UC Berkeley
UC Berkeley PhonLab Annual Report

Title
Word-prosodic Typology

Permalink

Journal
UC Berkeley PhonLab Annual Report, 1(1)

ISSN

Author
Hyman, Larry M

Publication Date
2005

DOI

Word-Prosodic Typology
Larry M. Hyman
University of California, Berkeley

If stress is monarchic, and length oligarchic, we may say that tone is democratic.
(Greenberg & Kaschube 1976:9)

1.   Introduction

Over the past several decades, many linguists have made pronouncements on how prosodic systems
should be typologized. While no other area of phonological typology has attracted as much attention, it is
not clear how much consensus there is on where things currently stand. Linguists sometimes speak or
write on the subject with great conviction, but the views that are expressed often conflict on both general
and specific issues, e.g. whether all human languages must have "stress", whether the prosodic system of
Tokyo Japanese is "tonal" vs. "accentual", and so forth. In this paper I attempt to sort out some of the
complexities of word-prosodic typology. I begin in §2 with a brief discussion of problems inherent in
doing typology, particularly when applied to phonology. In the next two sections I give brief definitions
of tone (§3) and stress-accent (§4), followed by a longer section (§5) which addresses the more
problematic notions of "accent" and "pitch-accent". I argue that the highest-level typological cut consists
of identifying two prototypes, one with stress-accent, the other with tone. While it is possible to define
these prototypes and establish a set of properties that typically cooccur in each, establishing a third pitch-
accent prototype is more elusive. This is, in part, because languages which have been identified as pitch-
accent freely "pick and choose" between the prototypical properties of stress-accent systems vs. tone
systems. In other words, there are many intermediate word-prosodic systems which are not best seen as
discrete types. While most of the discussion centers around typological issues resulting from structural or
systemic difference, §6 addresses the role of phonetics in typologizing prosodic systems. §7 provides a
brief conclusion.[*]

2.   Typology

Since the concern of this study is to address the typology of word-prosodic systems, it seems appropriate
to begin by asking the questions: What is typology? phonological typology? word-prosodic typology?
Concerning the first question, Hagège (1992:7) provides a traditional definition of typology as "... a
principled way of classifying the languages of the world by the most significant properties which
distinguish one from another." Vajda (2001) answers the second question in a similar fashion: "...it is
possible to classify languages according to the phonemes they contain.... typology is the study of
structural features across languages. Phonological typology involves comparing languages according to
the number or type of sounds they contain." It is significant that the above definitions speak of classifying
LANGUAGES rather than subsystems of languages. In any case, only certain parameters impress linguists
enough to establish language types: Within phonology, there is a class of "click languages", but not
"implosive languages", "open syllable languages", but not "onset languages" (meaning that every
syllable has to have an onset). The question is whether there is any reality in classifying languages rather
than analyzing the properties of the relevant subsystems. This issue is particularly pronounced in the
area of prosody, where the practice of distinguishing "stress languages" from "tone languages" is well-
established and has encouraged some to propose additional types: "pitch-accent language", "restrictive
tone language", and so forth. However, as Greenberg (1974:14) notes, "the same data can be utilized
either for a typology of linguistic properties or a typology of individual languages." A major aim of this
study is to show that there is considerably more diversity in prosodic systems than such labels have thus
far distinguished.

Most phonologists would probably agree that there is little, if any, difference between doing
phonological typology vs. phonological theory. At the very least, it is unlikely that one can do insightful

typology without addressing the same analytical issues that confront phonological theory. In order to appreciate the complexity involved in doing proper typology, consider the question of what phonologists might seek to typologize. There are at least three dimensions to this issue:

(i) What are the properties to be typologized? Segments? Systems? Rules?

(ii) At what level should the properties be typologized? Underlying (morphophonemic)? Lexical (phonemic)? Surface (phonetic)?

(iii) Within what domain should the properties be typologized? The morpheme? word? phrase?

For many phonological properties, one will obtain quite different results depending on the answers to the above questions. In some languages word-level prosody is predictable by rule (e.g. demarcative stress, morphological tone) and hence not present in underlying representations (URs). In other languages the prosodic properties are introduced only at the phrase level.

In this study I take the following approach to the above three questions:

(i) The properties to be typologized are linguistic SYSTEMS. Since there is considerable room for interpretation, care must be taken to distinguish the descriptive "facts" of linguistic systems from the ANALYSES that attempt to account for them. On the other hand, a simple inventory is not a linguistic system.

(ii) Linguistic systems necessarily capture the relationship between underlying, lexical AND phonetic representations. However, this study is primarily concerned with properties which are present at the lexical level, whether from URs or introduced by rule.

(iii) As seen in the title, this study is limited to prosodic properties which hold within the word domain vs. properties which make reference to the phrase or utterance levels.

Among the frequent assumptions underlying past attempts at phonological typology are: (i) EXHAUSTIVITY: all systems can be assigned to a type; (ii) UNIQUENESS: no system can be assigned to two types; (iii) DISCRETENESS: types do not overlap. By these criteria we arrive at the classic bi- and trifurcation of prosodic types in (1a,b).

(1)   Classic bi- and trifurcation of prosodic types (stress-accent, tone, pitch-accent: SA, T, PA)

a.   SA   T   b.   SA   T   PA   c.   SA   *PA   T
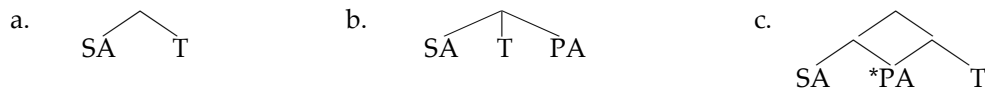
In (1a), prosodic systems are identified as either stress-accent (SA) or tone (T), while (1b) allows a third category, pitch-accent (PA). As indicated by the asterisk, the above assumptions do not condone (1c), where PA belongs simultaneously to two different types, the first with SA, the second with T.

As attractive as they are, all three assumptions are problematic. First, despite the discreteness of the putative types (SA, PA, T), prosodic systems may be ambiguous, i.e. analytically indeterminate. In languages such as Kinga (Schadeberg 1973) and Nubi (Gussenhoven 2006), every word must have one and only one high tone. Should such systems be categorized as "restricted" T, as PA, or as SA, where stress would be realized simply as H pitch? All three interpretations seem reasonable, perhaps not only to linguists but also to the native speakers. Given this indeterminacy, it may be that such languages provide the transitional "pivot" for change from one type of system to another (cf. Salmons 1992, Gussenhoven 2006).

Besides ambiguity, a second issue is that prosodic systems may be mixed. In Saramaccan (Good 2004), for one class of words a single syllable is marked /H/, the remaining syllables being underlyingly toneless. On the other hand, in a second class of words, all syllables must be specified for tone (all H, all L, or combinations of H and L). While Saramaccan has a stratified lexicon, which Good analyzes as PA vs. T, the same words may have both properties in Cherokee. As analyzed by Johnson (2005), a Cherokee word may or may not have a single L*H pitch accent. Whether or not it does, a non-accented syllable may also have a contrastive H or L tone. While Saramaccan and Cherokee combine PA and T, other languages

combine SA and T (see §5). Whatever its usefulness, the three-way distinction between SA, PA and T cannot therefore be a discrete, non-overlapping one. [1]

A final word before addressing the above SA, PA and T in more detail. The above discussion assumes that word-prosodic typology is limited to this trichotomy, or the properties it encodes. We have however not explicitly addressed the question of what counts as word prosody. Words are not only characterized by the classic three suprasegmentals of tone, length, and stress (Lehiste 1970, Greenberg & Kaschube 1976), but also by various kinds of harmonies and quantitative/qualitative distributional constraints concerning minimum/maximum mora/syllable count, initial- vs. final position restrictions, C/V combinatorics, and so forth. If word-prosodic typology were to take all of these issues into account as well, the result would be an explosion of disparate prosodic word types, as indicated in (2).

(2)   Different kinds of prosodic word?
   a.   the demarcative word   a property marks the beginning or end of the word
   b.   the culminative word   a property occurs only once per word
   c.   the harmonic word   a property is realized throughout the word
   d.   the metrical word   a word consists of hierarchically arrayed moras or syllables
   e.   the minimum word   a word must consist of a minimum # of moras or syllables
   f.   the maximum word   a word can consist of a maximum # of moras or syllables
   g.   the phonotactic word   a word permits only certain output segments/sequences
   h.   the morphophonotactic word a word permits only certain input segments/sequences

Beyond practicality there are legitimate reasons to group F0, duration, and intensity together. First, there is the intuitive recognition of all three as overlaid suprasegments (Lehiste 1970), whose effects can be realized not only in spoken language, but also on a musical instrument. Second, these three phonetic properties frequently interact, e.g. in the realization of stress and intonation. Finally, tone, length and stress also share functional similarities, e.g. culminativity, rhythmic alternations.

For the above reasons, the present study on word-prosodic systems will be limited to T, SA, and PA, and their manipulation of F0, duration, and intensity. In the following sections, tone, stress, and (pitch-) accent are taken up in turn.

3.   Tone

In order to establish prosodic types in a reasonably objective way, it is necessary to provide definitions for tone, stress and accent. I will assume the following as a working definition of tone (Hyman 2001a:1367, slightly modified from Welmers 1959, 1973):

(3)   A language with tone is one in which an indication of pitch enters into the lexical realization of at least some morphemes.

As indicated, the domain of tone is the morpheme. Depending on the language, morphemes with tone may be all, many or few. They can be lexical or grammatical morphemes, including tonal morphemes which lack a segmental content. According to (3), the presence of tone is established on the basis of lexical realization, i.e. the output of the lexical phonology. Tone may thus either be present in URs or be introduced by rule. If this latter occurs at the lexical level, rather than postlexically, this would count as tone by the above definition.

Tone is featural and paradigmatic: In a prototypical tone system such as Cantonese or Yoruba, one IDENTIFIES the tone of each tone-bearing unit (TBU). In other words, tone has a "distinctive function" (Martinet 1960). The tone system may consist of a simple binary opposition, e.g. /H, L/, or involve more levels, contour tones, and specific tones accompanied by phonation types (glottalization, breathiness etc.).

