PART I

THEORETICAL ISSUES IN WORD PROMINENCE

1
Word prominence and polysynthetic languages

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1.1 Introduction

Languages with complex morphology are the empirical focus of this book, which contains 18 chapters. Due to the morphological complexity and phonological length characteristic of words in these languages, they provide a particularly fruitful ground for investigating the effects of both phonological and morphological factors in the assignment of phonological prominence. The chapters of this volume address issues concerning the nature of word prominence, the interplay between morphological, phonological, and phonetic factors in the assignment of prominence, as well as a wide range of methodological and theoretical issues that are relevant when studying phonological prominence in (often considerably underdescribed and under-studied) polysynthetic languages. These issues are discussed for a genetically and geographically diverse group of languages, which contributes to both the empirical and theoretical value of this book.

Highly synthetic languages as a typological group were a central object of an extensive cross-linguistic study of lexical (i.e., phonologically unpredictable) accent in Bogomolets (2020). In addition, a number of relevant questions have sporadically been raised in the literature. Several relevant areal overviews of stress systems (although in each case – mixed between highly synthetic languages and non-highly synthetic languages of the respective areas) are found in van der Hulst, Goedemans, and van Zanten (2010). These include an overview of stress systems in Australian languages (Goedemans 2010), Austronesian languages (van Zanten, Stoel, and Remijsen 2010), stress, accent, and tone in Papuan languages (van Zanten and Dol 2010), a survey of South American stress systems (Wetzels and Meira 2010), and prosodic systems in languages of Africa (Downing 2010). A volume edited by van der Hulst (2014) devotes separate chapters to a number of pertinent questions, including the question of universality of word accent (Hyman 2014), the question of defining prominence at different prosodic levels (Gordon 2014), the problem of identifying secondary or rhythmic stresses (De Lacy 2014), and specific issues arising in the analysis of word-level prominence in some of the highly synthetic languages of the Americas (Rice 2014).

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Some of the major topics of discussion in the area of phonological prominence where highly synthetic languages feature prominently are the following: possible correspondences and mismatches between morpho-syntactic constituents and phonological domains (Bickel and Zúñiga 2017; Dyck 1994; Rice 1993; Russell 1999; Schiering, Bickel, and Hildebrandt 2010); a search for clear phonological and phonetic cues delimitating prosodic domains (Gordon 2005, 2014; Evans, Fletcher, and Ross 2008; Windsor 2017); prosody-specific cues to prosodic hierarchy such as word-level stress and phrase-level pitch accent (Baker 2014; Bishop 2002b; Gordon 2003, 2005, 2014; Mansfield 2017, 2019); differentiation of domains of rule application – prosodic vs. segmental (e.g. Baker and Harvey 2003; Hargus and Beavert 2016; Pentland and Laughren 2005); the role of lexical (underlying) marking and of accent competition in the assignment of stress (Alderete 1999; Bogomolets 2020, 2021; Revithiadou 1999; Vaxman 2016).

This introductory chapter is structured as follows. Section 1.2 presents a brief overview of the theoretical concepts relevant for the study of phonological prominence in general and phonological prominence in languages with complex morphologies in particular. In Section 1.3, we focus on one of such theoretical concepts – accent competition – in more detail and we defend the proposal that the notion of competition should be viewed as central in a study of accent. We discuss the scope of the volume in more detail in Section 1.4. The geographic coverage of prosodic studies in this volume is presented in Section 1.4.1 where we also refer to many previous studies of word prominence in polysynthetic languages. In Section 1.4.2, we provide an overview of the chapters that can be found in this volume.

1.2 Theoretical concepts

The diversity of word prominence[1] systems in the languages of the world is staggering. In previous work, in line with the work of others, van der Hulst developed an approach which 'deconstructs' word prominence profiles into several independent modules (see van der Hulst 2011). We will start with separating the notion (primary) 'word stress' and 'rhythm', which are familiar from (descriptions of) many languages that would appear to have one strongest syllable and, in addition, other syllables that display some kind of rhythmic alternation. In addition to primary accent and rhythm, van der Hulst (2011, 2014, this volume) proposes to recognize polar beats, characteristically located at the edge that lies opposite to the edge of primary prominence, as a separate type of prominence (see also Moskal 2012). Bogomolets (2020: Chapter 6) reanalyzes this previously proposed notion of a

[1] We are deliberately using the more neutral term 'prominence' (for the perception of a syllable being more salient than others) and 'stress' (with scare quotes) until, below, we establish a more precise terminology.

polar prominence (van der Hulst 2011, 2014), as just one type of 'secondary' accent proper.[2] All three types of prominence (i.e. primary stress, rhythm, and secondary stress) are often observed within the same word in languages with complex morphology. Thus, for instance, in Piro (Arawakan; Matteson 1963)[3] primary accent is fixed and is invariably assigned to the penultimate syllable. Secondary accent is also fixed and is assigned to the initial syllable. Rhythm in Piro propagates from the fixed secondary accent. Clashes with primary accent are banned in Piro, which creates a lapse at the right edge of words with an odd number of syllables; consider examples in (1) below:

(1a)	ˌtʃi.ya.ˈha.ta	'he cries'
(1b)	ˌsal.wa.yeh.ˈka.ta	'they visit each other'
(1c)	ˌpe.tʃi.ˌtʃi.mat.ˈlo.na	'they say they stalk it'
(1d)	ˌrus.lu.ˌno.ti.nit.ˈka.na	'their voices already changed'

(Matteson 1963: 28)

In addition to primary prominence, secondary prominence, and rhythmic prominence, other sources of prominence can be identified in many languages. A fourth source of perceived prominence is *syllable weight*. Syllables of a certain complexity (having a long vowel, a vowel with high sonority, a tonal property or ending in a coda consonant) can be perceived as prominent. As such they can 'interfere' with the algorithms for assigning primary, secondary, or rhythmic prominence, which are then said to be *weight-sensitive*.

Finally, another factor in the analysis of word prominence is attributed to the perception of word-internal prominence to the association of a tone (or tone sequence) to a tone-bearing unit (a syllable or mora), often located at the edge of words (see Gordon, this volume; Özçelik, this volume). Such a tonal unit, which can be lexical or phrasal, can be associated with reference to a prominent unit (the 'stressed' syllable), or it can be associated at the word edge,[4] sometimes only if the word occurs at the edge of a larger phrasal unit of some kind. We are thus presented with the following types of prominence:

(2) Different sources for word prominence
   a. Primary prominence
   b. Secondary prominence
   c. Rhythmic prominence
   d. Weight prominence
   e. Tonal prominence

[2] Here secondary does not necessarily mean 'a weaker stress'. The perceived relative prominence of the 'secondary' stress and primary stress may be dependent on the phrasal context of a word.

[3] This volume includes a chapter on prominence in a genetically related language – Satipo Ashaninka (Mihas and Maxwell, this volume).

[4] Özçelik (this volume) analyzes regular final 'stress' in Turkish in this way.

With respect to prominence patterns that involve word-internal 'rhythm' and a notion of 'primary stress', the basic design of Metrical Phonology is to first assign feet and then select a peripheral foot as the head foot of the word (Liberman and Prince 1977; Hayes 1995). A different view is to assign 'primary stress' first and assign rhythm, as well as secondary prominence, after that.[5] There are many arguments for separating primary prominence from these other sources of prominence in this way (see Goedemans and van der Hulst 2014 for a full discussion), a very important one being that primary accent and, as discussed in Bogomolets (2020: ch.6), secondary accent, may be subject to idiosyncratic exceptions (which have to be encoded in the lexicon; see below), whereas this never seems to be the case for rhythmic prominence. This difference may suggest seeing accent (both primary and secondary) as 'lexical' and rhythm as 'post-lexical' (cf. Roca 1986), given the diagnostics that are commonly associated with these two classes of rules (Kiparsky 1985).[6]

The source of prominence called rhythm has been widely discussed, and the entire edifice of Metrical Phonology is based on mostly impressionistic descriptions of languages for which word-internal rhythm has been reported (Hayes 1995). In several cases, instrumental studies have not been able to find empirical evidence for rhythmic beats. This matter is discussed in De Lacy (2014). We also refer to Tabain et al. (2014) for a clear case in point. South Baffin Island Inuktitut (Uqqurmiut), which is analyzed in Arnhold, Elfner and Compton (this volume), is another example. Based on acoustic data, the authors conclude that there is no evidence to support that South Baffin Island Inuktitut has a metrical stress system – neither bounded nor unbounded, neither quantity-sensitive nor quantity-insensitive (p.176). In this case, the authors also 'did not find clear evidence that a single syllable within each word carried acoustic characteristics marking it as the most prominent, as would be expected of a primary stress' (p. 176). With reference to similar claims concerning other Inuit-Yupik languages, the authors assume that the perception of some kind of prominence in words is likely due to intonational factors. While Uqqurmiut does not provide empirical support for rhythm or primary stress, there are many languages in which the presence of primary stress (and even secondary stress) is undisputed and instrumentally supported. It is nevertheless noteworthy that even alleged primary word stress locations have been called into question for some languages (see, for example, Molineaux, this volume).

