pitch.

To be clear, let me state again that languages that have domain accents do not have to have either diacritic syllabic or diacritic moraic accents. In some languages, ‘word stress’ is predictably located on a fixed syllable (being determined with or without reference to phonological weight)⁷, without reported exceptions. For example, in Finnish or Hungarian weight-insensitive stress is fixed on the first syllable. One can say that in these two languages, the location of accent, and stress, is fully determined by a default D-structure. In some languages with fully predictable ‘stress’, stress cues are reported to be ‘weak’ (or even instrumentally undetectable), which might lead to the conclusion that such languages do not have a word domain accent at all and that any apparent prominence effects are the result of ‘boundary cues’, such as boundary tones that occur at a word edge, either in all words or only when those words occur in a certain phrasal position. Another source of the apparent word stress in such languages, when only perceptible in phrase final words, is that we in fact are dealing with a phrasal prominence peak. Finally, the perceived prominence could be a ‘rhythmic effect’ of some kind, which is certainly possible if we separate the notion accent from rhythm. I would maintain that in such cases there is a D-structure, which, being a cognitive representation, the head of which does not necessarily have to correlate with anything ‘phonetic’, although some might say that this make the universality claim for D-structures immune to falsification. But this is only so if we consider ‘phonetic correlates’ as the only possible type of evidence and thus ignore cognitive effects (possible detectable with neuro-imaging techniques) or ‘speech errors’; see van der Hulst (in prep.) for further discussion.

⁶ Although, as mentioned, a common view is that such H tones can be used to replace moraic accents, which are then not needed. See Hyman (2006, 2009) and van der Hulst (2011, to appear).

⁷ We must thus bear in mind that ‘fixed’ does not mean that the word accent also falls on the same syllable position, because when weight is involved the position of the accent can vary.

3 Deep and surface phonology

In the preceding section I have distinguished between the sources of prominence and their phonetic correlates that make these sources perceptually salient. As discussed in Bogomolets and van der Hulst (2022), several different sources of prominence must be distinguished, such as syllabic accents (whether marking phonological or diacritic weight), rhythm, relative syllable weight or relative sonority and tonal specifications. With respect to these different sources, we have to acknowledge that they arise or become relevant at different levels of the derivation. Certain sources of prominence, specifically syllable weight and diacritic weight are present in the lexical representations of morphemes and words. Diacritic weight is either lexically specified or results from morpho-lexical accent rules that apply in specific morphological environments. Phonological weight and diacritic weight feed the assignment of domain accents, as detailed in section 4. This does not in itself tell us at which stage the accentual algorithms apply, although, when accent assignment is sensitive to diacritic accents, this must mean that it is lexical, on the assumption that diacritic marking is not visible post-lexically, let alone post-grammatically (i.e. when phonetic implementation applies). As discussed in the previous section, when the location of domain accents is only sensitive to phonological weight of syllables (i.e., being fully predictable, there are no exceptions that require lexical marking) it can, but does not have to be, determined lexically, although lexical assignment is suggested when the accentual algorithm applies to a accentual domain which is a subdomain of the word. As has been extensively argued and justified in the tradition of lexical phonology (Kiparsky 1982), following earlier work by Siegel (1974) and Allen (1978), phonological rules can be located at different levels *within* the lexicon, corresponding to different classes of word formation rules, and applying after each morphological rule within each level, creating the effect of cyclic rules application. In addition, it has been shown that certain rules apply ‘post-cyclically’, in principle after each cyclic block.⁸

There has been much discussion about the question as to whether these domains for lexical phonological rules are morphological domains or instead ‘phonological’ domains that are somehow derived from the morphological structure.⁹ It could be that both types of domains are in principle available for phonological rules. In that case, different diagnostic properties, such as greater or lesser sensitivity to non-phonological information, such as morpheme classes, word classes and even the specific identity of individual morphemes, would reveal which type of domain is most suitable for a given phonological rule. As mentioned, I assume that pre- and post-accenting rules are morpho-lexical rules that are associated with specific morphemes, which means that they apply with reference to the morphological structure.¹⁰

⁸ In work on English, post-cyclic rules were motivated after the so-called class I block of morphological rules. This post class I level, which was called the ‘word level’ in Chomsky and Halle (1968) is discussed in detail in Borowski (1993). The term ‘word-level’ is a misnomer because it precedes the attachment of Class II affixes which also form words (Siegel 1974, Allen 1978, Kiparsky 1982).

⁹ See Scheer (2010, 2022) for an extensive, historical account of the interaction between phonology and morphosyntactic structure and the possible mediation of some kind of phonological structure, often called prosodic structure.

¹⁰ Rules that are analogous to morpholexical rules but applying at the phrasal level are less common, but occur, as documented in Hayes (1990). Anticipating the terminology introduced below, these rules and the more common morpholexical rules belong to the *phonotactic phonology* which is opposed to the *prosodic or even implementational phonology*.

Another area of discussion with respect to lexical phonology/morphology has involved questioning its predictions regarding affix ordering and also whether phonological rules can be neatly aligned with ordered blocks of word formation rules. Below, I will assume that the distribution of affixes, as well as their phonological ‘behavior’ is perhaps less ‘neat’ and requires lexical marking of these properties (see Fabb 1988; Sproat 1985).

The idea that at least some phonological rules require phonological domains that are distinct from morphosyntactic domains was championed by Selkirk (1978) and Nespor and Vogel (1996). This approach was called the *indirect syntax* (or *indirect reference*) approach because the rules in question would not refer to morpho-syntactic structure directly. Opposed to this view was and is the *direct syntax* (or *direct reference*) approach, which holds that no rules require reference to domains other than morpho-syntactic domains (see Kaisse 1985; Seidl 2001).¹¹

Most theories that postulate a phonological structure that is distinct from the morphosyntactic structure assume that there is one unique phonological structure that serves all phonological rules. As argued in van der Hulst (2009), we likely have to acknowledge not one, but two phonological structures. In this, I follow Rischel (1978), who distinguishes between what he calls ‘deep phonology’ and ‘surface phonology’, both hierarchical in nature.¹² While the deep phonology closely mirrors the syntactic structure (albeit perhaps not without deviations), the surface phonology is much more autonomous. As shown in Lahiri and Plank (2010, 2022) the recognition of such a surface phonological level of hierarchical representation has a long tradition, going back to much work in the nineteenth century by British and German linguists. The so-called ‘Abercrombian foot’, which groups syllables with primary word stress and subsequent syllables up to the next primary word stress, forms a pivotal unit in this surface hierarchy.¹³ Plank and Lahiri show that the surface phonological structure, and in particular the Abercrombian foot, provides explanations for diachronic processes in Germanic languages.¹⁴ In the Selkirkian model, only one level of phonological structure was recognized, but it would seem that this structure with its strict-layer organization conflated the driving forces of syntax *and*

¹¹ A potential problem is that morpho-syntactic domains are highly theory-dependent, which allows for specific theories to postulate intermediate or adjusted morphosyntactic domains that ‘happen’ to work well for the phonology.

¹² Whether one or two phonological structures are postulated, the question comes up what kind of structure is required. Since Selkirk (1978) it has been claimed that the phonological structure is hierarchical, albeit displaying a different kind of hierarchy than what we see in morpho-syntax. The phonological hierarchy that Selkirk and others after her envisaged had a *strict layering* and, relatedly, shows no evidence for recursion. Since then, there has been much discussion about the nature of the phonological structure. A denial of recursion is a common theme (but see van der Hulst 2010), but some even deny *any* hierarchical structure whatsoever, claiming that phonological organization is strictly linear (see van der Koot and Neeleman 2016) or ‘flat’ (Scheer 2013). I will not enter into this discussion here, but see den Dikken and van der Hulst (2020, to appear) for a defense of a ‘non-flat’ phonology which displays recursive structure.

¹³ Various authors who recognize the need for two phonological organizations refer to the so-called ‘Abercrombian foot’, recognized by the phonetician Abercrombie (e.g. Abercrombie 1967) as a characteristic part of the surface phonological structure; see Anderson and Ewen (1987) and Fudge (1999). Clearly, these Abercrombian feet are quite different from the metrical feet proposed by Liberman and Prince (1977) which encode rhythmic beats in between word accents that only appear to be confined to word boundaries when words are treated as complete utterances.

¹⁴ As discussed in Plank and Lahiri (2010, to appear) the surface, prosodic structure, while largely following its own autonomous principles, can reflect syntactic structure in more formal styles of speaking.

phonology.¹⁵ Interestingly, Liberman (1975) and Liberman and Prince (1977) envisaged two ‘metrical’ structures, one being a copy of the morpho-syntactic structure, but with its nodes provided with S/W labels, which is similar to Rischel’s deep phonology.¹⁶ By adopting a second structure, the metrical grid, projected from the tree structure, but then subject to rules that reflect rhythmic properties of words and phrases, they actually came quite close to recognizing *two* phonological structures, somewhat comparable to those proposed by Rischel.¹⁷ Unfortunately, further developments in metrical theory aimed at eliminating having *two* structures, with some going for the grid as the only structure (Prince 1983), while others put all their money on the tree structures (Kiparsky 1979), allowing rhythmic adjustments by formulating arboreal transformations. This approach was further developed in Giegerich (1985), who starts out with a ‘metrically interpreted’ syntactic structure which is then changed into a surface rhythmic structure by means of metrical transformations.¹⁸

In van der Hulst (2009) and here, I accept Rischel’s model and refer to deep phonological structure as *phonotactic structure*, while I reserve the term *prosodic structure* for the surface phonology.¹⁹ It is important to keep in mind that the surface prosodic structure is not copied from the phonotactic structure. Rather, its organization is dependent on prosodic properties of affixes as well as principles of *surface syllabification*.²⁰ In contrast, I assume that the phonotactic structure is largely if not completely isomorphic to the morpho-syntactic structure, differing from it by replacing syntactic labelling by a ‘metrical’ S/W labelling.