The definition in (3) refers to "an indication of pitch" rather than pitch itself. This is intentional and is designed to extract away from analytic preferences. For example, it was mentioned in §2 that Kinga and Nubi require exactly one H tone per lexical word. The question was also raised as to whether these systems should be thought of as SA, PA or T. They could thus be analyzed with a /H/ tonal feature or an

---

[1] Another kind of mixed system has been occasionally proposed based on different levels of representation. Although subject to other interpretations, McCawley (1978:126) suggests that Luganda "can be described as having a pitch accent system in its deep phonology and a tonal system in its surface phonology."

abstract accent, which could be said to be realized as [H] by a postlexical pitch-assignment rule. However, since only pitch is involved, it is clear that the abstract accent is nothing but "an indication of pitch". By (3), Kinga and Nubi are tonal.

The question that is relevant in this context is whether we want to typologize according to the properties of prosodic systems or according to the analyses given to them by diverse linguists. This issue has arisen in a number of cases, the most prominent of which concerns Tokyo Japanese (TJ). As seen in (4), TJ has been analyzed both accentually and tonally:

(4) "An indication of pitch" abstracts away analytic preferences, e.g. concerning Tokyo Japanese (McCawley 1978, Haraguchi 1979, Poser 1984, Pierrehumbert & Beckman 1988 etc.)

	'pillow' + nom.	'heart' + nom.	'head' + nom.	'fish' + nom.
accentual	maˈkura ga	kokoˈro ga	atamaˈ ga	sakana ga
tonal	makura ga | H	kokoro ga | H	atama ga | H	sakana ga
output	mákùrà gà	kókórò gà	átámá gà	sákáná gá
output w/%L	mákùrà gà	kòkórò gà	àtámá gà	sàkáná gá

In the accentual account in the first row, the mark ˈ indicates where a drop occurs between H and L. (Others have used a tick mark or asterisk.) The tonal analysis in the second row starts with a /H/ prelinked to the mora that precedes the pitch drop. The third and fourth rows show that moras following the accent or /H/ are L, while the remaining moras are H, except where an initial %L boundary tone affects the first mora.

A final note concerning the notion of "word tone" (Mazaudon 2005). In the definition in (3) tone is identified with the morpheme, and nothing is said about the TBU, which can be the syllable or the mora. In Tamang, Kukuya, and a number of other languages, there is a fixed number of word- (or stem-) tone patterns independent of the number of syllables or moras (cf. the discussion of Skou in §5). For such systems it is sometimes suggested that the word takes precedence over the morpheme, or is even the TBU, rather than the domain determining the tone (cf. Garde's 1967:12-13 distinction between UNITÉ ACCENTUABLE vs. UNITÉ ACCENTUELLE applied to stress systems). Like TJ, there is a sense in which such languages diverge from what I have called prototypical tone systems. As in the case of vowel harmony systems, such tone systems have a syntagmatic dimension which is lacking in Cantonese, Yoruba etc., where tone contrasts paradigmatically on syllables.

4.   Stress

Whereas tone has to do with pitch features, the general approach to stress has been that it has to do with metrical PROMINENCE. The definition I would propose for stress-accent is given in (5).

(5) A language with stress-accent is one in which there is an indication of word-level metrical structure meeting the following two central criteria:

   a.   OBLIGATORINESS: every lexical word has AT LEAST one syllable marked for the highest degree of metrical prominence (primary stress)

   b.   CULMINATIVITY: every lexical word has AT MOST one syllable marked for the highest degree of metrical prominence

In many characterizations of SA, the phrase "one and only one" primary stress is used: "Every prosodic word contains one and only one head foot, which is the locus of main stress. The existence and uniqueness of the head foot are usually taken to be axiomatic—universal properties of GEN rather than violable constraints" (McCarthy 2002:110). As indicated in (5a,b), it is however fruitful to separate the phrase into two properties: obligatoriness and culminativity. Obligatoriness states that every lexical word has to have a primary stress. Although there is variation in the use of the term in the literature, culminativity is intended here to mean that a lexical word cannot have more than one primary stress.

In contrast to tone, which is featural and paradigmatic, stress is structural and syntagmatic. Prototypical tone has a distinctive function, while stress-accent has a CONTRASTIVE function (Martinet

1960), even where minimal pairs are possible. Whereas one IDENTIFIES the T of each TBU, one LOCATES stress within the lexical word domain.

Of the two criteria in (5a,b), obligatoriness is the more important. It is an absolute universal—DEFINITIONAL—of a SA system, which requires that an obligatorily headed metrical constituent be built at the word level. Rather than HEAD(PWd), "which says that each phonological word must have a unique head and therefore exactly one accent" (McCarthy 2002:78), and which thereby conflates obligatoriness and culminativity, I shall borrow from optimality syntax and refer to obligatoriness interchangeably as OBLHEAD (obligatory head).

Because of obligatoriness, no language fails to assign metrical stress to a word for lack of a specific phonological property. Thus, OBLHEAD rules out stress systems such as the following:[2]

(6) a. stress the penultimate syllable; monosyllabic words are stressless
     b. stress the last heavy syllable; words that lack a heavy syllable are stressless[3]
     c. stress the initial syllable if it has an onset; words beginning with a vowel are stressless
     d. stress the leftmost syllable with /a/, otherwise stress the leftmost syllable containing /e/ or /o/; words with only /i,u/ are stressless
     e. stress the last H tone; words lacking a H tone are stressless

What's wrong with the above systems is that they do not exercise default stress assignment in case stress-attracting phonological properties are lacking. Except for this property, (6a-e) would seem to be a priori reasonable, if not also grounded: Stress is often avoided on light syllables, so why not on a word that consists solely of light syllables?

In fact, the above systems might be argued to be less "crazy" than what we actually do find in the interaction between stress and phonological properties. In Tukang Besi, under appropriate conditions, "gemination occurs... on the consonant of the stressed penultimate syllable" (Donohue 1999:34), as in (7a).

(7) Tukang Besi (Donohue 1999)
     a.   top:áŋa   'cut branches'   motut:úɾɯ   'sleepy'
           mɛl:ái   'far'   moʔom:úɾɯ   'hungry'
     b.   káp:i   'wing'
           páŋ:a   'branch'
     c.   ɛ́k:a   'climb'
           ɛ́l:a   'tongue'

However, Donohue goes on to state: "if the stressed syllable is also the initial one (i.e. the word is di-syllabic), the gemination can jump one syllable forward." As seen in the examples in (7b), where initial gemination is prohibited, the onset of the post-stress syllable is geminated instead. The same is true in (7c), where the first syllable has no onset. It would appear that stress-based gemination is important to Tukang Besi speakers. Rather than suppressing gemination in (7b,c), they shift the syllable to guarantee gemination will occur. An otherwise reasonable option would be to restrict gemination to the onset of the stressed syllable, and block stress assignment to words such as *kapi, *paŋa, *ɛka and *ɛla. This, however, would violate OBLHEAD.

I suggest that word stress has this "obligatory" property because stress-accent is DEFINITIONAL of wordhood. A violation of OBLHEAD would imply that stressless words are not words. More generally, we observe that local phonology does not override higher levels of grammatical and prosodic organization. Thus, in a language where all words must begin with a consonant, a word which is underlyingly vowel-initial, will not fail to become a word. Instead, a default onset may be inserted or the vowel may be

---

[2] Cf. the Unstressable Word Syndrome of Hayes (1995:110-113), who also treats alleged exceptions.

[3] Dobrovolsky (1999) considers a possible counterexample in Chuvash, where stress is assigned to the last full vowel of a word. The question is whether stress is assigned to the first syllable of words lacking a full vowel, or whether such words are stressless. Based on a phonetic study of disyllabic words, Dobrolovsky concludes that "there is something different about stress on reduced vowel words" (p.542) and hypothesizes in favor of the interpretation that they are stressless. Thanks to Susannah Levy for reminding me of this paper.

deleted. As will be seen in §5, prosodic systems which are exceptions to OblHead invariably involve tone or length.

Returning to the definition in (5), a second definitional property of SA systems is that OblHead obligatorily targets SYLLABLES. The same cannot be said for T systems or PA systems, in which the TBU may be either the syllable or mora. This property of SA systems makes two interesting predictions which are borne out. First, a language which lacks syllables clearly cannot have SA, e.g. Gokana (Hyman 1985). Second, a language in which some words lack syllables cannot have SA. The reason for this is that it would violate OblHead: words with syllables would have stress, while those which lack this phonological property wouldn't. According to Bagemihl (1991), in Bella Coola a syllable must contain a sonorant (as in most languages). A word consisting solely of obstruents contains no syllables, e.g. *ćktskʷć* 'he arrived'. Bella Coola thus provides the test case—the possibility that words with a sonorant (and hence a syllable) will have stress, while words lacking a sonorant won't. Newman (1947:132) clearly states that in Bella Coola there is "no phonemically significant phenomena of stress or pitch associated with syllables or words." He continues: "When two or more syllabics occur in a word or sentence, one can clearly hear different degrees of articulatory force. But these relative stresses in a sequence of acoustic syllables do not remain constant in repetitions of the utterance." That Gokana and Bella Coola lack SA is thus predicted by the definition in (5).

It appears that OblHead and syllables are definitional properties of SA systems in two senses. First, all SA systems have these properties. Second, systems other than SA are not required to have these properties. Thus, there can be accentless words in many so-called PA languages (e.g. TJ, Somali), which are also free to target moras instead of syllables. Besides culminativity (to which we will return in §5), additional common properties of SA systems may or may not characterize non-SA systems. Here I mention four of these, since they have been occasionally cited as evidence that systems which I would identify as restricted T are really PA: (i) PRIVATIVITY: stress is either present vs. absent on a given syllable; (ii) SUBORDINATION: one stress may be subordinated to another, as in compounding, focus marking, etc. (McCawley 1970, 1978); (iii) DEMARCATION: stress fixed on initial, final etc. syllables can tell you where the word boundary is; (iv) RHYTHMICITY: echo-stresses frequently occur on every other syllable. With these additional properties identified, we can now move on to consider the nature of (pitch-) accent.