[5] See Goedemans and van der Hulst (2014) and references therein. We are aware of some systems in which the location of primary stress has been claimed to depend on prior footing. In previous work, van der Hulst has referred to these systems as 'count systems'; see Section 7.1.5 in van der Hulst (this volume) for references and how such systems can be analyzed without giving up the 'primary stress first' approach.

[6] It is perhaps advisable to abandon the term post-lexical, which is traditionally taken to mean 'at the syntactic level', and replace it by 'post-grammatical', which stands in contrast to rules that apply at the lexical and syntactic levels, which are both called grammatical. After all, accent rules can also apply at the phrasal levels to account for what is usually called phrasal stress. We submit that the distinction between grammatical accent rules and post-grammatical rhythmic rules is not only relevant at the word level, but also at the syntactic phrasal level, but we will not pursue these analogies here.

We have thus far mostly used the neutral term 'prominence', but also 'stress' and 'rhythm'. The term 'prominence' is useful as an 'umbrella' term for all instances in which a certain syllable has some kind of perceptual salience, even though it is clear that we have to distinguish several sources for prominence, as shown in (2). The term 'stress' is often used interchangeably with the term 'accent'. We propose to make a distinction between these two terms. We take 'stress' to refer to *phonetic correlates* of an abstract phonological property that we call *accent*.[7] In addition to (or in place of) *word* accent, we suggest that the term *domain accent* has to be recognized because accents can be assigned with reference to domains that are smaller than the grammatical word. This then may result in several accents being assigned within the grammatical word each belonging to different domains. Often, this gives rise to distinguishing primary and secondary accents, depending on the relative saliences of these multiple accents within a word. We return below to the important question as to what the nature of such accentual domains is.

Correlates of domain accents can vary from language to language (see Roettger and Gordon 2017 for a typological study of different correlates of word accents), covering a variety of phonetic properties such as extra duration, loudness, higher pitch, and hyper-articulation, in which case linguists often speak of 'stress' (or *stress accent*; cf. Hyman 1977). Some languages predominantly use just one phonetic cue, such as pitch, in which case the term *pitch accent* is frequently used (see van der Hulst 2011, 2012, to appear). Other kinds of domain accent manifestations are conceivable. When the primary or even only cue of accent is duration, we can speak of 'duration-accent'; we refer to Roettger and Gordon (2017) for examples. As pointed out in Lehiste (1970), the 'stretchable' properties of speech (such as duration, F0, and amplitude) lend themselves best to cue the location of domain accents. Other cues, such 'spectral tilt' or fortition of consonants can also function as domain accent cues, but notice that 'nasalization', while potentially gradient, has not been observed as a cue for accent.

Apart from phonetic cues, another cue to the location of domain accents can be that the accented syllable allows a greater array of *contrastive options*, which would be captured in the phonotactic system of the language. If, for example, only accented syllables can have a vowel length contrast, we can speak of a length-accent language. Needless to say, phonotactic manifestations of accent can only be present if the accent algorithm is lexical, because contrast is specified lexically as part of the phonotactic system of a language. It should be noted that the various types of accent manifestations are not mutually exclusive. A language can cue domain accents with pitch and, at the same time, limit a length contrast to the accented syllables.

We expect that correlating accent with multiple phonetic and phonotactic manifestations is not limited to the 'accent' source of prominence. In principle, the same is possible for the other sources of prominence. For example, if prominence can

[7] Note that this usage is the opposite of how others, such as for example van Zanten and van Heuven (1998), define these terms.

be due to rhythmic beats, we might find that rhythmic beats can be manifested phonetically in different ways. This leads to a rather complicated many-to-many correlation between the sources of prominence and their correlates:

(3)

Source	**Correlates**
Accent	Stress
Polar[9]	Pitch
Rhythm	Duration
Weight	Other phonetic properties
Tone	Phonotactic

If a language has a primary accent, a secondary accent and rhythmic 'beats', there is no necessity for these sources to have the same correlates, despite the usage of the term 'stress' for these different sources in many publications. We must, however, recognize that there are certain lines in (3) that are likely non-occurring. For example, rhythmic prominence, if post-grammatical, cannot correlate with phonotactic cues which are by definition established lexically. The source called 'tone' is likely exclusively correlated with a pitch correlate, although other phonetic correlates can co-occur.[8] The source 'weight' perhaps does not need any correlates, other than, by definition, the relevant intrinsic phonotactic properties, which are by themselves sufficient to lend a heavy syllable perceived prominence.

Given the multiple sources for prominence, it may happen that a certain prominence cue is mistaken as a cue of a word domain accent (or, in common terminology of 'primary word stress'), while in fact it is due to a tonal association at the edge of a word. This point has been made for several languages in Gussenhoven (2004), such as French and Tokyo Japanese, or Korean (in Jun 1998), and, in this volume, by Özçelik (this volume) for Turkish; for other examples, see also Gordon (2014, this volume). Another possibility is that an alleged word stress is the first or the last rhythmic beat, which is certainly possible given that we separate domain accent assignment from providing grammatical words with a rhythmic carpet post-grammatically. A language may have rhythm without having accent (an possible example of such a system – Creek – is discussed in Gordon and Martin, this volume).[9]

What seems clear is that the correlates of accents, especially when those are subject to exceptions, are typically more robust than those for other sources, which is likely due to accent (especially primary accent) often being potentially

[8] Bear in mind here that the list of correlates is not exhaustive. Other correlates, often called phonation, such as breathy voice, could also function as exponents of tone and perhaps of other sources. See Lockwood (1983) for an interpretation of tone as devoid of any inherent phonetic cue.

[9] If the rhythm is assigned from left to right and the rightmost rhythmic beat attracts a tone, we effectively have a 'count system' in which the most salient syllable lies at the edge that is opposite the edge where the rhythmic pattern started.

contrastive and thus necessarily lexical, even when the functional load of contrasting accent positions is low. In contrast, when the accent location is entirely predictable ('automatic'), it may be difficult to detect perceptually or even instrumentally, sometimes leading linguists to deny that there are consistent cues to word accent at all, and to proposals that such languages lack accents.

This leads to the following thorny issue. Given the distinction between domain accent locations and phonetic or phonotactic cues, we must consider the possibility that there is no phonetic or phonotactic correlate of accent at all in a given language. While this could in principle render the accent location undetectable at the word level, this location may still reveal itself by functioning as an anchor for the association of intonational tones, typically tones that mark some kind of 'focus' (in which case they are confusingly called 'pitch accents'[10]). When there is no correlate whatsoever, we cannot know whether words have accents or not, but we have to consider the possibility that the *raison d'être* of accents is not necessarily *to be manifested* if accents are in fact heads of phonological (or phonotactic) domains, and that such structure is simply the result of the fact that the syllables of words are *cognitively* represented in terms of a 'metrical' dependency structure rather than as a linear string. We suggest that the 'metrical' dependency structures, whose head would be the accent that can, but does not have to, have a phonetic correlate, have the cognitive function of imposing a hierarchal grouping on strings of syllables, likely for the purpose of lexical storage and retrieval, and also with respect to speech planning (Levelt 1989).[11]

Leaving the issue of the universality of word accents undecided, we propose that next to domain accents (of which the notion 'word domain' is a special case), a third type of accent can be distinguished. We noted that exceptions to otherwise regular domain accent locations must be encoded in the lexicon. We here assume, we believe uncontroversially, that exceptions to phonological accent rules will be represented in terms of *syllabic accents* that are specified in the lexicon. Such syllabic accents are *diacritic marks*. Syllables thus marked behave like syllables that are phonologically heavy without actually having the relevant phonological properties. For this reason, we could refer to syllabic accents as representing 'diacritic weight'. Phonological accent rules determine the location of *domain accents* with

[10] If an intonational pitch accent only appears on the penultimate syllable of the right-most word in a phrase (as in the Australian language Ngalakgan; see Mansfield, this volume**)**, this would be a case in which one might say that there is in fact a penultimate accent on each word, with accent having no other cue than a phrasally determined pitch accent, although it is also possible to say that there is a phrasal accentuation algorithm that locates the penultimate accent. The term 'pitch accent' for intonational units, introduced in Bolinger (1958), need not be confusing if we take it to refer to an intonational pitch property being anchored to a syllable that has *phrasal accent*, as opposed to pitch accent being a pitch property that is anchored to a word accent, which inappropriately gives rise to the term 'pitch accent *language*'.