Below, I will propose that phonologically-driven accent assignment applies at the level of prosodic structure. This makes my understanding of the prosodic level somewhat different from what Lahiri and Plank have in mind. These authors see prosodic structures as being driven by word and phrasal accents that are already there, making prosodic structure mainly be about the overall rhythmic structure of utterances. Influenced by this understanding of prosodic structure, I suggested in van der Hulst (2022) the module that gives rise to the prosodic structure could be the so-called *phonetic implementation system*, which is also responsible for all automatic segmental processes (and thus not only for those that are universal), as proposed in Pierrehumbert (1984). Following Pierrehumbert and Liberman (1985), van der Hulst (2011) and Liberman (2019), I will in fact assume that *all* automatic processes, including all processes that have been called ‘allophonic’ can likely be handles by the phonetic implementation system.

¹⁵ In Selkirk (2011) the driving forces of syntax are captured by constraints that demand the phonological structure to be faithful to the syntactic structure, while markedness constraints capture the rhythmic forces, which, if higher ranked than the faithfulness constraints can enforce phonological structure to deviate from the syntactic structure.

¹⁶ This is what Zubizarreta and Vergnaud (2005) call a ‘metrically interpreted’ structure.

¹⁷ The question whether the surface prosodic structure is a ‘grid-only’ structure or has some kind of constituent structure is indeed an independent issue. Neeleman and van der Koot (2006) argue that the Selkirkian phonological structure is not a constituent structure, but it would seem that their arguments regard the notion of a surface prosodic structure and not the deep phonology, which I call the phonotactic structure. Nevertheless, I will contend that the surface phonology is hierarchical.

¹⁸ See Kager and Zonneveld (1989) for an excellent historical review of different views in Generative Phonology on ‘prosodic structure’.

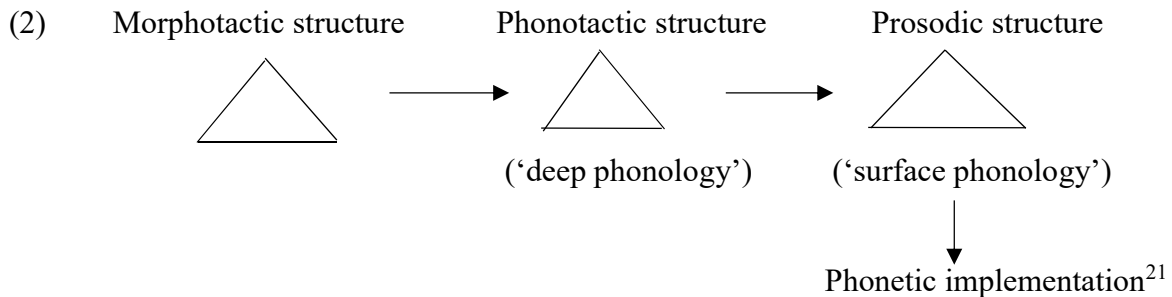
¹⁹ The reader consulting van der Hulst (2022) should be aware of the fact that in that article I which I call phonotactic both the S/W labelled structures that are copies of the morphological structure and the S/W labelled structures that contain the α - and β -domains, while I ‘prosodic structure’ as resulting from phonetic implementation. In the current proposal I separate the two S/W labelled structures, referring to the former as phonotactic and the latter as prosodic, while taking phonetic implementation to be a ‘later’ module that implements the prosodic structure.

²⁰ Note that I distinguish between *surface syllabification* and *phonotactic syllable structure* which is encoded in morphemes and words at the lexical level; see van der Hulst (2009).

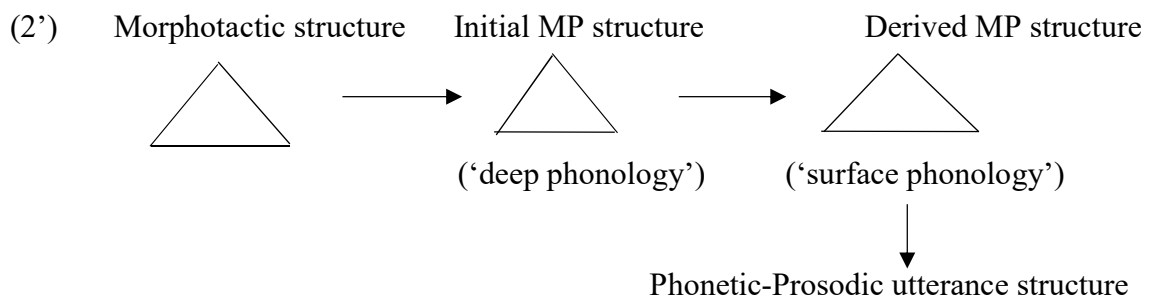
Given the proposal to separate ‘primary stress’ from rhythm, with the latter following the former (rather than the opposite route, which metrical phonology pursues), I also locate the assignment of rhythm in this implementation model.

Here, I will take a different position in one sense only. I will therefore assume here that the prosodic structure is *the input to the implementation module* where rhythm arises, but I will attribute to prosodic structure a hierarchical organization that in van der Hulst (2022) I failed to distinguish from the deep phonological structure that I called (and still) the phonotactic structure. In the proposal in his chapter, phonotactic structure strictly is a metrically interpreted morpho-syntactic structure (using S/W labelling). The hierarchical structure here called prosodic is the ‘translation’ of the lexical phonology ‘levels’ into prosodic domain, following a proposal in Inkelas (1990). My current distinction between prosodic structure and implementational structure in a sense splits the ‘surface phonology’ (of Rischel and Lahiri and Plank) into two levels.

In summary, when considering where to locate phonological rules or processes, including those that account for word prominence patterns, we need to consider the following three available hierarchical organizations (four, if we refer to the output of phonetic implementation as a ‘level’):



Alternative (avoid term prosodic altogether):

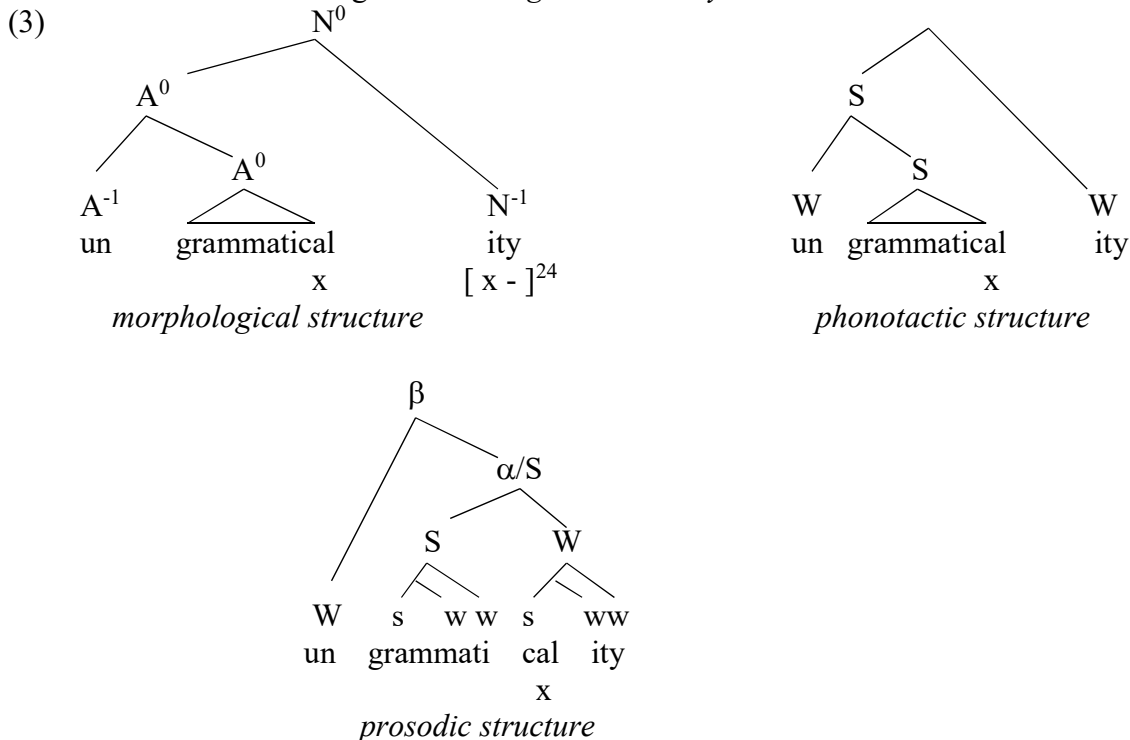


It has long been recognized that linguistic expressions have (hierarchical) representations in two planes, giving rise to the property of *duality of patterning* (Hockett 1960), also called *double*

²¹ See van der Hulst (2022, section 7.1.5) for the idea that phonetic implementation may be phase-sensitive with the prosodic α - and β -domain being different phases. This idea permits allophonic (i.e. implementational) processes to occur within the α -domain, giving them the appearance of being lexical in lexical phonology/morphology models (see Harris 2087). This would also allow rhythmic structure applied to the α -domain to feed accent assignment in the β -domain, which offers a potential analysis of so-called ‘count system’ in which ‘primary stress’ has been claimed to be dependent on ‘foot structure’; see van der Hulst 1997, in prep.) for discussion.

articulation (Martinet 1960).²² The structures in each plane are subject to their own constraints and as such not (necessarily) isomorphic, although mutual influence can be observed, mostly going from morpho-syntax to phonosyntax. Given the distinction made here between two levels of phonological structure, we have to conclude that duality of patterning is not enough: we need to recognize at least three ‘patterns’.

