

1 **Part I. Typological Surveys**

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1 **1. Word accent: Terms, typologies and theories**

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4 *Harry van der Hulst*

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8 **1. Introduction**

9 This chapter provides a discussion of terminology, typology and theories
10 in the domain of word accent. Section 2 discusses the use of terms like
11 ‘accent’ and ‘stress’ and promotes the use of the former term as designat-
12 ing a unique abstract property of domains (such as words) which serves
13 as a reference point for a number of phonetic, phonological and other
14 grammatical properties. Section 3 discusses the idea that we can distin-
15 guish several levels of accentuation. Section 4 asks whether words can be
16 without accent (unaccented), while section 5 briefly addresses variability in
17 the location of accents. Section 6 reviews typologies and theories of accent
18 locations. In section 7 we deal with the notion of syllable weight. Finally,
19 section 8 offers a summary and some conclusions. Where required, we will
20 use illustrative examples that clarify central properties of our subject, even
21 though an extensive analysis of these examples may ultimately raise prob-
22 lems of various kinds that cannot be dealt with here.

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25 **2. Terminological practices**

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27 *2.1. Accent and cues*

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29 In dictionary entries lexicographers often use a graphic symbol, adjacent
30 to or on top of one of the letters, to indicate what is called the location of
31 ‘accent’ or ‘stress’. We will use these two terms interchangeably until,
32 below, we will explicitly propose to differentiate them in a particular way.

33 If a phonetic transcription is added to the spelling form, the accent
34 symbol is often a small superscripted vertical line which is placed before
35 the syllable that is accented. Sometimes the accented syllable is capital-
36 ized. One of these practices is illustrated with a few random examples
37 from an English dictionary:

38 (1) *escalade* [ˈɛskəleɪd] ...

39 *escalate* [ˈɛskəleɪt] ...

40 *escallop* [ˈɛskəloʊp] ...

1 The graphic indication of accent is meant to provide information regard-
 2 ing the correct *pronunciation* of the entries. In the examples at hand, the
 3 idea is that the syllable following the symbol is pronounced in a manner
 4 that makes it perceptually more “salient” than the other syllables. Let us
 5 consider what this might mean by discussing a specific example.

6 Consider the word *hippopotamus*. Almost every speaker of English will
 7 pronounce the medial syllable of this word with more ‘force’ than all other
 8 syllables. Phonetically, articulatory force involves a number of proper-
 9 ties which the accented syllable has to a greater degree relative to the
 10 unaccented syllables. For example, the vowel of an accented syllable is
 11 more precisely articulated (less centralized) and/or longer (cf. Gussenhoven
 12 2004: 14–15).¹ In many other places one also finds reference to accented
 13 syllables having higher amplitude levels and higher pitch. In this respect,
 14 one also finds the term “intensity” which refers to greater energy but is
 15 sometimes used as a cover term for the cumulative effect of duration,
 16 amplitude and pitch.

17 Preciseness of articulation, spectral tilt, duration, amplitude, energy and
 18 pitch are all ‘stretchable’ properties that all vowels (indeed all segments²)
 19 have to some degree, but it would seem that the accented vowels have all
 20 of these to the greatest degree. In addition, the consonants of the accented
 21 syllable may have special phonetic properties such as articulatory precision,
 22 longer duration, aspiration, affrication, etc. Unaccented syllables have these
 23 properties to a lesser degree, which sometimes affects their articulation,
 24 causing vowels to reduce or consonants to be realized more ‘weakly’.

25 Many of these phenomena can be observed in our example which
 26 might be transcribed phonetically as follows: [hɪpəp^harəməs]. In this
 27 word, the second, fourth and fifth vowel is [ə], the schwa, a vowel that
 28 never occurs in an accented syllable, where we always find a full vowel
 29 quality. The occurrence of the vowel [ɪ] and [a] in the first and third sylla-
 30 ble seems to indicate that these syllables are not stressless or without
 31 accent, which is an indication of the fact that even though the third sylla-
 32 ble stands out over the rest, the rest is not undifferentiated, but instead
 33 displays a rhythmic organization with ‘beats’ and ‘non-beats’; the first
 34 syllable apparently has a ‘beat’, which is very much like an accent,
 35 although it does not provide its syllable with the same force that the third
 36

37 1. Gussenhoven also refers to a more technical notion ‘spectral tilt’, discussed in
 38 Sluijter and van Heuven (1996) which involves a more even intensity distribu-
 39 tion across the frequency spectrum for accented vowels.

40 2. Of course, voiceless consonants technically have no pitch level.

1 syllable has. We will return to this phenomenon of multiple accents, with
 2 only one being ‘primary’, in section 3; for the moment we will focus on the
 3 primary accent.

4 Notice that the /p/ of the medial syllable is aspirated, unlike the /p/
 5 of the second syllable. Traditionally, [p^h] and [p] are called *allophones*
 6 (‘realizations’) of one *phoneme* /p/. The lexical representation of the word
 7 only has a segment /p/. The aspirated segment, as the stronger allophone,
 8 is derived by an allophonic rule. Since [p^h] only occurs in accented syllables
 9 (if not preceded by /s/) its presence is a *cue* of accent. Thus, one might
 10 say that English has a process ‘add aspiration’ which ensures that the
 11 lexical form /pin/ is rendered as [p^hɪn]. The flap [ɾ] is also a cue of accent,
 12 since this ‘weaker’ sound can only occur following an accented and pre-
 13 ceding an unaccented vowel, as an allophone of, in this case, /t/.

14 Besides these *phonetic allophonic cues*, accent also has *phonotactic cues*.
 15 Phonotactic cues for accent lie in the regularities that govern the dis-
 16 tribution of phonemes in the word (i.e. *phonotactics*). Regularities in the
 17 phonotactic structure of words involve two classes of statements, i.e. state-
 18 ments about the inventory of phonemes (segment structure constraints)
 19 and statements about the possible combinations of these segments
 20 (sequence structure constraints). An important subset of the latter is the
 21 class of syllable structure constraints. It is not unusual to make *general*
 22 statements about the segmental inventory and the set of possible syllable
 23 structures of a given language without reference to the position in the
 24 word that the syllables occur in. However, it is important to realize that
 25 often certain syllables allow more segment types and more complex com-
 26 binations than others, depending on their position in the word. At this
 27 point it will not come as a surprise to learn that the syllables that allow
 28 ‘more’ are the ones that can be called accented. Compared to accented
 29 syllables, non-accented syllables display a reduction in segmental and
 30 sequential options, i.e. a neutralization of contrastive options.

31 In fact, the occurrence of schwa in unaccented syllables *can* be inter-
 32 preted in this way. We could say that, in English, accented syllables allow
 33 a contrast between all the (full) vowels that the language has. Whereas, in
 34 unaccented syllables, we only find a very small set of vowels, notably a
 35 vowel called ‘schwa’.³ In fact, this schwa does not occur in accented syllables
 36 so that the sets of vowels in accented and unaccented syllables are, in
 37 fact, complementary. By all standards, the schwa is less complex than the
 38

39 3. Bolinger (1981) identifies three reduced vowels in English, forming a triangu-
 40 lar system: *happy*, *hollow*, and *father*).

1 other, full vowels, and this is a typical result: accented syllables allow
 2 more complexity in terms of the feature combinations that make up
 3 segments. This account is based on the idea that English schwa is a lexical
 4 segment (as suggested in Bolinger 1981). A different, and perhaps more
 5 common interpretation (following Chomsky and Halle 1968), of the
 6 occurrence of schwa, which was implied in the preceding paragraph, is
 7 that the occurrence of schwa is ‘merely’ an allophonic effect. In fact, both
 8 approaches (allophonic and phonotactic) are not mutually exclusive and
 9 indeed, languages like Dutch and German are commonly analyzed as
 10 having both lexical and allophonic schwas.⁴

11 Another example of phonotactic, distributional asymmetries concern-
 12 ing vowels is found in various Romance languages. In those cases, the
 13 accented syllable allows all vowels that the language has. Unaccented
 14 syllables differ depending on whether they follow or precede the accented
 15 syllable. In post-accent syllables only one vowel is found (a schwa),
 16 whereas in syllables that precede the accented syllable a subset of the
 17 vowels is found (typically /a/, /i/ or /u/) (Cristófar-Silva 1992 for
 18 Brazilian Portuguese). The differences between syllables following and
 19 preceding the accent will not be addressed here; they may involve different
 20 degrees of accent (see section 3). The point that is important now is that
 21 accented syllables allow a larger set of vowel phonemes than unaccented
 22 ones (possibly with a greater degree of accent correlation with a greater
 23 degree of contrastive options).

24 A set of specific cases of a neutralization of contrast in unaccented
 25 syllables should be mentioned here because they involve features whose
 26 phonetic correlates are duration and pitch, which *can* be mere phonetic
 27 cues of accent. A language that has a length contrast among vowels might
 28 have that contrast only in accented syllables, unaccented syllables allow-
 29 ing only short vowels. The Australian language Yidiñ (Hayes 1982) dis-

31 4. In general, an allophonic cue of accent may, over time, phonologize and thus
 32 become a phonotactic cue. As might be expected, linguists may differ in their
 33 analysis of a given language with respect to judging the cue as being ‘phonetic’
 34 or ‘phonological’. In the phonological analysis, instead of adopting an allo-
 35 phonic rule of vowel reduction, the analysis would postulate a phonological
 36 repair rule that replaces a full vowel by a schwa phoneme when an accented
 37 vowel alternates with an unaccented occurrence in a morphologically related
 38 form. This may be the proper analysis for English where ‘vowel reduction’
 39 is complete and obligatory. In Dutch, on the other hand, even though this
 40 language has lexical schwas, vowel reduction is clearly incomplete and
 allophonic.

1 plays this property. Do we say that in those languages duration is a cue of
 2 accent? No! Rather, we should say that the manifestation of a *length con-*
 3 *trast* is a cue of accent. There is a subtle, yet crucial difference between a
 4 language that has no length contrast, but adds duration to all vowels in
 5 accented syllables (sometimes only in open syllables as in Mohawk) and
 6 a language that limits a length contrast to the accented syllable. In a
 7 similar vein, we can find languages that show a tonal contrast only in
 8 accented syllables (such as Swedish).⁵ Many languages that are called
 9 tonal, in fact, show evidence for accent in that tonal reduction rules are
 10 operative that eliminate or reduce contrast in certain syllables (which, in
 11 my view, would be unaccented); cf. van der Hulst and Smith (1988). Such
 12 reduction rules are just like the reduction rules that lead to vowel reduc-
 13 tion (full to schwa) in English. The only difference is that different dis-
 14 tinctive features are involved.⁶

15 Another distributional phonotactic difference between accented and
 16 unaccented syllables involves sequential complexity or complexity in sylla-
 17 ble structure. A syllable can contain consonants that precede the vowel
 18 (collectively called the onset) or consonants that follow the vowel (the
 19 coda). All languages allow monoconsonantal onsets, which in some cases
 20 is the only possibility. Other languages allow monosegmental onsets and
 21 ‘empty’ onsets (i.e. no consonant at all). Still other languages allow the
 22 onset to contain more than one consonant. As for the coda, some lan-
 23 guages do not allow them, others do and may apparently even tolerate
 24 more than one consonant in the coda.⁷ Linguists agree that a simple CV
 25 syllable (C for consonant, V for vowel) is the most common (or least
 26 ‘marked’) syllable form (more common than just V), which illustrates
 27 that what is common is not necessarily the most simple in terms of the
 28 number of segments. They also agree that increasing the options (two con-
 29 sonantal or ‘empty’ onsets, presence of coda, and so on) leads to more
 30 marked syllable types. With this background, we return to asymmetries

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 32 5. The property of amplitude is not used distinctively in any language, so this
 33 cue can only be an ‘allophonic’ manifestation of accent, and not be involved
 34 in a neutralization of contrast situation. The same must be said of energy.
 35 This leaves duration, pitch and vowel quality (i.e. full version schwa, or
 36 perhaps peripheral versus central, i.e. precision of articulation) as properties
 37 that could be phonetic cues or phonotactic cues.

38 6. Again it could be that such phenomena are phonotactic or allophonic.

39 7. Whether prevocalic and postvocalic consonants clusters are technically tauto-
 40 syllabic with the vowel is of course a matter of analysis; cf. van der Hulst and
 Ritter (1999).

1 between accented and unaccented syllables. In languages that allow more
 2 than just CV, it is not untypical to find that only accented syllables display
 3 the full array of syllable types that is allowed by the language. Unaccented
 4 syllables may be restricted to CV, for example. In Dutch, for instance, a
 5 syllable that contains a lexical schwa (which is always unaccented or
 6 indeed unaccentable) cannot be preceded by a complex onset (Kager and
 7 Zonneveld 1986).