[11] A reviewer points out that non-cued accents could in principle be revealed in clever psycholinguistic experiments, if it is indeed true that accents can exist covertly, i.e. cognitively, while lacking overt cues.

reference to diacritic and phonological weight.[12] In so-called 'lexical' or 'free' accent systems, diacritic marking of accents is the norm, although the morphemes of such a language can be accented (on some syllable) or be unaccented, which leads to some complex words having multiple syllabic accents, while others may lack an accent altogether. As we will discuss in the next section, lexical accent systems thus require a *resolution* strategy to determine which syllabic or diacritic accent becomes the 'winner' in case there is more than one lexical accent. In addition, such systems require a 'default' procedure to locate a *default accent* in words that lack lexically specified, diacritic accents.[13]

Resolution is, however, required not only in lexical accent systems. In languages in which there is a regular, phonological word accent rule that is weight-sensitive, the accent algorithm needs to 'decide' which of the heavy syllables within the accent domain is the 'winner'. It also means that in such systems a default option is necessary for words that do not contain a heavy syllable. In the next section, we will present a systematic review of strategies for accent competition resolution in both lexical accent systems and systems that are weight-sensitive.[14]

Before concluding this section, we return to the issue of domains. What is the nature of sub-word domains and how does the linguist determine their size? We will discuss these questions with respect to complex words, since if simplex words would show evidence for different accentual domains, such domains are necessarily phonological in nature. Strictly phonological word-internal domains are syllables (and their subparts) and, depending on one's theory, feet and possible groupings of feet. Since the focus of the present volume is on morphologically complex words, we will focus on complex words here. By definition, complex words have a word-internal structure that can be called morphological or morpho-syntactic, which minimally consists of morphemes that could be the domain of accent rules, roots or affixes (see, for example, Rice, this volume). Non-minimally, such structure refers to hierarchical relations between morphemes, the details of which once more depend on which theories are applied. It would not be surprising to find that accents can be assigned with direct reference to the morphological structure. From a functional point of view is has long been argued that accents, especially in languages which do *not* have very long words, can have a demarcative

[12] An additional dimension of difference is that accent rules refer to so-called accentual windows, which in a bounded system is small (two or three syllables) but can comprise the entire accentual domain in unbounded systems; see van der Hulst (this volume).

[13] Diacritic accents, in addition to being lexically specified *in* morphemes, can also result from following a certain prefix or preceding a certain suffix. Such accents can be analyzed in terms of post- or pre-accenting rules that are part of the morphological operation that introduces these affixes, comparable to the rule that turns /k/ into /s/ before certain suffixes in English, or they can refer to morpho-syntactic features of morphemes. We refer to such rules, which we will not discuss in this chapter, as *morpho-lexical rules*. However, other approaches have been proposed which consider pre- and post-accenting to be a type of underlying (*lexical*) grid marking, and as such formally having an equal status with underlying grid marking observed with underlyingly accented morphemes. We will not evaluate here the merits of these different approaches.

[14] We do not exclude that accent rules may be sensitive to both phonological and diacritic weight within a single language; see Vaxman (2016) for a study and theoretical analysis of such 'hybrid' systems; also see Section 1.3.3.

function when placed near the edge of words, such that the perceiver gets cues to where word boundaries are. In languages that have very long words, it would make sense that accents can be used as a cue to the parsing of these words in terms of the constituting morphemes or morpho-syntactic domains. Thus, if the accent falls on the last syllable of the root, this location would signal the division between the root and following suffixes.

It has also long been argued that linguistic expressions, in addition to having a morpho-syntactic structure, have a phonological (often called prosodic) structure which is motivated by the fact that certain phonological rules seem to operate with reference to this structure rather than with reference to the morpho-syntactic structure. In this volume, we find several examples of analyses which postulate word-internal prosodic domains. These domains usually carry names that are taken from the morpho-syntactic structure, with a preceding adjective 'prosodic', such as *prosodic stem*, *prosodic word*, *prosodic phrase*, because their size is not too different from the morpho-syntactic units from which they only slightly deviate. We suggest that such near-isomorphy, which apparently holds in languages with shorter complex words, is perhaps inadequate and even misleading when applied to polysynthetic languages. This issue is explicitly discussed in Gordon (this volume), who provides examples from mismatches between the morpho-syntactic structure and the prosodic structure. Van der Hulst (this volume) also addresses the mismatch issue, referring to the phonological structure as *phonotactic* because he argues that, in addition to this phonotactic structure, languages have a different, more 'surfacy' phonological structure, which he calls *prosodic*.

We will now turn to a 'typology' of prominence systems with specific reference to the issue of accent competition resolution.

1.3 Accent competition

One of the major questions that research on highly synthetic languages can elucidate is what the role is of morphological factors versus phonological factors in accent assignment and accent competition in word prominence systems. This issue is one of the central topics in a number of chapters in this volume. While in some cases, morphological structure turns out to be important for the resolution of accent competitions in word-level prominence patterns (e.g. in Mapudungun, Molineaux, this volume; Nivkh, Mattissen this, volume; Ese Ejja, Rolle, this volume), in other cases, despite the extreme morphological complexity of the languages in question, morphology turns out to play only a marginal role or no role at all in the assignment of word-level prominence (e.g. Arapaho, Bogomolets, this volume; Circassian, Gordon and Applebaum, this volume). In this section, we explore the issue of accent competition in more detail.

Accent competition can be seen as a response to the (near-)universal pressure to mark one and only one syllable per word with the highest degree of prominence. This is referred to as the factor of culminativity; for discussion, see Bogomolets

2020; Hayes 1995; van der Hulst 2012; Hyman 2009 a.o.). Thus, if more than one syllable within a domain is designated phonologically (see **3.1**), lexically (see **3.2**), or both phonologically and lexically (see **3.3**) to be the most prominent unit, a competition arises which must be resolved in some way. In what follows, we aim to present a theoretically informed typology of the possible ways in which such a resolution can be carried out. We will defend the view that the cross-linguistic repertoire of the possible resolutions is highly constrained, and we will discuss the empirical facts presented in this section in light of the theoretical questions pertaining to the interaction between phonological, lexical, and morphological information available to the accent competition resolution.

1.3.1 Competition in phonologically predictable accent systems

Competition arises in languages with phonologically predictable accent locations if more than one syllable within the accent domain competes for receiving the accent. Accent location can be sensitive to two phonological factors: domain edges and syllable weight. Thus, accent can be predictable from the distance from one of the domain edges, i.e. when accent position is *fixed,* and accent always falls on the same syllable. The most common patterns cross-linguistically involve fixed accent on one of two edge-most syllables at either of the word edges, although extrametricality can push the accent one syllable further inward. Accent competition does not arise in systems with a fixed accent position within the word as a whole. However, accent competition will arise if different subdomains of the word (including the word as a whole) have their own accent rule. This is the case in several of the languages discussed in the volume, for instance in Mapudungun (Molineaux, this volume), where a fixed accent assigned to the final syllable of the 'stem' may compete with a weight-sensitive stress assigned at the word level. If these two accents are on adjacent syllables, Molineaux reports that such clashes in the language are usually resolved in favor of the rightmost of the competing accents.[15]

The second way in which accent placement can be phonologically predictable is through the sensitivity to the inherent prominence of some syllables in a wordform. Such prominence most often is conditioned by quantitative weight distinctions, with syllables containing long vowels and/or codas counting as heavy in the majority of quantity-sensitive systems. Syllable prominence can also be conditioned by other, non-quantitative factors such as vowel quality (e.g. full vowels are 'heavier' for the stress assignment purposes than reduced vowels) or pitch distinctions (see Zec 2011). We will now briefly consider the competition resolution

[15] Van der Hulst (this volume) discusses the fact that when such multiple accents are not clashing, they still compete for being the most prominent one, which then leads to one receiving primary stress, whereas the other gets secondary stress. In such a competition, the 'loser' accent then is not deleted. We refer to van der Hulst's chapter for a proposal to resolve this competition with reference to the headedness of the phonological domains within which these accents are assigned.

strategies found in the quantity-sensitive systems (**3.1.1**) and in 'quality'-sensitive systems (**3.1.2**).

1.3.1.1 Weight-based systems: quantitative weight

Competition between syllables that compete for accent may arise in weight-sensitive accent systems, either within a *bounded* accent window or within an *unbounded* window. In the latter case, phonologically heavy syllables compete within the whole wordform. If a language assigns accent in a bounded window, this window comprises two or three syllables at the left or right edge of an accentual domain (which can be the whole word or a subdomain, such as the root or stem); see Kager (2012) for a study of 'stress' windows and van der Hulst (2012, this volume) for a parametric account of bounded vs. unbounded systems.[16] Competition in both bounded and unbounded weight-sensitive stress systems is, to the best of our knowledge, always resolved *linearly*, i.e. either the rightmost or the leftmost (depending on the language) of the heavy syllables within the relevant window always wins.[17]

A number of languages with complex morphology discussed in this volume show weight-sensitivity and linear resolution. Primary stress is weight-sensitive in Satipo Ashaninka and is assigned within a bounded trisyllabic window at the right edge of every word (Mihas and Maxwell, this volume). When a competition arises, i.e., if more than one heavy syllable is present within the trisyllabic window, the leftmost of the heavy syllables receives the winning accent. This pattern is schematized in (4) below where the 'x' mark over a syllable stands for accent, the superscript 'W' stands for weight, and the square bracket stands for the word edge:

(4) Satipo Ashaninka accent competition: Leftmost heavy wins[18]

x	x			x		
σ^W	σ^W	$\sigma]$		σ	σ	$\sigma]$

A possible formal analysis, as shown in (4), is that all heavy syllables project an accent, which then creates competition that is resolved linearly; see van der Hulst (this volume).