To demonstrate the difference between the three levels of organization, consider in (3) the three structures of the English word *ungrammaticality*:²³



The α and β labels refer to distinct prosodic domains in the sense of Inkelas (1990), which are essentially the kinds of domains that others currently refer to with labels such as ‘prosodic stem’ or ‘prosodic word’ which are formed, in essence, by class I and class I affixes (in the terminology of classical lexical phonology). As shown, the prosodic domain structure deviates from the phonotactic structure (which is isomorph to the morphological structure). Such deviations are caused by specific phonological demands of affixes which cause the prosodic

²² See Ladd (2014) for an in-depth discussion of this notion, showing that Hockett’s and Martinet’s views were not the same, a point also discussed in van der Hulst (2009).

²³ The three-way distinction does not necessarily exhaust the structures that prominence rules (or phonological rules in general) can refer to. For example, one could distinguish different *levels* of morphosyntactic structure, as in the original version of generative grammar, a deep structure and a surface structure (not to mention intermediate levels). In such an approach the phonotactic structure could be regarded as reflecting either the initial syntactic structure or a structure that results from transformations. In this chapter, I will take a ‘simple’ view of morpho-syntactic structure that only allows a single level, which is of the kind advocated in the ‘simple syntax’ approach of Culicover and Jackendoff (2005). This level is directly referred to by morpholexical rules that account for phonological allomorphy (both segmental and accentual).

²⁴ The suffix *-ity* has a ‘pre-accenting feature’ which represents the morphological rule that assigns a diacritic syllabic accent to the final syllable of its morphological base. The superscripts ‘0’ and ‘-1’ refer to free forms and affixes, respectively; see Hoekstra, Moortgat and van der Hulst (1980).

structure to deviate from the phonotactic structure. Here I will just say that affixes are lexically marked as forming either type of domain.²⁵ I can now be more explicit about the notion accentual domain. In many languages in which accent assignment is completely oblivious to morphological structure (except in most cases compounding), the entire word, whether simplex or morphologically complex, forms the accentual domain. However, in many other languages, English being a case in point, the word contains subdomains that are relevant for accent assignment and which thus form accentual domains that are smaller than the whole word. In (3), we see that the phonotactic structure of complex words in English that contain ‘class I’ suffixes, those suffixes form an α -domain with their base, this domain being the accentual domain for the English ‘Main Stress Rule’. I will explain the need for having an S/W labelling in the prosodic structure at the end of section 4, whereas the role of the S/W labelling in the phonotactic structure is addressed in section 5. Anticipating that, the role of the *phonotactic structure* is to account for cases in which the location of word accent in lexical accent systems is ‘morphologically-driven’, which here means that resolution (licensing) in case of competing syllabic accents is hierarchical, being determined by the S/W labelling of this structure. (As we will see licensing in lexical accent systems *can* also be linear, in which case resolution applies at the prosodic level.) When accent location is *phonologically-driven*, the accent algorithm applies at the *prosodic structure* (see section 4) and resolution/licensing is always linear. Finally, the assignment of rhythm is delegated to the post-prosodic implementational level.²⁶

4 Phonologically-driven word accent

In van der Hulst (1999, 2012, 2022), I develop a theory of ‘word accentuation’ for bounded and unbounded stress-accent systems, which I will here summarize (with some minor ‘tweaks’ from van der Hulst (in prep.)). This theory is based on the claim that word accent and rhythm form different modules of the phonology, rather than being conflated in one formalism as in Metrical Phonology (Lieberman & Prince 1977). Many arguments for the separation of accent and rhythm, as well as precedents of this view, are given in van der Hulst (1984, 1996, 1997, 2009, 2012, 2014a, b, in prep) and in Goedemans & van der Hulst (2014). The accent module contains two crucial components: resolution (licensing) and the assignment of a dependency structure. As mentioned, I will not discuss the assignment of rhythm in this chapter (see van der Hulst 2014).

Resolution refers to the selection of a syllabic accent from a number of ‘contenders’ for the domain accent. In a weight-sensitive stress-accent language, competition between syllabic accents can arise due to the occurrence of multiple syllabic accents (based on weight and/or diacritic) within the accentual domain. Taking a bounded, weight-sensitive, right-edge system as

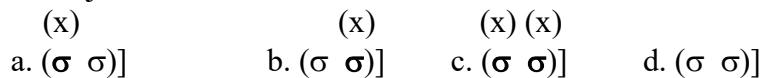
²⁵ Acknowledging the relevance of prosodic domains for accent assignment opens the door to cyclic accent assignment because both the α - and β -domain can have an internal recursive structure when more than one affix is involved. Cyclic accent assignment within the α -domain has been claimed for English to account for so-called cyclic ‘stresses’ as in words like *condensation* which contrast with *compensation*. Lexicalization processes tend to wipe out such cyclic stresses or reduce them to diacritic marks. The latter idea is not unproblematic if syllabic diacritics can only count for word accent and not for ‘non-primary’ stresses; see also footnotes 28 and 44.

²⁶ Here I do not discuss whether all three structures should be understood as accounting for both hierarchical and linear organization. Even though it is now commonly assumed that morpho-syntactic structure is not linearized, it would seem that the application of morpholexical rules, if applying with reference to morphosyntactic structure, presuppose a linearized input.

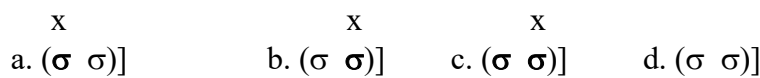
an example, my way of determining the domain accent involves three steps. Firstly, heavy syllables (given in bold in 4) project what I call a *variable accent* (notated as ‘(x)’). Secondly, I capture resolution in terms of setting a *licensing parameter* (with the values ‘left’ and ‘right’).²⁷ A variable accent that is licensed becomes the ‘winning accent’, i.e. the domain accent; the other accents become ‘invisible’, and can therefore not have any phonetic cues.²⁸ The third step constructs a left- or right-headed dependency structure (D-formation), which (by default) will designate a syllable as the domain head in case the domain contains no syllabic accents. In bounded systems, these three steps are preceded by the formation of a two-syllable *accentual window* (indicated with parentheses):

(4) Right-edge weight-sensitive system with stress on the rightmost heavy syllable

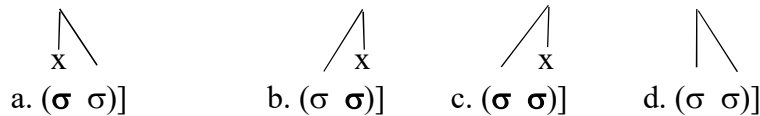
i. Projection of variable accents



ii. Licensing of rightmost variable accent



iii. Construction of left-headed D-structure



(For step iii it should be understood that x-marks demand to be heads, which means that the left-headed structure functions as a default when there are no x-marks.)

Licensing accounts for the property of *culminativity*: there can only be one winner. This leaves us with the fourth ‘column’, where there is no heavy syllable in the accentual window. This case requires a ‘default clause’. While in van der Hulst (2012) ‘default’ simply inserts a syllabic accent on the left or right edge in the window (which is then automatically the winner), I propose in van der Hulst (2022) that the culminativity of stress-accent systems is the result of a parameter setting which determines the constructing of a *dependency structure* (D-structure) that groups all syllables (first in the accent window, and eventually in the whole relevant accentual domain) into a single word structure. Dependency structures (or ‘metrical’ structures) account for the fact that the relevant domain has a unique head, or what Liberman & Prince (1977) call a ‘designated

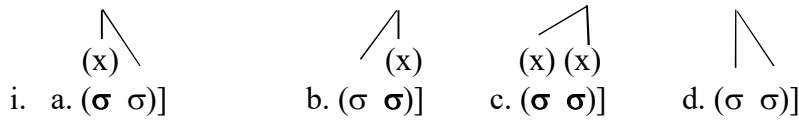
²⁷ There is a formal analogy here with my work on vowel harmony, where I use the notion of variable specification for harmonic elements and licensing to account for whether or not a variable element is phonetically realized; see van der Hulst (2018). The kind of licensing that is invoked here can be called linear licensing. In section 5 I will introduce a notion of hierarchical licensing, which selects the winner with reference to the headed, hierarchical phonotactic structure. I did not find evidence for hierarchical licensing in vowel harmony systems, although it should be explored whether so-called ‘dominant-recessive’ systems can be thus analyzed.

²⁸ There may be cases that suggest that ‘losers’ show up with phonetic exponents that are less prominent than the correlates of the winner; see van der Hulst (in prep.) for discussion regarding phonetic correlates of diacritic accents that have not been ‘chosen’ to be the domain accent.

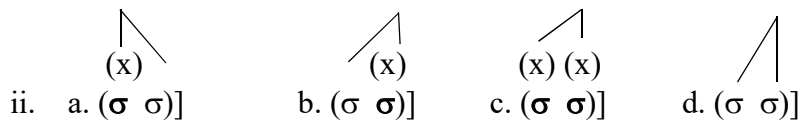
terminal element' (DTE). In the present proposal, the D-structure is responsible for the property of *obligatoriness*.