8 Downing (this volume) also draws attention to phonotactic cues of
 9 accent, with special reference to African languages. She refers to the fact
 10 that “in a number of West African Niger-Congo languages one finds that
 11 the full range of consonant contrasts can typically only be found in C1
 12 position of roots. . . . In C2 position, contrasts are often reduced drasti-
 13 cally.” (p. 384). She also remarks, on the basis of this and other examples:
 14 “Even though African languages with contrast distribution asymmetries
 15 do not have the usual stress-accent motivating the segmental asymmetries,
 16 it is plausible to propose that, universally, these kinds of distributional
 17 restrictions are to be accounted for in terms of accent, as they create
 18 culminative prominence asymmetries within a bimoraic/bisyllabic con-
 19 stituent akin to a stress foot. These segmental asymmetries are, moreover,
 20 demarcative, typically highlighting a major morpheme edge, like root- or
 21 stem-initial syllable.” (p. 385).

22 The segmental differences between the contrastive options that can
 23 occur in accented and unaccented syllables, as well as the differences in
 24 syllable types that are allowed in these two circumstances are clear exam-
 25 ples of phonotactic cues for accent.⁸

26 Summarizing, accentual cues may be of a wide variety of types includ-
 27 ing phonetic, allophonic phenomena, as well as distributional asymmetries
 28 in phonotactic patterns. Given the separation of accent and its cues, and
 29 given the variety of cues, we should perhaps also allow for the possibility
 30 that accents (in certain languages or certain word positions) correlate with
 31 cues that have not yet been established or gone unnoted because certain
 32 potential cues, especially the phonotactic one were not reckoned with. It
 33

34 8. Certain positions, here called accented, have been referred to as displaying
 35 ‘positional faithfulness’ in the Optimality Theory literature. See for example
 36 Beckman (1998). In this literature, positions that promote contrast are not
 37 necessarily called accented or stressed. Rather, faithfulness is attributed to
 38 salient positions which may be accented/stressed or, for example, close to an
 39 edge without necessarily being accented. The spirit of what is proposed here is
 40 to identify ‘salient’ with ‘accented’ in all cases.

1 is, in addition, possible that accents are merely signaled by playing a role
 2 in morphological processes involving the selection of specific allomorphs
 3 or the site of infixation.⁹ Finally, accents may be exclusively cued by the
 4 fact that certain syllables form anchors for intonational tones; see section
 5 2.2. That in English accented syllables, which indeed form anchors for
 6 intonational tones, are also cued by other factors does not imply that
 7 such other factors must be present in all languages. When phonotactic,
 8 morphological and intonational factors are all taken into account, the
 9 number of languages with noticeable stress/accent will go up.

10 This, of course, then raises the important question whether we should
 11 entertain the hypothesis that perhaps *all* languages are accentual. Given
 12 that a total of approximately 90% of the languages that are covered
 13 by the StressTyp/WALS samples discussed in Goedemans (this volume)
 14 have been described as having stress or accent, based on the ‘usual pho-
 15 netic cues’ (rather than on the basis of phonotactic, morphological or
 16 intonational criteria), it is perhaps not outrageous to hypothesize that
 17 indeed all languages have stress/accent.¹⁰ The list in (2) summarizes the
 18 cues for stress/accent:

19 (2) *Phonetic and phonological properties of accented syllables*

- 20 a. The syllable has greater duration
- 21 b. The syllable has a balanced spectral tilt
- 22 c. The syllable has greater amplitude
- 23 d. The syllable has a higher fundamental frequency (~ pitch)
- 24 e. The segments are pronounced with greater precision or extra
- 25 phonetic traits (such as full vowel quality, aspiration)
- 26 f. Extra phonotactic possibilities, i.e. greater complexity
- 27 g. The syllable marks sites for morphological processes
- 28 h. The syllable is an anchor for intonational tones

29
 30 This list is not meant to be finite. Whatever the details, an accented sylla-
 31 ble will differ from unaccented syllables in having ‘more’ of whatever
 32 ‘stretchable’ property any syllable may have (such as duration, spectral tilt,
 33 amplitude, fundamental frequency, precision of articulation; cf. Lehiste
 34

36 9. An area that could be studied is ‘prosodic morphology’ which may provide
 37 pointers to a word accentual structure that is not otherwise cued.

38 10. If we allow for the logical possibility that there could be no cue for accent
 39 at all one might characterize the claim that all languages are accentual as an
 40 unfalsifiable hypothesis (Hyman 2008).

1 1970), allow greater phonotactic complexity or is somehow singled out by
 2 other components of the grammar (morphology, intonation).

3 In English, it would seem that all the cues in (2) *together* signal the
 4 location of the accent. Referring specifically to the cues in (2a–e), phoneti-
 5 cians have asked for the longest time whether it is the case that there is
 6 a difference in importance between the various cues of ‘stress’. By working
 7 with digital speech recordings one can, in principle, eliminate or reduce
 8 one or more factors and see whether speakers are still able to hear where
 9 the accent is. Or one can test the various cues separately under conditions
 10 of interfering noise, and establish which factor is the most robust one.
 11 These are interesting and important matters, but they will not be discussed
 12 here (see Lehiste 1970, Fox 2000, 120 ff.). We will simply take it as a fact
 13 that accent in English is manifested as a collection of several kinds of cues
 14 which need not be equally important under all circumstances.

15 While many languages have been recognized as displaying the phenome-
 16 non of word stress/accent as just described, many other languages display a
 17 partly similar phenomenon in that a particular syllable in the word is singled
 18 out, the difference being that the cues for its special status are not the same
 19 set of phonetic, allophonic and phonotactic cues that we find in English.

20 Here, let us take a look at a language that, apparently, manifests its
 21 accent in a different way, Safwa (Bantu) as described in Odden (1988:
 22 227). Consider the following words or word combinations:

- 23 (3) 'ami-ino ‘teeth’
 24 'gami-ino ‘the very teeth’
 25 mi-i'no ‘it is teeth’
 26 in'koombe 'iim-bisi ‘uncooked beans’
 27 in'koombe m-bi'si ‘the beans are uncooked’
 28
 29

30 Again, we have provided certain vowels with what is often (and appro-
 31 priately) called an ‘accent mark’. As in the case of English, speakers of
 32 Safwa will presumably perceive the syllables that contain these accented
 33 vowels as more prominent than the surrounding syllables. When we now
 34 look at the articulatory and acoustic properties of the vowels in question,
 35 it appears that what distinguishes them from other vowels in the word is
 36 just their relative higher pitch. Thus, the relevant vowels are singled out
 37 by only one of the properties that can cue the presence of accent in
 38 English, namely pitch.

39 Another similar case that is often mentioned, is Tokyo Japanese. The
 40 syllable that stands out in this language is again mainly or even exclusively

1 associated with a high(er) pitch. In this case there is additional leftward
 2 spreading of this high pitch up to but not including the first syllable;¹¹
 3 McCawley (1968), Haraguchi (1977). Consider the four following nouns
 4 in (4a):

- 5 (4) a. inoti kokoro atama
 6 'life' 'heart' 'head'
 7 b. 'inoti ko'koro ata'ma
 8

9 Japanese words have a specific 'tonal pattern' (L) H (L). There is always
 10 an H (possibly spread out over more than one syllable) and sometimes a
 11 preceding L and/or a following L. Instead, however, of literally assigning
 12 tones to words, it may be sufficient to mark the syllable after which there
 13 is a drop to low, as in (4b). Then we assign high pitch to the marked
 14 syllable and the syllable preceding it, except for the first mora.

15 The 'mark' in (4b) can be regarded as an accent and thus Tokyo
 16 Japanese is quite like Safwa in that the accented syllable is realized with
 17 high pitch, the difference being that in Japanese this high pitch 'spreads'
 18 leftwards.¹²

19 Let us now introduce a specific use of terms like 'accent' and 'stress'.
 20 Hyman (1977) referred to systems such as Safwa and Tokyo Japanese as
 21 *pitch-accent systems*, while proposing to use the term *stress-accent systems*
 22 for cases like English. In this terminological proposal, the term 'accent'
 23 refers to the property of 'standing out', while the terms 'stress' and 'pitch'
 24 refer to the cues that signal the location of the accented syllable.¹³ Fox
 25 (2002: chapter 3) provides a general discussion of the notion 'accent' and
 26 shows how this term is used differently in different traditions. The use
 27 proposed in Hyman (1977) (accent as an abstract property of words or
 28 morphemes without any specific content) represents a tradition of usage
 29 that can also be found in Abercrombie (1976), Laver (1994) and Beckman
 30 (1986), and is adopted by Fox. In this practice, then, we adopt 'com-
 31 pound' terms of the form 'X-accent where 'X' characterizes the cue that
 32 correlates with accent. Hence 'pitch-accent' means: the accent is cued by
 33

34
 35 _____
 36 11. This should actually be the first half of the first syllable, or rather the first
 37 mora; cf. section 7.

38 12. There are words without a lexically marked accent which will be discussed in
 39 section 4.

40 13. The traditional distinction between musical accent and dynamic accent refers
 to the difference between pitch-accent and stress-accent languages.

1 pitch (typically, but not necessarily high pitch).¹⁴ It would, furthermore,
 2 seem that in this practice, the term ‘stress’ refers to a rather heterogeneous
 3 collection of phonetic properties (such as found in English). It may be that
 4 such a collection of properties represents a true type, but it may also be
 5 that, on closer investigation so-called pitch-accent languages also involve
 6 additional phonetic cues such as duration, but to a much lesser extent than
 7 English. In fact, this is the view of Beckman (1986) who divides accent systems
 8 in stress-accent and non stress-accent systems, pitch-accent systems
 9 falling in the latter category. Whereas stress-accent systems make use of a
 10 variety of cues, pitch-accent systems, while perhaps using the same variety,
 11 single out pitch as the *primary* cue. (English, as we will see below, is perhaps
 12 less varied in terms of its phonetic cues than we have made it sound
 13 thus far, duration perhaps being the primary cue in this case.)

14 But, one might ask, why not refer to Japanese and Safwa as a *tone-*
 15 *accent* (X = tone) languages, meaning that the accent location is manifested
 16 by attracting a tone, H in this case. There is a reason to avoid this
 17 term for these languages. Generally, linguists reserve the term *tone* for
 18 cases in which different pitch levels are used *distinctively*, just like we use
 19 the term *length* when different degrees of duration (usually just two) are
 20 used *distinctively*. So when we talk about *tone languages*, we talk about
 21 those cases in which the languages in question allow (all or some) vowels
 22 in a word to have different distinctive pitch levels, typically high and low,
 23 sometimes including one or two mid options, or even falling or rising
 24 tone contours. These tonal properties can be seen as forming part of the
 25 vowels, just like their other properties (open vs. closed jaw, front vs. back
 26 raising of the tongue, rounded lips vs. spread, and others). It is crucial,
 27 then, that in those cases, the pitch property does not function to make
 28 one syllable more prominent than the other(s). Rather, pitch is used
 29 *distinctively* as part of the inventory of distinctive features for vowels, or
 30 segments in the rhyme of the syllable (which may sometimes include
 31 consonants as well).¹⁵

32 It is crucial to see that tone and accent are not mutually exclusive
 33 notions. It is possible, as we have remarked earlier, that tonal distinctions
 34 may be limited to the accented syllables (as in Swedish) which would be an
 35 instance of phonotactic cues to accent, or that tonal distinctions are
 36 neutralized in unaccented syllables. Following the terminological practice
 37

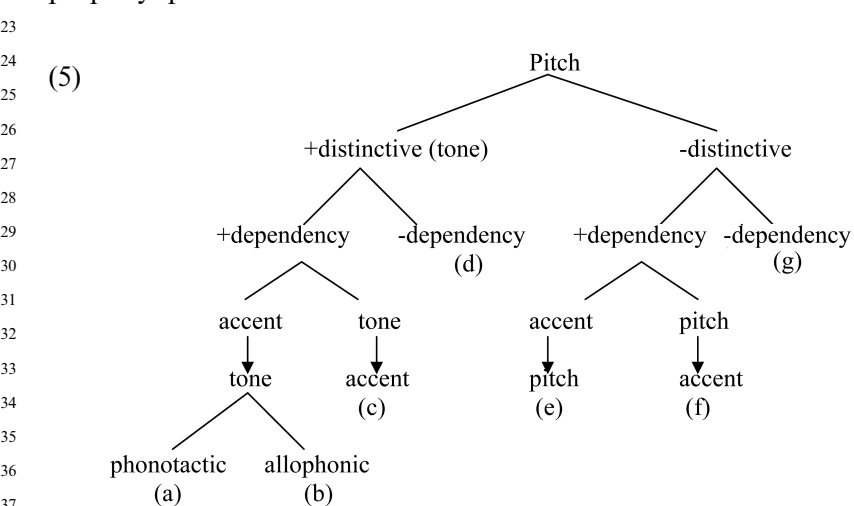
38 14. We are not aware of a system in which the accent is cued by low pitch.

39 15. Here we ignore the idea that tones may link to ‘structural’ units such as moras
 40 or syllables.