5. Accent

There has been considerable terminological ambiguity as well as conceptual confusion concerning the notion of "accent" (cf. Hyman 1977a, Clements & Goldsmith 1984, Beckman 1986, Pulleyblank 1986, van der Hulst & Smith 1988a, Salmons 1992, Ladd 1996, Odden 1999, van der Hulst 1999a, Fox 2000, Gussenhoven 2005, among others). Some of the uses of the term "accent" are indicated in (8).

(8) The term "accent" has been used to refer to the following

    a.   prominence *tout court*

        "...an accent is simply an 'abstract' mark where a culmination of prosodic features occurs, thereby marking that syllable (or accent-bearing unit) with greater salience than surrounding syllables." (Hyman 1977a:4)

    b.   a place of F0 activity (cf. phrase-level "pitch-accents", e.g. English intonational H*L)

    c.   a lexical diacritic (which is exceptional or unpredictable)
        i.   used to indicate a potential metrical head
        ii.   used to indicate the alignment of a tone

    d.   a tone that allegedly acts like a stress (cf. "stress-accent" vs. "pitch-accent")

It is the last two uses that are most relevant to the definitions of tone and stress-accent given in §3 and §4. These are discussed in the next two sub-sections.

5.1. Diacritic accent

A representative case of diacritic accent appears in Donohue's (2003) treatment of tone in Skou (New Guinea). As seen in the summary of tonal distributions in (9),

(9)   Tonal distributions in Skou (Donohue 2003)

tone melody	monosyllabic	disyllabic	trisyllabic
/H/	H	H-H	H-H-H
/L/	L	L-L	L-L-L
/LH/		L-H	L-H-H
/LHL/		L-HL	L-H-L
/HL/	HL	H-L, HL-L, H-HL	H-H-L, H-HL-L, H-H-HL

Donohue analyzes Skou as having five underlying tone melodies, which show two interesting properties. First, since Skou does not permit LH rising tones, /LH/ and /LHL/ do not exist on monosyllables. Second, /HL/ shows three different mapping possibilities on bi- and trisyllabic words. Donohue's solution is to indicate the prelinking of /HL/ tones by means of a diacritic accent, as in (10).

(10)   Donohue's solution with diacritic accent to mark prelinking

a.   ˈσ   σ   b.   σ   ˈσ   c.   σ   σ
     H   L   H   L   H   L
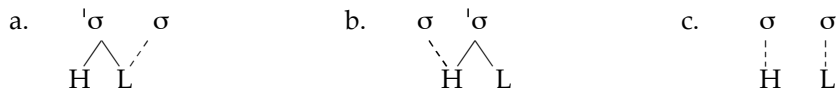
The /HL/ melody prelinks to the accented first syllable in (10a) vs. the accented second syllable in (10b). Where there is no accent, as in (10c), tones link to TBUs on a one-to-one basis.

Donohue (2003:335) states that "an accent is an attractor for tonal units" (cf. Goldsmith 1987). In Skou this accent is limited to either the final or penultimate syllable of a word. As seen in (11), the diacritic is also contrastive on /HL/ monosyllables:

(11)   Monosyllabic /HL/ and /ˈHL/ words are indistinguishable in isolation, but differ in compounding

a.   HL   +   L   [H-L]
     kue   +   ta   →   kúe.tà   'beard'   (cf. kûe 'jaw')
     'jaw'   'hair'

b.   HL   +   L   [HL-L]   (cf. hɔ̂ 'sago')
     ˈhø   +   na   →   hɔ̂.nà   'sago flesh'
     'sago'   'flesh'

The diacritic accent cannot co-occur with /LH/ and /LHL/ melodies because of the prohibition against rising tones or with /H/ and /L/ melodies because it would have no effect (Donohue 2003:336-7).

If it could be shown that Donohue's diacritic marks a potential metrical head, we would have an argument that there is something accentual about the Skou tone system. However, it seems that his "accent" is used only as a diacritic "indication of pitch", as per the definition of tone in (3). The prelinked representations in (10a,b) could have been given without the indicated accents. Alternatively, the same outputs would be obtained if the L were prelinked to the first syllable in (10a), and the H to the second syllable in (10b). The prosodic system of Skou is therefore exclusively tonal, but with an interesting complication in the mapping of /HL/ melody.

5.2.   Pitch-accent

If Skou is strictly tonal, what, then, is a "pitch-accent" system? Several attempts at defining PA assume a syntagmatic accentual component and focus on its different realization from stress-accent:

(12)   Putative realizational differences between PA and SA

   a.   PA has a constant tonal realization

      "In a tonal or pitch-accent system (like Japanese, for instance), in addition to the abstract accent, there is a constant physical property [i.e. a tone] associated with the accent...." (Hyman 1977a:4)

      "Pitch accent languages must satisfy the criterion of having INVARIANT TONAL CONTOURS on accented syllables, since tone is a lexical property. This is not so for pure stress languages,

where the tonal contours of stressed syllables can vary freely, being determined postlexically by the intonational system...." (Hayes 1995:50)

b. SA has more than a tonal realization

"Hypothesis: Stress accent differs phonetically from non-stress [pitch-] accent in that it uses to a greater extent material other than pitch." (Beckman 1986:1)

The above definitions attempt to distinguish PA from SA. It is also necessary to distinguish PA from T, since both employ pitch features at the word level. As stated by Bybee et al (1998:277), "A pitch-accent system is one in which pitch is the primary correlate of prominence and there are significant constraints on the pitch patterns for words...." The classic example of TJ would be a case in point, since the distribution of output H and L tones is highly constrained. However, languages in which tones are sparsely distributed, e.g. one /H/ per word, have also been referred to as having a "restricted tone system" (Voorhoeve 1973, Schadeberg 1973), a point argued specifically for TJ by Meeussen (1972). Since tone systems themselves differ in the degree to which their tones are distributionally restricted, TJ-type PA may simply be a tone system at one end of the restrictedness scale.

The claim of this paper is that pitch-accent is not a coherent notion, rather a "pick and choose" among the properties that characterize prototypical tone vs. stress-accent systems (Hyman 2001a, 2001b: Appendix). Despite vague attempts such as in (12), because there is no single prototype of PA, it is not possible to give an explicit definition of PA as one can for T (3) and SA (5). By PA linguists have generally meant one or more of the following properties:

(13) "PA-like" properties

    a. a system whose underlying prosody is abstractly different from surface realizations
    b. a system which combines tone and stress
    c. a system which has restricted, sparse, or privative tone (e.g. /H/ vs. Ø)

A representative case of (13a) is Tonga, which Meeussen (1963) analyzed with underlying "determinant" vs. "neutral" moras and the following general algorithm: (i) moras occurring between determinant moras are realized H; (ii) all other moras are realized L. While Goldsmith (1984) uses diacritic accents (asterisks) where Meeussen had determinants, Pulleyblank (1986) argued for a strictly tonal analysis with /H/. It should be clear that, as in Skou, these diacritics are "indications of pitch" and not accentual in the SA sense in (5).

The property in (13b) refers to systems which combine tone and stress. The table in (14) categorizes languages which have been claimed to have lexical SA, lexical T, both, or neither (cf. Hyman 1977a, Ladd 1996:156, Fox 2001:265):

(14) Classification of languages according to whether they have SA, T, both, or neither

	+Stress-Accent	-Stress-Accent
+Tone	Ma'ya, Usarufa, Fasu, Serbo-Croatian, Swedish-Norwegian, Ayutla Mixtec...	Yoruba, Igbo, Kuki-Thaadow, Skou... (Tokyo Japanese, Somali, W. Basque...)
-Tone	English, Russian, Turkish, Finnish...	Bella Coola, French, Tamazight, Bengali...

A quick glance at the languages listed in the upper left quadrant will establish that there is no single prosodic type consisting of T+SA. As summarized in (15), coexistent T and SA may have very different relations to each other (Hyman 1977a, van der Hulst & Smith 1988a; van der Hulst 1999a):

(15) A PA type as T+SA is insufficient

    a. {T, SA} : T and SA as independent systems

        e.g. Ma'ya (Remijsen 2001, 2002): /H/ and /LH/ tones occur only on the final syllable, contrasting with Ø; penultimate and final stress contrast on words with final /H/; stress is otherwise final

    b. {T; SA} : SA dependent on T

        e.g. Usarufa (Bee & Glasgow 1962): in words with a pitch drop, stress is assigned to a /H/ or /HL/ preceding a L, else to the first H of an all H word, else to the last L of an all L word

c.   {SA; T} : T dependent on SA

e.g. Fasu (May & Loeweke 1964): /H/ and /L/ contrast only on the stressed syllable; non-stressed syllables are toneless

d.   {SA=T} : T and SA co-dependent systems

e.g. Neo-Štokavian dialect of Serbo-Croatian (Zec 1999): stress is assigned to a pre-/H/ syllable; words without /H/ receive initial stress, which in turn requires a H tone

Turning to the properties in (13c), systems in which tones are sparse, ultimately limited to a single occurrence per word, have often been identified as PA. However, as seen in the top right quadrant in (14), I have interpreted TJ, Somali, and Western Basque as [+T, -SA], They clearly meet the definition in (3) for T. While some of their properties may be reminiscent of SA, they do not meet the definition for SA in (5). Thus, from the point of view of the T vs. SA dichotomy proposed in §3 and §4, they, like Skou and Tonga, are strictly tonal. In §4 we claimed that if a system is SA, it will satisfy OBLHEAD, culminativity and privativity, and it may exhibit additional properties of metrical systems (subordination, demarcation, rhythm). To classify TJ, Somali, Basque etc. as PA represents a reversal of the antecedent and consequence of the condition: If a tone is obligatory, culminative, privative, subordinative, demarcative or rhythmic, then it must be PA (on analogy with SA). Any one of these properties can and has been cited as evidence that some language is "accentual." While these are important and interesting subproperties of prosodic systems, the question is whether any property other than OBLHEAD suffices to characterize a tone as an accent.