I have shown in previous work that the setting of the licensing parameter and the D-formation parameter are independent, thus allowing four different systems, which I give in (5), with all three steps conflated into one representation for reasons of space, thus leaving the variable accents as '(x)', even those that are licensed:

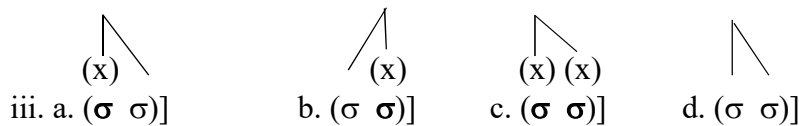
(5) Right-edge weight-sensitive systems²⁹



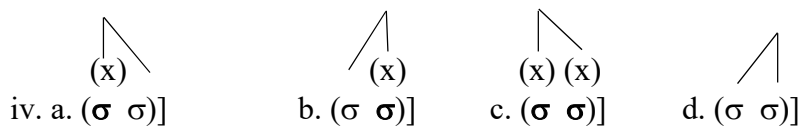
e.g. Epena Pedee: stress the rightmost (last) heavy syllable, otherwise the leftmost (first) syllable (i.e. if there is no heavy syllable): RIGHT/LEFT³⁰



e.g. Yapese: stress the rightmost (last) heavy syllable, otherwise the rightmost (last) syllable: RIGHT/RIGHT



e.g. Sunda: stress the leftmost (first) heavy syllable, otherwise the leftmost (first) syllable: LEFT/LEFT³¹



e.g. Aklan: stress the leftmost (first) heavy syllable, otherwise the rightmost (last) syllable: LEFT/RIGHT

In a bounded system, the accentual module operates within a *two-syllable window*, either on the right edge of the word (as in (4) and (5)), or on the left edge of the word where we find the same four types (not shown here). In all cases, we expect cases in which 'extrametricality' pushes the

²⁹ References for the languages cited are given in van der Hulst (1999).

³⁰ I here adopt 'Right/Left' as the label for this system, instead of 'Last/First', although the latter label has also been used, especially for unbounded systems.

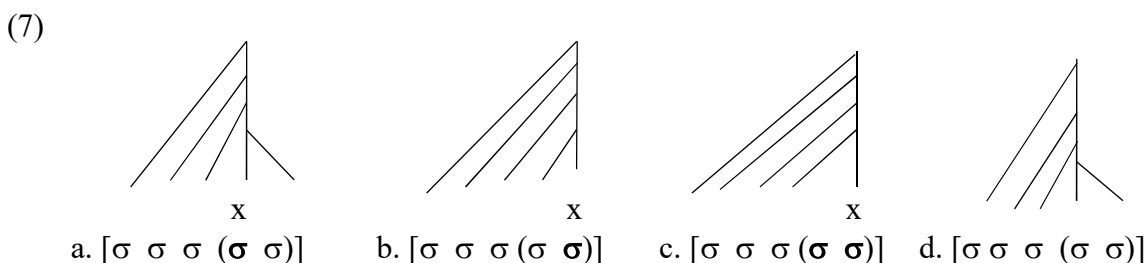
³¹ Hayes (1995:179-188) reports this kind of system for Awadhi and Sarangani Mamobo. Note that there is no metrical foot type (in any generally accepted version of foot theory) that can account for this pattern (as well as the pattern in 5iv). In such approaches a heavy syllable can never be the dependent in a weight-sensitive foot.

window one syllable in.³² In van der Hulst (2012) I replace the traditional notion of extrametricality by the notion ‘satellite’. The proposal is that the accentual window can be extended by one syllable *on either site*, here illustrated for a right-edge window:

- (6) a. Bounded(R); Satellite(R):
 $\sigma \{(\sigma \sigma)+\sigma\}$] (external satellite)
 b. Bounded(R); Satellite(L):
 $\sigma \{\sigma+(\sigma \sigma)\}$] (internal satellite)

The notion of satellite allows us to extend a two-syllable window with an ‘adjunct’ into a three-syllable window. It would appear that external satellites are always *invisible* for accent. The need for internal satellite comes from cases in which the third-syllable-in can be accented so that, as a result, three syllables are available for accentuation, either regularly or in specific circumstances. Regularly visible internal satellites are required in languages such as Spanish (Roca 1999) or Greek (Revithiadou 1999), and even in other languages where in specific words the accent can exceptionally occur on the third syllable from the word edge. Sometimes, it would appear that the visibility of the internal syllable is phonologically conditioned. I refer to van der Hulst (2012) for a brief discussion of the case of Munster Irish which has third syllable accent in the specific case that a word starts with the sequence LLH (Doherty 1991) and for further examples in van der Hulst (in prep.).

The bisyllabic D-structure that is formed within the accentual window is incorporated into a dependency structure that comprises the whole accentual domain. This structure takes the head of the bisyllabic accentual domain as the ultimate head of the whole structure:



e.g. Epena Pedee: stress the rightmost heavy syllable, otherwise the leftmost (first) syllable (i.e. if there is no heavy syllable) [within a right-edge accentual window]

In line with the separation of word accent and rhythm, this dependency structure does not account for rhythmic patterns in terms of a sequence of feet. Rhythm is assigned ‘later’ and does not in fact require foot structure (see van der Hulst (2014) for an extensive account of attested rhythmic patterns).³³

The procedure just outlined also applies to cases in which ‘stress’ is not weight-sensitive. In that case, the bisyllabic window is only subject to D-formation. However, in such systems, the

³² Extrametricality can also apply at the level of syllable structure when a final consonant is not syllabified, which turns a potentially heavy syllable into a light one. This kind of extrametricality can also be external or internal; see van der Hulst and Rosenthal (1999). In van der Hulst (2011, in prep.).

³³ Whenever it appears that ‘foot’ structure has to be present lexically or ‘early’ in the phonology, I regard this structure as a recursive extension of syllable structure. See van der Hulst (2010a, to appear).

default head orientation of D-formation can be overruled when syllables are marked as exceptions, which in my model means that they have a diacritic (variable) syllabic accent. In such a system it is unlikely that the accent window will contain more than one diacritic accent, but that situation might arise when the window comprises a stem-final syllable and a suffix syllable, both with a diacritic accent, in which case resolution is required, through licensing of one of the variable accents; which one that it, depends on the licensing parameter that must then be set. We must also take into consideration that syllabic accents can be rule-governed when specific morphological categories are always accented, or when a complex word contains pre- or post-accenting affixes.³⁴ The occurrence of multiple diacritic accents can easily arise in so-called lexical accent systems, which, as understood here, are unbounded systems in the sense that the accentual window comprises the whole word; see section 5.

Diacritic syllabic accents can thus co-occur with syllabic accents that are due to phonological weight. I am assuming that both types of accent are treated alike by the accentual algorithm. This predicts that in a system as in (4), a diacritic accent to the left of a heavy syllable could not ‘overrule’ the latter, which means that the exceptional pattern of penultimate ‘stress’ when the word ends in a heavy syllable is impossible. This empirical prediction could turn out to face counterexamples, which, then, would imply that diacritic weight can outrank phonological weight, either universally or in specific systems. The potential need for ‘weight scales’ that mix both types of weight are motivated in Vaxman (2016, 2019). As already mentioned, independent need for weight scales could also come from languages which have a greater than binary distinction in phonological weight; this has been analysed with a ‘weight scale’ (e.g. Pirahã, Everett 1988; Nanti, Crowhurst and Michaels 1995). When weight scales are relevant, I will assume that resolution is fed by a subroutine that creates a syllable weight tier with only the heaviest syllables. I refer to Vaxman (2016, 2019) for analyses of such cases adopting this approach.

Turning to unbounded systems, it is well-known that there are four types of unbounded, weight-sensitive stress systems:³⁵

(8) Four types of weight-sensitive unbounded systems³⁶

- a. RIGHT/LEFT: Stress the rightmost (last) heavy, or else the leftmost (first) light syllable; e.g. Sikaritai
- b. RIGHT/RIGHT: Stress the rightmost (last) heavy, or else the rightmost (last) light syllable; e.g. Puluwatese

³⁴ This is clearly demonstrated in Roca’s (1999) analysis of stress in Spanish. In this language, ‘stress’ occurs within a three-syllable window on the right side of the word. In underived words, the location of stress is largely unpredictable, but in inflectional paradigms, certain morphological categories predictably occur with an accent.

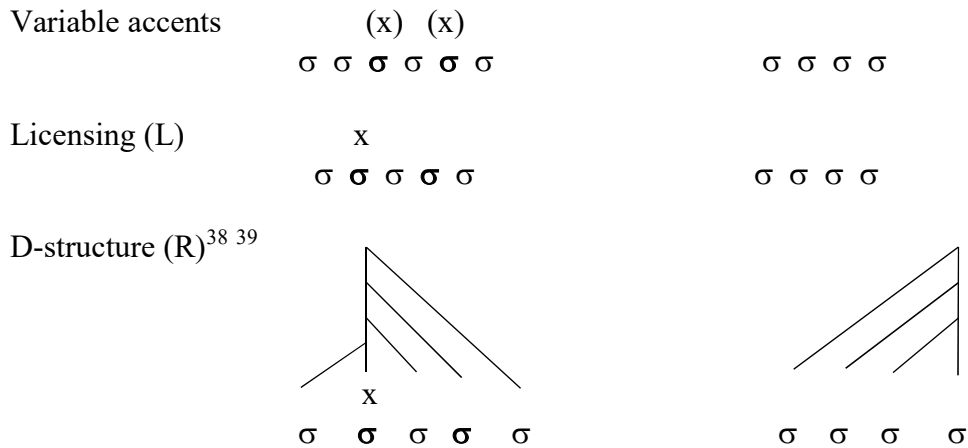
³⁵ Again, note that I do not use a ‘Last/First’ (L/F) system to label an unbounded system, which is more common, to be consistent with the labelling of bounded types. The two practices can lead to considerable confusion, given that Amele in my labeling is Left/Left (LEFT/LEFT), which can be confused with the other labelling, which would be LEFT/LEFT (i.e. Last/Last) for Puluwatese. I will here use the LEFT/RIGHT terminology.