1 promoted here, we should adopt the term *tone-accent* language for lan-
 2 guages in which the tone contrast is limited to the accented syllable.¹⁶
 3 Accordingly, we do not wish to call Safwa a tone (or tone-accent) lan-
 4 guage, because there are no contrastive tones in this language. Rather
 5 pitch is used as a cue to accent. Hence we refer to this language as a
 6 *pitch-accent* language.

7 Given that there are, as we have seen, many cues for accent, it is likely
 8 that we must reckon with, for example, ‘duration-accent systems’ (in
 9 which duration is the primary or only cue). In short, it is possible, if not
 10 likely, that accent may be signaled in terms of many combinations of
 11 cues of various sorts and that among these cues one may be the strongest,
 12 most salient and thus primary cue. If this is pitch, we speak of a pitch-
 13 accent language, if it is duration we speak of a duration-accent language,
 14 etc. The cross-linguistic array of accentual cues is at present far from under-
 15 stood and much detailed phonetic and phonological analysis is needed in
 16 this respect. The important point here is that it seems useful to separate
 17 the notion accent (a ‘formal’ property of syllables without any link to
 18 specific cues) and accentual *cues*, so that we can develop a theory about
 19 the former without specific regard for the latter, and vice versa.

20 At this point it may be useful to illustrate the various ways in which a
 21 specific phonetic property may correlate with accent. We will use the
 22 property ‘pitch’ for this illustration:



16. In fact Hyman (1987) uses the term ‘tonal accent language’ for this case.

1 In (a) and (b), tone-accent languages, the distribution (a) or realization (b)
2 of tones is dependent on accent. Type (c) represents the case in which
3 accent location is sensitive to tone (e.g. accent is on the last high tone
4 and if there is no high tone on the last syllable, as in Golin; cf. Hayes
5 1995: 278–9). Case (d) has tone and accent, but there is no correlation.
6 Moving to non-tonal systems, case (e) is a pitch-accent language. Case
7 (f) is a language in which words have non-distinctive pitch properties
8 (such as inherent pitch correlating with vowel height, or phonation of con-
9 sonants due to which native speaker experience the sensation of ‘accent’.
10 This case may be different from the previous types in that the notion
11 ‘accent’ in this case may be ‘non-structural’, and thus epiphenomenal;
12 Finally, in case (g) we have accent and phonetic pitch properties that are
13 not correlated. A similar schema of possible relations can be drawn for
14 other phonetic properties such as duration and ‘articulation precision’
15 and we refer to van der Hulst (in prep.) for further discussion and
16 exemplification.

17 The schema in (5) strengthens the important point that we must sepa-
18 rate the notion of accent from the cues that may or may not correlate
19 with its location. We do not, however, wish to suggest that cues that cor-
20 relate with accent are motivated by the need to signal the accent. Rather it
21 would seem that accents, being there (for whatever reason) in some cases
22 merely lend themselves as ‘reference points’ for these other grammatical
23 and phonetic properties. The separation of accent and cue, and the recog-
24 nition that there is a diversity of cues, explains why attempts to find a
25 unique phonetic basis for accent (whether in articulation, acoustics or
26 perception) never led to a generally accepted proposal (Fox 2000: 120–
27 127). Below, we will see that the *raison d’être* of accents may be the fact
28 that words and large utterances have an organizational structure of some
29 kind of which accents are an inherent part (cf. Fox 2000: 149 ff.).

30 Having separated the notion ‘accent’ from whatever its cues are, it will
31 now be possible to focus on the notion of accent alone and discuss a
32 theory of accent that simply ignores cues. Likewise, one could focus on
33 developing a typology of accentual cues (cf. 2 above). The crucial issue
34 for a theory of accent locations will be, as we will see, the regularities (if
35 any) that govern the location of accents within the word, i.e. what these
36 locations are and how they can be formally represented and explained. It
37 is an empirical (and interesting) issue as to whether the typology of accent
38 locations and the typology of phonetic cues are totally independent, or
39 whether there are dependencies and constraints that limit certain cues to
40 certain accent locations, or vice versa (see Dogil and Williams 1999).

1 2.2. *Intonation*

2
3 Meanwhile, we have to be aware of other terminological practices. In one
4 (represented by Bolinger 1958, and later work), the term ‘stress’ is used for
5 the abstract property of words, while the term ‘accent’ is used for the
6 observable manifestation that stressed syllables (may) have. This usage
7 is apparently opposite to the use of these terms promoted here. Bolinger
8 is specifically referring to the fact that ‘stressed’ syllables function as
9 anchors for tonal events that make up the intonational melody of
10 sentences. In fact, and this adds to the confusion, the intonational events
11 are called ‘pitch-accents’.

12 Before we can establish whether, these two terminological views are
13 irreconcilable, we must review a specific approach to intonation that
14 follows Bolinger’s term use, although not all other aspects of his theory
15 of intonation. Intonational melodies can be understood as unanalyzable
16 ‘holistic events’ or as being composed of smaller building blocks which
17 are either seen as pitch movements (one approach), or as pitch levels
18 (another approach). The pitch-level approach was proposed in Liberman
19 (1975) and worked out in Pierrehumbert (1980).¹⁷ Since there are distinctive
20 (combinations of) pitch levels (expressing different intonational meanings),
21 the units that make them up are *phonological tones*, namely H and L. The
22 manner in which the tones that make up these *pitch accents* are lined up
23 with the words in the utterance expresses information regarding which parts
24 of the utterance are “important”. Additional tones (called *boundary tones*)
25 add further structure to the intonation melody. Thus, intonation contours
26 provide cues bearing on the overall syntactic and semantic structure of
27 utterances, i.e. the grouping of words into meaningful “chunks” and the
28 informational status of these chunks. Consider the following simple exam-
29 ple (which ignores boundary tones):

- 30 (6) a. H
31 |
32 Larry bought [a small hippopotamus]
- 33 b. H
34 |
35 Larry bought a [small] hippopotamus.

36
37 Let us assume that the utterance in (6a) is an answer to the question: *What*
38 *did Larry buy?* The important part of the utterance is in that case *a small*

39
40 ¹⁷. See Ladd (2009), Gussenhoven (2004) for discussions of this approach.

1 *hippopotamus*. We say that the phrase in question is *in focus*. In (6a) we
 2 only indicated the pitch-accent (a simple H tone) which signals the phrase
 3 that is informationally foregrounded (or is ‘in focus’). The point of interest
 4 to us is that the pitch accent, which designates this part as important, is
 5 lined up with a particular syllable in the relevant phrase, more specifically
 6 with a particular syllable of the word *hippopotamus*. This is precisely the
 7 syllable that the lexicographer would represent as being accented (or, as
 8 others would say ‘stressed’). In English, it would be inconceivable to line
 9 up the pitch peak with the syllable *mus*. The reason is that this syllable
 10 does not bear accent.

11 Note that if we line up the H tone with (the accented syllable of) the
 12 word *small* as in (6b), the relevant utterance would more likely be an
 13 answer to the question: *What kind of hippopotamus did Larry buy?* In the
 14 answer to this question, the phrase in focus is *small*.

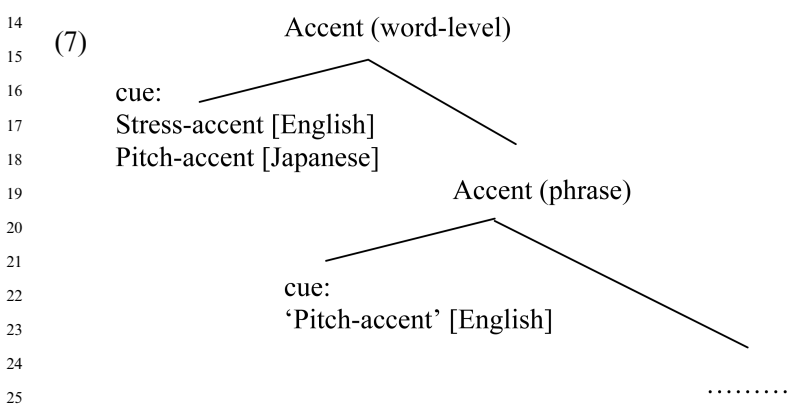
15 The examples in (6) show that an intonational tone that signals focus
 16 associates with a specific *word* in the relevant phrase. Speakers of English,
 17 then, must know which word in a focused phrase will make its accented
 18 syllable available for this function. Looking at (6) one might suggest that
 19 it is the last word in a focused phrase that does this, but matters are not
 20 that simple. We refer to Fuchs (1976), Gussenhoven (1984), Baart (1987)
 21 and Selkirk (1984, 1995) for extensive discussion of these issues.¹⁸

22 The association locus of intonational pitch accents is often referred to
 23 as the *phrasal accent* which, then, is the (primary) accent of the word in
 24 the focused phrase that is selected for this purpose. Thus, a particular syl-
 25 lable that carries the *word accent* can at the same time carry a phrasal
 26 accent. This fact shows that syllables can be accented with reference to
 27 several inclusive domains, i.e. words and phrases.¹⁹ Word accents, then,
 28 can reveal themselves by functioning as anchoring points for some of the
 29 tones that make up the *intonation* melody.

31 18. Here we cannot explain why a pitch accent on the noun *hippopotamus* can
 32 cause the whole noun phrase including the adjective to be in focus. In fact,
 33 the intonation structure in (6) is ambiguous in that it could also be an answer
 34 to the question ‘What did Larry buy that was small?’. In that case the ‘in
 35 focus’ part of the answer is only the noun *hippopotamus*; cf. Selkirk (1995)
 36 for an introduction to this phenomenon.

37 19. If the same phrase is uttered without being focused, we will assume the
 38 phrasal accent is still there, possibly having phonetic cues, even though it is
 39 not associated to an intonational tone. This would follow if we take the notion
 40 ‘phrasal accent’ to also be abstract, like word accent, and not intrinsically
 linked to cues.

1 Let us now return to Bolinger's terminological schema. Bolinger uses
 2 the term pitch accent for intonational pitch events which are properties of
 3 *phrasal units*. Earlier we used the term pitch-accent to characterize a sys-
 4 tem like that found in Japanese. For this language we could in fact refer to
 5 the pitch events as pitch accents, which, in this case would be properties of
 6 *words*. Pitch-accents, then, are pitch events that can be associated with
 7 units of different sizes, i.e. words or phrases. But why are pitch accents in
 8 Japanese associated with 'accents', while at the phrasal level they are asso-
 9 ciated with 'stresses'. It is only a little step to say that Bolinger's phrasal
 10 pitch accents are in fact also linked to accents, namely phrasal accents.
 11 Accepting this point, we can reconcile the two apparently contradictory
 12 terminological usages in the following manner:



27 (In (7) we leave undecided whether phrasal accents can be promoted fur-
 28 ther, e.g. to sentence accents.) Thus, intonational pitch-accents are analo-
 29 gous to the pitch-accents in Japanese, the difference being the domain
 30 that these pitch-accents belong to. The only quarrel one could have with
 31 Bolinger's use of the term 'pitch accent' is that, in English, there are at
 32 least two phonologically distinct pitch levels, namely H and L, and various
 33 combinations of these, which implies that the term 'tone-accent' would
 34 be more appropriate. Intonational pitch-accents, in our view, would exist
 35 in languages that realize phrasal accents in terms of a non-distinctive
 36 pitch event.

37 This discussion of intonation, meant to clarify a particular tradition in
 38 the uses of terms like stress and accent, allows us to make an important
 39 point about the set of cues for accent in a stress-accent language like
 40 English. The role that word accents play in attracting intonational tones

1 has, in the past, given rise to the idea that the word level stress-accented
 2 syllables in English are primarily cued by ‘pitch’. However, if the relevant
 3 words form part of phrases that are not in focus, implying that their
 4 accent does not attract an intonational tone, this ‘cue’ disappears, while
 5 others remain (although there may be a modest pitch elevation still which
 6 is independent from intonation). The most notable cue that remains
 7 appears to be duration (see e.g. Van Heuven en Sluiter 1996).

9 2.3. *Other terminological practices*

11 The term ‘pitch-accent’ system is used differently in at least two of the
 12 chapters in this volume. Van Zanten and Dol (this volume) reserve this
 13 term for systems in which “one syllable is more prominent than the other
 14 syllables in the same word, a prominence that is achieved by pitch.”
 15 (p. 120) This prominence must be noticeable by native-speakers. This
 16 definition thus excludes many cases which would be pitch-accent systems
 17 according to the preceding section where perceptible prominence is not
 18 a criterion.

19 Downing (this volume), on the other hand, uses a definition that is
 20 broader than what we have proposed. She refers to *any* language that has
 21 some kind of interaction between tone/pitch and accent as a pitch accent
 22 language. This would include cases in which accent assignment is depend-
 23 ent on tone.