Consider, for example, the culminative property. Some alleged PA languages have culminative, but not obligatory underlying accent/tone. As exemplified in (4), in TJ, there is one or no /H/ per word, following which there is a drop to L. In Western Basque, there is similarly one or no /H/ per word, with a drop to L afterwards (Hualde 1991, 1999). In Somali, a word may have a single /H/, which is assigned to the final or penultimate vowel according to morphological rules. Subject nouns and finite verbs in main clauses are toneless (Hyman 1981, Banti 1988, Saeed 1999). In Iraqw, /H/ is assigned mostly by the morphology to the final syllable of some words. However, "the overall majority of nouns are low throughout" (Mous 1993:21). It is significant that these systems, which do not require that every word carry an overt lexical mark, are as easily analyzed in strictly tonal terms—an option which is not available in the case of such SA languages as English, Russian, and so forth.

The condition "if culminative, then accent" is also suspect for the conclusions it forces us to draw concerning non-tonal features. In Cuzco Quechua, a language with penultimate stress, glottalized and aspirated consonants have the properties in (16).

(16)   Culminative glottalized and aspirated consonants in Cuzco Quechua (Parker 1997:2)

a.   root-controlled: occur only in roots, never in suffixes
b.   non-obligatory: occur in some roots, not in all
c.   culminative: may occur only once per root: *T'VT'V, *TʰVTʰV, *T'VTʰV, *TʰVT'V
d.   directional: only occur on first stop of root: T'VTV, TʰVTV *vs.* *TVT'V, *TVTʰV

NB. C' and Cʰ occur only in onset position of the syllable, never in codas

On the basis of its culminative nature and the restriction of glottality to prominent positions (roots, onsets), should one conclude that Cuzco Quechua is a "glottal accent" (GA) language?

A similar example concerning vowel length is seen in Mam (Mayan). As stated by Willard (2004:7), "...only one long vowel is allowed per word. In addition, the presence of a long vowel in a word disallows the presence of a glottalized vowel in the same word...." Willard argues that besides being culminative, Mam vowel length shows dominance effects, another property which is frequently identified with SA. As seen in the examples in (17), a suffix may be dominant or recessive, independent of whether it has a long or short vowel itself:

(17)   Dominant/receive vowel length in Mam

a.   recessive short suffix: /ooq'-b'il/   →   ooq'-b'il   'sth. which causes crying'
b.   recessive long suffix: /b'iitz-oo-/   →   b'iitz-a-   'sing'
c.   dominant short suffix: /q'ooj-leʼn/   →   q'oj-leʼn   'state of fighting'
d.   dominant long suffix: /liich'- ich'iin / →   lich'-ich'iin 'breakable'

When a suffix is recessive, as in (17a,b), length is preserved on the preceding root. If both the recessive suffix and the root have a long vowel, as in (17b), the culminative condition requires that the former be shortened. On the other hand, when a suffix is dominant, as in (17c,d), length is lost on the root. While the shortening seen in (17d) can also be attributed to culminativity, that in (17c) cannot be: the dominant short-vowel suffix imposes a short vowel on the root as well. Should one then talk of a "quantity accent" (QA) in Mam?

An argument mitigating against GA and QA interpretations of Cuzco Quechua and Mam, respectively, is that each language has an independent SA system. Stress is penultimate in Cuzco Quechua, and is assigned in Mam according to the following hierarchy:

(18)   Stress hierarchy in Mam (England 1983, Willard 2004)

      VV >> Vʔ >> VC >> V

   a.   stress a long vowel: a.ˈqʼ<u>uu</u>ntl   'work'
   b.   stress the rightmost syllable closed by a glottal stop: puʔ.ˈl<u>a</u>ʔ   'dipper'
   c.   stress the rightmost syllable closed by a consonant: xpi. ˈch<u>a</u>q   'raccoon'
   d.   stress the penultimate syllable: ˈsp<u>i</u>.kyʼa   'clear'

While length is implicated in stress assignment in Mam, length and stress must be considered two separate systems.

Unless we are to proliferate accents to include GA, QA etc., and allow for languages to have several competing accentual systems at the same time, it should be clear that culminativity is not a sufficient criterion for establishing PA. As we have seen, features other than tone can be culminative, even demarcative. As seen in Cuzco Quechua and Mam, such culminative systems can be independent of SA, and of each other. Thus, culminative H tone and culminative vowel length occur in different positions in phrasal outputs in Chimwiini (Kisseberth 2000). The features of glottality, length and tone can have very stress-like qualities, but crucially not obligatoriness—unless they are in fact implicated in the realization of SA. As far as I know, no language has been reported with two independent obligatory-culminative systems, that is, where every word obligatorily has two of the following properties: SA, PA, GA, QA (others?). The reason for this should be clear: Given the definition of SA in §4, only one system can meet the OBLHEAD requirement or there would be conflicting definitions of the metrical word.

One can easily imagine hypothetical prosodic systems with independent, obligatory SA and PA, e.g. one with penultimate stress and a single obligatory /H/ which can occur on different syllables. In quest of such a system, consider the class of Bantu languages which have been analyzed with privative /H/ vs. Ø tone. A subset of these which have lost the historical *V/*V: opposition are reported to have penultimate SA, realized typically as vowel lengthening (Hyman 1977a, 1989, Odden 1999, Kisseberth & Odden 2003, Downing 2004). A different, smaller subset of /H/ vs. Ø Bantu languages has imposed obligatoriness on the /H/ tone. However, such "restricted tone" systems as found in Kinga (Schadeberg 1973), and Bena (Odden 1988) have kept the vowel length opposition and do not show evidence of penultimate stress. Other languages such as Chimwiini (Kisseberth & Abasheikh 1974) have retained the historical vowel length opposition, underlyingly, but restrict surface long vowels to one per word (or phrase), typically either the penultimate or antepenultimate syllable. In these languages, if there is no underlying long vowel, output vowels will all surface as short. I have to date not found a single Bantu language which has two INDEPENDENT accentual properties in sense of OBLHEAD, e.g. obligatory, culminative /H/ and obligatory, culminative vowel length.[4]

In summary, where languages have been reported to have two accent-like systems, one or both of these fail to meet the OBLHEAD requirement. In Maˈya (§5.2) stress is obligatory and restricted to the final or penultimate syllable. The /H/ and /LH/ tones which are restricted to the final syllable, are culminative, but not obligatory (words may lack tone altogether). In Cherokee (§2), neither T nor the culminative L*H PA are obligatory (words may lack both), and so forth.

---

[4] Gérard Philippson (personal communication) points out that some Makonde dialects which have penultimate lengthening come close to requiring a H on every word. The Comorian language Ngazidja appears to be another case where obligatory /H/ is in the process of being imposed—at least at the phrase level. Whether a metrical account is adopted, as in Cassimjee & Kisseberth (1989), or a tonal domains account, as in Cassimjee & Kisseberth (1998), words do not require both /H/ and SA.

There appear to be two ways to interpret the results thus far. The first, which we have been assuming, would be to impose a Unique Obligatory Head Constraint which would prohibit words from exhibiting more than one obligatory "accentual" property. The second interpretation would be to assert that only SA can meet the OBLHEAD requirement—and therefore, any prosody properties which meets OBLHEAD must be SA by definition. This would include obligatory vowel lengthening and obligatory /H/ tone. Assuming that a word cannot have two SA systems (cf. §6), no language would have two accent-like systems meeting the obligatoriness requirement. Note that this interpretation would have the effect of labeling the obligatory /H/ of languages such as Nubi (Gussenhoven 2006) as SA, thereby conflicting with the observation that they meet the definition of T in (3). This may at first seem to be the result that is called for: Gussenhoven (2006) suggests that the Nubi prosodic system is "pivotal" in that its obligatory one-H-syllable-per-word may be interpreted either as SA or restricted T. However, both Safwa and Kinga clearly exhibit an obligatory one-H-mora-per-word system, as seen in the realization of antepenultimate H tone in (19).[5]

(19) Antepenultimate /H/ in two obligatory-/H/ Bantu languages

a. Safwa (Voorhoeve 1973)		b. Kinga (Schadeberg 1973)	
šílihu	'which one' (cl. 7)	ʊkúheka	'to laugh'
amáfuko	'bags'	ʊkúvala	'to count'
amíina	'holes'	ʊkʊgéenda	'to go'
tuúbale	'let us go'	ʊkʊgeendélela	'to walk around'
bahwiítiha	'they believe'	ʊkʊhwaánana	'to become similar'

In §4 it was required that SA target syllables. Since Safwa and Kinga assign their obligatory /H/ by mora, their obligatory /H/ cannot be SA. As Voorhoeve and Schadeberg propose, they can be appropriately viewed as "restricted tone systems." Their prosodic systems are thus less "pivotal" than Nubi's, showing again that languages "pick and choose" between the prototypical properties of T vs. SA systems. More evidence for this will be seen in the next subsection.

5.3. Rhythmic accent

The definition of SA in (5) refers to obligatory metrical structure. A SA system necessarily identifies an obligatory head syllable for each word. The assumption is that SA languages hierarchize syllables into a metrical word constituent whose most prominent syllable receives primary stress. However, metrical properties not observing OBLHEAD should not be confused with SA. Independent of its head-defining function, metrical phonology has a well-known counting function used to locate or assign phonological properties within a string. This is particularly clear in the case of rhythmic alternations. To show that this counting or rhythmic function need not be an expression of SA, consider the alternation of H tones in Kirundi in (20).