³⁶ From a functional point of view, unbounded systems are curious because the location of accents provides no information about word edges, thus lacking a demarcative function. It must be concluded that in systems of this sort the ‘greed’ of heavy syllables in catching the word accent has overtaken the edge-based preference of bounded systems. In essence, demarcation is due to the accentual window being bounded. This kind of conflict is expressed in terms of the ranking of constraints in Optimality Theory (Prince & Smolensky 1993 [2004]). The present chapter follows a parametric approach to language variation. My reasons for not adopting OT have been provided elsewhere (van der Hulst 2011).

- c. LEFT/LEFT: Stress the leftmost (first) heavy, or else the leftmost (first) light syllable; e.g. Amele
- d. LEFT/RIGHT: Stress the leftmost (first) heavy, or else the rightmost (last) light syllable; e.g. Tahitian

All four patterns are attested in the languages of the world (see Hayes (1995); van der Hulst (1999)). As is clear from the verbal statements, these four types are exactly the same as the four types for bounded systems in (5). In van der Hulst (1999, 2012, in prep.), I therefore propose the same analysis for both unbounded and bounded systems, the difference being that the size of the accentual window comprises the whole accentual domain in unbounded systems (modulo extrametricality). Unbounded systems can thus be formally analysed in the same way as I analysed the four right-edge bounded systems. Heavy syllables are represented as variable accents, licensing recognizes the left- or rightmost variable accent as the word accent and all words are subject to the formation of a left- or right-headed dependency structure. Recall that the four-way distinction is possible because both licensing setting and the D-formation setting can be chosen independently. I illustrate this in (9) for a left/right system, with the same three steps:³⁷

(9) LEFT/RIGHT (in an unbounded accentual domain)



Weight-insensitive, unbounded systems would only display D-formation (with the possible interference of diacritic lexical accents). In fact, such systems are *only* identifiable as

³⁷ We find that in unbounded systems, the D-formation parameter may require its domain to be bounded (see Vaxman’s 2016 analysis of Witsuwit’en). This raises the possibility that default D-formation always applies first in a bounded domain before it groups all syllables in accentual domain into a dependency structure. I assume in this article that D-structure is always formed at the prosodic level, even in languages that have hierarchical licensing. I refer to van der Hulst (in prep.) for further discussion.

³⁸ The adjunction of the first syllable immediately preceding the head is not justified here, but it could reflect a general principle that favours right-adjunction.

³⁹ We find that in unbounded systems, the D-formation parameter may require its domain to be bounded (see Vaxman’s 2016 analysis of Witsuwit’en). This raises the possibility that default D-formation always applies first in a bounded domain before it groups all syllables in accentual domain into a dependency structure. I assume in this article that D-structure is always formed at the prosodic level, even in languages that have hierarchical licensing. I refer to van der Hulst (in prep.) for further discussion.

unbounded by exceptional locations that clearly lie outside the domain of a potential bounded window. In van der Hulst (1999, 2012), Turkish is identified as an example of this kind.⁴⁰

In the cases discussed thus far in this section, there is an algorithm that locates the domain accent. This algorithm can be weight-sensitive or weight-insensitive and in either case exceptional patterns can be accounted by specifying diacritic syllabic accents on syllables that attract the word accent, acting as if they are phonologically heavy, despite being phonologically light. Such languages are said to have fixed accent, even though there may be exceptions.

In summary, the system for phonologically-driven accent locations has five parameters:⁴¹

- (10) Parameters for phonologically-driven accentuation [i.e. licensing is linear]
 - a. Bounded (left/right)
 - b. Satellite (left/right)
 - c. Project weight (yes/no)⁴²
 - d. Licensing (left/right)
 - e. D-formation (left/right)

To accommodate the distinction between so-called bounded and unbounded accent systems, we need a window parameter which is parameter (10a). The accentual window can be either ‘bounded’ (a bisyllabic window on the left or right side of the phonotactic domain) or unbounded (the whole phonotactic domain), both subject to the option of an extra syllable *on either side* of the accentual domain, which are called satellites (10b).⁴³ The first two parameters are ‘optional’. If no value is set for parameter (10a), the system is unbounded, in which case there is no further left/right choice to be made. Likewise, parameter (10b) does not have to be set when the satellite option does not apply. (Bear in mind that for a right-edge window, ‘left’ for satellite generates an internal satellite) The other three parameters are not optional and thus always active. The weight projection parameter is self-evident; the *yes* option makes heavy syllable available as variable accents for the computation of accent, but some syllables may have a variable accent and behave as heavy due to diacritic marking.⁴⁴ The licensing parameter determines the winning accent in the accentual

⁴⁰ As argued in Özçelik (2022), the manifestation of diacritic accents is ‘stress’, while the default final position owes its prominence to the association of a boundary tone. This justifies that the default head location is not represented in terms of an accent mark because this would trigger the same phonetic prominence exponent for both the accent location and final prominence, and potentially also that D-formation applies at the prosodic level.

⁴¹ In van der Hulst (2014) I propose a set of rhythm parameters which will not be reviewed in this chapter.

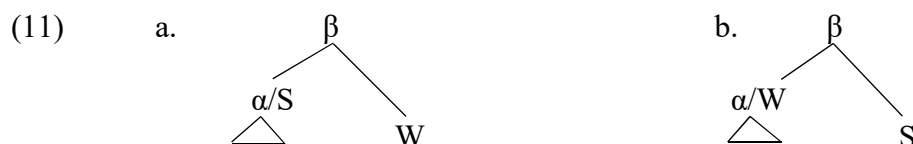
⁴² Weight projection determines whether or not syllables with specific phonological properties (which make them intrinsically ‘heavy’) enter into the computation of the word accent location. Diacritic weight is ‘automatically’ projected because it is specified as a diacritic property of syllables (in the form of an x-mark).

⁴³ I construe extrametricality in terms of a Satellite parameter which can add an extra syllable to the left or right of the accentual window. This allows extrametrical syllables that are not word-peripheral, but I will here not motivate why we need this. Basically, a word-internal extrametrical syllable can be accented, while a peripheral extrametrical syllable (which reflects extrametricality in the traditional sense) cannot. I here do not discuss the motivation and properties of internal satellites in any detail; see van der Hulst (2012, in prep.).

⁴⁴ Perhaps we also have to consider the possibility that a heavy syllable behaves as light? I am not aware of real cases that require such an exception for medial syllables, although, in general *final* mora or consonant extrametricality can make a final heavy syllable behave as light and still be visible; see Rosenthal and van der Hulst (1999) for discussion of cases in which heavy syllables count as light, but only in word-final position. Another issue is that sometimes syllables need to be marked as ‘unaccentable’ or ‘stress-repelling’, which goes further than being marked as light. Giving a role to S/W labelling in addition to diacritic accents, a possible approach is to mark such syllables with a diacritic label ‘W’, which prevents them from ending up in a strong metrical position. A detailed

window. Recall that in a weight-insensitive system, licensing can only be set when there are diacritic accents to mark exceptional word accent locations, although that typically does not deliver competition (unless complex words are involved in which more than one morpheme bears a diacritic accent). Finally, the D-formation parameter accounts for the default accent location if there is no accent due to phonological or diacritic weight, first within the accent window and then within the whole accentual domain.

We have assumed that in the systems discuss thus far, the accentual algorithm is blind to morphological structure, applying at the prosodic level. While, I wish to maintain that these accentual algorithms do not refer to morphological structure, they can be dependent on the structure at the prosodic level which can display a hierarchy of accentual domains. As we saw in example (3), there may be more than one prosodic domain within words, referred to as the α - and β -domain. I mentioned there that these domains can form separate accentual domains, which have their own accentuation algorithm. This means that a word can end up having more than one domain accent. Where this is the case, we usually find that one accent is more prominent than the other. In this case we thus need a way to determine which domain accent prevails over the other.⁴⁵ I propose that we can handle this prominence effect in terms of the headedness of the prosodic structure, as anticipated in (3) where the prosodic structure contains S/W labels. I will here illustrate this with reference to English. It is possible to analyse English word prominence in terms of two accentual algorithms, one locating the ‘primary stress’ on the right edge of the word (being guided by both phonological and diacritic weight), while the other places a secondary, polar accent on the left edge. I suggest that these two algorithms apply in the α - and β -domain, respectively, and that the smaller α -domain is labelled Strong, which makes the right-hand daughter of the β -domain Weak. As I show in van der Hulst (2022) it is not a universal fact that the α -domain prevails over the β -domain. In the language Mapudungun (see section 7.1.3 in that article) the accent of the β -domain is the most prominent (Molinaux 2022):⁴⁶



It is of course not necessary that accentuation is sensitive to word-internal, prosodic subdomains. If a language has a single, fixed stress location, a single accentual algorithm will do. It will not be easy to determine whether in that case the domain is an α -domain or a β -domain, which would both cover the same stretch of syllables that makes up the whole word. To make that determination, it would have to be the case that both types of domains have independent distinguishing properties.

Given that accentual algorithms can apply within specific word-internal, prosodic domain those algorithms have to be ‘indexed’ for the prosodic label that they apply to.

account of these special cases can be found in van der Hulst (to appear). Thirdly, some phonologists make a distinction between strong and weak accents (see for example Kiparsky 2021), which could mean that diacritic accents can involve degrees, just as has been claimed for phonological weight in languages such as Pirahã (Everett 1988) and Nanti (Crowhurst and Michaels 1995).

⁴⁵ Again, I remind the reader that multiple domain accents only arise when the accentual windows are bounded. In unbounded systems, the accentual window always seems to comprise the whole grammatical word.

⁴⁶ The effect in English called rhythmic reversal, which involves a greater prominence on the polar accent, can be handled by reversing the S/W labelling, as in essence was the proposal in Kiparsky (1979).