27 3. Levels of stress/accent

29 We have so far focused on the notion of primary accent (at the word or
 30 phrase level). However, when we consider the ‘prominence pattern’ of
 31 such units they appear to have two distinguishable general characteristics.
 32 Firstly, there is one syllable that prevails over all others in the domain, the
 33 so-called *primary accent*. Secondly, there tends to be a regular alternation
 34 of ‘beats’ and ‘non-beats’; this is their *rhythmical* aspect. Considering the
 35 rhythmic profile of words or phrases, we perceive their primary accents as
 36 the strongest beat, but other syllables may have beats too, that are sub-
 37 ordinated to the primary accent beat. We will call these beats *rhythmic*
 38 (or *non-primary*) *accents*, although we will question below whether the
 39 term ‘accent’ should, in fact, be used for syllables that are rhythmically
 40 ‘strong’.

1 Even though the primary word²⁰ accent is introduced as a property of a
 2 particular syllable, it is quite clearly a property of the whole word, a point
 3 that is also strongly suggested by the fact that each dictionary entry is
 4 normally provided with at most one such symbol. This property of accent
 5 is often called *culminativity*. Primary accents are “maxima” of some kind,
 6 which implies that each such accent “signals” the presence of one accen-
 7 tual “domain”. One might say that primary word accents function to
 8 signal the number of words in a sentence. Moreover, we can say that if
 9 two primary word accents are detected, a word boundary must be some-
 10 where in between. Thus, primary accents may play a role in parsing
 11 sentences into their constituting words. In fact, in languages where the
 12 location of accent is on a fixed syllable in the word (e.g. the first one, as
 13 in Icelandic, Hungarian and Czech), the exact boundary between words
 14 can be uniquely determined. But also if the accent location is not exactly
 15 at the edge and instead is separated from the edge by one syllable (as in
 16 Polish where the location is the penultimate syllable), accents still provide
 17 clear information about the parsing of sentences into words. This is what
 18 is called the (potential) *demarcative function* of accent. The culminative
 19 and demarcative functions of primary accent were the focus of study
 20 within the Prague School (see Fox 2002: 134–138).²¹ This school did not
 21 deny that accent can sometimes be contrastive, namely in languages in
 22 which its distribution is ‘free’, but this function of accent was clearly seen
 23 as marginal. This being said, rhythmic beats can also have a demarcative
 24 role at the word level if, for example, one edge is always or typically
 25 marked by a rhythmic beat; this, for example, is the case in Dutch or
 26 English where initial syllables (if not primary accented), tend to have a
 27 “secondary accent”.

28 The culminative property of accent implies that accent is a *syntagmatic*
 29 property, i.e. a property of the linear structure of units that form the
 30 accent domain. Syntagmatic properties contrast with *paradigmatic* proper-
 31 ties, i.e. properties that can be present or absent on more and possibly all
 32 linearly arranged units that form a domain. Thus, vowel frontness is para-
 33 digmatic if any vowel in a word can be front (or back) in principle. On the
 34 other hand, some languages (such as most of the Finno-Ugric and Turkic
 35 languages) show a phenomenon of *vowel harmony* which involves (roughly
 36

37 20. We will focus here on the word domain. Below we return to the phrase
 38 domain. In general, we believe that both domains display entirely analogous
 39 properties.

40 21. They largely neglected rhythmic structure (cf. Fox 2002).

1 speaking) the situation that all vowels in the word must be front or back.
 2 In such cases, frontness is in fact a syntagmatic property, rather than
 3 a paradigmatic property. Therefore, Garde (1968) proposes to refer to
 4 vowel harmony as accentual. From a functional point of view, harmony
 5 probably indeed helps to parse sentences, since a shift from front to back
 6 vowels (or vice versa) in principle marks the vicinity of a word boundary.
 7 Thus, harmony may be said to have an identifying and demarcative func-
 8 tion, like accent.

9 The analysis of accent within the tradition of American structuralism
 10 can be characterized as an attempt to analyze accent as a paradigmatic
 11 property (Fox 2000: 127–134). Hence, within this tradition there are
 12 multiple ‘values’ of accent, just like other paradigmatic properties can
 13 have multiple (although typically two) values. This brought the above-
 14 mentioned rhythmic accents (which the Prague school did not pay much
 15 attention to) to the forefront. As Fox (2000) shows, various proposals did
 16 not limit the values of stress to two (primary, non-primary), but instead
 17 distinguished sometimes up to 8 degrees, although more commonly 4
 18 degrees:

- 19 (8) a. Primary accent 'father
 20 b. Secondary accent 'door''bell
 21 c. Tertiary accent 'ele,vator
 22 d. Weak or no accent all vowels not marked for stress
 23
 24

25 As can be seen, non-primary accents appear to have different sources. The
 26 tertiary accents are what we will call *rhythmic beats*, whereas the second-
 27 ary accent on *bell* is a ‘demoted’ primary accent which will be called a
 28 *cyclic accent*. Within the SPE tradition (Chomsky and Halle 1968), in
 29 principle, an infinite number of accentual levels is recognized, because in
 30 this model, accent is assigned *cyclically* to morphologically or syntacti-
 31 cally complex domains. Each domain has a higher degree of stress than
 32 less deeply embedded domains. However, it has been widely recognized
 33 that there is no requirement that all these levels correspond to perceptible
 34 levels of prominence and, moreover, it has also been claimed that these
 35 cyclic accents often ‘make way’ for rhythmically assigned beats; cf.
 36 Giegerich (1985), Hayes (1995, ch. 9) and Visch (1999). We return to
 37 cyclic accents in section 5 and to the apparent conflict between cyclic
 38 accents and rhythmic beats below.

39 Some linguists propose a more modest inventory of accents. Fox (2000)
 40 proposes to recognize one level of accent within the word domain. He calls

1 this level 1 accent. All accent types in (8) would be level 1 accents in
 2 his view which implies that words, both simplex and complex, can have
 3 more than one such accent. The differentiation of level 1 accents is a
 4 matter of superimposing an intonational peak on certain level 1 accents
 5 which operates at the phrasal level. In another view (one that we pro-
 6 mote), the assignment of intonational peaks is ‘fed’ by rules that assign
 7 phrasal accents, some of which may then be anchors for intonational
 8 tones. Fox’s suggestion is to skip the assignment of phrasal accents and
 9 directly assign intonational tones to certain level 1 accents. A language
 10 that has level 1 accents is called a *stress-timed language* by Fox. He also
 11 suggests that languages may do without level 1 accent, mentioning French
 12 as a case in point, which would be a syllable-timed language. He then
 13 refers to languages such as Spanish and Italian that, while syllable-timed
 14 in his view, do also appear to display rhythmic level 1 accents; he con-
 15 sideres these cases ‘unclear’.

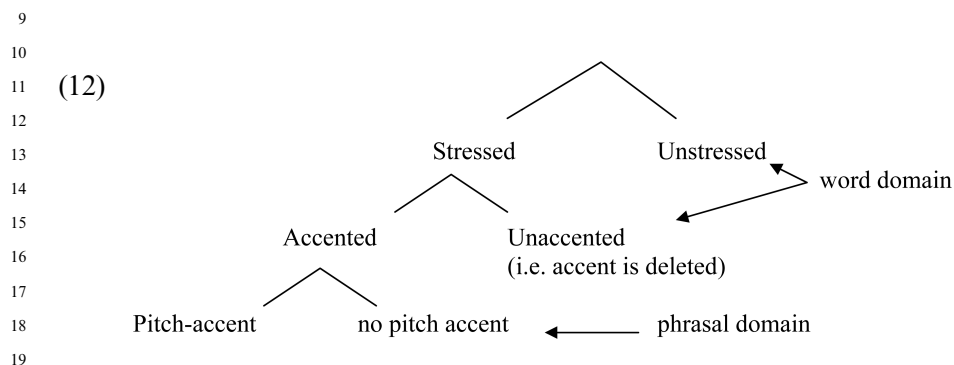
16 Gussenhoven (2004: 19–22) advocates a similar view. In his terminol-
 17 ogy words can have one or more, what he calls, ‘stressed’ syllables
 18 (corresponding to Fox’s level 1 accents). He also introduces the notion
 19 ‘accented’, which means that the stressed vowels have an intonational
 20 pitch configuration (i.e. a pitch accent); this seems to correspond to Fox’s
 21 level 2 accent. However, in Gussenhoven’s model, the accent mark (“*”) is
 22 formally distinct from an ‘intonational pitch accent’. All stressed vowels
 23 will bear the accent, but then there are rules that will delete accents in
 24 certain positions; the resulting vowels remain stressed, but are no longer
 25 possible anchors for intonational pitch accents.

26 He proposes three constraints that govern the distribution of accents in
 27 English:

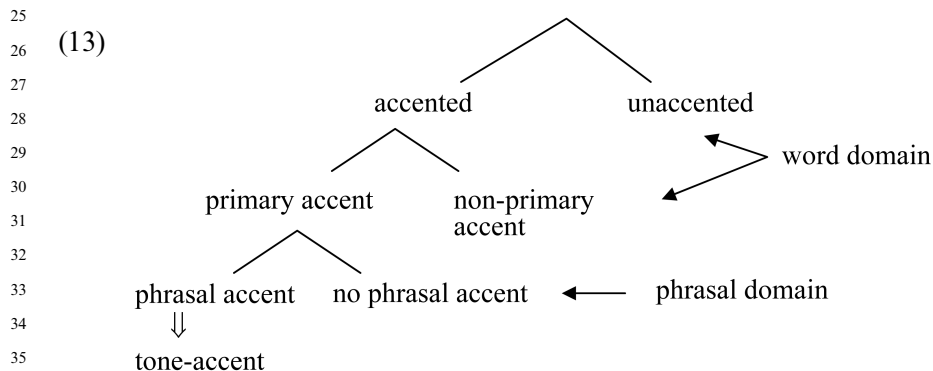
- 28 (9) a. All lexical words have an accent
 29 b. In compounds the right hand member’s accent is deleted
 30 c. In complex words, all accents except the rightmost one are deleted
 31
 32 (10) a. * (*) b. (*) * (*)
 33 [door][bell] [[kitchen][[towel][rack]]
 34
 35 c. (*) *
 36 Rembrandtesque
 37
 38 d. * (*) e. * *
 39 elevator ballerina
 40

1 have more than one ‘pitch accent’ as remarked in Gussenhoven (2004: 22):
 2 “... English words frequently have two pitch accents, one on the main
 3 stress, and one on a preceding secondary stress, like ... in *sardine*.” It
 4 would be odd to suggest that a single word can be split into two focus do-
 5 mains. A solution is to recognize the earlier pitch accents as ‘copies’ of the
 6 final ‘nuclear’ pitch accent. (cf. Fox 2000: 301 ff.). Here we will not con-
 7 sider these issues in any further depth.

8 We summarize Gussenhoven’s distinctions in (12):



21 The terminology that we propose would be different, although the same
 22 distinctions are made:
 23



38 Terminology aside, we must note another difference in view which has
 39 to do with the question whether domains have just one accent or whether
 40

1 they can have several. Both Fox and Gussenhoven assume that words can
 2 have several accented syllables, whereas we seem to imply that domains
 3 have only one accent, somewhat redundantly called the primary accent.
 4 We can illustrate the difference by considering *hippopotamus*. We would
 5 say that there is an accent on the antepenultimate syllable, whereas the
 6 first syllable has a *rhythmic beat*. Where, then, in our view do rhythmic
 7 beats enter the scene? Here, following van der Hulst (1984, 1999, 2009a
 8 among others), we adopt a model in which accents (as cumulative proper-
 9 ties of domains) are assigned ‘first’, whereas rhythmic beats are assigned
 10 ‘later’.

11 Returning to the example in (11), it has been claimed that, quite inde-
 12 pendent of pitch accents, primary accented syllables may display a rhyth-
 13 mic organization and this has suggested to researchers that, at the phrasal
 14 level, we need to distinguish between primary (phrasal) accent and non-
 15 primary (i.e. rhythmic) beats.

16
 17 (14) *
 18 * * *
 19 * * * * *
 20
 21 Larry bought [a small hippopotamus]
 22 |
 23 H

24
 25 In this display (called a metrical grid; cf. Liberman and Prince 1977) pri-
 26 mary word and phrase accents are represented by underlined asterisks and
 27 it is assumed that the rhythmic structure is also represented by asterisks.
 28 The column height represents rhythmic strength. Note that the rhythmic
 29 organization respects the localization of accents in two ways. Accents are
 30 rhythmically strong and, secondly, they are rhythmically stronger than
 31 rhythmic beats that do not correspond to accents.

32 At this point the question arises whether word-internal rhythmic beats
 33 are any different from phrasal rhythmic beats. Often, phonologists speak
 34 of the rhythmic structure of words without realizing, or making explicit,
 35 that these words are considered in isolation which effectively provides
 36 them with the realization of a phrase. Also, it has often been remarked
 37 that the rhythmic structure of words can be dependent on the ‘phrasal
 38 context’ (*Ticonderóga* versus *Fórt Ticonderóga*; Prince 1983). This suggests
 39 that we do not need to distinguish between modules for word and phrasal
 40 rhythm, but that rhythm is phrasal, or rather belongs to a level of repre-

1 sentation at which we consider the way in which linguistic expressions are
2 actually realized.

