**In Defense of Prosodic Typology: A Response to Beckman & Venditti**

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ABSTRACT

In two recent handbook articles, Beckman & Venditti (2010, 2011) present overviews of tone and intonation which take issue both with traditional typology and with recent attempts to bring clarity to the rather confused study of prosodic typology. In the course of their coverage B&V question the "usefulness" of distinguishing prosodic systems by "tonemic function alone" (e.g. lexical tone, stress, intonation) and raise the question "Is typology needed?" Although citing Hyman (2001a, 2006, 2011), they at times attribute positions to me that are the exact opposite of what I have been arguing for decades. Within this context I once again argue for a "property-driven" approach to prosodic typology whose goal is not to classify LANGUAGES into prosodic types, rather to accurately characterize the same vs. different ways in which prosodic PROPERTIES are exploited. We thus ask (i) whether a given language has word-level contrastive pitch ("tone"), word-level metrical structure ("stress"), both, or neither; (ii) if yes, what does the prosodic system do with the tones and/or stress, both at the word level and postlexically? Given the level-ordered nature of phonological systems, only after the first two questions are dealt with can we move on to the the question with which B&V are most concerned: (iii) how are the surface or output word-prosodic properties integrated with phrase- and utterance-level intonation? While B&V question the usefulness of "broad-stroke typologies" which have traditionally distinguished tone, stress and intonation, their disposition to minimize systemic differences in favor of surface comparisons of phonetic realizations raises important questions concerning levels of representation and the nature of phonological typology itself.

> *What's in a name? That which we call a tone by any other name would sound as sweet.*
> —William Shakespeare

## 1. Introduction

In the second editions of the Blackwell *Handbook of Phonetic Science*s (2010) and *Handbook of Phonological Theory* (2011), respective chapters on "Tone and Intonation" and "Intonation" by Mary E. Beckman and Jennifer J. Venditti consider recent proposals in the area of prosodic typology. Stating that they disagree with such works as Hyman (2001a, 2006, 2011), which they cite, Beckman & Venditti (henceforth, B&V) arrive at the following rather surprising conclusion:

(1)   There is no useful classification of prosodic types that falls out from the classification of languages in terms of tonemic function alone. (B&V 2011:531)

By "tonemic function" B&V are referring to traditional typologies which distinguish word-prosodic systems with contrastive pitch ("tone") and/or metrical structure ("stress"), with some scholars also recognizing a third "pitch-accent" type. Although the statement in (1) seems to question the whole enterprise of prosodic typology (as I will further document below), it seems to be in partial conflict with the overlapping statements in (2) and (3).

　
(2)   The difference that is deemed critical in these broad-stroke typologies is a distinction between the tonemic function of lexical contrast and everything else—between languages such as Cantonese... and languages such as English.... This is a useful distinction, because it predicts that there would be sharp differences in native speakers' and linguists' metalinguistic awareness of the tone count.... However, contra Hyman (2001a, 2006), we do not see that it correlates neatly with all of the other distinctions that could be made on the basis of the functions outlined in sections 4.2 and 4.3. (B&V 2010:642-3)

(3)   This is a useful distinction, because it predicts that there would be sharp differences in native speakers' and linguists' metalinguistic awareness of the tone count.... However, contra Hyman (2006) we do not see that it correlates neatly with all of the other distinctions that could be made on the basis of the functions outlined in Sections 5.2 and 5.3. That is we can appreciate the difference in ease of counting tones in Putonghua versus English that falls out from the fact that a L+H that is anchored to a stressed syllable in Putonghua is a toneme whereas a L+H* that is anchored to a stressed syllable in English is a pragmatic morpheme. But this difference does not change the fact that these two languages are far more like each other in many other respects than either is to a language such as Japanese. There is no useful classification of prosodic types that falls out from the classification of languages in terms of the tonemic function alone. (B&V 2011:531)

According to (1) such classifications are not "useful". According to (2) and (3) they ARE useful in making predictions about metalinguistic awareness. The alleged problem is that the tone vs. stress dichotomy cannot account for the claim that Putonghua (PRC Standard Chinese), a language with four contrastive lexical tones, is more like English, a language where "the tones are pragmatic morphemes" (B&V 2010:642), than either is like Japanese, which has at most one HL or H*+L lexical "pitch-accent" per accentual phrase (Beckman & Pierrehumbert 1986:260).