(20) Alternation of H tones in Kirundi (Goldsmith & Sabimana 1986)

-sab- 'ask for'	-báz- 'ask (question)'	
ku-sab-a	ku-báz-a	'to ask' (infinitive)
ku-bi-sab-a	ku-bí-baz-a	-bi- 'them'
ku-bí-mu-sáb-a	ku-bí-mu-báz-a	-mu- '(to) him'
ku-bí-mu-kú-sab-ir-a	ku-bí-mu-kú-bar-iz-a	-ku- '(for) you'
ku-há-bi-mú-ku-sáb-ir-a	ku-há-bi-mú-ku-bár-iz-a	-ha- 'there'

'to ask him (for) them for you there'

As indicated, the verb root -sab- is toneless, as is the infinitive prefix *ku-* and the final inflectional vowel *-a*. The form *ku-bi-sab-a* 'to ask for them' shows that when a single object marker (OM) is present, it too is toneless. It would therefore appear that the /H/ of *-báz-* has undergone anticipatory shifting onto the OM in *ku-bí-baz-a* 'to ask them'. The full pattern of alternating Hs is seen in forms with two or more OMs. From comparative evidence we know that a second (third, fourth) OM carries a /H/ tone. From the Kirundi point of view, however, all that can be said is that combinations of OMs introduce a /H/. The generalization is that if there is at least one /H/, the span consisting of the OMs + verb root will receive a

---

[5] Voorhoeve (1973:1) is non-commital as to whether the H pitch which cooccurs with greater amplitude is a tone or stress.

H on every other mora. As seen, H tone is neither obligatory nor culminative in Kirundi. Thus, while Goldsmith & Sabimana (1986) construct binary s-w feet for the purpose of distributing the H tones, it should be clear that this rhythmic pattern in Kirundi has nothing to do with the definition of SA in (5).[6]

The above illustration raises the question of whether there is a necessary relationship between metrical feet and SA. Two non-canonical prosodic systems which have been covered in the SA stress literature (e.g. Prince 1983, Halle & Vergnaud 1987, Hayes 1995) are Creek "tonal accent" and Seneca "accent", which I consider briefly below.

As described by Haas (1977), Creek /H/ obeys OBLHEAD but not culminativity. Haas points out that "fixed" accents may result in two H tones in the same word, e.g. *náfka:kís* 'they are hitting him'. Otherwise /H/ tones are mostly predictable, as Haas states in (21).

(21)   Predictable "tonal accent" in Creek

   a.   "in any string of L[ight] syllables containing no fixed accents the tonal accent will be placed on the last even-numbered syllable" (p.202): *hicíta* 'one to see one', *ahicitá* 'one to look after, watch one'

   b.   "if the penult is a H[eavy] syllable and the ultima a L[ight] one, the tonal accent will be placed on the penult" (p.203): cá:lo 'trout, bass', *sókcya* 'sack, bag', *ałakkóycka* 'appreciation'

   c.   "However, if the ultima is a H[eavy] syllable, then the placement of the accent is no longer automatic. Instead morphological rules come into play..." (p.204): *hátki:* 'white', *hoktí:* 'woman'

While the distribution is based on metrical principles, both the constant H-tone realization and the violation of culminativity make Creek "tonal accent" different from a prototypical SA system.

The placement of alternating "accent" in Seneca also follows metrical principles. While Chafe (1977, 1996) presents an iambic analysis, the following trochaic account is based on Melinger's (2002) reanalysis:

(22)   Trochaic analysis of Seneca, based on Melinger (2002)

   a.   mark the first syllable extrametrical
   b.   build disyllabic trochees left-to-right
   c.   assign H tones (i) to the initial syllable of each trochee if closed; (ii) to the initial syllable of each trochee if light, but followed by a closed syllable

As indicated, Melinger proposes to mark off the first syllable and build trochees left to right. While she goes on to propose metrical structure above the foot, there does not seem to be a need for a metrical word tree. Instead, as I have indicated in (22c), H tones are assigned to the first (head) syllable of each trochee that contains a closed syllable. As schematized in (23), three out of the four possible combinations of open and closed syllable trochees will result in an initial H tone, while one will result is no H tone being assigned:

(23)   Seneca violates OBLHEAD (Prince 1983, Hayes 1995)

   a.   H on the first syllable   b.   no H tone
        closed-closed: [CV̱C.CVC]   open-open: [CV.CV]
        closed-open: [CV̱C.CV]
        open -closed: [CV̱.CVC]

Examples are given in (24).

(24)   Seneca examples (Melinger 2002)

			OBLHEAD	Culminativity
a.	\<a\> (ge ga) (yéʔ o̱h)	'I'm willing'	+	+
b.	\<de\> (wá geʔ) (nyo da) (géʔ o̱h)	'I'm busy'	+	−
c.	\< de̱\> (ga de) (nye o) de̱ʔ	'I'll put a necktie on'	−	−

---

[6] Re the possibility of "tonal feet", see Leben (2002).

Only the second foot in (24a) has a closed syllable (in fact, two), so the single H assigned to this word satisfies both OBLHEAD and culminativity. In (24b), both the first and third feet contain a closed syllable (the latter, two). Two H tones are therefore assigned in violation of culminativity. The form in (24c), receives no H tone because its footed syllables are all open. (The last, left-over syllable does not get footed.) It therefore violates both OBLHEAD and culminativity.

In his comprehensive and thoughtful survey of accentual phenomena, van der Hulst (1999a:94) states that "...it remains mysterious... why a weight-sensitive accent rule (which assigns accents to syllables rather than moras) cannot produce accents that get a tonal interpretation." Such appears to be what is going on in both Creek and Seneca. In Creek, the assignment of H is sensitive to syllable weight, and in Seneca it is sensitive to open vs. closed syllables. Seneca is unusual not only in targeting closed syllables, but especially in not caring whether the closed syllable is initial or final in its trochee. It is as if Seneca distinguishes heavy vs. light trochees (Wallace Chafe, personal communication).

Having considered Creek and Seneca, we are now in a position to complete the table in (25).

(25) Restricted H tone systems attest all four combinations of obligatoriness and culminativity

	+culminative	-culminative
+obligatory	Kinga	Creek
-obligatory	Somali	Seneca

As indicated, prosodic systems which have been variously referred to as "accent", "pitch-accent" "tonal accent" or "restricted tone" attest all four combinations of obligatorniess and culminativity. Words have exactly one H mora in Kinga. Words may have at most one H mora but can also be toneless in Somali. Words must have one H syllable in Creek, but may have more than one. Finally, words can have one, more than one, or no syllable with H tone in Seneca. While we could give a name to each of these feature combinations, there is no reason to think they are distinct "types". Rather, they simply share one vs. two vs. neither of the properties required of SA but not T. In other words, the fact that we obtain all four feature combinations shows that a hierarchical tree model of prosodic types will not be possible, e.g. where the highest cut is accent vs. tone, based, say, on culminative vs. non-culminative, and then only culminative systems are further broken down into obligatory vs. non-obligatory. We could call all four systems "accent" or "pitch-accent", but how would we capture the intuition that of the four, languages like Kinga, Safwa and Nubi are the most SA-like? My suggestion is that prosodic typology address the properties of SA and T prototypes directly, rather than "classifying" systems by name.[7]

6.   Phonetics

There has been a longstanding tension between typologizing prosodic systems by their linguistic function vs. their phonetic realization (cf. Hyman 1977b:38-40). Phonologists have been mostly concerned with functional or structural properties of prosodic systems. For example, Hayes identifies stress-accent in terms of rhythm: "...in stress languages, every utterance has a rhythmic structure..." (Hayes 1995:8). Non-stress-accent, on the other hand, is often identified in terms of culminativity: "A word may contain several accented morphemes, but only one accent may surface in a word domain" (Hualde 1999:962). The problems discussed in preceding sections have had to do with cases where such notions run into difficulty: not all rhythmic phenomena indicate SA, not all so-called PA languages respect culminativity, etc. We have claimed that the unique defining feature of SA is OBLHEAD, while the unique defining feature of T is "an indication of pitch" at the output of the lexical phonology.

Lost in much of this is the role of phonetics. In (12) I presented some of the views on how SA and PA might be distinguished on the basis of the phonetic realizations: Like T, the realization of PA is primarily pitch, whereas the realization of SA may involve different phonetic features. Attempts to provide a phonetic characterization of prosodic differences are not contradictory, but rather should follow from functional definitions. T is analyzed in terms of phonological features for which one should expect relatively constant phonetic analogues. SA, on the other hand, is an abstract or underlying mental construct (Weinreich 1954:2, Lehiste 1970:150). It should therefore not be surprising if languages and speakers vary in how they realize abstract SA in the output. As instrumental studies have shown, the

---

[7] The table in (25) considers only languages which assign a single feature, here /H/. An expansion of the set would have to include systems where there are two (more?) restricted tones or tonal melodies, e.g. /H/ vs. /L/ in Fasu (May & Loeweke 1964), /H/ vs. /LH/ in Ma'ya (Remijsen 2001, 2002).

phonetic correlates of stress can be quite subtle—even absent on syllables that one "feels" are really stressed. Given this, the functional basis of stress in actual speech may have less to do with aiding the listener to segment words (as is often proposed) than with helping the speaker organize phonetic material for his own purposes.

The above problem becomes particularly acute in cases where there is a question about whether a language has stress at all. Researchers who operate under the assumption that all languages have SA may read stress into the phonetic variations they hear or observe instrumentally. Since many tone systems are adequately described with no mention of SA, I am less inclined to posit SA in non-tonal languages which make it so hard to find evidence of stress., e.g. Bella Coola (§4), some variants of Berber, and a number of languages of Ethiopia and the Indian subcontinent (Hyman 1977b). In other words, we might say: If word-stress is so hard to find, perhaps it is not there at all.[8]

On the other hand, some linguists seem to apply the flip side of this motto: If it sounds like stress, it must be stress! The result has been to posit stress features that are quite different from what we normally think of as SA. Kähler-Meyer (1962:257-8) identifies a "Dehnungsakzent" which lengthens a penultimate vowel in Chasu (Kipare), as in many other Bantu languages (§5.2). The lengthened penult also receives the "Druckakzent" (stress) with one exception: As seen in (26a), a phrase-final L that derives from the /H/ of a /L-H/ sequence instead receives the stress:

(26) Alleged stressed vs. non-stressed final L in Chasu

    a.   /mì-tí/   →   [mì:ˈtì]   'trees'   (cf. [mìtí ˈmí:ŋgì] 'many trees')

    b.   /mì-sì/   →   [ˈmì:sì]   'pestles'

As seen, the two "Akzente" do not line up in (26a), whereas they do in (26b), where the final L from /L/ is not stressed. Whatever the difference is between final ˈL vs. L (which Kähler-Meyer says is hard to hear), it is likely to be a slight difference in the F0 contour, as occurs in Chaga, Rimi, Bemba and elsewhere in Bantu (Hyman 1977a:16-17). Thus, treating final ˈL in terms of stress rather than tone is suspect. It also brings us close to the situation rejected in §5.2 wherein a language would have two different obligatory word-accent systems, here QA and SA.[9]

In other cases, claims of two independent SA systems are also dubious. In the Mixtec dialects/languages stems are generally disyllabic ("couplets"), with stress on their first syllable. Such stem-initial stress often conditions lengthening of the first vowel or second consonant. Certain dialects, however, have been claimed to have potentially two stresses per stem or word. According to E. Pike & Oram (1976), a second unpredictable stress occurs on the second syllable of some, but not all stems in Diuxi Mixtec—specifically on those for which a final *ʔ has been reconstructed. Just as final ˈL in Chasu is suspect, the alleged stem-final stresses in Diuxi have been reanalyzed in terms of tone (Daly 1978).