3 Following this model, in languages like English there are rules for the
4 assignment of word accent and phrasal accent, each domain having
5 exactly one such accent. Phrasal accents are assigned to word accents ac-
6 cording to certain principles. The phrasal accent is the locus of focal pitch
7 accents which mark the fact that a phrase is *in focus*. We assume that all
8 these aspects belong to ‘grammar proper’, i.e. to the mental module that
9 accounts for the grammatical properties of *linguistic expressions*. Then, as
10 a separate procedure, *utterances* are provided with a rhythmic structure
11 which (a) fills in the spaces *in between* word accents by adding beats on
12 syllables and (b) creates rhythmic alternation of word accents, again by
13 adding rhythmic beats to certain word accents. Hayes (1984) provides
14 clear demonstration of the rhythmic principles which are responsible for
15 the creation of structures which are optimally eurhythmic. At the lowest
16 level, rhythmic beats may be sensitive to syllable weight, just like primary
17 accent can be. The separation of accentuation and rhythm can be argued
18 for on several grounds. Perhaps the most powerful argument is that
19 whereas accentuation rules can be governed by lexical and grammatical
20 information (as it is in English, both at the word and phrasal level), rhyth-
21 mic rules are blind to such information.

22 The separation of accent (as a property of linguistic expressions)
23 and rhythm (as a property of utterances) also suggests a solution to the
24 ‘problem’ that the non-primary accents that are predicted by the cyclic
25 application of accent rules (both at the word and phrase level) do not
26 always ‘show up’, but rather can be overwritten by rhythmic beats.
27 There is no conflict here if we maintain that accents are abstract structural
28 entities, belonging to cognitive linguistic expressions, whereas rhythmic
29 beats are properties of utterances (i.e. instances or specific *implementations*
30 of linguistic expressions). As abstract entities, accents, whether primary or
31 demoted (i.e. cyclic), do not necessarily correspond to any phonetic cue,
32 although they can. Rhythmic beats on the other hand belong to the realm
33 of utterances and as such they are typically associated with phonetic
34 cues. Whereas rhythmic beats typically ‘respect’ the location of primary
35 accents, they are less faithful to non-primary cyclic accents. When cues
36 of non-primary accents and cues of rhythmic beats together produce an
37 a-rhythmical effect, either cyclic accents give up their cues, or rhythmic
38 principles are ‘stretched’ (from binary to ternary patterns) to achieve a
39 match between cyclic and rhythmic accents.

40 Let us now return to the proposal made by Fox (2000) that some lan-

1 guages, such as French, lack word accentuation. All *phrases* are accented
 2 on the final syllable which he attributes (as we have seen earlier) to the
 3 assignment of an intonational unit (although we could also say, as argued
 4 above, that a phrase accent is assigned, which subsequently forms an
 5 anchor for intonation units). The question is whether in addition to
 6 phrasal accents, we can think of any reason for first assigning a final
 7 accent to each individual lexical French word. If primary word accents
 8 are understood as inherent properties of a structural organization that all
 9 words, in all languages, necessarily have, we would say that there *are*
 10 word accents which happen to not correspond with any specific cues.
 11 However, this remains a speculation at this point. We could also say that
 12 in French there is only a phrasal accent which is assigned to the last sylla-
 13 ble in the phrase. However, we could push this further. Given its fully
 14 automatic character, it isn't even obvious that French has a phrasal accen-
 15 tuation rule. The 'phrasal accent' could be an 'utterance effect' and as such
 16 be regarded as part of the rhythmic component. As a result, French would
 17 have no accentuation rules at all, neither at the word level, nor at the
 18 phrasal level. The entire prominence pattern of French phrases could be
 19 due to the utterance level rhythmic component. We refer to Gussenhoven
 20 (2004) for an analysis of French accent and intonation and Dell (1984) for
 21 careful analysis of the rhythmic properties of French.

22 In this perspective we would assign accent rules only to languages in
 23 which the location of accents (at the word and/or phrase level) shows signs
 24 of sensitivity to grammatical information (i.e. lexical diacritics, morpho-
 25 logical information, syntactic structure). On the other hand *all* languages
 26 would have an utterance-level rhythmic component which would show
 27 respect to primary accents and would be less faithful to (cyclic) non-
 28 primary accents:

29 (15)	English	French
30		
31 Grammar	word accent	–
32 (<i>linguistic</i>		
33 <i>expression</i>)	phrase accent	?
34 Implementation	rhythm	rhythm
35 (<i>utterance</i>)	(prosodic structure)	(prosodic structure)
36		

37 In (14) we represented the rhythmic structure as a pure grid, i.e. as having
 38 no grouping. This does not need to be so. The implementational com-
 39 ponent can be understood as building not only a rhythmic structure but
 40 also imposing a grouping which sets domains to which various segmental

1 sandhi processes (cf. Nespor and Vogel 1986) and ‘tune’ processes
 2 respond.²² If this view is on the right track, it would follow that the
 3 so-called prosodic hierarchy, or rather some version of it, belongs to the
 4 implementational level together with all processes that are dependent on
 5 it. This would include the fast-speech, or more generally, the ‘P2’ rules
 6 in Kaisse’s model (Kaisse 1985, 1990). Effectively, then, there are two
 7 phonologies (Kaisse 1990, van der Hulst 2009b). The first phonological
 8 system interacts with the morpho-syntactic structure (‘direct reference’),
 9 whereas the second system is effectively the implementational system. The
 10 structure that this system creates is dependent on the morpho-syntactic
 11 structure perhaps only to the extent that it reckons with the accents
 12 assigned in the first system and the division of sentences into focus
 13 domains which can be understood as grammatical directives for construct-
 14 ing the prosodic organization of utterances.

15

16

17 4. Unaccented words?

18

19 Returning to common dictionary experience, we might note that some
 20 entries (or words), particularly those consisting of one syllable, are not
 21 provided with the accent symbol. To the user of a dictionary this causes
 22 no problems since he uses the tacit rule that in such cases the accent falls
 23 on the only syllable there is. That a monosyllable can bear accent suggests
 24 that “being accented” is not a purely relative notion as has sometimes
 25 been suggested. Among the monosyllabic words in English there is a
 26 majority which must always be pronounced with a full vowel quality,
 27 i.e. not a schwa, but for a small category of words (like articles), a pro-
 28 nunciation with schwa is perfectly possible. This appears to indicate that
 29 not all monosyllables are accented.

30

31 Indeed, many languages have ‘little words’ that do not belong to such
 32 categories as Noun, Verb, Adjective and Adverb, but rather to the classes
 33 of conjunctions, pronouns, articles etc. which typically do *not* appear to
 34 have a primary accent, thus also lacking the kinds of cues that are asso-
 35 ciated with accent in the relevant language. Such words are often called
 36 (phonological) *clitics*, and in the sentence these clitic words ‘attach’ them-

36

37

38 22. The combination of rhythm and grouping could be formally represented in
 39 terms of a bracketed grid (Halle and Vergnaud 1987) or in two different
 40 planes (Nespor 1990).

1 are not clitics. Thus, in Tokyo Japanese there is a class of nouns that is not
 2 lexically accented (see 18b). When used without a suffix, the final syllable
 3 acquires an pitch-accent ‘by default’, whereas if a suffix is added, the
 4 default pitch-accent will fall on that suffix. Thus there is a subtle difference
 5 between nouns with final lexical accent and nouns without lexical accent:

6 (18) a. ata¹ma-ga b. sakura-ga
 7

8 Here we will leave undecided whether the default ‘pitch-accent’ is indeed
 9 an accent or just pitch (see van der Hulst, in press).
 10
 11

12 5. Variability or uncertainty in accent locations?

13
 14 We have seen that in English longer words have non-primary ‘accents’
 15 (i.e. rhythmic beats) in addition to primary accents:

16 (19) húrricàne
 17 téléphòne
 18 páradise
 19 àpalàchicóla
 20

21 The desire to mark non-primary ‘accents’ stems from the fact that not all
 22 syllables lacking the primary accent are felt to be equal in salience, and
 23 this salience, as we have seen, affects the pronunciations of the words
 24 in sometimes significant ways. In English, for example, syllables marked
 25 with a non-primary accent symbol cannot have a pronunciation with a
 26 schwa-like vowel. They have a full-vowel quality, a property they share
 27 with primary accented vowels. Still, such syllables are felt to be less salient
 28 than the primary accented syllable and furthermore they normally fail to
 29 function as anchor points for intonational tones.

30 At the end of section 3, we have suggested that whereas the primary
 31 accents are due to lexical accentuation rules (which take into account
 32 grammatical and lexical properties of morphemes to account for the fact
 33 that the location of primary accent is far from ‘automatic’), rhythmic
 34 beats could be attributed to an utterance-level rhythmic component.²⁴
 35
 36

37
 38 24. By relegating rhythmic beats to the implementational level, we seem to be
 39 committed to the view that the English schwas in all rhythmically weak syl-
 40 lables are due to phonetic implementation, i.e. due to allophonic reduction
 rules. However in all cases in which schwas do not alternate with full vowels,
 they *can* regarded as being lexical(ized).

1 Opinions sometimes differ with respect to the location of syllables that
 2 bear rhythmic beats. This is especially so if these beats do not manifest
 3 clearly detectable phonetic cues and one therefore has to rely on impres-
 4 sionistic judgments or “intuitions”. We must also acknowledge the fact
 5 that linguists may claim to perceive rhythmic beats that objectively are
 6 simply not present in the signal. If such perceptual beats are, or can be,
 7 biased by a linguist’s own language, this may result in attributing a rhyth-
 8 mic signature to the language being described that native speakers of that
 9 language would not perceive. Differences in opinion with respect to the
 10 location of rhythmic beats may of course also be due to the fact that the
 11 location of these beats are dependent on the phrasal context in which a
 12 word occurs, or performance factors such as speech style, rate of speech
 13 and so on. In general, rhythmic accents are more difficult to study for
 14 reasons of this sort, and many descriptions simply do not mention them
 15 at all.

16 If non-primary ‘accents’ are indeed purely rhythmic then we would not
 17 expect that their location is dependent on anything else than the syllabic
 18 make-up of words and phrases. However, there are cases in which the
 19 location of *non*-primary accents appears to be dependent on the location
 20 of the primary accents of the words that are embedded in complex words.
 21 This is seen most clearly in the case of compounds, in which the primary
 22 accent of the right-hand member (in English and Dutch) surfaces as a non-
 23 primary accent; the examples are from Dutch:

- 24 (20) a. *
 25 * *
 26 almanak committee
 27
 28 b. *
 29 * *
 30 almanak commissie
 31
 32 c. *
 33 * *
 34 almanak omnibus
 35

36 Here the location of the secondary accent follows the pattern of the
 37 primary accent location in the right-hand member. Clearly, these non-
 38 primary accents are not rhythmic, but rather *cyclic*. We have suggested
 39 that cyclic accents belong to the realm of grammar proper.

40 The question is whether non-primary accent locations of complex

1 words that do *not* involve compounding can also be dependent on the
 2 accentual patterns of their parts. It has been argued that this is indeed
 3 possible. Consider the following ‘classical’ examples:

4 (21) *còmpensàte* *còmpeñsátion*
 5 *còndèns* *còndènsátion*
 6

7 The second syllable in the words on the right are different in that in
 8 ‘compensation’ the vowel is reduced (schwa), whereas in ‘condensation’ it
 9 is (or can be) pronounced with full vowel quality. The explanation is that
 10 the words on the right are derived from words that already have a lexical
 11 accent and this lexical accent ‘persists’ in the derived words by showing up
 12 as a cyclic accent.²⁵

13 Whereas cyclic accents in compound words are not controversial (but
 14 see below), the reality of cyclic accents in derived words has been called
 15 into question. Firstly, *condensation* can easily be pronounced with a
 16 reduced vowel in the second syllable. In this case it could be said that the
 17 rhythmic component overwrites the cyclic accents. A further possibility is
 18 that the cues of the cyclic accents are simply incorporated in the lexical
 19 representation of the phonological form of the morphemes as ‘weight’
 20 (i.e. as actual heavy syllables). In this case the two words in (21) on
 21 the right have lexical representations in which vowels may be schwas:
 22 *còmpeñsátion*, *còndènsátion*. Bolinger (1981) adopts this perspective.