One question remains to be answered. I have noted that it in all unbounded systems that have linear licensing (whether diacritic or phonological), and thus are accounted for at the prosodic level, the domain of licensing always coincides with the whole grammatical word. The explanation for this fact might be that the notion ‘unbounded’ can simply be interpreted as ‘the entire word domain’ (modulo extrametricality). Thus, one could say that if the parameter that specifies the location of a bounded window is set to ‘no’, the accentual domain by default comprises the whole grammatical word. To reflect these points, (12) presents revision of the parameter set for phonological accent assignment:

- (12) Parameters for phonologically-driven accentuation [i.e. licensing is linear]
- a. Domain (α , β , ...)
 - b. Bounded (yes/no) [if not set: unbounded]
 - c. Satellite (left/right)
 - d. Project weight (yes/no)⁴⁷
 - e. Licensing (left/right)
 - f. D-formation (left/right)

It must be kept in mind that the computation of word accent is dependent on two notions of ‘domain’, namely the *accentual domain* and the *accentual window*. When words are morphologically structured, accent computation can take place with reference to accentual domains that are smaller than the whole word, such as the α -domain. The second notion of domain was called the *accentual window* which can comprise the entire prosodic domain, in which case we say that accent placement is unbounded, or a bisyllabic subdomain in which accent placement is bounded. In both cases, the domain can be extended with a satellite syllable, and accent location can be weight-sensitive or weight-insensitive (weight being either phonological or diacritic).

5 Morphologically-driven accent

In the preceding section, I have explained phonologically-driven accentuation algorithms which are essentially characterized by the fact that resolution is linear. Focusing on resolution, Bogomolets (2020) argues convincingly that some languages appeal to a *non-linear resolution* strategy that depends on a hierarchical structure, which in her theory is morphosyntactic, albeit augmented with ‘prosodic boundaries’.⁴⁸ In this section we focus on cases in which the

⁴⁷ Weight projection determines whether or not syllables with specific phonological properties (which make them intrinsically ‘heavy’) enter into the computation of the word accent location. Diacritic weight is ‘automatically’ projected because it is specified as a diacritic property of syllables (in the form of an x-mark).

⁴⁸ Alderete (1999, 2004) analyzes the accent system of Cupeño, in which, in his interpretation, the root accent wins over accents in suffixes and prefixes; this is called ‘root-control’. Bogomolets (2020) shows that there is no need for a third kind of licensing that makes specific reference to roots (or to affixes, for that matter). She claims that we only find ‘trivial’ root-control in systems in which only roots can be marked for lexical accent, with all affixes being unaccented. Multiple examples of such systems have been reported, for instance, Gitksan (Penutian; Forbes 2015), Wappo (Yukian; Sawyer 1991), Jamul Tiipay (Yuman; see Rice 2010 for an overview); also see Rice (2022). Garde (1973) also proposes an approach that is ‘morphological’, albeit not in the sense that hierarchical structure is taken to be relevant, but rather in the sense that morpheme classes of a language can be ranked on a scale in terms of their

headedness of the phonotactic structure can play a *direct* role in determining the winning accent in complex words. I will refer to this as *hierarchical resolution* (or *hierarchical licensing*). Like linear licensing, hierarchical licensing decides between competing accents, which are in this case diacritic; in other words, we are always dealing with so-called lexical accent systems. (I am not aware of a system in which hierarchical licensing is required to choose between phonologically heavy syllables). In short: the diacritic accent in a phonotactic head position prevails over a diacritic accent in a non-head position. In the absence of diacritic accents, a default domain head is determined by a D-structure at the prosodic level. For reasons of space, I refer to van der Hulst (2022), where I offer a detailed analysis of accent in two Sahaptin languages, which Bogomolets (2020) analyses in terms of hierarchical (in her terms: ‘cyclic’) resolution. In that article I also advocate for hierarchical licensing in certain Salish languages (following Revithiadou 1999).

The notion *head* that drives hierarchical licensing in my approach is thus *not* to be understood as morpho-syntactic head, but rather as the head of the phonotactic structure. In this sense my proposal differs from those in Revithiadou (1999) and Bogomolets (2020). In my proposal, hierarchical resolution relies on the headedness of phonotactic domains, which means that I essentially adopt the idea that resolution appeals to what Zubizarreta and Vergnaud (2005) call ‘a metrically interpreted morphological structure’. However, as we have seen, this approach goes all the way back to earlier work of Liberman (1975) and Rischel (1987) and is also adopted in Ladd (2008).

There are, however, also languages in which diacritic accents take center stage, i.e. lexical accent systems in which licensing is not hierarchical. A case in point is the stress system of Russian (see Revithiadou 1999):

- (13) Russian (LEFT/LEFT)
Stress the leftmost diacritic accent or else the leftmost (first) syllable

As it turns out, accentual algorithm for a language like Russian is not different from the procedures that we have discussed in this section for languages that were said to have weight-sensitive domain accents; see in particular (8c). The only difference is that licensing selects from diacritically heavy syllables instead of phonologically heavy ones (see Bogomolets and van der Hulst 2022).

Since the Russian system does not depend on a hierarchical structure, I will assume that its accentual algorithm applies at the prosodic level. This allows us to make a clear distinction between linear and hierarchical licensing:

- (14) a. Hierarchical licensing refers to the phonotactic structure
b. Linear licensing refers to the prosodic structure

What this means is that specifying the type of licensing and the level at which accent is determined are strictly correlated. Additionally, as already mentioned I assume that D-formation always applies at the prosodic level, even when licensing refers to the phonotactic level.

‘accentual strength’ such that the accent of the strongest morpheme wins. Garde’ approach has been further developed in Vaxman (2019). It is possible that his scalar resolution approach is required for languages that can be called hybrid because they have competition between syllables that are phonologically heavy and syllables that are marked for diacritic weight.

Lexical accent languages are often said to have ‘free accent’, but as we have seen being ‘free’ does not mean that there is no need for a procedure to decide which lexical syllabic accent will emerge with the word domain accent. When more than one morpheme bears a lexical accent, only one of them can be licensed as the word domain accent. Also, if no morpheme in a word is accented there must be a default structure to locate the syllable that will have the word domain accent.

It is important to see that systems in which diacritic syllabic accents play a major role are often unbounded in the sense that the accent location is not restricted to a two-syllable window. Such is the case in the systems that have hierarchical licensing, discussed in van der Hulst (2002), i.e. certain Sahaptin and Salish languages, and also in cases like Russian which have linear licensing. However, in bounded systems it is also possible for the location of the word accent to be heavily dependent on diacritic weight, varying its position within the window for different words. A case in point is Greek, as analysed in Revithiadou (1999), where the word accent occurs within a right-edge three-syllabic accentual window, its location being dependent on lexical accents and accents that are predictable on morphological grounds, or Spanish, as analysed in Roca (1999). We should now ask whether bounded, lexical accent systems can be differentiated in those that employ hierarchical licensing and those that involve linear licensing.

It would seem that the linear approach is perhaps always possible and thus sufficient in bounded systems. This could have two reasons. Firstly, it could be that bounded windows are simply too small to see any effect of the headedness of the phonotactic structure. To see the effect of hierarchical licensing in a bounded system, we would need a situation in which an accented root is followed by an accented suffix, both occurring within the bounded right-edge accentual window, with selection of the winner being either the left accent or the right accent, depending on the morphosyntactic properties of the suffix. Secondly, it could be that systems that appeal to hierarchical licensing are simpler in the sense of not allowing a bounded accentual window (although they might still require setting the satellite parameter. To push this further, we could say that systems that submit to hierarchical licensing only have to be specified *as such*, which would then imply that they have diacritic weight and, as per (14a) refer to the S/W labelled phonotactic structure. This means that only the default S/W labeling must be set. (The head-orientation of D-structure, which emerges at the prosodic level, will then align with the default S/W labelling). This makes for a very simply parameter system for morphologically-driven, hierarchical systems:

- (15) Parameters for morphologically-driven accent (i.e. licensing is hierarchical)
- a. Satellite (left/right)
 - b. Default S/W labelling (SW/WS)

A further necessary complication might be required when different layers in the morphological structure determine different S/W labelling rules, which is. As suggested in Dyck (2004) and Revithiadou (1999), Salish language distinguish between two classes of so-called lexical suffixes (called ‘incorporating’ and ‘compounding’) which correlate with different S/W labelling rules in what I call the phonotactic structure.⁴⁹

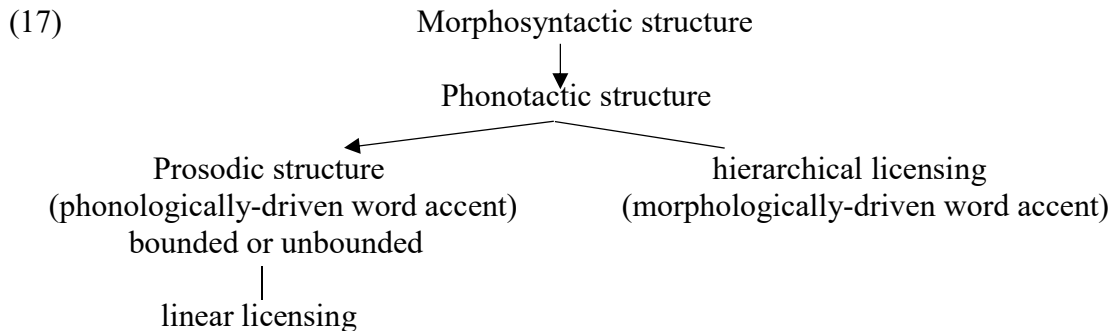
⁴⁹ In that chapter, I used the labels as ‘ α ’ and ‘ β ’ for these different morphological layers, but that was due to the fact that I did not understand that these labels ‘belong’ to the prosodic level. If labels are required to differentiate layers for S/W labelling in the phonotactic structure, these should be categorically different labels.