The statements in (1)-(3) are characteristic of the sharp differences expressed by B&V vs. several articles of mine, which they repeatedly cite as representing previous prosodic typologies:

(4)   Although we have singled out Hyman (2006) as representative of the broad-stroke typologies, we could have cited any of many other papers that assume that other prosodic differences naturally fall out from the difference between using tone 'to make semantic distinctions' and using it 'to add functional meaning.' (B&V 2010:642)

Interpreting these statements requires quite an enterprise in itself, as multiple assumptions and issues are often packed into a single phrase—even a single word. For example, to whom or for what purpose does the word "useful" refer in (1)? The authors mention the apparent psycholinguistic usefulness in (2) and (3), but do not raise the question of whether the distinction between word-level tone vs. stress is useful for other goals, e.g. accounting for the structural properties of phonological systems (and their interface with morphology and syntax), predicting the effects that stress (but not tone) can have on segments, tracing linguistic change, conducting field work on understudied and endangered languages (their chapters are largely limited to well-studied languages such as English, Cantonese, Mandarin, and Japanese), and so forth.

It is clear that there are lots of reasons why it is essential to distinguish tone from stress, and ultimately intonation. As I will further discuss below, the goals of the two B&V chapters

which receive the most attention are (i) how to do a symbol mark-up of surface tonal targets (answer: in terms of Hs and Ls) and (ii) how to relate these surface targets to the observed physical realizations (answer: in terms of pitch tracks, admittedly "only a first-pass phonetic representation" (B&V 2011:494)). The above statements thus generally relate to this goal: As long as the right Hs and Ls have been assigned, (1) and (3) imply that it doesn't matter how they got there. (2) and (3) say that similarities in surface representations, e.g. L+H and L+H* in Putonghua and English, respectively, are more significant than other similaries, e.g. that Putonghua and Tokyo Japanese require some indication of pitch in lexical entries. Statement (4) is rather puzzling since there have been many claims of "other prosodic differences" than "tone count" which fall out from whether a language has word-level tone, stress, both or neither. For example, the stress properties (metrical structure) of a syllable are far more likely to affect whether it will undergo phonetic lengthening vs. shortening than the presence or absence of a H or L tone. Neutralizations such as English flapping are much more likely to be sensitive to metrical structure (stress) than to tone. This very point is elsewhere recognized by B&V (2010:639, 2011:528-9) who contrast the reduction effects that accompany Putonghua "neutral tone" syllables, which are stressless (metrically weak), with high vowel devoicing in Japanese and Korean which is not sensitive to H vs. L—which in turn are not manifestations of metrical stress-accent. The not "useful" distinction of the tone ≠ stress typology referred to in (1) and (4) seems to mean that it cannot predict the similarity of Putonghua L+H and English L+H*, which most phonologists would find rather superficial compared to the deep differences between the two prosodic systems. Thus consider what Gussenhoven (2007:256) says about the surface similarity between English and Tokyo Japanese H*L:

(5)    While phonologically comparable, the pitch accents of Japanese and English have very different morphological statuses. In Japanese, they form part of the underlying phonological specification of morphemes, along with the vowels and consonants. Intonational pitch accents are morphemically independent of the words they come with, and are chiefly used to express the information status of the expression. The fact that the English example in (4) seems to have an accentuation similar to the Japanese example in (3) is ENTIRELY ACCIDENTAL (my emphasis—LMH).

The picture that emerges from the above brief consideration is that the statements in (1)-(4) are highly personal, likely to be met with considerable disagreement from others working in the field. Since these chapters are likely to be widely read by specialists, generalists, and students alike, it is important both to clarify the issues involved in prosodic typology, as well as set the record straight, e.g. concerning positions they erroneously attribute to me. The logical place to begin is by considering definitions of tone, stress, and intonation, which I do in §2. I then turn in §3 to the question of prototypes, i.e. "canonical" properties of each type of system, ending with further demonstration that there is no coherent prototype that captures all and only those systems that have been referred to as "pitch-accent". In §4 I address the importance of typology, thus providing an affirmative answer to the question "Is typology needed?" (B&V 2010:641). A few final remarks are presented by way of a conclusion in §5.

## 2.    The need for explicit definitions

In her classic monograph *Suprasegmentals*, Lehiste (1970:i) observed that "a certain degree of vagueness seems to characterize most discussions of prosodic features." Although there has been extraordinary progress since 1970, it is unfortunate how confused typological discussions of "tone", "stress", "pitch-accent" and "intonation" can still be. A goal of a lot of my work in this area has been to sort out the different issues, pinpointing those on which most linguists agree vs. those on which we don't. This has meant two things. First, I have tried to interpret analyses and typological proposals to see, first of all, if there really is significant disagreement, and if so, why. Thus, I have attempted to understand why some scholars insist on a third "type" of word-prosodic system to which the unfortunately polysemous term "pitch-accent" is given. The conclusion in Hyman (2001a,b, 2006, 2011) was that there is no coherent definition that covers ALL AND ONLY the systems that have been referred to as "pitch-accent", nor is there any single "prototype" (cf. §3). The fullest demonstration of this is found in Hyman (2009), from which I will also quote below. As we shall see in this section, part of the "vagueness" and "confusion" stems directly from a failure to agree on definitions, which in turn makes it difficult to distinguish terminological issues from substantive disagreements. In the following subsections I successively consider definitions of *intonation*, *tone*, and *stress-accent*.