23 The issue of whether or not accents are assigned cyclically repeats itself
 24 at the phrasal level, and proponents of cyclic application (plus rhythmic
 25 adjustment) and non-cyclic application can be found; cf. Hayes 1995,
 26 chapter 9; Gussenhoven 2004: 282 ff.). Earlier, we suggested that cyclic
 27 application, i.e. application of accent rules with reference to morpho-
 28 syntactic structure is not necessarily at odds with rhythmic patterns that
 29 do not reflect the abstract cyclic accents. We need to accept that accents
 30 (both primary and cyclic) are abstract entities. Whereas primary accents
 31 are respected by the rhythmic component, demoted, cyclic accents can
 32

33
 34 25. Fox (2000, 129 fn 16) refers to Daniel Jones’ claim that non-primary accents
 35 can play a ‘linguistic role’. He cites the word *certification* which may have sec-
 36 ondary accent on the first or second syllable with a difference in meaning. The
 37 form with initial accent means ‘act of certifying’, while the form with second-
 38 ary accent on the second syllable means ‘granting a certificate’. Clearly, Jones
 39 was observing *cyclic accents* since the location of the secondary accent in this
 40 case can be predicted in this way if we assume that the two forms are derived
 from *certify* and *certificate*, respectively.

1 easily be overwritten by the rhythmic component if their distribution is
2 not compatible with the ‘laws of rhythm’.

3 Disagreement with respect to primary accent location is untypical. If
4 there is disagreement about primary accent location this usually means
5 that there are two possible primary accentuations of the word. Consider
6 the following examples from Dutch:

7 (22) hélsinki helsínki ‘Helsinki’
8 chímpansee chimpansée ‘chimpanzee’
9

10 Usually in such cases one of the accent locations is exceptional whereas
11 the other is a regularized form. The initial accentuations in (22), for exam-
12 ple, violate the rule in Dutch that primary accent cannot lie to the left of
13 a penultimate closed syllable. But even for primary accent location sys-
14 tematic disagreement sometimes occurs, especially if the language lacks
15 clearly detectable phonetic cues (cf. the studies in Odé & van Heuven
16 1994 on ‘stress’ in Indonesian).

18 6. Possible locations for accent²⁶

20 Let us now consider what kind of theories can account for accentual struc-
21 ture. Two broad approaches can be found which differ in terms of the
22 dependency between primary accent and rhythmic accent:
23

24 (23) Metrical theory Alternative
25 Rhythm ⇒ Primary accent Primary accent ⇒ Rhythm
26

27 Before we discuss these alternatives and their merits, let us (re)familiarize
28 ourselves with the basic generalization concerning accentual systems.

29 The diversity in accentual systems is huge. A search in StressTyp re-
30 veals no less than 132 different ways in which languages can encode the
31 location of primary accent. In an insightful global typological survey, we
32 therefore need to limit ourselves to a presentation of the main trends only.
33 Such a presentation is, however, impossible without an introduction of
34 some of the basic parameters that underlie the surface accentual patterns.
35

36
37
38 26. This section is in part based on section 2. in van Zanten and Goedemans
39 (2007).
40

1 We will leave the statistics for these surface patterns, and a quantitative
2 analysis of the accent parameters themselves for more theoretically oriented
3 work, such as Goedemans (this volume, chapter 11).

4 We divide the languages into two groups: (i) a group of languages
5 that always have primary accent on a particular syllable in the word, the
6 so-called *fixed accent* languages, and (ii) a group of *variable accent*
7 languages in which the location of accent is not the same for every word
8 but depends on one or more word-internal factors. The location is fully
9 determined for each given word, but for the lexicon as a whole we see
10 that various accent locations occur.

11 To keep the proliferation of surface patterns in check, we dispense
12 with all language-internal exceptions. Languages may easily have a rule
13 that places primary accent on the last syllable in all words, except for
14 a small group of words, in which accent is located on the penultimate
15 syllable. For our purposes, we will deal with such languages as if they
16 were purely final-accent languages. The reduction thus achieved leaves us
17 with a manageable set of possible surface patterns for both groups of
18 languages. Let us look at these more closely.

19 20 6.1. *Fixed primary accents*

21 Limiting the attention to primary accent, let us first note that the following
22 six positions in the word have been attested as possible accent locations:
23

24 (24)	<i>Left</i>			<i>Right</i>		
25	<i>Initial</i>	<i>Second</i>	<i>Third</i>	<i>Ultimate</i>	<i>Penultimate</i>	<i>Antepenultimate</i>
26	Czech	Dakota	Winnebago	Turkish	Polish	Macedonian
27	Finnish			French		

28 We find three terminological systems to refer to one of three right edge
29 locations:
30

31 (25)	Terms for right edge accent:		
32	Ultimate	Final	Oxytone ²⁷
33	Penult(imate)	Prefinal	Paroxytone
34	Antepenult(imate)	(Pre-prefinal)	Preparoxytone
35			
36			

37
38 27. The . . . tone terminology, which prevails in the study of Romance languages,
39 seems to be based on the idea that the principal cue for accent is pitch.
40

1 For left edge locations there is no commonly used set of terms, but we do
2 find expressions like:

- 3
4 (26) Terms for left edge accent:
5 Initial/First syllable accent
6 Second syllable accent ('post-initial'/'pen-initial')
7 Third syllable accent ('post-post-initial'/'post-pen-initial')

8 Any student of word accent must deal with this kind of terminological
9 proliferation which, in any event, does not seem to be based on any theo-
10 retical differences.

11 As shown in (24), fixed accent languages come in six flavors:

- 12
13 (i) A fairly large number of languages have **initial accent (I)**. An exam-
14 ple from this group is Ono (Trans New Guinea Phylum; Papua New
15 Guinea); ' and , denote main and secondary accent, respectively):

16 (27) 'lolo_t,ne 'many' 'ari_,mage_,ake 'he always goes'.

- 18 (ii) A few languages have accent on the **second syllable (S)**. Siroi (Trans
19 New Guinea Phylum; Papua New Guinea) exemplifies the pattern:

20 (28) ku'mah 'dead' ku'bele 'yesterday'.

- 22 (iii) Only one language in our sample, Winnebago (Siouan; Illinois),
23 exhibits accent on the **third syllable (T)** (see also Hayes 1995):

24 (29) hochi'chinik 'boy' wagh_i'ghi 'ball'.

- 26 (iv) The third syllable from the right we call the **antepenultimate (A)**.
27 An example of a language with predominantly antepenultimate
28 accent is Pa'disua (Austronesian; Halmahera):

29 (30) 'igono 'coconut' be'le?asa 'shoulder'

- 31 (v) The second syllable from the right is the **penultimate (P)**. Penultimate
32 accent is fairly common. A language with this pattern is Lenakel
33 (dialect of Tanna; Austronesian; Tanna Island):

34 (31) kay_,elaw'elaw 'kind of dance'
35 ,t_ina_,gamyasi'ŋəvɪn 'you will be copying it'.

- 37 (vi) Languages with accent on the final, or **ultimate (U)**, syllable are ex-
38 emplified by Weri (Trans-New Guinea; Morobe, Papua New Guinea):

39 (32) u_,lua'mit 'mist' ,aku_,nete'pal 'times'.

1 In one of the first typological surveys Hyman (1977) counts more penulti-
 2 mate than initial cases, final accent coming in third place. Postinitial and
 3 antepenultimate are rare. Hardly any cases of accent falling on the ante-
 4 penultimate syllable have been reported and third syllable accent is not
 5 mentioned at all by him. The StressTyp collection confirms this distribu-
 6 tion. Of the 506 usable languages in StressTyp, 283, or 56%, exhibit a
 7 fixed accent pattern (see Goedemans, this volume [Chapter 11]).

8 Initial and ultimate accent could be accounted for by primary accent
 9 rules that simply seek out edges of the accentual domain.²⁸ But what
 10 about postinitial, penultimate and antepenultimate accent? Let us first
 11 note the observed asymmetry between left edge accent and right edge
 12 accent. Whereas the latter seems to be able to “reach” the third syllable
 13 from the edge (as in *Macedonian*), third syllable accent is hardly ever
 14 attested, if at all. Even though only few examples of fixed antepenultimate
 15 accent occur, this location is frequently found in the exceptional vocabu-
 16 lary of languages that have penultimate accent. A theory of accent
 17 placement must perhaps account for this asymmetry, but it certainly must
 18 also account for the fact that (fixed) patterns *other* than those in (24) are
 19 never found. If primary accent placement was unrestricted, in the sense
 20 that any syllable that is at a fixed distance from the word edge could be
 21 reached, we would expect to find languages having accent on the fourth
 22 syllable from either the left or right edge. Another pattern that we never
 23 find is that accent is placed on the medial syllable in odd-syllable words
 24 and in even-syllabled words to the left or right of the word middle.

25 We therefore need a mechanism for primary accent placement that will
 26 *not* allow us to construct such cases. We will first consider what would *not*
 27 be an appropriate mechanism. Suppose we formulate primary accent rules
 28 that *literally* place an accent mark on a particular syllable. We will call
 29 this the *lexicographic practice*. A first drawback of this theory is that it
 30 fails to account for the fact that words can have only one primary accent,
 31 i.e. it does not account for the culminative property of accent. After all if
 32 accent is thus treated as a paradigmatic property (i.e. a local property that
 33 can be present or absent on each vowel, or syllable), nothing will stop us
 34 from assigning accents to multiple or all vowels in the word. The theory of
 35 accent placement proposed in Chomsky & Halle (1968) has this drawback.

36
 37

38 28. This domain is ‘the word’ in languages in which affixation does not seem to
 39 make a difference, and ‘simplex word’ in languages in which complex words
 40 call for special attention.

1 This is the lexicographic practice in a formal disguise, which acknowl-
 2 edges a segmental feature [\pm stress], formally identical to other segmental
 3 features such as [\pm round] and [\pm sonorant].²⁹ The lexicographic practice,
 4 then, does not explain the culminative character of accent because no
 5 aspect of that theory prevents us from assigning an accent mark to the first
 6 *and* last syllable, or indeed to every syllable in the word.³⁰

7 The lexicographic practice also does not account for the ways in which
 8 accent can exhibit its preference for 'edge-closeness'. If the rules in (33a–f)
 9 are necessary for the attested cases, we can formulate the rules in (33g–h)
 10 just as easily.

- 11 (33)
- | | | | | | |
|----|----|----------|----------------------|---|--------------|
| 12 | | | x | | |
| 13 | a. | σ | $\rightarrow \sigma$ | / -] | (Turkish) |
| 14 | | | x | | |
| 15 | b. | σ | $\rightarrow \sigma$ | / [- | (Hungarian) |
| 16 | | | x | | |
| 17 | c. | σ | $\rightarrow \sigma$ | / - (σ] | (Polish) |
| 18 | | | x | | |
| 19 | d. | σ | $\rightarrow \sigma$ | / [(σ) - | (Dakota) |
| 20 | | | x | | |
| 21 | e. | σ | $\rightarrow \sigma$ | / - ((σ) σ] | (Macedonian) |
| 22 | | | x | | |
| 23 | f. | σ | $\rightarrow \sigma$ | / [((σ) σ) - | (Winnebago) |
| 24 | | | x | | |
| 25 | g. | σ | $\rightarrow \sigma$ | / - (((σ) σ) σ] | (Unattested) |
| 26 | | | x | | |
| 27 | h. | σ | $\rightarrow \sigma$ | / [(((σ) σ) σ) - | (Unattested) |

29. In all fairness, Chomsky and Halle (1968) did propose a convention which
 lowers the degree of stress of all vowels that are already marked as [+stress]
 by a previous application of the same or another stress rule. In this way (ex-
 cluding simultaneous rule application), all vowels will bear a different degree
 of stress.

30. Whether indeed accent is culminative in all cases is discussed in van der Hulst
 (in press).

1 Now (33f) may be a highly improbable option but (33g–h) seem to go
2 beyond what appears to be possible. The lexicographic practice is clearly
3 inadequate as a theory of primary accent placement.

4 To more properly express the restricted edge-based nature of accents,
5 phonologists have, following original ideas of Liberman (1975), Prince
6 (1976) and Liberman & Prince (1977), constructed a framework of para-
7 meters leading to what is called *metrical phonology*. The parameters that
8 are relevant to the discussion here are summed up in (34).³¹

- 9 (34) a. the location the bisyllabic **accent window** (the stretch of the
10 word in which main accent *can* be located). *Left* or *Right*
11 edge of the word.
12 b. the **location of accent** within the accent window. *Left* or *right*,
13 or in more common terms, use a *Trochaic* (x .) or an *Iambic*
14 (. x) **foot**.
15 c. **non-peripherality** or **extrametricality**. One element, usually
16 a syllable, at one of the word's edges is *extrametrical*; it is
17 skipped in the computation of accent locations.
18

19 To derive, for instance, the primary accent pattern of Ono in (27), we need
20 to place the accent window at the left side of the word, starting at the first
21 syllable, and construct a trochaic foot there, as in (35).