Mapudungun (Molineaux, this volume) and a number of languages of North America discussed in Rice (this volume) show weight-sensitivity in their accent assignment as well. In all cases of accent competition in these languages, the

[16] It is crucial to differentiate the notion 'window' and the notion 'domain'. If a language has penultimate 'stress' in words and no other prominence peak, we say that the accentual *domain* is the word, while the accentual *window* is the two-syllable stretch at the right edge of that domain.

[17] The distinction between *linear* (or *directional*) accent competition resolution and *morphology-dependent* (specifically, *cyclic*) accent competition resolution was first proposed and elaborated on in Bogomolets (2020). See also Section 3.2.2 below.

[18] Languages differ in their treatment of the 'losing' accents. While in some languages the non-winning accents are deleted and thus are not phonetically realized in any way, in other languages, the non-winning accents are not deleted, but are 'demoted' and realized as secondary stresses.

winning accent is determined with a simple rule of 'the rightmost/leftmost accent wins' (as in (4) above), i.e. accent competition is resolved linearly.

1.3.1.2 Weight-based systems: qualitative weight

Accent competition resolutions in accent systems with qualitative weight distinctions are most often governed by linear resolution rules as well. Thus, for instance, in an accent system where syllables differ in their phonological prominence based on pitch distinctions, the rightmost or the leftmost high-pitched syllable within the stress domain would win. In a system where vowel quality (e.g. full vowels vs. schwas) or vowel sonority (e.g. low vowels vs. high vowels) is the deciding factor, the rightmost or the leftmost syllable with a full vowel or the most sonorous vowel would win. For example, in Fore (Trans-New Guinea; Nicholson and Nicholson 1962) 'stress' falls on the first syllable with a high tone. In words without high tones stress is on the first syllable.

Rice (this volume) summarizes the facts for one such language (Hən'q'əmin'əm', Salishan) with qualitative weight distinctions where syllables containing a full vowel are counted as heavy, while syllables containing a schwa are considered light. In this language, if multiple syllables with a full vowel are present, the leftmost one receives primary stress and a schwa can only ever bear stress if there are no full vowels in the word. Mihas and Maxwell (this volume) point out that Kampa languages also take vowel quality into account in the resolution of accent competitions. In Nanti, for example, stress falls on the syllable with the lowest vowel (a > e, o > i) in the word, while in Pichis Ashéninka, high vowels are dispreferred as carriers of stress (Crowhurst and Michael 2005; see, however, Rasin 2020 for a competing analysis). Another language discussed in this volume where qualitative differences between syllables play a role in the assignment of prominence is Tlingit (Crippen, Déchaine, and Elfner, this volume). In Tlingit, pitch distinctions (among other factors) are significant for assigning primary stress.

It is significant that, as far as we know, systems where syllables compete for accent based on phonological weight (whether quantitative or qualitative) always recruit linear resolution. We refer to van der Hulst (this volume) for an attempt to explain this correlation.

1.3.2 Accent competition in lexical stress systems

We will now shift our attention from syllables that compete for accents based on their inherent weight to syllables that compete due to having 'diacritic weight', which is often called lexical accent (bearing in mind that these accents are syllabic accents, as defined in Section 1.2). Languages with complex morphology are particularly interesting for studying the behavior of lexical accents, since they give

the necessary phonological word length and morphological complexity to explore both the phonological and morphological factors in the resolution of accent competition. It is often assumed that in lexical accent languages word prominence is not governed by any phonological factors, but instead is dependent on morphological structure. However, there is a clear phonological dimension to such systems. While, as noted in Bogomolets (2020: 14), accents are predominantly phonologically unpredictable *within* a morpheme in lexical accent languages, the accent algorithm always requires the assignment of the default 'stress' which is determined in purely phonological terms, in the same way as it is in systems with overall phonologically predicable accent. Additionally, many lexical stress systems do not require any morphological information to resolve accent competition since accent competition resolution in lexical accent systems can be strictly linear. Linear resolution is arguably a phonological matter. This kind of lexical accent systems is addressed in **1.3.2.1**. In section **1.3.2.2**, we then turn to systems in which resolution is morphology-dependent. We thus propose, based on Bogomolets (2020), to distinguish between two types of lexical accent systems, depending on whether resolution is phonological or morphological (see also and van der Hulst, this volume, for extensions of this proposal). An important question is to determine, if case resolution is not linear, what kind of morphological information is available to the resolution strategy or, to put it differently, how much morphological information is made available to the resolution strategy.

1.3.2.1 Linear resolution

It appears that despite the common assumption that lexical accent systems must involve reference to morphology for the resolution of accent competitions, most languages with complex morphology that have lexical accents, do not require access to morphological structure at all. Instead, when more than one underlying accent is present within a word (or another type of accentual domain, e.g. a stem), the competition between these accents is resolved linearly, i.e. either the rightmost or the leftmost accent wins.

These systems are thus virtually identical to the weight-based accent systems discussed in **3.1**, especially if we accept the view of accent being sensitive to phonological weight or diacritic weight (van der Hulst 2012; see also Section 1.**2** in this chapter). Compare the representation of a linear resolution of accent competition in a lexical accent system (5) to the representation of an accent competition resolution in a phonologically predictable accent system (6). For clarity of exposition, accent marks projected from lexical marking are superscripted with 'LA' in (5), and accent marks projected from syllable weight are superscripted with 'W' in (6); the square brackets stand for an accentual domain, whether the domain is bounded or unbounded is not important here.

(5) Lexical Accent: Linear resolution

(5a) Rightmost wins

x x x
[σ^{LA} σ^{LA}] [σ σ^{LA}]

(5b) Leftmost wins

x x x
[σ^{LA} σ^{LA}] [σ^{LA} σ]

(6) Weight-sensitive Accent

(6a) Rightmost wins

x x x
[σ^{W} σ^{W}] [σ σ^{W}]

(6b) Leftmost wins

x x x
[σ^{W} σ^{W}] [σ^{W} σ]

Completing the parallel between phonologically predictable accent systems and lexical accent systems with linear resolution of competitions, the latter type of accent can be either bounded or unbounded. Thus, for instance, in the Uto-Aztecan language with complex morphology Choguita Rarámuri, the accent window is bounded: primary stress must be assigned within the first three syllables of every word (Caballero 2008, 2011). According to an analysis proposed in Bogomolets (2020; to appear), Choguita Rarámuri accent competition patterns are accounted for in the most straightforward way by a linear resolution rule whereby the leftmost of underlying accents within the bounded left-edge domain wins. Another language with lexical accent and linear resolution of accent competition, Arapaho, has a mirror image of the Choguita Rarámuri system. The accent window in Arapaho is bounded to the right edge of a word and in the situation of accent competition, the rightmost of the underlying accents wins (see Bogomolets 2020, this volume). An example of an unbounded lexical accent system with linear competition resolution is found in Cupeño, where the leftmost of the underlying accents within a word receives primary stress (Yates 2017). We are thus presented with the typology shown in Table 1.1 lexical accent systems with linear resolution of accent competition.

As evident from Table 1.1, we find that lexical accent systems which do not require access to morphology can be seen as varying along two parameters: boundedness and right/left orientation. It is worth noting that there appears to be a correlation between the left/right orientation for the window and the left/right choice for the winning accents, although we do not have a formal explanation for this correlation at this time. This correlation could be a tendency, perhaps to be explained in terms of an 'easy' choice for the learner. Table 1.1 also has two gaps

Table 1.1 Typology of lexical accent systems with linear competition resolution

		Rightmost wins	**Leftmost wins**
Bounded	Right edge	Arapaho, Greek, Spanish	???
	Left edge	Ese Ejja	Choguita Rarámuri
Unbounded		???	Cupeño, Selkup

which we have not been able to fill, and we leave the question of whether these gaps are true typological gaps or not for further research.

Lexical accent systems with linear resolution only require access to the marking of syllabic accent, but do not need to make any reference to morphological structure or morphological properties of the morphemes within a word in the resolution of accent competitions. In this regard, this type of lexical accent can be compared to other phonological properties which are part of the underlying phonological representation of morphemes, but whose realization does not depend on morphological structure, such as tone in many tonal languages. For instance, it cannot be predicted from phonological factors which morphemes will have a high tone in Mandarin, i.e. tonal specification is underlying/lexical. However, it is also not the case that the distribution of H tone depends on morphological structure whereby only a particular type of morphemes would be marked by H tone.[19] Lexical accent systems such as those in Table 1.1 thus suggest that the notions of *lexical accent* and *morphology-dependent accent* must be separated. In the next section, we address accent competition in the lexical accent systems with morphology-dependent accent.