Another potential case of multiple stresses arises in Ayutla Mixtec. Pankratz & E. Pike (1967), henceforth P&P, analyze Ayutla dialect as having tone-dependent stress, as in (27).

(27) Tone-dependent stress in Ayutla Mixtec (Pankratz & E. Pike 1967; wording from Mortensen 2005)

    Within the stem+suffix domain, stress the leftmost H-toned syllable immediately followed by the L-toned syllable, else stress the leftmost M-toned syllable immediately followed by a L-toned syllable, else stress the leftmost H-toned syllable, else stress the leftmost syllable.

However, as Mortensen (2005:2) points out, "the couplet-initial prominence seems to be a much better candidate for stress than pitch prominence (which isn't present in some [monosyllabic] words and is confounded by the 'allotonic' variations in pitch described by P&P." Assuming that the stem-initial syllable is stressed would account for the preaspiration of voiceless stops and the lengthening of

---

[8] An interesting case pointed out by the editors concerns Indonesian. Whereas Cohn (1989) reported a weight-sensitive, word-level level stress, subsequent acoustic studies and experiments by van Zanten & van Heuven (1998) and van Zanten, Goedemans & Pacilly (2003) have shown that the language only has intonational "pitch-accents", realized near the right edge of the phrase.

[9] The prohibition in question concerns two obligatory word-level accentual systems. Kähler-Meyer's accentual indications suggest that both penultimate lengthening and final H → L take place phrase-finally.

sonorants when occuring in the second consonant position of CVCV stems. It also would explain why /k/, /č/ and /v/ undergo optional weakening in post-stem, but not stem-internal position. The tone-dependent stress algorithm in (27) often results in stress coinciding with the first stem syllable. Where it doesn't (e.g. L-H stems, L-L stems + H suffix), it is not clear that stress is involved at all. What would be convincing would be if the second-consonant effects were absent in the case of L-ˈH stems and if the suffix C were instead preaspirated or lengthened if L-ˈH stems were followed by a L suffix. If we were to posit both P&P's tone-dependent stress AND stem-initial stress, we would still have to choose between two interpretations. The first—and undesirable—one would be that a word could have two stresses, i.e. ˈL-ˈH, ˈL-L+ˈH. The second is that stress is initially assigned stem-initially, where it conditions the post-stress consonant effects, but is subsequently attracted away when the most prominent tone is found later in the stem+suffix domain.[10] As Mortensen suggests, it seems more likely that P&P's tone-dependent stress is simply phonetic pitch prominence.[11]

The logical endpoint of a system claimed to have multiple stress would be one where stress fulfills the same distinctive function as segmental and tonal features. Gilley (2004:100) has recently claimed that "...stress in Nilotic is privative, a feature with binary opposition.... a word may be stressed or not. The stress in itself may function as a morpheme in some cases and stress may occur on any of the three level tones." Examples from Shilluk are seen in (28).

(28)   Alleged distinctive stress in Shilluk

	singular	plural			singular	plural	
a.	ˈdít	diê̠t	'bird'	b.	álà̠t	áˈlè̠t	'cloth'
	ˈt̠òok	t̠óòk	'mouth'		péèm	ˈpèém	'chest'

In (28a) singulars are said to be stressed, while in (28b) the plurals are stressed. As seen in the first example of each set, the presence vs. absence of stress may also be accompanied by segmental changes. There are, however, at least four reasons why this is not stress in the usual sense. First, a word can lack stress in violation of OBLHEAD. Second, a word can have more than one stress, in violation of culminativity, e.g. á-ˈcámmꜜ-ˈá (PST:E-eat:AM:R-1sg). Third, the phonetic effect on vowel length is the opposite of what one expects: "Phonetically, stress in these Nilotic languages is characterized by a shortening of vowel length, and by an increased intensity or level of force on the syllable." (Gilley 2004:117). Finally, native speakers consider the "unstressed" syllables to be the marked member of the opposition. This correlates with the apparent historical origin of the opposition: "...suffixes were lost, but the timing unit of the suffix remained and was incorporated into the root... This analysis concludes that the normal unmarked form is the shorter or 'stressed' word" (Gilley 2004:111). As in the case of the

---

[10] If the disyllabic stem (couplet) = a foot, preaspiration and lengthening could be interpreted as strictly foot-based processes. Tone-dependent stress, on other hand, is assigned within the stem+suffix domain. A general issue not addressed in the present study is how to interpret positionally-restricted distributions and realizations. For example, in a number of Northwest Bantu languages, Bantoid, and Cross-River languages, voiceless stops are found only stem-initially (Hyman 1990; in press), e.g. Koyo /ɔ̀-tétɔ́/, /è-kúkí/ → ɔ̀-térɔ́ 'basket', è-kúgí 'door'. While such phenomena are occasionally cited as evidence for stem-initial accent, it is significant that reduplications typically produce exceptions (e.g. ɔ̀-tétɛ́ 'spark', ì-kákàní 'legend'). Whether one treats these latter as having two stems with initial consonant correspondence or by some other means, if voicelessness = accent, then these words would have two (demarcative) accents. SA can have such effects, but I do not take the presence of such effects to unambiguously indicate accent.

[11] There has an increasing number of instrumental investigations into the realization of stress in tone languages (e.g. Remijsen & van Heuven 2005 study the realization of stress in Curaçao Papiamentu which also has a privative tone contrast). In some reports of non-restricted tone systems with tone-dependent stress describe the phonetic effects of stress in impressionistic terms, or, as in the case of the alleged SA system in Usarufa summarized in (15b), do not indicate the effects or realization of stress at all. What is typically missing is PHONOLOGICAL evidence. It would be impressive, for example, if the alleged stressed syllable of Usarufa provided the reference point for building iterative stress-feet, or if it constituted the locus for categorical segmental rules, e.g. a stressed onset stop is aspirated, a post-stress consonant is geminated, a stressed mid vowel is diphthongized etc. While I have long been skeptical, if SA can be assigned as claimed in Usarufa, Ayutla Mixtec, and many more non-restricted tone systems, such phonological evidence should be forthcoming.

alleged "multiple stresses" of Campa (K. Pike & Kindberg 1956, E. Pike 1974), the distinctive syllable properties in question should not be identified with SA.

Most of the discussion in this section has concerned claims of stress in languages which have unrestricted tone systems. As expressed in the binary typological distinction between SA and T in (1a), it was once thought that stress and tone were two mutually exclusive prosodic systems: Since F0 is an important phonetic factor in the realization of SA, it seemed reasonable to assume that a language in which tonal oppositions are realized solely in terms of F0 would not be able to support an independent SA system. While we now know that this is false, the question still remains as to whether SA has access to the same range of phonetic exponents in languages with vs. without T. In fact, there is some reason to think that SA may have different properties when cooccurring with T. A case in point is Pirahã (Everett 1998), which, based on the hierarchy in (30), assigns stress to the heaviest syllable within a final three-syllable window:

(30)   Unusual syllable weight hierarchy in Pirahã

        CVV >> GVV >> VV >> CV >> GV   (C = voiceless, G = voiced)

As expected, long vowels are heavier than short vowels. Not expected, however, is that onsets contribute to syllable weight—and that voiceless onsets attract stress over voiced onsets. Reminiscent of Shilluk, Everett (1998:114) finds that "the vowels of unstressed syllables have a significantly greater duration than the vowels of stressed syllables". However, this may be a compensatory adjustment to the fact that onsets are significantly lengthened under stress: "The primary acoustics of stress in Pirahã are amplitude and duration. The vowels of stressed syllables have significantly greater amplitude. In addition, stressed syllables have a significantly greater duration. The greater duration of stressed syllables is the result of the greater duration of the onsets of stressed syllables. Finally, the F0 and formant frequencies of F1 and F2 were not significantly different in the vowels of the stressed and unstressed syllables" (Everett 1998:121). These findings are important because they suggest that the phonetic realization of SA may indeed be partly determined by the phonological inventory of a language. Pirahã has T and contrasting vowel length, placing a damper on both F0 and vowel duration as ideal phonetic cues of SA. Instead, onsets not only attract stress, but also undergo significant modification, e.g. increase in length, when occurring under stress. It thus seems that an alternative to resisting SA in a language with T is to incorporate SA in a way that minimizes interference with the relevant tone (and length) contrasts.[12]

7.   Conclusion

This paper has dealt with various aspects of word-prosodic typology. I began with a quotation from Greenberg & Kaschube (1976:9). Stress, they said, is "monarchic": A monarchy must have one and only one king or queen. This corresponds to OBLHEAD, a definitional requirement placed on SA. At the other end, tone is "democratic": in a non-restricted tone system, there can be more than one H tone per word. Although I have not treated length separately in this study, Greenberg & Kaschube give it the intermediate characterization "oligarchic", as (vowel) length can be culminative, restricted to one occurrence per word (cf. Mam in §5.2). Their—and my characterizations have focused on structural and functional aspects of word prosody. As implied in §6, it is also possible to typologize on the basis of "substance", e.g. How is SA realized in different languages? What role does F0 play in different languages? The variety and overlap of phonetic realizations no doubt contribute to the difficulties characterizing the study of prosody. As Odden (1999:189) puts it:

> "Modern phonological theory is grounded in the idea that the categories of phonological analysis are phonetically based, and therefore if a language is analyzed as making active use of a given feature, it is assumed that this feature has a certain element of phonetic reality. Thus, for example, the opposition between [u] and [ɨ] would be accounted for in terms of rounding, and never nasalization, since linguists have shared assumptions about the phonetic meaning of 'rounding' vs. 'nasalization'. The question is whether there is ever any hope of being able to hear a difference between tone and stress: the answer seems to be that there is not."