22 (35) (x .)
23 'lolot,ne
24

25 Antepenultimate accent in Pa'disua can be derived by locating a window
26 on the right edge of the word which, due to extrametricality skips the final
27 syllable:

28 (36) (x .)
29 be'le?asa
30

31 By making the bisyllabic accent window the basic tool of the theory, while
32 allowing skipping of one syllable on the edge, this theory accounts for the
33 restricted edge-location of fixed accents.
34

35
36
37 31. Note that (34) only accounts for the location of primary accent. In most
38 versions of metrical theory *feet* are the all important building blocks in the
39 derivation of rhythm as well. For the separation of primary accent and
40 rhythm see van der Hulst (1996, 2009a) and section 6.5.

1 The theory does not answer the question why penultimate accent shows
 2 up more often than final accent, nor does it explain the sharp differ-
 3 ence between third syllable accent and antepenultimate accent, which are,
 4 formally, equally complex.

5
 6 6.2. *Variable primary accents*

7 In so-called *quantity-sensitive* languages, the accent is not fixed on a
 8 particular syllable in the word, but neither does the accent rule indis-
 9 criminate target just any syllable. It is sensitive to internal properties
 10 of the target syllable, or, to use a common term for this phenomenon,
 11 *syllable weight*. Which properties may exactly count towards syllabic
 12 weight is something we will discuss in section 7. It suffices here to say
 13 that syllables are either **heavy**, or **light** in a quantity-sensitive accent sys-
 14 tem. If there is a heavy syllable in the main accent window, it attracts
 15 accent, while one of the light ones only receives accent if there are no
 16 heavies in the accent window. Naturally, a choice must also be made in
 17 case the accent window is filled with two heavy syllables. With this in
 18 mind it is not difficult to envisage the enormous growth in possible accent
 19 types that the introduction of quantity sensitivity entails. Consider the
 20 pairs in (37) which show H = heavy and L = light syllables at the right
 21 side of the word in a hypothetical language.

22
 23 (37) a. (H L)] b. (L H)] c. (H H)] d. (L L)]

24 The universal property of a quantity-sensitive system is that in cases (37a)
 25 and (37b) accent will always be located on the heavy syllable (shown in
 26 bold face). Languages with right-edge windows and weight-sensitivity
 27 may differ from each other with respect to (37c) and (37d). In case (37c)
 28 the accent falls on the final (i.e. rightmost) heavy syllable in most lan-
 29 guages. In (37d), the most usual case is to have accent on the left-hand
 30 light syllable (i.e. the familiar trochaic pattern). Overall then, the most
 31 common right-edge weight-sensitive system would be described in (38).

32
 33 (38) a. (H L)] b. (L H)] c. (H H)] d. (L L)]

34 e.g. Epena Pedee (Choco, Southern Embera, Colombia; only long
 35 vowels form heavy syllables):

36 'taama 'snake' war'raa 'flavourful'
 37 tee'soo 'long' 'warra 'son'

38
 39 The other logical options for the (H H) and (L L) cases do also occur in
 40 natural languages. The Austronesian languages Yapese, Sunda and Aklan

1 only differ from Epena Pedee, and from each other, in their choice for
2 which syllable is accented in these cases.

- 3 (39) i. a. (**H L**) b. (**L H**) c. (**H H**) d. (**L L**) e.g. Epena Pedee
4 ii. a. (**H L**) b. (**L H**) c. (**H H**) d. (**L L**) e.g. Yapese
5 iii. a. (**H L**) b. (**L H**) c. (**H H**) d. (**L L**) e.g. Sunda
6 iv. a. (**H L**) b. (**L H**) c. (**H H**) d. (**L L**) e.g. Aklan
7

8
9 If we then add to these four logical possibilities the four that may occur
10 at the *left* edge of the word, we come to eight different quantity-sensitive
11 accent systems. All eight occur in the languages of the world. The Malayalam
12 (Dravidian; southern India) examples in (40) illustrate the most
13 common left-edge pattern ([**H L**], [**L H**], [**H H**], [**L L**]). Ossetic, Archi
14 and Capanahua are examples of languages that use the other three logical
15 left-edge options.

- 16 (40) i. a. [**H L**] b. [**L H**] c. [**H H**] d. [**L L**] e.g. Capanahua
17 ii. a. [**H L**] b. [**L H**] c. [**H H**] d. [**L L**] e.g. Archi
18 iii. a. [**H L**] b. [**L H**] c. [**H H**] d. [**L L**] e.g. Malayalam
19 iv. a. [**H L**] b. [**L H**] c. [**H H**] d. [**L L**] e.g. Ossetic
20

- 21 (41) Malayalam (long vowels make syllables heavy)
22 a. 'kuuɽam 'crowd' b. paɽ[aa]ak,kaaran 'soldier'
23 c. 'aakaaçam 'sky' d. 'kutira 'horse'
24

25 In both Epena Pedee and Malayalam, accent falls on the heavy syllable
26 that is closest to the word edge, with the trochaic pattern being the default
27 option in case the two candidate syllables are both light.

28 Now remember that initial or final syllables can be made invisible to the
29 accent rules, a phenomenon we called extrametricality. Suppose each of
30 the eight patterns revealed here could occur with or without extrametricality,
31 then we are left with 16 possibilities. From a typological point of
32 view the number of classes now quickly becomes unmanageable, while
33 the aforementioned types do not even exhaust the possible variable accent
34 systems we find in the world's languages.
35

36 6.3. *Unbounded systems and their theoretical consequences*

37 We must now consider yet another parameter in the discussion of quantity-
38 sensitive accent systems: **boundedness**. So far, we have assumed that the
39 windows in which accent is assigned are always bisyllabic, or **bounded**.
40

1 *Unbounded* windows also exist, however. In accent systems with unbounded
 2 windows, primary accent may occur *anywhere in the word*. The rules typi-
 3 cally favor either the first or the last heavy syllable in the word, placing
 4 primary accent at either the left or right edge in the absence of heavy syl-
 5 lables. Thus, we derive the four possible unbounded accent types in (42).

- 6 (42) a. Accent the first heavy, or else the first light syllable; Amele,
 7 Trans New Guinea phylum
 8 b. Accent the first heavy, or else the last light syllable; Tahitian,
 9 Austronesian
 10 c. Accent the last heavy, or else the last light syllable; Puluwatese,
 11 Austronesian
 12 d. Accent the last heavy, or else the first light syllable; Sikaritai,
 13 Geelvink Bay
 14

15 All four patterns are attested in the languages of the world. Below we give
 16 some examples from Amele (Trans New-Guinea phylum; Madang, Papua
 17 New Guinea).
 18

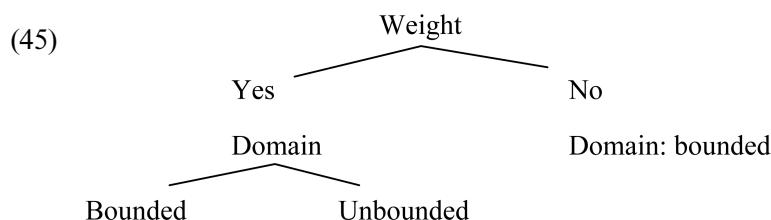
- 19 (43) Amele (codas render heavy)
 20 ja'walti 'wind from north'
 21 iti'tom 'righteous'
 22 'nifula 'species of beetle'
 23

24 On top of this, extrametricality may come into play once more to move
 25 the unbounded window one syllable away from one of the edges and
 26 derive patterns that, for instance, place accent on the first heavy syllable,
 27 or else on the penult, but never on the ultimate (not even if it is the only
 28 heavy syllable). Hence, we can add twelve (four basic ones, and all these
 29 with either left- or right-edge extrametricality) unbounded systems to
 30 the sixteen bounded ones, and add up a subtotal of 28 possible quantity-
 31 sensitive accent systems.

32 Unbounded systems can be recognized as such when the location of
 33 accent is variable, i.e. dependent on syllable weight. Logically, we could
 34 ask what happens when the accent is fixed within the unbounded window.
 35 The result of this mix of parameter settings, taking into account extra-
 36 metricality is yet another 4 possible systems which, however, are descrip-
 37 tively equivalent to fixed bounded systems:

- 38 (44) Unbounded [(σσσσσσσσ)] [(σσσσσσσσ)]
 39 Unbounded + EM [σ(σσσσσσσ)] [(σσσσσσσ)σ]
 40

1 This undesirable ambiguity could be eliminated if it is assumed that the
 2 set of parameters is organized in such a way that the unbounded domain
 3 choice is only available if weight plays a role:
 4



12 From a functional point of view, unbounded systems are curious
 13 because the location of accents provides no information about word edges.
 14 It must be concluded that in systems of this sort the ‘greed’ of heavy syllables
 15 in snatching the word accent has overtaken the edge-based preference
 16 of the accents that have fallen victim to their attraction.

17 Unbounded systems have always been problematic for metrical theories
 18 since, as is evident, the location of accent does not seem to be determined
 19 by the choice of feet, which are inherently bounded. In early varieties of
 20 this theory (such as Vergnaud and Halle 1978, Hayes 1990) a special category
 21 of *unbounded feet* was proposed which, however, cannot be equated
 22 with what we have here called the unbounded domain. Working with such
 23 unbounded feet created various ambiguities (cf. van der Hulst, in prep.)
 24 and in the end Hayes (1995) presents the majority view in rejecting such
 25 unbounded foot types, thus restricting the scope of metrical theory to
 26 bounded systems. However, such a strict separation of bounded and
 27 unbounded systems is not necessary if, as we did here, we simply adopt
 28 the choice of domain (bounded or unbounded) as a basic parameter, with-
 29 out insisting that we construe these domains as ‘feet’. In fact, if we do this,
 30 as is proposed in van der Hulst (1996, 2009a), we reveal a clear generaliza-
 31 tion about the variety of bounded and unbounded systems which is that,
 32 once the domain (and extrametricality) has been set, the location of accent
 33 is determined by two accent rules:
 34

(46)

Weight-sensitive	Bounded (right/left edge)	Unbounded
LAST/LAST	(<u>σ</u> σ) (σ <u>σ</u>) (<u>σ</u> σ) (σ <u>σ</u>)	(σσσσ <u>σ</u> σσσ) (σσσσσ <u>σ</u>)
FIRST/LAST	(<u>σ</u> σ) (σ <u>σ</u>) (<u>σ</u> σ) (σ <u>σ</u>)	(σ <u>σ</u> σσσσσσ) (σσσσσ <u>σ</u>)
FIRST/FIRST	(<u>σ</u> σ) (σ <u>σ</u>) (<u>σ</u> σ) (σ <u>σ</u>)	(σ <u>σ</u> σσσσσσ) (<u>σ</u> σσσσσ)
LAST/FIRST	(<u>σ</u> σ) (σ <u>σ</u>) (<u>σ</u> σ) (σ <u>σ</u>)	(σσσσ <u>σ</u> σσσ) (<u>σ</u> σσσσσ)

1 We have four accentual possibilities in both bounded and unbounded
 2 domains when weight enters into the location of primary accent. The
 3 parameter choice before the slash determines where the accent lies in case
 4 the domain contains heavy syllables, whereas the choice after the slash
 5 settles the case when there are no heavy syllables. Hence, for example,
 6 ‘LAST/LAST’ reads as ‘place an accent on the last (rightmost) heavy syl-
 7 lable and, if there are no heavy syllables, on the last syllable’. The two
 8 choices are independent from each other, which leads to four possibilities.
 9 Clearly, if weight does not play a role in a system only one choice needs to
 10 be made; one could say that, in that case, there is no evidence for setting
 11 the weight-choice; as stated earlier, we assume that this option does not
 12 apply for unbounded domains:

13

14 (47) Weight-insensitive Bounded (right/left edge)

15 X/LAST ($\sigma\sigma$)16 X/FIRST ($\underline{\sigma}\sigma$)

17

18
 19 This domain-based theory, although still bearing a resemblance to stan-
 20 dard metrical theory in its use of a foot-like domain for bounded systems,
 21 and to the lexicographic theory in assigning accent marks, is, in fact, very
 22 different from both. Within both kinds of domains we distinguish two
 23 rules for the selection of what might be called the *head* of the domain.
 24 Translated into standard metrical theory this would mean that for
 25 bounded domains we need to choose *two* foot-types in weight-sensitive
 26 systems rather than one, which is the common practice in this theory.
 27 That this method fails is evident from the fact that the four-way varieties
 28 in (39) and (40) cannot be accommodated in this way without postulating
 29 additional ‘retraction rules’ (cf. van der Hulst, in prep.).

30

31

32 6.4. *Lexical accent systems*

33

34 To add to the 28 variable-accent languages, there is a final type in which
 35 accent is completely unpredictable and thus lexically marked. In so-called
 36 *lexical accent* languages, it is usually assumed that the location of accent
 37 may be anywhere in the domain, so that it needs to be specified in the
 38 lexicon. Such languages are by some considered to be as ‘weight-sensitive’
 39 as the others mentioned in this section, since in a way the accent rule that

40

1 places main accent can be said to be sensitive to syllables that are lexically
 2 marked for ‘diacritic’ weight. Note that even a slight degree of lexicality³²
 3 may introduce minimal pairs that are different only in their accent loca-
 4 tions, as for instance, in the Meah (Bird’s Head, Papua Province, Indonesia)
 5 examples in (48) in which accent is a phonemic (distinctive) property.