1.3.2.2 Morphology-dependent resolution

In contrast to lexical accent systems in which the resolution of accent competitions relies on the linear order of competing accents, languages with morphology-dependent competition resolution require some morphological information about the morphemes containing underlying accents in order to choose a winning accent, which will be manifested as primary stress. The type of morphological information required for the accent resolution varies from language to language and also often depends upon the theoretical and analytical choices made in the proposed accounts of these systems. However, what unifies the morphology-dependent lexical accent systems is the impossibility of accounting for the accent

[19] Interestingly, tonal languages can also display resolution strategies, especially in circumstances of adjacent H tones, which perhaps points to the accentual nature of such H tones; see van der Hulst (2011, to appear). In tonal systems, we can always find reduction of tonal contrast in 'metrically' weak(er) positions, which is a kind of resolution that is comparable to prominence differences between stress-accents in different domains within the word.

resolution patterns with a simple 'rightmost accent wins' or 'leftmost accent wins' rule.

One example of such a system, demonstrating the type of morphological information which might be required for accent resolution, is the stress system of Chamorro (Austronesian). It has been argued that this system requires access to information about the position of morphemes in the morpho-syntactic structure (Chung 1983). Specifically, Chung (1983) argued for a *cyclic* analysis of accent competition resolutions in Chamorro. Crucially, in Chamorro, directionality ('rightmost' or 'leftmost' accent) cannot account for the patterns of competition. Rather, the winning accent is always the one in the outermost derivational layer. Consider the change in stress position between the forms in (7) versus (8); stressed syllables are in bold:

(7a)	'**kwen**tus speak 'to speak'	(7b)	kwen'**tus**-i speak-to 'to speak to'	(7c)	'**a**-kwentus-i RECP-speak-to 'to speak to one another'
(8a)	man'**ti**ka fat 'fat'	(8b)	'**mi**-mantika abounding.in-fat 'abounding in fat'	(8c)	mi-mantika-'**ŋa** abounding.in-fat-COMPR 'more abounding in fat'

(Chung 1983: 41)

In Chamorro, as Chung convincingly argues, primary stress is assigned *cyclically,* such that the accent assigned in the outermost derivational layer wins. Non-winning accents show up with weaker 'cyclic' stresses. This pattern of 'an accent in the outermost derivational layer wins' might very well also apply to languages such as English and Dutch, although this cannot be conclusively proven due to the absence of accented prefixes. Nevertheless, in these languages it is always the outmost accented suffix that wins.

Other examples of languages which may be analyzed as requiring information about the relative height of morphemes within the morpho-syntactic structure (i.e. *cyclic* accent systems) include Sahaptian languages Ichishkiin Sinwit and Nez Perce (Bogomolets 2020, 2021; for alternative analyses see Hargus and Beavert 2016; Bjorkman 2010; Crook 1999; Kiparsky 2021; van der Hulst, this volume). Bogomolets (2020, 2021) argues that we observe a variety of lexical accent systems with *cyclic* resolution of accent competition cross-linguistically. The differences in surface patterns of competition between those languages are due to the differences in the domains that are relevant for accent assignment in a particular language.

One type of information which unquestionably plays a role in the resolution of lexical accent competition is the information that lies at the junction of morphology and prosody, namely, the affiliation of morphemes (or morpheme classes) with prosodic domains that are relevant for accent and that cannot be fully identified as morphological domains (which once more of course depends on the

morphological theory that is applied). Domains shown to play a role in accent competition resolution have been referred to as prosodic stem, prosodic word, and clitic (or composite) group. For instance, Dyck (2004) presents an analysis of the accentual patterns in Salishan languages where such domains play a crucial role; see also Bogomolets (2021) for an analysis of lexical accent in Ichishkiin Sɨnwit relying on the differences between morpho-prosodic domains. In the current volume, see Mattissen's analysis of accentual patterns in Nivkh where such domains determine accent placement as well, and Rice (this volume) for an overview of the role of morpho-prosodic domains in polysynthetic languages of North America. Van der Hulst (this volume) pushes the relevance of phonological factors for domain delimitation further and argues that the hierarchical structure that is relevant for accentuation (when linear resolution fails) is not the morphological structure, but what he calls a phonotactic structure that is derived from it, based on specific phonotactic demands of affixes.

Besides being sensitive to the cyclic structure of complex words, lexical accent languages which cannot rely on the linear resolution have been analyzed as being dependent on other types of morphological information to resolve accent competitions. Two prominent accounts of lexical accent competition with a reference to morphological information have been proposed. Revithiadou (1999) proposed that stress assignment depends on hierarchical relations between morphemes in the word whereby an accent in the morphological *head* of a word always wins. Thus, for instance, it is argued that in a complex word consisting of a root, a derivational suffix, and an inflectional suffix, where all three are underlyingly accented, the derivational suffix would win in the accent competition because it is the morphological head of the word. A refinement in Revithiadou's approach is that inflectional affixes can win when they are 'functional heads'. This differs from the approach in Bogomolets (2020) which holds that the underlying accent in the structurally highest morpheme within an accentual domain wins, irrespective of its inflectional or derivational status (a distinction that can be hard to make). An alternative account of the morphological conditioning of accent competition resolution has been proposed in Alderete (1999, 2001) who argued that accent in roots overrides accent in affixes (Alderete 1999, 2001). However, predictions of the Root-Controlled Accent hypothesis appear to be born out only in a limited set of languages, if at all (see Bogomolets 2020: Chapter 4).

1.3.3 Accent competition in mixed phonologically predictable/lexical stress systems

So far, our discussion in this section has been centered around accent systems where an accent competition is resolved either relying exclusively on phonological factors (**1.3.1**), or relying on non-phonological factors (**1.3.2**). Some

languages, however, have been reported to have, within one system, both phonologically predictable accent properties (such as syllable weight-sensitivity) and non-phonologically predictable accent properties (such as underlying/lexical accent marking).

In such mixed or 'hybrid' systems, the involvement of lexical marking for accent may be limited to just a small number of 'exceptional' underlyingly accented lexical entries with the accent assignment being phonologically governed and predictable otherwise. Under this very broad understanding of the mixed systems, a number of languages addressed in this volume and discussed above, may fall into this group. Thus, for instance, Turkish (analyzed in Özçelik, this volume) famously has a limited set of lexically accented suffixes which disturb the otherwise phonologically regular pattern. Similarly, while generally stress is phonologically predictable in Mapudungun (Molineaux, this volume), a number of suffixes can be analyzed as underlyingly accented and they receive stress whenever present in a word.

An interesting case of a mixed system is found in Witsuwit'en (Dene) and summarized in Rice (this volume). As Rice argues, based on the empirical generalizations presented in Hargus (2007), this language combines a quantitative weight-sensitive system with a sensitivity to morpho-prosodic domains and to lexical accent marking restricted to root morphemes. The accent competition pattern appears to be resolved in this language with a reference to the following weight hierarchy (Hargus 2007; Rice, this volume; Vaxman 2016, 2019):

(9) Lexical accent > VV > V > əC > ə

The Witsuwit'en accent system thus involves an intricate mix of phonological, morphological, and lexical factors in the resolution of accent competition.

The specific interactions between different morpheme classes, underlying accent marking, and phonological weight in mixed systems such as Witsuwit'en requires further research, but it is noteworthy that in such systems, in the case of accent competition, the underlying accent always wins and receives primary prominence while phonologically assigned accents lose to the lexically marked ones. We refer to Vaxman (2016, 2019) for an interesting theoretical proposal to account for mixed systems, using a notion of weight-scales inspired by the work of Garde (1973) on accent resolution in Slavic languages.

1.3.4 Linearity vs. structure in accent competition

We conclude this section with the following question: with a variety of options available as the base for accent competition resolution, is there a 'default' for resolving such competitions? It would appear (at least from our sample of languages) that relying on the linear order and reference to the edges of an accent domain is a more widely attested way to resolve accent competitions. Thus, even

in languages with lexical/underlying accent systems, in the majority of cases, if multiple underlyingly accented syllables are present within a wordform, the competition is resolved linearly (**1.3.2.1**). This might suggest that linear resolution is the default strategy. Nevertheless, accent competition resolutions based on structural morpho-syntactic relations between the morphemes do occur, but here we note that the amount of morpho-syntactic information available might be limited to the information about the relative hierarchical height of the morphemes in competition as well as to broad distinctions between morphological classes such as roots vs. affixes vs. clitics. Having only limited access to morphological information within accentual systems may be advantageous from the point of view of a learner as it limits the number of possible types of prominence systems to those that rely on a constrained set of phonological parameters (such as syllabic weight or boundedness) and a constrained set of morphological parameters (e.g. cyclicity or sensitivity to the distinction between roots and affixes).[20]

1.4. Scope of the volume

In this section, we first provide an overview of the geographic and genetic coverage of the volume situating chapters of the volume, whenever possible, within the existing scholarship on prosodic prominence of languages with complex morphologies. The second part of this section presents brief summaries of the chapters of the current volume.