A major problem, therefore, is that one cannot go directly from the phonetic signal to the phonological analysis. By following well-established methods, linguists will in most cases be ultimately convinced as to whether a SURFACE contrast should be characterized in terms of F0 or something else. However, this is

---

[12] For more discussion of languages with onset-sensitive stress placement, see Gordon (2005).

only the beginning: We must now characterize the system UNDERLYING the surface contrast. Should Odden's [u] vs. [ɨ] be analyzed as /u/ vs. /ɨ/, /u/ vs. /V/, or /ɨ/ʷ vs. /ɨ/? In other words, does the phonetic difference in rounding correspond to an opposition which is binary ([±round]), privative (Round vs. Ø), or prosodic (ʷ vs. Ø)? Similarly, should a [H-L] sequence be analyzed as /H-L/, /H-Ø/ or /Ø-Ø/ᴴᴸ? Or should it be analyzed as (s-w), (*-˚) etc.? Maybe there are more possibilities and more ambiguities in the area of prosodic systems, but, to my knowledge, this has not been demonstrated. Instead, I contend that the lack of clarity and the controversy that seem sometimes evident in the identification of word-prosodic systems, can be overcome by applying the same methods of analysis and argumentation to prosody that routinely apply to segmental phonology.

The history of word-prosodic typology has been characterized by vagueness, disagreement, and yet great conviction on the part of different scholars. In this study I have not cited every past proposal nor considered every logical possibility. I have proposed that the most significant typological cut concerns prosodic systems which do vs. do not satisfy the OBLHEAD property. Aside from a few ambiguous systems such as Kinga and Nubi, this separates SA systems from the rest (whether they cooccur with tone or not). A reviewer has, however, pointed out that a different result would obtain if the culminative property provided the first cut. Accent systems would be those which meet the culminative requirement, further differentiated into those which satisfy OBLHEAD (SA) vs. those which do not (PA). The result is the tripartite typology (1c) which I rejected: SA and PA satisfy culminativity while PA and T satisfy the tonal definition given in (3). Under this scheme, as the reviewer further points out, Kinga and Safwa would have SA despite the fact that they count moras rather than syllables in assigning H tones. Tokyo Japanese would have PA, while Creek and Seneca become non-accentual tone systems even though their H tones are assigned by metrical principles. There are of course many more ways to taxonomize prosodic systems, some of which are not entirely counter-intuitive (e.g. by whether prosodic oppositions are unary, binary or involve multiple features, whether they are fixed vs. free, and so forth). However, I would argue that the "deepest" typological cuts should be based on properties which make the strongest predictions about the systems in question. As was seen in §4, the OBLHEAD property is a very restricted one in that it does not apply to features, rather to structure. It predicts that stressless major category words will never occur in a SA language, which also will never require that a second phonological property occur on all words (e.g. H tone, vowel length, glottalization, aspiration). It also turns out that all SA systems assign prosody to syllables rather than moras. However, in §5.2 we saw that the notion of culminativity has not been not been restricted to a culmination of structure, but has in addition been applied to various prosodic and non-prosodic features. Under the reviewer's proposal, Cuzco Quechua which allows only one glottalized or aspirated consonant per word, presumably has a "glottal accent". Consider also the Bantu language Punu, which has the five underlying vowels /i, ɛ, u, ɔ, a/, but restricts /ɛ, ɔ/ to the first root syllable (Kwenzi Mikala 1980, Fontaney 1980). Since a word has at most one /ɛ/ or /ɔ/, mid vowel height has the culminative property. However, would we want to say that Punu has a "mid accent"? We avoid all these problems if we start with the OBLHEAD property: Punu does not require every word to have a mid vowel any more than Cuzco Quechua requires every word to have a glottalized or aspirated consonant. Such systems, I would claim, do not exist. Concerning word-prosodic systems, the primary typological questions are whether a prosodic system has tone ("an indication of pitch enters into the lexical realization of at least some morphemes") and/or stress-accent ("every lexical word has AT LEAST one syllable marked for the highest degree of metrical prominence").

In both segmental and prosodic phonology there is a paradox concerning the role of theory. On the one hand theory is absolutely essential in doing typology—which, recall from §2, does not simply aim to establish inventories that vary across languages. On the other hand, we need to extract away from the particulars of theories and "normalize" the data to be sure that our typologies are based on the properties of prosodic systems rather than the interpretations given to them by different analysts—or by even the same analyst on different occasions. Finally, theory/typology should be based on as complete a range of what is (potentially) attested in languages as possible. As stated by Hayes (1995:403): "Phonological studies, which have access to perhaps the greatest breadth of language data, have shown that individual languages may develop an amazing variety of rich and idiosyncratic formal systems. Only broad typological work can establish which traits are properties of Language, and which are properties of individual languages." Lehiste (1970) once observed that "...a certain degree of vagueness seems to characterize most discussions of prosodic features." We have learned a lot since 1970, and although I hope that the above proposals will help clarify some of the complexities facing word-prosodic typology, there is much more to discover!

References

Bagemihl, Bruce. 1991. Syllable structure in Bella Coola. *Linguistic Inquiry* 22.589-646.

Banti, Giorgio. 1988. Two Cushitic systems: Somali and Oromo nouns. In van der Hulst & Smith, 11-50.

Beckman, Mary E. 1986. *Stress and non-stress accent*. Dordrecht: Foris Publications.

Bee, Darlene & Kathleen Barker Glasgow. 1962. Usarufa tone and segmental phonology. In James C. Dean (ed.), *Studies in New Guinea linguistics*, 111-27. *Oceania Linguistic Monographs* 6. Sydney: University of Sydney.

Bybee, Joan L., Paromita Chakraborti, Dagmar Jung, and Joanne Scheibman. 1998. Prosody and segmental effect: some paths of evolution for word stress. *Studies in Language* 22.267-314.

Cassimjee, Farida & Charles W. Kisseberth. 1989. Shingazidja nominal accent. Studies in the Linguistic Sciences 19.33-61.

Cassimjee, Farida & Charles W. Kisseberth. 1998. Optimal domains theory and Bantu tonology: a case study from Isixhosa and Shingazidja. In Larry M. Hyman & Charles W. Kisseberth (eds), *Theoretical aspects of Bantu tone*, 33-132. Stanford: CSLI.

Chafe, Wallace L. 1977. Accent and related phenomena in the five nations Iroquois languages. In Hyman (ed.), 169-181.

Chafe, Wallace L. 1996. Sketch of Seneca: an Iroquian language. *Handbook of American Indian Linguistic*s, vol. 17, 551-579. Washington DC: Smithsonian Institution.

Clements, G.N. & John Goldsmith. 1984. Introduction. *Autosegmental studies in Bantu tone*, 1-18. Dordrecht: Foris Publications.

Cohn, Abigail. 19989. Stress in Indonesian and bracketing paradoxes. *Natural Language & Linguistic Theory* 7.167-216.

Daly, John P. 1978. Notes on Diuxi Mixtec tone. W*ork Papers of the Summer Institute of Linguistics*, University of North Dakota, 22: 98-113.

Dobrovolsky, Michael. 1999. The phonetics of Chuvash stress: implications for phonology. *Proceedings of the 14th International Congress of Phonetic Sciences* 1.539-542.

Donohue, Mark. 1999. *A grammar of Tukang Besi*. Berlin: Mouton de Gruyter.

Donohue, Mark. 2003. The tonal system of Skou, New Guinea. In Shigeki Kaji (ed.), *Cross-linguistic studies of tonal phenomena*, 329-364. Tokyo: ILCAA.

Downing, Laura J. 2004. What African languages tell us about accent typology. *ZAS Papers in Linguistics* 37.101-136.

England, Nora C. 1983. *A grammar of Mam, a Mayan language*. Austin: University of Texas Press.

Everett, Keren Madora. 1998. The acoustic correlates of stress in Pirahã. *Journal of Amazonian Languages* 1.104-162.

Fontaney, L. 1980. Le verbe. In F. Nsuka-Nkutsi (ed.), *Eléments de description du punu*, 51-114. CRLS, Université Lyon II.Fox, Anthony. 2000. *Prosodic features and prosodic structure*. Oxford University Press.

Garde, Paul. 1967. *L'Accent*. Paris: Presses Universitaires de France.

Gilley, Leoma. 2004. The feature of stress in Nilotic. In Rose-Juliet Anyanwu (ed.), *Stress and tone: the African experience. Frankfurter Afrikanistische Blätter* 15.99-120.

Goldsmith, John. 1984. Tone and accent in Tonga. In G. N. Clements & John Goldsmith (eds), *Autosegmental studies in Bantu tone*, 19-51. Dordrecht: Foris.

Goldsmith, John & Firmard Sabimana. 1986. The Kirundi Verb. In Francis Jouannet (ed.), *Modèles en tonologie*, 19-62. Paris: Editions du CNRS.

Goldsmith, John. 1987. Tone and accent and getting the two together. *Berkeley Linguistic Society* 13.88-104.

Good, Jeff. 2004. Tone and accent in Saramaccan: Charting a deep split in the phonology of a language. *Lingua* 114.575-619.

Gordon, Matthew. 2005. A Perceptually-Driven Account of Onset-Sensitive Stress. *Natural Language & Linguistic Theory* 23.595 - 653.

Greenberg, Joseph H. 1974. *Language typology: A historical and analytic overview*. The Hague: Mouton.