If, however, a good case can be made for needing hierarchical licensing in a bounded window, a slightly different parameter set is required

- (16) Parameters for morphologically-driven accent (i.e. licensing is hierarchical)
- a. Bounded (left/right) [if not set: unbounded]
 - b. Satellite (left/right)
 - c. Licensing (S/W labelling rules)
 - d. Default S/W labelling (SW/WS)

A further necessary complication might be required when different layers in the morphological structure determine different S/W labelling rules, which is. As suggested in Dyck (2004) and Revithiadou (1999), Salish language distinguish between two classes of so-called lexical suffixes (called ‘incorporating’ and ‘compounding’) which correlate with different S/W labelling rules in what I call the phonotactic structure.⁵⁰

In summary, the unified theory of word accent proposed here has the following organization:⁵¹



As in the case of unbounded with-sensitive systems, I have seen no evidence for an unbounded system that is sensitive to phonological weight in which resolution is anything else than linear. We have to ask why this is so.

To explain why phonological weight-based systems always seem to have linear resolution, I suggest that phonological weight and linear licensing form natural partners in that both are phonological in nature. This correlation would become theoretically necessary if we wanted to argue that unbounded accent algorithms that are strictly sensitive to phonological weight should be analysed as implementational, but this would only be possible if there are absolutely no exception which would require lexical, diacritic accents. In contrast, the mechanism of lexically marked diacritic accents forms a natural partner with morphologically-driven hierarchical licensing. But the correlation in the latter case is not perfect, because lexical accent systems can also appeal to the phonological mechanism of linear licensing (as in

⁵⁰ In that chapter, I used the labels as ‘ α ’ and ‘ β ’ for these different morphological layers, but that was due to the fact that I did not understand that these labels ‘belong’ to the prosodic level. If labels are required to differentiate layers for S/W labelling in the phonotactic structure, these should be categorically different labels.

⁵¹ For a more extensive summary, the reader could also read section 8 at this point, before proceeding to the case studies.

Russian). To explain this imperfection, we must take note of the fact that when diacritic weight is the major type of weight, diacritically marked syllables can often be traced back historically to syllables that were phonologically heavy, a situation which would naturally have triggered linear licensing. As noted in Halle and Kiparsky (1977), the widespread unbounded LEFT/LEFT pattern in Indo-European, specifically Slavic languages that mark weight diacritically, can be traced back to a Proto-Indo-European tonal stage in which weight was phonological, with rightmost H toned syllables attracting the word accent, which went to first syllables in the absence of an H tone. Likewise, in Spanish, which can be analysed as a bounded lexical accent system with linear licensing, diacritic weight can be traced back to phonological weight in terms of vowel quantity in Latin. It is thus likely that the possible occurrence of linear licensing in languages with predominant diacritic weight has been ‘left over’ from an earlier stage when weight was still phonological, giving rise to an ‘unnatural’ cooccurrence of non-phonological weight and phonological resolution. Bogomolets and van der Hulst (2022) wonder whether linear resolution might be the unmarked option for all accentual systems, since it is always observed in systems that are based on phonological weight and often in lexical accent systems, almost necessarily so in bounded lexical accent systems given that competition between diacritic accents in such small domains is unlikely to occur.

6 Summary and conclusions

I have proposed a unified account of word accentuation. I have made a distinction between syllabic accent, moraic accent and domain accents. Syllabic accents can be based on phonological weight or be diacritic. Moraic accents are always diacritic. Importantly, but not said explicitly before, there are no diacritic domain accents because domain accents always result from an accentual algorithm. This limits the role of diacritic accents which can only play a role if they occur within the accentual window. I have proposed that syllabic accents are variable (i.e. they are *potential* domain accents) so that selection as a licensing procedure will designate one variable accent as non-variable. The non-licensed variable accents remain phonetically silent.⁵² The second notion of domain that is relevant in phonologically-driven accent systems, is called the *accentual window*, which can comprise the entire word (modulo satellite formation), in which case we say that accent placement is unbounded, or a bisyllabic subdomain (also possibly extended with a satellite syllable), in which case accent placement is bounded. In both cases, accent location can be weight-sensitive or weight-insensitive (weight being either phonological or diacritic).

We have seen that in phonologically-driven systems, the word accent location involves four steps. First, we determine the accentual domain. Then within that domain we determine the accentual window and possibly a satellite. If there is more than one syllabic accent within the window, one has to be licensed and thus designated as the ‘winner’. If the window does not contain a syllabic accent, a word accent is established by assigning a dependency of ‘metrical’ structure to the accentual window, which designates the left- or rightmost syllable as the head. This D-structure is first assigned within all windows, also those that have a licensed syllabic

⁵² However, if in a language losing accents are ‘audible,’ one could suggest that the diacritic accents are non-variable; see section 7.3.1. If there is an apparent winner in such a case, this effect must either be caused by the occurrence of this accent in a ‘strong’ position or be due to the association of an intonational element.

accent, which, in that case must be the head of that structure, and subsequently extended to comprise the whole word (including satellites).

While diacritic syllabic accents are usually needed in phonological systems to account for exceptions, such accents take center stage in so-called lexical accent systems. In such system, licensing can be hierarchical and thus apply at the S/W labelled phonotactic structure. Diacritic accents determine S/W labelling which, in the absence of diacritic accent requires a default S/W labelling setting. D-structure formation applies to the outcome of hierarchical accent resolution at the prosodic level. (Perhaps such systems are always unbounded, but this claim might be too strong.) Phonological weight-sensitive unbounded system fall outside the scope of hierarchical licensing which is only triggered in lexical accent systems.

Lexical accent systems that use linear licensing ‘fail’ to access the morphologically-based phonotactic structure for the purpose of resolution and the determination of word accent is then phonologically driven.

It is important to keep in mind that I have distinguished two ways in which morphological structure can impact on accent location. When hierarchical licensing applies, the morphological structure is copied in the form of a ‘metrically-interpreted structure’ with S/W labelling. As discussed in van der Hulst (2022), but not demonstrated here, S/W labelling can differ within different layers in the morphological structure (as in Salish languages). Lexical accents project S-labels. This is what I have referred to as accent being morphologically-driven. However, when accent is phonologically driven (meaning that licensing is linear), with the accentual algorithm always applying at the prosodic level, morphological information can determine the formation of different accentual domains within the prosodic structure. The prosodic structure can deviate from the phonotactic structure due to the fact that affixes can have prosodic insertion frames that cause them to group with their base ‘intimately’ (causing integration in what I have called the α -domain) or more remotely (falling to integrate and forming what I called a β -domain). In words that are monomorphemic, or in languages in which accent assignment is not sensitive to morphological structure at all, we can simply say that these words project an α -domain and an isomorphic β -domain, where both domains can still be subject to their own accent rule (as is the case in English where monomorphemic words have two accents, one on the right-edge assigned in the α -domain and one on the left-edge assigned in the β -domain (which is often referred to as having ‘secondary stress’).

References

- Aditi Lahiri and Franz. 2010. Phonological phrasing in Germanic: the judgement of history, confirmed through experiment. *Transactions of the Philological Society* Volume 108/3: 370–398.
- Alderete, John. 1999. *Morphologically governed accent in Optimality Theory*. Amherst, MA: University of Massachusetts dissertation.
- Alderete, John. 2004. *Root-controlled accent in Cupeño*. *Natural Language & Linguistic Theory* 19/3: 455-502.
- Allen, M. 1978. *Morphological Investigations*. Doctoral dissertation, University of Connecticut.
- Anderson, J. & C. Ewen. 1987. *Principles of Dependency Phonology*. Cambridge: Cambridge University Press.

- Blevins, Juliette. 1993. A Tonal Analysis of Lithuanian Nominal Accent. *Language* 69.2: 237-273.
- Bogomolets, Ksenia. 2020. *Lexical Accent in Languages with Complex Morphology*. PhD University of Connecticut, 2020.
- Borowsky, T. 1993. On the word level. In E. Kaisse and S. Hargus. eds. *Studies in Lexical Phonology*. [Phonetics and Phonology. Volume 4]. New York: Academic Press, 199-234.
- Crowhurst, Megan J. & Lev Michael. 2005. Iterative footing and prominence-driven stress in Nanti (Kampa). *Language* 81: 47-95.
- Dyck, R. A. 2004. *Prosodic and morphological factors in Squamish (Skwxwú7mesh) stress assignment* (Doctoral dissertation). University of Victoria.
- Fabb, Nigel. 1988. English suffixation is constrained only by selectional restrictions. *Natural Language and Linguistic Theory* 6. 527-39.
- Garde, Paul. 1973. Principles of the synchronic description of stress. In Erik C. Fudge (ed.), *Phonology: Selected Readings*. Harmondsworth: Penguin, 309-19.
- Giegerich, H.J. 1985. *Metrical phonology and phonological structure*. Cambridge: Cambridge University Press.
- Goedemans, Rob. 1993. *Rhymes and riddles. Investigations in the phonetics and phonology of the weightlessness of syllable onsets*. Leiden, The Netherlands: Leiden University MA thesis.
- Gussenhoven, Carlos. 2006. Between stress and tone in Nubi word prosody. *Phonology* 23: 193-223.
- Halle, M., and J.-R. Vergnaud. 1987. *An essay on stress*. Cambridge: MIT Press.
- Halle, Morris & Paul Kiparsky. 1977. Towards a reconstruction of the Indo-European accent. In Larry Hyman. ed. *Studies in Stress and Accent*, 209-238. SCOPIL 4. Department of Linguistics, USC.
- Harris, J. 1987. Non-structure preserving rules in lexical phonology. *Lingua* 72/4: 255-292.
- Hayes, Bruce (1990). Precompiled phrasal phonology. In: Sharon Inkelas and Draga Zec. eds. *The Phonology-syntax connection*. Chicago and London: The university of Chicago Press, 85-108.
- Hockett, Charles. 1960. The origin of speech. *Scientific American* 203: 89-96.
- Hulst, Harry van der. 1984. *Syllable structure and stress in Dutch*. Dordrecht: Foris.
- Hulst, Harry van der. 1996. Separating primary accent and secondary accent. In Rob Goedemans, Harry van der Hulst & Ellis A. M. Visch. eds. *Stress patterns of the world* (HIL Publications 2). The Hague: Holland Academic Graphics, 1-26.
- Hulst, Harry van der. 1997. Primary accent is non-metrical. *Rivista di Linguistica* 9/1: 99-127.
- Hulst, Harry van der. 1999. Word accent. In Harry van der Hulst. ed. *Word prosodic systems in the languages of Europe*. Berlin and New York: Mouton de Gruyter, 3-116.
- Hulst, Harry van der. 2009. Brackets and grid marks or theories of primary accent and rhythm. In Eric Raimy & Charles E. Cairns. eds. *Contemporary views on architecture and representations in phonological theory*. Cambridge, MA: MIT Press, 225-45.
- Hulst, Harry van der. 2010a. A note on recursion in phonology. In Harry van der Hulst (ed.), *Recursion in human language* (Studies in Generative Grammar 104). Berlin: Mouton de Gruyter, 301-42.
- Hulst, Harry van der. 2010b. Word accent: Terms, typologies and theories. In Rob Goedemans, Harry van der Hulst & Ellen van Zanten. eds. *Stress patterns of the world. Part II: The data*. Berlin and New York: Mouton de Gruyter, 3-54.