1.4.1 Geographic and genetic coverage of the volume

Chapters in the current volume are organized geographically: Chapters 4–9 present prominence systems in languages of North America; Chapters 10–12 discuss prominence systems in languages of South America; Chapter 13 presents an overview of phonological prominence in Australian languages; Chapters 14–17 are devoted to prominence systems in languages with complex morphologies in Europe and Asia. Chapters 2–3 present general discussions of the issues of prominence drawing the empirical data from a number of languages with synthetic morphologies. Chapter 18 offers an attempt to arrive at a unified theory for both phonologically driven and morphologically driven accent systems, while trying to place all the languages discussed in this volume in the resulting 'typology'.

[20] Van der Hulst (this volume) accounts for this limited access to morpho-syntactic structure by pursuing a tradition that regards the hierarchical structure that is relevant for accentuation as a 'metrically interpreted' morpho-syntactic structure. We refer to his chapter in this volume for further discussion and references.

In this book, we have attempted to collect a geographically representative set of case studies. However, the availability of theoretical research on prominence in languages with complex morphologies differs from area to area and this is reflected in the distribution of chapters in this volume (i.e. for example, six chapters are devoted to languages of North America and only one chapter to languages of Australia). It is our hope that this volume will inspire future research on prominence systems of languages with complex morphologies, and especially for those areas and genetic families which remain largely unstudied. To date, theoretical assessments of the prosodic systems in languages with highly synthetic morphologies have unfortunately presented a skewed geographic coverage, but this is not meant to say that much important work has not been published.

Languages of North America have undoubtedly received the most amount of attention in the literature on the topic. Salishan (e.g. Bar-el and Watt 1998; Czaykowska-Higgins 1993, 1997; Dyck 2004; Revithiadou 1999), Athabaskan (e.g. Bob and Alderete 2005; Gordon and Luna 2004; Hargus 2005; Leer 2005 a.o.), Algonquian (e.g. Bogomolets 2014a, b, 2020: Ch.2; Brittain 2000; Goddard 1979; LeSourd 2013; Milligan 2005; Newell 2008; Weber 2016), Iroquoian (e.g. Chafe 1977; Dyck 2009; Foster 1982; Uchihara 2016), Pomoan (e.g. Buckley 1991, 1994), Plateau Penutian (e.g. Bjorkman 2010; Bogomolets 2021; Crook 1999; Hargus and Beavert 2006, 2016), Uto-Aztecan (e.g. Alderete 1999, 2001; Bogomolets 2020: Chapter 4, *forth.*; Caballero 2008; Guion et al. 2010; Miller 1996), Yupik and Inuit (e.g. Arnhold et al. 2018; Hayes 1995; Krauss 1985; Miyaoka 1985), Muskogean (e.g. Munro and Ulrich 1984) are just some of the language families of North America that have featured prominently in the literature on prosody. Rice (2014 and this volume) notes a great diversity in the prominence systems in the languages of North America with respect to positioning of primary stress, the role of syllable weight, the degree of interaction between stress and morphology, and salience of rhythm. This book includes descriptions and analyses of prominence in highly synthetic languages of North America, including discussions of stress in Inuktitut (Arnhold, Elfner, and Compton, Chapter 5), an analysis of stress and tone patterns in Arapaho (Bogomolets, Chapter 7), word prominence patterns in Tlingit (Crippen, Déchaine, and Elfner, Chapter 6), as well as an analysis of interactions between morphological and phonological domains in Kashaya (Buckley, Chapter 8), and an overview of prosodic traits of Muskogean languages (Gordon and Martin, Chapter 9).

Prosody in highly synthetic languages of South America, although not as widely studied as that of languages of North America, has been investigated to some degree. Wetzels and Meira (2010) present a highly relevant comprehensive survey of stress systems in languages of South America. A number of languages and language families, which have the characteristically complex morphology, have featured in studies on stress, accent, tone, and intonation. The Tupi languages (and specifically the Tupi-Guarani languages) being the best described larger

linguistic family in South America (Wetzels and Meira 2010), have received a considerable amount of attention in prosodic literature (e.g. Gordon and Rose 2006; Picanço 2002; Rodrigues and Cabral 2015); Arawakan languages (e.g. Aikhenvald 1996; Crowhurst and Michael 2005; Mosonyi 2002) and Pano-Takanan languages (e.g. Bennett 2013; Ulloa 2006; González 2008) have been analyzed in some detail as well. The volume devotes three chapters to stress and prosody in languages of South America addressing phonological and morphological factors in stress assignment in Mapudungun (Molineaux, Chapter 10), metrical and intonational prominence in Satipo Ashaninka (Mihas and Maxwell, Chapter 11), and a complex system of stress assignment in Ese Ejja (Rolle, Chapter 12).

Australian languages with complex morphologies have to date not received much attention in the literature on phonological prominence (but see Goedemans 2010 for a survey of prominence systems in Australian Aboriginal languages). Existing studies on prosody in two groups of highly synthetic languages of Australia – Gunwinyguan languages and the Southern and Western Daly languages – include Bishop (2002a, b); Evans (2003); Baker (2008, 2018); Mansfield (2019) (see Mansfield, this volume for additional references). The current volume includes an overview chapter on prosody of highly synthetic languages of Australia (Mansfield, Chapter 13), which draws on the previous studies and provides some new analyses and commentary.

Finally, four chapters in this volume are dedicated to stress, tone and prosody of highly synthetic languages of Europe and Asia: a discussion of phonological wordhood in Nivkh (Mattissen, Chapter 14), of prosody in Circassian languages (Gordon and Applebaum, Chapter 3), of prosodic traits in highly synthetic languages of East and South Asia (Hildebrandt and Anderson, Chapter 17), and a novel analysis of the lexical accent and intonation interactions in Turkish (Özçelik, Chapter 16).

1.4.2 Summary of the chapters

In this section, we briefly summarize the main ideas of each chapter in the volume while also pointing out where these ideas converge.

Chapter 2. Alana Johns: Polysynthetic words

Johns reviews a number of important theoretical issues that involve polysynthesis in general, with data for the discussion coming from a variety of polysynthetic languages. The author provides an overview of different syntactic operations which have been argued to derive complex words. A special attention is given to the Bundling Hypothesis (Harley 2017), whereby heads may carry more or fewer features, leading to cross-linguistic differences. In this chapter, this view is expanded to functional elements in general. Johns argues that what differentiates

polysynthetic languages is that individual sets of features are instantiated morphologically rather than being bundled together into a single morpheme, as in languages like English. Template languages are discussed as being the most extreme examples of non-bundling, resulting in complex words being restricted to a single clause. This chapter also examines language change and polysynthesis by looking at one detailed account of a language becoming polysynthetic within a short time frame (Reid 2003). Finally, Johns reviews phonological properties of polysynthetic words in Inuktitut, focusing the discussion on phonological cues to internal structure of words.

Chapter 3. Matthew K. Gordon: Word stress and intonation in highly synthetic languages

In this chapter, Gordon reflects on the role which languages with highly synthetic morphological profiles have played in the development of stress and intonation theories. He addresses the current issues with disentangling 'word-level' and 'phrase-level' prominence in languages where holophrasis (i.e. single grammatical words that are informationally equivalent to entire sentences in other languages) is a common occurrence. Gordon notes that two major areas of prosodic studies have especially benefited from the evidence from highly synthetic languages: studies of rhythm (or rhythmic stress), and studies of the mappings between morpho-syntactic and prosodic domains, and, relatedly, the relationship between various types of stress-based and intonational prominence. Since stress is typically regarded as a word-level property and intonation as a phrase-level feature, disentangling the domain of a particular type of prominence enables one to determine whether prominence reflects stress or an intonational property associated with a larger domain. With morphological complexity comes the potential for prosodic isomorphism between morphological words and prosodic domains larger than the word, such as phrases and utterances, in which word stress might be confounded with higher level intonational properties, including pitch accents and tones associated with prosodic boundaries. Gordon addresses the possible ways of assessing phonetically and phonologically the confounds between word-level and phrase- and utterance-level prosody in languages with complex morphologies.

Chapter 4. Keren Rice: Domains of prominence in polysynthetic languages of North America

This chapter presents a survey of stress systems found in a number of highly synthetic Indigenous languages of North America. The major question asked in this chapter is how stress aids in determining morphological structure in these languages. Rice shows that stress in many polysynthetic languages of North America provides cues to word-internal structure, utilizing the morphological root, the morphological stem, or the phonological word as its domain. Another important

generalization is made regarding the edge orientation of stress assignment in languages which are predominantly suffixing: these languages in the sample, somewhat unexpectedly, tend to have a left-edge oriented stress at the word level. Finally, the author also makes a conclusion that various phonological processes may conspire to preferentially assign stress to the root or the stem domain within morphologically complex words in languages with synthetic morphologies.