6 (48) 'ɛɾɛsa ‘go visit’ ɛɾɛ'sa ‘child’
 7

8 Tokyo Japanese, discussed earlier, is a lexical accent system, and so is
 9 Russian, in which accent falls on the rightmost accented syllable (of which
 10 there can be more than one in morphologically complex words) or on the
 11 first syllable if there is no lexical accent.

12 Lexical accent systems are not necessarily unbounded. They can be,
 13 as in Japanese and Russian and this implies that the accent location is
 14 not restricted to a two- or three syllable window on the right or left edge.
 15 However, in bounded systems too we can encounter the case in which
 16 accent is variable, let us say ultimate or penultimate, without any way of
 17 predicting which choice obtains for any given word.³³

18 19 6.5. *Count systems*

20 The following pattern is found in Creek in words that contain only light
 21 syllables:

22
23 (49) In even-syllable words, primary accent final

24 In odd-syllable words, primary accent is prefinal

25 In words that contain heavy syllables, we need to locate the rightmost
 26 heavy syllable and then apply the procedure in (49) to the stretch of light
 27 syllables following this heavy syllable (Hayes 1995: 64–67). In (50) we
 28 only illustrate the case with words that have only light syllables:
 29
30
31

32
33 32. Languages may use lexical specification of stress for only a part of their
 34 vocabulary. In Dutch, for instance, 85% of the vocabulary has stress in a pre-
 35 dictable location, leaving 15% of lexically specified exceptions (cf. Langeweg
 36 1988). Many languages in StressTyp act like Dutch. This fact is not con-
 37 sidered here, however, because we only look at dominant patterns in order to
 keep the number of possible stress types in check.

38 33. In StressTyp such systems are coded as ‘irregular’ rather than lexical, the
 39 latter code being applied only to unbounded varieties.
 40

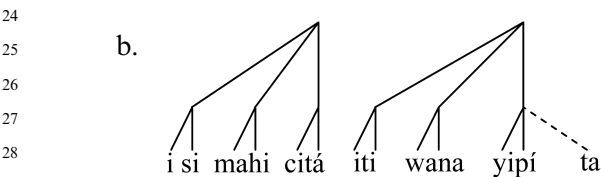
- 1 (50) cokó 'house'
 2 osána 'otter'
 3 apataká 'pancake'
 4 anocíta 'to love'
 5 isimahicíta 'one to sight at one'
 6 itiwanyipíta 'to tie each other'

7 Here accent appears to be right-edge bounded but the location, while
 8 being rule-based, cannot be locally determined on that edge. To know the
 9 location one has to group the syllables from left to right into bounded
 10 domains in which the head is located on the right:
 11

- 12 (51) (. x) (. x) (. x) (. x) (. x) (. x)
 13 isi mahi citá iti wana yipí ta

14 Strictly speaking, we only need to locate the head in the rightmost
 15 domain. This iterative way of assigning bounded domains provides the
 16 only evidence for the idea, characteristic of metrical theory, that words
 17 are parsed into binary domains ('feet') from right to left or from left to
 18 right *before* the primary accent location can be selected. In this approach,
 19 indeed, primary accent location is determined in two steps:
 20

- 21 (52) a. (x) (x) Word Tree RH³⁴
 22 (. x) (. x) (. x) (. x) (. x) (. x) Feet (L ⇒ R)
 23 isi mahi citá iti wana yipí ta



30 The notation in (52a) is now commonly used after Halle and Vergnaud
 31 (1987), while that in (52b) is closer to the original 'arboreal' notation in
 32 Liberman and Prince (1977).

33 *None* of the bounded systems considered earlier require such an
 34 elaborate procedure for primary accent location which is why we simply
 35 adopted the practice to locate one bounded domain on the edge where
 36 primary accent falls. This deviates from the standard metrical approach
 37

38 _____
 39 34. 'RH' stands for 'right-headed'.
 40

1 which assumes that primary accent is always located by first parsing the
2 entire word into feet and then selecting the leftmost or rightmost foot as
3 the head foot of the word. However, as will be clear, only in systems in
4 which the edge at which footing starts differs from the edge location of
5 the head foot (as is the case in Creek) we crucially must apply iterative
6 footing first. In all other cases we can simply locate one foot-like domain,
7 select the head and leave it to that.

8 At this point it would seem that a powerful argument in favor of the
9 standard procedure could run like this. All this time we have focused our
10 attention on primary accent. However, as discussed earlier, words fre-
11 quently have rhythmic beats in addition to their primary accent. It would
12 seem that iterative foot structure perfectly captures the distribution of
13 rhythmic beats. Now, in non-count systems, iterative feet that account
14 for rhythmic pattern *could* be assigned after we have located the primary
15 accent or, and this might be considered more elegant, we might simply say
16 (as metrical theory does) that iterative foot assignment applies first and
17 that primary accent selection is done by selecting a peripheral foot as the
18 head foot of the word. Count systems, then, simply represent the logical
19 possibility where head foot selection chooses the foot that was assigned
20 last, rather than the foot that was assigned first. A second argument could
21 be that this way of doing things explains the bounded nature of primary
22 accents, given that feet are bounded units.

23 In van der Hulst (1984) it was suggested that the metrical ‘bottom-up’
24 procedure of standard metrical theory is at odds with certain differences
25 that may exist between the rhythmic beats and the beat that is promoted
26 to primary accent status. The most notable difference is that in many lan-
27 guages primary accents, although regular, have lexical exceptions, whereas
28 rhythmic beats always appear to be completely regular. We noted these
29 properties already in section 3. This suggests that primary accent is
30 ‘lexical’, while rhythm is ‘post-lexical’ (or perhaps: post-grammatical,
31 belonging to the implementation system). Roca (1986) also proposes this
32 for Spanish. But if rhythm is post-lexical, primary accent, if lexical, cannot
33 be fed by it and thus has to be assigned independently first. We refer to
34 van der Hulst (2009a, in prep.) for an elaboration of these points which
35 lead to a strict separation of primary accent and rhythm. This separation,
36 which was also suggested at the end of section 3 above, is also reflected
37 in the organization of StressTyp. Thus, whereas Hayes (1995) and most
38 others take the bottom-up procedure as the default case, allowing top-
39 down construction where needed, we have chosen to adopt the top-down
40

1 view (primary accent first) as the default, which leaves count systems as
 2 the special case. This leaves the question how count systems are accounted
 3 for? We refer to van der Hulst (1997, in prep.) for a further discussion of
 4 count systems and their theoretical consequences. One proposal is to
 5 assign a bounded accent window and suppress the accentual rules that
 6 normally would assign a head. This then allows rhythmic beats to ‘invade’
 7 this domain so that a rhythmic beat ends up being the head of the accen-
 8 tual domain.

9

10

11 7. Weight factors

12

13 To make the quantity-sensitivity picture complete, we should devote some
 14 attention to the phenomenon of weight itself. In the previous section, we
 15 have seen that languages may accent certain syllables on the basis of their
 16 weight. But what is weight?³⁵ The syllabic properties that determine
 17 weight can differ from one language to the next. An important deter-
 18 minant of weight is *vowel length*, as we have seen in (38) and (41), closely
 19 followed by *syllable closure*. In principle, both factors are independent, but
 20 often both long vowels and closed syllables will cause syllables to be heavy
 21 in one and the same language, leaving the category of light syllables for
 22 open syllables with short vowels.³⁶

23 Thus, we distinguish three regular types of weight:

24

- (53) a. Long vowels make syllables heavy.
 25 b. Closing consonants make syllables heavy.
 26 c. Both long vowels and closing consonants make syllables heavy.³⁷

28

29 An example of (52c) is Cebuano (Austronesian; Philippines). If the final
 30 syllable is light (CV or CVC, i.e. word-final consonants are extrametrical),
 31 accent falls on the penult if it has a long vowel or coda: *'tinda* ‘sell’

32

33 35. See Goedemans (1998) for a study of phonological weight.

34 36. Note that, phonologically, short vowels are represented by one segment slot,
 35 while long vowels have two such slots. Apparently, the presence of a segment
 36 after the vowel, be it another vowel (identical, or different, as in diphthongs)
 or a consonant, can make syllables heavy.

37 37. Current metrical theory excludes prevocalic consonants as a weight factor.
 38 However, weightful geminate onsets are reported for Pattani Malay by Hajek
 39 & Goedemans (2003).

40

1 *ʔtagman'saanas* ‘fond of apples’, *kaʔu'sa* ‘once’.

2 Considering the enormous diversity we already have encountered in
3 the world of accent, one might guess this is not the complete story. And
4 indeed it is not. To these three weight factors, we must add another one,
5 labeled **prominence** (Kenstowicz 1994). In systems that use prominence to
6 determine whether syllables are heavy or light, certain *properties* of the
7 segments in the syllable count towards weight, not their mere presence.
8 There are various properties that come into play here. One of the most
9 important ones is tone. In languages that have contrastively pitched syllables
10 (i.e. tone languages), accent may be sensitive to such distinctions and,
11 for example, be located on the leftmost or rightmost high-pitched syllable
12 in the accent window. Look at the Sikaritai (Trans New Guinea Phylum;
13 Papua Province, Indonesia) examples in (54) in which the last high-toned
14 syllable is accented, or else the first syllable (acute accent indicates high
15 tone).

16 (54) *sébé'kí* ‘narrow’ *hú'ráε* ‘male’
17 *'apare* ‘handle’

19 Another prominence factor concerns vowel aperture, or more generally
20 vowel quality. If overall vowel quality is relevant, the opposition typically
21 is reduced (light) as opposed to full (heavy vowels). We will see such vowel
22 quality systems abundantly in the Austronesian languages (chapter 3).
23 If aperture is relevant, more open (low) vowels will count as heavy,
24 as opposed to closed (high) vowels. The Yindjibarndi (Pama-Nyungan;
25 Western Australia) examples in (55) show initial accent unless the second
26 syllable contains a low long vowel.

28 (55) *'martuur,raa* ‘twilight’ *nyi'laarti* ‘native mead’

30 This behavior reflects a general tendency among prominence factors.
31 Many of these divide syllables such that the more sonorous ones are heavy
32 while the others are light. The next prominence factor directly relates to
33 consonant sonority. In Inga (Quechuan; Colombia) only sonorant codas
34 make syllables heavy, while syllables ending in obstruents are light. The
35 final syllable is accented if it is heavy, otherwise accent is penultimate.
36 Some examples are given in (56).

37 (56) *ya'war* ‘blood’ *'kančis* ‘seven’
38 *apa'muy* ‘to bring’ *kam'kuna* ‘you.PL’

40

1 Languages with other heavy-light divisions among the set of possible
2 codas exist as well. Quite often these involve the glottal stop. In Mam
3 (Mayan; Guatemala), for instance, weight is assigned according to a scale
4 (a phenomenon we find more often) in which syllables with long vowels
5 are the heaviest, followed by syllables that have a glottal stop in the
6 coda. Syllables closed by any other consonant than the glottal stop are at
7 the bottom of the scale.

8 To the four weight categories described above we add a final one. We
9 have already noted in section 6.4. that we view syllables that are lexically
10 marked for accent as heavy. Therefore we must now add lexical marking
11 to the weight factors.

12

13

14 8. Summary

15 In the beginning of this chapter we have promoted the use of the term
16 ‘accent’, making the point that accents can be manifested in a variety of
17 ways. We proposed to follow Hyman (1977) in making a distinction
18 between *stress-accent* languages and *pitch-accent* languages. The gen-
19 eralizing notion for him was *accent* which does not have an inherent
20 cue or exponent. In a *pitch-accent* language, the accent is cued by a pitch
21 property (an elevated pitch or a pitch rise, typically). In a stress-accent
22 language, the manifestation is ‘stress’ which he took to be the kind of
23 properties that are typically associated with ‘stress’ in languages such as
24 English (extra duration, extra loudness, hyper-articulation etc.). However,
25 we then saw that there is no reason to limit the manifestation possibilities
26 of accent to these two cases. For example, accent could be manifested
27 by duration alone (a duration-accent language), or by full vowel quality
28 (accentless vowels being reduced), etc. In addition, the accented syllable
29 may distinguish itself from non-accented syllables by a greater array of
30 phonotactic possibilities, or by being the locus of tonal distinctions, or by
31 being the anchor point for intonational tones.

32 By making a distinction between accent and cue we allowed ourselves
33 to then focus on the factors that determine the location of the accented
34 syllable in the word. We have identified the role of domains and syllable
35 weight as critical factors. We also promoted the idea to separate the treat-
36 ment of primary and rhythmic accents which together make up the pro-
37 sodic structure of words.

38 We hope that this introduction will provide the reader with elementary
39 terminology and theoretical tools to organize the variety of accentual
40 systems that will be discussed in the subsequent chapters of this book.

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