- Hulst, Harry van der. 2011. Pitch accent systems. In Marc van Oostendorp, Colin J. Ewen, Elizabeth V. Hume & Keren Rice. eds. *The Blackwell Companion to Phonology*, vol. 2, London: Wiley-Blackwell, 1003-26.
- Hulst, Harry van der. 2012. Deconstructing stress. *Lingua* 122/13: 1494-521.
- Hulst, Harry van der. 2014a. Representing rhythm. In Harry van der Hulst. ed. *Word stress: Theoretical and typological issues*, 325-65. Cambridge: Cambridge University Press.
- Hulst, Harry van der. 2014b. Word stress: Past, present and future. In Harry van der Hulst. ed. *Word stress: Theoretical and typological issues*. Cambridge: Cambridge University Press, 3-55.
- Hulst, Harry van der. 2018. *Asymmetries in vowel harmony: A representational account* (Oxford Linguistics). Oxford: Oxford University Press.
- Hulst, Harry van der. 2020. *Principles of Radical CV Phonology* (Edinburgh Studies in Theoretical Linguistics 4). Edinburgh: Edinburgh University Press.
- Hulst, Harry van der. in prep. Accent and rhythm. Ms, University of Connecticut.
- Hulst, Harry van der. to appear. How to get rid of accent (or not). In: Pavel Iosad and Björn Köhnlein. eds. *Synchronic and diachronic approaches to tonal accent*. Oxford: Oxford University Press.
- Hyman, Larry M. 1977. On the nature of linguistic stress. In Larry M. Hyman. ed. *Studies in stress and accent*. Los Angeles: Department of Linguistics, University of Southern California, 37-82.
- Hyman, Larry M. 2006. Word-prosodic typology. *Phonology* 23/2: 225-57.
- Hyman, Larry M. 2009. How (not) to do phonological typology: The case of pitch accent. *Language Sciences* 31: 213-38.
- Inkelas, S. 1990. *Prosodic constituency in the lexicon*. New York: Garland.
- Inkelas, Sharon & Draga Zec. 1988. Serbo-Croatian pitch-accent: The interaction of tone, stress and intonation. *Language* 64: 227-248.
- Kager, René & Wim Zonneveld. 1999. Phrasal phonology: an introduction. In R. Kager & W. Zonneveld. eds., *Phrasal Phonology*. Nijmegen: Nijmegen University Press, 1-34.
- Kaisse, E. 1985. *Connected Speech*. San Diego: Academic Press.
- Kiparsky, Paul. 1979. Metrical structure assignment is cyclic. *Linguistic Inquiry* 10: 421-441.
- Kiparsky, Paul. 1982. From cyclic phonology to Lexical Phonology. In Harry van der Hulst & Norval Smith. eds. *The Structure of Phonological Representations (Part I)*, 131-175. Dordrecht: Foris.
- Kiparsky, Paul. 2021. Phonology to the rescue: Nez Perce morphology revisited. *The Linguistic Review* 38/3: xxx-xxx.
- Ladd, D.R. 2008. *Intonational phonology*. Cambridge: Cambridge University Press. 2nd edition.
- Ladd, D.R. 2014. *Simultaneous structure in phonology*. Oxford: Oxford University Press.
- Lahiri, Aditi and Franz Plank. 2022. Phonological phrasing: Approaches to grouping at lower levels of the prosodic hierarchy. In: Elan Dresher and Harry van der Hulst. eds. *The Oxford History of Phonology*. Oxford: Oxford University Press, 134-162.
- Lieberman, M. and J. Pierrehumbert. 1984. Intonational invariance under changes in pitch range and length In: M. Aronoff and R. T. Oehrle. eds. *Language and sound structure*. Cambridge, Mass.: MIT Press, 157-233.
- Lieberman, M., and A. Prince. 1977. On stress and linguistic rhythm. *Linguistic Inquiry* 8: 249-336.

- Martinet, André. 1960. *Eléments de linguistique générale. Nouvelle édition remaniée et mise à jour 1980*. Paris: Armand Colin.
- Molineaux, Benjamin. 2022. reassessment of word prominence in Mapudungun: phonological vs. morphological activation. In K. Bogomolets & H. van der Hulst. eds. *Word prominence in languages with complex morphology*. Oxford University Press, 311-332.
- Nespor, M., and I. B. Vogel. 1986. *Prosodic Phonology*. Dordrecht: Foris.
- Özçelik, Öner. 2022. Prosody in Turkish. In K. Bogomolets & H. van der Hulst. eds. *Word prominence in languages with complex morphology*. Oxford University Press, 493-519.
- Pierrehumbert, Janet. 1980. *The phonology and phonetics of English intonation*. [Unpublished Ph.D. dissertation, MIT, Cambridge, Massachusetts.]
- Prince, Alan. 1983. Relating to the grid. *Linguistic Inquiry* 14: 19-100.
- Revithiadou, Anthi. 1999. *Headmost accent wins. Head dominance and ideal prosodic form in lexical accent systems*. LOT Dissertation Series 15 (HILEFT/LEFTEiden Universiteit The Hague: Holland Academic Graphics.
- Rice, K. 2010. Accent in the native languages of North America. In: H. van der Hulst, R. Goedemans, E. van Zanten. eds. *A survey of word accentual patterns in the languages of the world*, 155-248.
- Rice, K. 2022. Domains of prominence in polysynthetic languages of North America. In K. Bogomolets & H. van der Hulst. eds. *Word prominence in languages with complex morphology*. Oxford University Press, 97-137.
- Rischel, J. 1983. On unit accentuation in Danish – and the distinction between deep and surface phonology. *Folia linguistica* 17: 51-97.
- Rischel, J. 1987. Is there just one hierarchy of prosodic categories? In: W. Dressler, H.C. Luschützky, O.E. Pfeiffer and J. Rennison. eds. *Phonologica 1984*. Cambridge: Cambridge University Press, 253-259.
- Roca, Iggy. 1999. Stress in the Romance languages. In Harry van der Hulst. ed. *Word Prosodic Systems in the Languages of Europe*, 659-812. Berlin and New York: Mouton de Gruyter.
- Scheer, T. 2010. *A guide to morphosyntax-phonology interface theories: how extra-phonological information is treated in phonology since Trubetzkoy's Grenzsignale*. Berlin/New York: Mouton de Gruyter.
- Scheer, T. 2022. Generative phonology: interaction between phonology and morpho-syntax. In: Elan Dresher and Harry van der Hulst. eds. 2022. *The Oxford History of Phonology*. Oxford: Oxford University Press, 462-484.
- Seidl, Amanda. 2001. *Minimal Indirect Reference: A Theory of the Syntax-Phonology Interface*. New York/London: Routledge.
- Selkirk, Elisabeth. 1978. On prosodic structure and its relation to syntactic structure. In Thorstein Fretheim (ed.), *Nordic Prosody 2*: 111-140. Trondheim: TAPIR.
- Siegel, D. (1984). *Topics in English morphology*. PhD dissertation, MIT.
- Sproat, Richard 1985. *On deriving the lexicon*. Ph.D dissertation, MIT.
- Trubetzkoy, Nikolai S. 1969. *Principles of phonology*. Translated by Christiane A. M. Baltaxe. Berkeley & Los Angeles: University of California Press. Originally published 1939 as *Grundzüge der Phonologie*. Göttingen: van der Hoeck & Ruprecht.
- Vaxman, Alexandre. 2016. *How to beat without feet: Weight scales and parameter dependencies in the Extended Accent First theory*. PhD. University of Connecticut, 2016.
- Vaxman, Alexandre. 2019. A Scales Approach to the problem of morphologically-conditioned exceptionality in accent assignment. In: Goedemans, Rob, Jeffrey Heinz and Harry van

- der Hulst. eds. 2019. *The study of word stress and accent: theories, methods and data*. Cambridge: Cambridge University Press, 387-424.
- Zubizarreta, M. L. and Vergnaud, J.-R. 2005. Phrasal Stress, Focus, and Syntax. In M. Everaert and H. van Riemsdijk (eds.) *The Syntax Companion*. Chapter 49. Cambridge: Blackwell.