Chapter 5. Anja Arnhold, Emily Elfner, and Richard Compton: Inuktitut and the concept of word-level prominence

This chapter addresses the question of word prominence in Eastern Canadian Inuktitut. The main analysis is based on original data from South Baffin Island (Qikiqtaaluk Nigiani) Inuktitut, but the chapter also examines the literature on other varieties from across the language family. The authors present acoustic analyses of three potential correlates of stress or prominence: duration, fundamental frequency, and intensity. Duration of syllables increased at the end of the word, while fundamental frequency and intensity dropped at the right word edge. Arnhold, Elfner, and Compton conclude that there is no indication that South Baffin Island Inuktitut has stress or another type of word-level prominence. Instead, in line with previous research on Inuit prosody, they analyze the prosodic system of the language as consisting of regular marking of the borders of words and other prosodic constituents. Two prosodic contours are especially robust: one associated with 'prosodic word'-level domains (corresponding to orthographic words) and one with 'intonational phrase'-level domains (corresponding roughly to sentences or utterances composed of more than one word-level unit). The hallmark of the former is identified as a HL contour creating a pattern of falling pitch throughout the prosodic word. The larger prosodic domain is demarcated by prosodic pauses and by a right-edge L boundary tone.

Chapter 6. James Crippen, Rose-Marie Déchaine, and Emily Elfner: Tlingit (Anti-) prominence

This chapter explores the expression of prominence in the complex words of Tlingit, a Na-Dene language. The authors propose a novel analysis of the word prominence system of Tlingit, arguing that it tracks prominence-by-tone and prominence-by-weight. Tlingit contrasts between two levels of surface tone (H and L) and it also contrasts long and short vowels. Remarkably, it is shown that the stem in the language is the locus of prominence as it must (i) have a high tone, or (ii) have a long vowel, or both (i) and (ii). A combination of high tone and weight thus identifies the stem as prominent. Crippen, Déchaine, and Elfner address in detail the prosody-syntax alignment in Tlingit highlighting the ways in which prosodic structures can mirror the syntactic structure in a morphologically highly complex language. It is argued that the prosody-syntax alignment, reflected

in pervasive Verb-Noun parallelism, accounts for the finely graded distribution of Tlingit proclitics, prefixes, suffixes, and enclitics relative to their ability to bear prominence in terms of tone and weight.

Chapter 7. Ksenia Bogomolets: Accent and tone in Arapaho, Plains Algonquian

This chapter focuses on word-level prominence in Arapaho (Hinóno'eitíít), a severely endangered Plains Algonquian language spoken by approximately 1,000 people, most of them in Wyoming and Oklahoma. Bogomolets proposes a novel analysis of the stress system of Arapaho and argues that it is best analyzed as a *lexical accent* system, i.e. the position of accent within a morpheme is phonologically unpredictable and is part of the underlying phonological form of the morpheme. The defining role in the system belongs to (i) the underlying specification of some syllables within some morphemes as carrying accent, to (ii) an accent competition resolution whereby the rightmost of competing accents wins, and to (iii) a trisyllabic stress 'window' aligned to the right edge of a morphological word. Stress must be present within the final three syllables of every morphological word, while a default penultimate accent is the result of an iambic foot followed by an extrametrical syllable. On the acoustic side of the Arapaho prominence, the author proposes a relativized version of the *Functional Load Hypothesis* (Berinstein 1979). Bogomolets argues that a weaker version of the *Functional Load Hypothesis* is motivated by the fact that Arapaho seems to be utilizing the same acoustic cues (vowel duration and modulations of F0) in both cuing stress and in cuing other contrasts in the language (phonemic vowel length and marking lexical tone respectively). Finally, the chapter provides a brief overview of the tone system in Arapaho. The language has developed a single falling toneme (HL); its assignment is synchronically unpredictable, i.e. lexical, and is independent from stress in the language.

Chapter 8. Eugene Buckley: M-words, P-words, and accent phrases in Kashaya

Buckley's chapter surveys the evidence for M-Words, P-Words, and accent phrases in Kashaya, a Pomoan language of northern California. Against the background of a review of the morphological structure, which is supported by a number of phonological segmental processes, word prominence is analyzed in terms of an iterative, quantity-sensitive, left-to-right iambic footing which is crucial for locating primary stress. Footing starts after an initial extrametrical syllable (which is blocked when it comprises the whole root). Two further processes, accent shift and foot flipping, are postulated to locate the primary stress in specific cases. There is no clear evidence of secondary phonetic prominences beyond the main stress, but a pattern of iambic lengthening is shown to respond to iambic foot structure. Additionally, an optional phrasal accent which depends on the same kind of LR

iambic parsing motivates the accent phrase constituent. The accent phrase is then shown to play a different role in reduplicated verbs.

Chapter 9. Matthew K. Gordon and Jack B. Martin: Prominence in Muskogean languages

In this chapter, the authors, having provided an overview of Muskogean morphology, first focus on rhythmic prominence as a diagnostic for the prosodic word. Both, rhythmic and non-rhythmic prominence (including edge-based, stem, and tonal prominence) are discussed. Rhythmic prominence is instantiated in iterative, quantity-sensitive, left-to-right iambic footing, which is evidenced in a restricted pattern of iambic lengthening. However, in Muskogee, the exponent of this pattern is pitch rather than duration. Comparing the three languages under investigation (Chickasaw, Choctaw, and Muskogee), the authors suggest that metrical prominence in Muskogee, Chickasaw, and Choctaw could be characterized as stress, where the weighting of cues to prominence differs between the languages. Interestingly, close phonetic measurements of Choctaw and Muskogean reveal that in both languages secondary acoustic markers of metrical prominence supplement the more salient primary exponents of prominence, duration in Chickasaw and pitch in Muskogee. In Chickasaw phonetic data supports a distinction between primary and secondary stress. Evidence for culminativity is provided: within the whole word, a primary stress falls on the final syllable, unless 'attracted leftward' to a long vowel, although when more than one long vowel is present, the location of stress is variable, i.e. either long vowel or both can attract the primary stress. Interestingly, the long vowels that attract the stress can be underlyingly long *or be long due to iambic lengthening*, which entails that the unbounded 'Last/Last' algorithm for primary stress is fed by the LR iambic pattern. The authors also identify a pattern of 'stem prominence' which selects the penultimate syllable of the stem. Muskogean languages also display a limited tonal contrast. The authors discuss at length the correlations between grammatical and prosodic domains, arguing that morphological words in Choctaw and Chickasaw can be divided into multiple prosodic domains. Finally, they explore diachronic explanations for areas of prosodic divergence between Muskogean languages.

Chapter 10. Benjamin Molineaux: A reassessment of word prominence in Mapudungun: Phonological vs. morphological activation

Molineaux examines the word prominence system of Mapudungun and argues against the widespread claim that the language is a perfect grid stress system. A reassessment of the primary literature, alongside analyses of an original dataset, shows a system that does not fall squarely within traditional prosodic typology and lacks some canonical features of stress (culminativity, rhythmicity). Morphologically complex words in Mapudungun can bear more than one stress. An

analysis in terms of word-internal prosodic domains is proposed whereby non-iterative, right-aligned, moraic trochee bears stress at the word level, while at the stem level, a second stress is identified on the final syllable. While this creates a non-culminative stress system (i.e. more than one 'primary' stress can be assigned within a word), stress is shown to be obligatory. Interestingly, Molineaux shows that prominences appear to be assigned with reference to morphological structure and have remarkably little effect upon the broader phonological makeup of the language. Finally, it is argued that lack of prominence-based segmental asymmetries, absence of culminativity, as well as the unambiguous marking of the stem-edge, conspire to create transparency in the morphological structure of complex words.

Chapter 11. Elena Mihas and Olga Maxwell: Satipo Ashaninka word- and phrase-level prominence

The chapter explores the interaction of word-level prominence with the complex word-internal morphological structure in Satipo Ashaninka spoken in the Junín region of Peru. In this chapter, the authors highlight that words can have two prominence peaks, a right-edge weight-sensitive primary stress and a left-edge weight-sensitive secondary stress. Although Ashaninka words may give an impression of having multiple 'equal' stresses, the authors show that the phonetic correlates of the two stress types differ: primary stress is cued by several phonetic exponents (duration, intensity, and sometimes f0), while secondary stress is cued by intensity (and possibly f0). Heavy syllables occurring in between the primary stress and initial secondary stress are inherently salient due to their segmental length, but they do not exhibit phonetic cues of secondary stress. In addition to weight-sensitive primary and secondary stress, Mihas and Maxwell show that lexically specified prominence in the form of high tone is found in several inflectional morphemes and pragmatic enclitics in the language. Finally, an interesting property of the Satipo Ashaninka prosodic system is in the interaction of phrasal prominence with stress: the phrasal pitch accent shows a preference for secondary stress locations.