Greenberg, Joseph H. & Dorothea Kaschube. 1976. Word prosodic systems: a preliminary report. *Working Papers on Language Universals* 20.1-18.

Gussenhoven, Carlos. 2005. *The phonology of tone and intonation*. Cambridge University Press.

Gussenhoven, Carlos. 2006. The prosody of Nubi between stress and tone. *Phonology* (this volume).

Haas, Mary R. 1977. Tonal accent in Creek. In Hyman (ed.), 195-208.

Hagège, Claude. 1992. Morphological typology. *Oxford International Encyclopedia of Linguistics*, vol. 3, 7-8.

Halle, Morris & Jean-Roger Vergnaud. 1987. *An essay on stress*. Cambridge, MA: MIT Press.

Haraguchi, Shoshuke. 1979. *The tone pattern of Japanese: an autosegmental theory of tonology*. Tokyo: Kaitakusha.

Hayes, Bruce 1995a. *Metrical stress theory: Principles and case studies*. University of Chicago Press.

Hualde, José I. 1991. *Basque phonology*. London: Routledge.

Hualde, José I. 1999. Basque accentuation. In van der Hulst, 947-993.

Hulst, Harry van der. 1999a. Word accent. In van der Hulst, 3-115.

Hulst, Harry van der (ed.). 1999b. *Word prosodic systems in the languages of Europe*. Berlin: Mouton de Gruyter.

Hulst, Harry van der & Norval Smith. 1988a. Introduction. In van der Hulst & Smith, ix-xxiv.

Hulst, Harry van der & Norval Smith (eds). 1988b. *Autosegmental studies on pitch accent*. Dordrecht: Foris.

Hyman, Larry M. 1977a. Tone and/or accent. In D.J. Napoli (ed.), *Elements of tone, stress and intonation*. Washington: Georgetown University Press. 1-20.

Hyman, Larry M. 1977b. The nature of linguistic stress. In Hyman (ed.), 37-82.

Hyman, Larry M. (ed.). 1977c. *Studies in stress and accent*. Southern California Occasional Papers in Linguistics 4.

Hyman, Larry M. 1981. Tonal accent in Somali. *Studies in African Linguistics* 12.169-203.

Hyman, Larry M. 1985. *A theory of phonological weight*. Dordrecht: Foris. Reprinting (2003) with an introduction. Stanford: CSLI.

Hyman, Larry M. 1989. Accent in Bantu: an appraisal. *Studies in the Linguistic Sciences* 19.115-134.

Hyman, Larry M. 1990. Non-exhaustive syllabification: evidence from Nigeria and Cameroon. In *Papers from the Parasession on the Syllable in Phonetics and Phonology. Chicago Linguistic Society* 26.175-195.

Hyman, Larry M. 2001a. Tone systems. In Martin Haspelmath et al (eds), *Language typology and language universals: An international Handbook*, vol. 2, 1367-1380. Berlin & New York: Walter de Gruyter.

Hyman, Larry M. 2001b. Privative tone in Bantu. In Shigeki Kaji (ed.), *Cross-linguistic studies of tonal phenomena*, 237-257. Tokyo: Institute for the Study of Languages and Cultures.

Hyman, Larry M. In press. Directional asymmetries in the morphology and phonology of words, with special reference to Bantu. *Linguistics* 45.

Johnson, Keith. 2005. Tone and pitch accent in Cherokee nouns. UC Berkeley Phonology Lab Annual Reports. http://linguistics.berkeley.edu/phonlab/annual_report/2005/JPhon_Cherokee.pdf

Kähler-Meyer, E. 1962. Studien zur tonalen Struktur der Bantusprachen. II. Chasu. *Afrika und Übersee* 46.250-295.

Kisseberth, Charles W. 2000. The phonology-syntax interface: Chimwiini revisited. Ms.

Kisseberth, Charles W. & Mohammad Imam Abasheikh. 1974. Vowel length in ChiMwi:ni: A case study of the role of grammar in phonology. In A. Bruck et al (eds), *Papers from the Parasession on Natural Phonology*, 193-209. Chicago Linguistic Society.

Kisseberth, Charles W. & David Odden. 2003. Tone. In Derek Nurse & Gérard Philippson (eds), The Bantu languages, 59-70. London: Routledge.

Kwenzi Mikala, J. 1980. Esquisse phonologique du punu. In F. Nsuka-Nkutsi (ed.), *Eléments de description du punu*, 7-18. CRLS, Université Lyon II.

Ladd, D. Robert. 1996. *Intonational phonology*. Cambridge University Press.

Leben, William R. 2002. Tonal feet. In Ulrike Gut & Dafydd Gibbon (eds), *Typology of African prosodic systems*, 27-40. Bielefeld Occasional Papers in Typology 1. Universität Bielefeld.

Lehiste, Ilse. 1970. *Suprasegmentals*. Cambridge, MA: MIT Press.

Martinet, André. 1960. *Eléments de grammaire générale*. Paris.

May, Jean & Loeweke, Eunice. 1964. "The phonological hierarchy in Fasu". *Anthropological Linguistics* 7.5: 89-97.

Mazaudon, Martine. 2005. On tone in Tamang and neighbouring languages: synchrony and diachrony. In Shigeki Kaji (ed.), Proceedings of the Symposium Cross-linguistic Studies of Tonal Phenomena. Historical development: Tone-syntax interface, and descriptive studies, ILCAA, Dec. 14-16 2004. Tokyo University of foreign Studies.

McCarthy, John. J. 2002. *A thematic guide to optimality theory*. Cambridge: CUP.

McCawley, James D. 1970. Some tonal systems that come close to being pitch accent systems but don't quite make it. *Chicago Linguistic Society* 6.526-531.

McCawley, James D. 1978. What is a tone language? In Victoria Fromkin (ed.), *Tone: a linguistic survey*: 113-131.

Meeussen, A. E. 1963. Morphotonology of the Tonga verb. *Journal of African Languages* 2.72-92.

Meeussen, A. E. 1972. Japanese accentuation as a restricted tone system. *Papers in Japanese Linguistics* 1.267-270.

Melinger, Alissa. 2002. Foot structure and accent in Seneca. IJAL 68.287-315.

Mortensen, David. 2005. Ayutla Mixtec tone. Handout from seminar presentation, April 28, 2005.

Mous, Maarten. 1993. *A grammar of Iraqw*. Hamburg: Helmut Buske Verlag.

Newman, Stanley. 1947. Bella Coola I: Phonology. *IJAL* 13.129-134.

Odden, David. 1988. Predictable tone systems in Bantu. In Harry van der Hulst & Norval Smith (eds), *Autosegmental studies on pitch accent*, 225-251. Dordrecht: Foris.

Odden, David. 1999. Typological issues in tone and stress in Bantu. In Shigeki Kaji (ed.), *Cross-linguistic studies in tonogenesis, typology, and related topics*, 187-215. Tokyo University of Foreign Studies: Institute for the Study of Languages and Cultures.

Parker, Steve. 1997. An OT account of laryngealization in Cuzco Quechua. *Work Papers of the Summer Institute of Linguistics*, University of North Dakota, 41.1-11.

Pierrehumbert, Janet B. & Mary E. Beckman. 1988. *Japanese tone structure*. Cambridge, MA: MIT Press.

Pike, Eunice V. 1974. A multiple stress system versus a tone system. *International Journal of American Linguistics* 40.169-175.

Pike, Eunice V. & Joy Oram. 1976. Stress and tone in the phonology of Diuxi Mixtec. *Phonetica* 33.321-333.

Pike, Kenneth L. & Willard Kindberg. 1956. A problem in multiple stresses. *Word* 12.415-428.

Poser, William. 1984. *The phonetics and phonology of tone and intonation in Japanese*. Doctoral dissertation, MIT.

Prince, Alan. 1983. Relating to the grid. *Linguistic Inquiry* 14.19-100.

Pulleyblank, Douglas. 1986. *Tone in lexical phonology*. Dordrecht: Reidel.

Remijsen, Bert. 2001. *Word-prosodic systems of Raja Ampat languages*. Doctoral dissertation, LOT.

Remijsen, Bert. 2002. Lexically contrastive stress accent and lexical tone in Ma'ya. In Carlos Gussenhoven & Natasha Warner (eds), *Laboratory Phonology 7*, 585-614. Berlin: Mouton de Gruyter.

Remijsen, Bert & Vincent J. van Heuven. 2005. Stress, tone and discourse prominence in the Curaçao dialect of Papiamentu. *Phonology* 22(2).

Saeed, John. 1999. *Somali*. Amsterdam: John Benjamins.

Salmons, Joe. 1992. *Accentual change & language contact*. Stanford University Press.

Schadeberg, Thilo C. 1973. Kinga: a restricted tone language. *Studies in African Linguistics* 4.23-48.

Vajda, Edward. 2001. Posted at: http://pandora.cii.wwu.edu/vajda/ling201/test2materials/Phonology3.htm.

Voorhoeve, Jan. 1973. Safwa as restricted tone system. *Studies in African Linguistics* 4.1-22.

Weinrich, Uriel. 1954. Stress and word structure in Yiddish. In Uriel Weinrich (ed.), *The field of Yiddish: Studies in Yiddish language, folklore and literature*, 1-27. New York: Linguistic Circle of New York.

Welmers, William E. 1959. "Tonemics, morphotonemics, and tonal morphemes". *General Linguistics* 4: 1-9.

Welmers, William E. 1973. *African language structures*. Berkeley: University of California Press.

Willard, E. Rainbow. 2004. Dominance effects in a dialect of Mam Maya. Ms. University of California, Berkeley.

Zanten, Ellen van, Rob Goedemans & Jos Pacilly. 2003. The status of word stress in Indonesian. In Jeroen van de Weijer, Vincent J. van Heuven & Harry van der Hulst (eds), *The phonological spectrum*, vol. 2, 151-175.

Zanten, Ellen van & Vincent J. van Heuven. 1998. Word stress in Indonesian: its communicative relevance. 154(1). 's-Gravenhage: M. Nijhoff

Zec, Draga. 1999. Footed tones and tonal feet: rhythmic constituency in a pitch-accent language. *Phonology* 16.225-264.