Chapter 12. Nicholas Rolle: Polysynthesis, stress uniformity, and the opposite-to-anchor stress system in Ese Ejja

In his chapter, the author shows that in Ese Ejja (Tacanan) each word has only one primary stress which falls within a left-edge three-syllable window. Stress assignment in this language is quantity-insensitive and rhythmic stress is not reported. A first striking feature of the Ese Ejja system is that inflectional suffixes can assign an accent to a position in the stem. This accent is only realized as stress if it falls within the three-syllable window on the left edge of the word. Different inflectional suffixes locate the accent in different root locations, not by locally pre-accenting the root's final syllable, but by initiating iterative leftward weight-insensitive footing

with the leftmost foot head delivering the accent in the accent window that is realized as 'stress'. This property creates an 'opposite-to-anchor' system, meaning that whereas the edge where footing starts is on the right, the leftmost foot delivers the locus for primary stress. In contrast to forms that only have inflectional affixes, iterative RL footing does not occur within verbal forms with both inflectional and derivational morphology. Ese Ejja has a large number of derivational morphemes that can intervene between the root (at the left) and the triggering suffixes (at the right), which may result in 'long-distance anchor dependencies'. Rolle accounts for such apparent 'long-distance anchor dependencies' by proposing a form of analogy or paradigm uniformity due to which a complex form [[[root]-deriv]-infl] can copy the stress pattern for the root from the simpler structure [[root]-infl] which lacks the intervening derivational suffixes.

Chapter 13. John Mansfield: The prosodic structure of Australian polysynthetic verbs: Bininj Gun-wok, Murrinhpatha, and Ngalakgan

In this chapter, Mansfield describes and analyzes the prosodic structure of verbs in three languages of northern Australia: Bininj Gun-wok, Murrinhpatha, and Ngalakgan. The author argues that, despite the morphological complexity, evidence for a uniquely identifiable prosodic word domain in each of the languages can be found. In all three languages, such evidence comes from accents which are anchored to the edges of prosodic words. These accents provide the clearest form of prosodic prominence with no clear evidence of stress in the languages in question. Interestingly, polysynthetic verbs in Bininj Gun-wok and Ngalakgan may contain multiple prosodic word constituents which are evidenced by multiple pitch accents within a complex verb and the possibility of inserting verb-internal pauses in careful pronunciation. In Murrinhpatha, on the other hand, accent placement is culminative and obligatory within a polysynthetic verb. Mansfield compares the prosodic properties of complex verbs in the three languages to prosodic properties of 'canonical word units' – simple nouns. He shows that the prosodic word constituent can be clearly motivated with reference to these canonical grammatical words. In each language, this prosodic word constituent maps onto subparts of the polysynthetic verb, and crucially, this mapping is not arbitrary, but rather packages the most semantically and morphosyntactically inter-dependent parts of the verb into an integrated prosodic unit.

Chapter 14. Johanna Mattissen: Phonological and morphological wordhood in Nivkh

Mattissen presents a study of the interaction between phonology and morphology in the constitution of complex word forms in Nivkh, a highly synthetic language isolate spoken on the lower reaches of the Amur River and on the North-Western and Eastern parts of Sakhalin island in Siberia. Mattissen identifies a number of

prosodic constituents in Nivkh, including the syllable, phonological word, composite group, phonological phrase, and a constituent introduced specifically to account for the Nivkh data – a determiner group. The author notes that no evidence for foot structure is found in the language. Mattissen shows that phonotactics and culminative accent signal the edges of phonological words, while fixed types of affixes bracket the morphological word. An interesting property of the prosodic system of Nivkh is that prefixes are phonologically more cohering than suffixes. Thus, in Mattissen's analysis of the prosodic system, prefixes constitute a part of the phonological word together with the root, while suffixes are outside of the phonological word domain and constitute a part of the composite group constituent. Phonological phrases contain multiple phonological words and/or composite groups and are characterized by a particular pitch contour.

Chapter 15. Matthew K. Gordon and Ayla B. Applebaum: Prosody in Circassian

In this chapter, Gordon and Applebaum present a study of prosody in Circassian languages (Northwest Caucasian family). They show that complex morphological words in these languages show isomorphy with prosodic words, which is evident in the assignment of a single demarcative stress at or near the right edge. Morpheme-specific exceptions to this stress assignment are also discussed. Despite the morphological complexity and resulting long words found in Circassian, no evidence of rhythmic stress has been discovered thus far. An exception to the isomorphism between grammatical and prosodic words is provided by a process involving fusion of multiple short morphological words into a single prosodic word. At the phrase level, Gordon and Applebaum show that stress and intonation support the existence of phrase-level prosodic units characterized by stress-linked pitch accents and boundary pitch movements.

Chapter 16. Öner Özçelik: Prosody in Turkish

In this chapter, Özçelik gives an overview of Turkish prosody, referring to both lower and higher levels of the Prosodic Hierarchy and presenting novel data. He analyzes regular word-final 'stress' in Turkish as intonational prominence that does not refer to foot structure. This type of analysis for final prominence has been proposed for several languages, such as French, Tokyo Japanese, and Korean (Gussenhoven 2004), as well as for some languages with complex morphologies in Gordon (this volume [general chapter on intonation]). A subject of much attention has been that in certain Turkish words, a non-final stress can be observed, which is either lexical in certain underived words (so-called Sezer-words) or attributed to certain suffixes. Focusing on the latter type of cases, the author does not analyze the non-final stresses in terms of diacritic accents, but rather attributes them to partial foot structure that is lexically associated with the relevant suffixes. While the partial foot structure is expanded as trochaic feet, the author states specifically

that the analysis of regular prominence is not dependent on foot structure. Özçelik also discusses sentential prominence, which falls on the first prosodic word within the final phonological phrase of an utterance.

Chapter 17. Kristine Hildebrandt and Gregory D. S. Anderson: Word prominence in languages of Southern Asia

Hildebrandt and Anderson present a survey of prosodic phenomena in a large number of languages of South and Southeast Asia that demonstrate polysynthesis, specifically languages belonging to the Tibeto-Burman and Austroasiatic (Munda) families. The authors discuss the current issues in studying prosody in the Munda languages, including the details of phonetic realization of prominence, which are still debated, and the mapping between prosodic constituents and morphological domains. Word edges are demarcated in Tibeto-Burman languages through tone and segmental patterns, while stress is a less salient indicator of word-level prominence. Phrase and clause-level (intonational) phenomena in the highly synthetic languages of South and Southeast Asia are addressed in the chapter as well.

Chapter 18. Harry van der Hulst: A unified account of phonological and morphological accent

Van der Hulst develops a unified account of word prominence phenomena, focusing here on the *location* of word accents, rather than the phonetic correlates. Following Bogomolets (2020), he distinguishes between phonologically driven accentuation and morphologically driven accentuation, the main difference being the manner in which accent conflicts are resolved: linearly and hierarchically, respectively. Other properties (such as sensitivity to the cyclic structure of accentual domains), which correlate with this dichotomy, are also addressed. A second issue regards the role of diacritic syllabic accent, which is more pervasive in morphologically driven systems. However, a headed hierarchical, what he calls *phonotactic structure* can play a role in both phonologically and morphologically driven accent systems. In the former, headed phonotactic structure determines a prominence ranking between competing accents that can result from different accentual domains having their own accent. In that case, the headed structure (with a mother-daughter S/W labeling) 'promotes' (rather than selects) one such accent to be the most prominent one accent. In morphologically driven systems, on the other hand, the hierarchical *cyclic* structure of phonological domains functions as a licensing mechanism by designating 'the winner' from among diacritic syllabic accents. From the viewpoint of this unified theory, van der Hulst analyses a variety of languages, including all those that are the subject of the other chapters in this volume.

1.5 Concluding remarks

In this chapter, we discussed some of the definitional traits of prominence systems as they apply to the languages which are the main empirical focus of the current volume, i.e. languages with complex morphologies. We have proposed a 'typology' of prominence systems with specific reference to the issue of accent competition resolution, building on the previously defended view of formal similarity between languages with phonologically predictable accent and languages with diacritic/lexical accent (van der Hulst 2012), and on the previously proposed idea of viewing accent competition as a defining property of accent systems (Bogomolets 2020).

This chapter also reviews theoretical and empirical issues in the study of phonological prominence in languages with complex morphologies as highlighted by the case studies presented in the current volume. Such issues involve the phonological distribution and phonetic manifestation of stress, accent, and tone, the mappings from morpho-syntactic structure to prosodic hierarchy, problems of defining degrees, and levels of prominence, among other issues. A number of trends can be identified based on the collection of descriptions and analyses in this volume. Firstly, it can be noted that even though languages with highly synthetic morphological profiles have played a crucial role in the development of the theoretical accounts of rhythmic structure (see Gordon, this volume Chapter 3), few of the languages discussed in this volume have been reported to exhibit evidence of rhythm, which is rather unexpected given the length of words in languages of this kind. Secondly, we observe a robust preference for prosodically delineating word-internal domains (such as roots or stems) among languages with complex morphologies. Relatedly, a number of languages in the volume are reported to allow for more than one prominent peak within a grammatical word, often with no clear phonetic hierarchy between such peaks.

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