## 2.1. Intonation

In order to see how terminology can be confused with substantive disagreements, consider the way B&V (2011) open their chapter on intonation:

(6)  As a technical term in phonological descriptions of spoken languages, *intonation* refers to pattern variation in voiced source pitch that serves to contrast and to organize words and larger utterances. In this general statement of its meaning, it is synonymous with the technical term *tone*. (B&V 2011:485)

Setting aside any possible merit to such a conflation, I am sure that many readers of the *Handbook of Phonological Theory* will be immediately surprised to read that *intonation* and *tone* are "synonymous". The authors do go on to say:

(7)  In typical usage, however, the two terms are differentiated by applying them to different aspects of these linguistic uses of pitch, a differentiation that is reflected in this edition of the *Handbook of Phonological Theory* by the fact of there being a separate chapter on tone (Hyman [2011]...). (B&V 2011:485)

Although the antecedent of *these* has not yet been established in line 2 of (6), it presumably refers to the traditional distinction between *intonation* and *tone*, which has yet to be defined. In the following paragraph B&V cite "two parts of the sixth definition for the entry for 'tone' in the *Concise Oxford English Dictionary* (eleventh edition)":

(8)  ... (in some languages, such as Chinese) a particular pitch pattern on a syllable used to make semantic distinctions'

 ... (in some languages, such as English) intonation on a word or phrase used to add functional meaning

They add: "This sixth definition is tagged as the meanings for a technical term in phonetics, and its second part subsumes the term 'intonation', which is defined in its own entry as 'the rise and fall of the voice in speaking'" (B&V 2011:485). Curiously, when one consults the on-line version of the OED, the sixth sense of tone, also tagged "Phonetics" reads differently:

(9)  A word-accent; a rising, falling, or compound inflexion, by which words otherwise of the same sound are distinguished, as in ancient Greek, modern Chinese, and other languages

The stress accent (French *accent tonique*) on a syllable of a word; the stressed or accented syllable.

Both the differences and the specific contents confirm the inadvisability of basing scientific work on these definitions, for at least two reasons: First, (8) does not clarify what is meant by "semantic" or "functional meaning". For example, would a H genitive tonal morpheme be an example of a "semantic distinction" or "functional meaning"? Readers should not have to consult the OED entry of *functional* to determine what is meant, especially as they will not find anything identified as "Phonetics" or even "Linguistics".[1] A second problem is that the distinctions made by intonation are more often referred to as *pragmatic*, a term which occurs 11 times in B&V (2011) vs. four occurrences of *semantic*, two of which are from the first definition in (8) itself. Thus, B&V (2011) speak of "pragmatically-specified L% or H%" (p.504), "the elusiveness of pragmatic 'meaning'" (p.524), "pragmatic morphemes" (p.501, 523, 524, 531, 532n) and "tone qua intonation... mirroring the syntactic structure of an utterance or indicating its pragmatic role in the larger discourse context" (p.486). The definitions in (8) are even less helpful as they group together very different prosodic systems (ancient Greek, "Chinese", French).

It is not clear why the various versions of the OED have such inconsistent and inadequate definitions, which easily could have been replaced by better ones occurring in recent works such as Gussenhoven (2004, 2007) and Ladd (2008a). As one reads on, it appears that B&V wish to endorse the use of the term *tone* to refer both to "pitch contrasts affiliated with word-level morphemes" as well as the various Hs and Ls which are affiliated with phrase- and utterance-level intonation. However, there is much advantage to keeping the concepts *tone* and *intonation* distinct and unconfused. Thus consider the following definition of *intonation*:

(10)  Intonation, as I will use the term, refers to the use of *suprasegmental* phonetic features to convey "postlexical" or *sentence-level* pragmatic meanings in a *linguistically structured* way." (Ladd 2008a:4; his italics)

Ladd goes on to devote one long paragraph each to explaining why *suprasegmental, sentence-level*, and *linguistically structured* are in italics. There are two reasons Ladd gives for using the term *suprasegmental*. The first is to be inclusive: There is significant intonational marking which involves suprasegmental features other than pitch. For example, in Shekgalagari there are four

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[1] As an informal test, I separately emailed three colleagues (a semanticist, a syntactician, and an anthropological linguist) the following question: "Does the phrase 'functional meaning' mean anything to you? Here is the context, a definition of *tone* from the Concise OED: '... (in some languages, such as English) intonation on a word or phrase used to add functional meaning'. The answers I received were: (i) "... this phrase is anomalous to me." (ii) "It doesn't. That's really odd." (iii) "I wouldn't know how to interpret 'functional meaning' without further explanation...."

mutually exclusive intonational patterns before pause, depending on utterance type (where PLL = penultimate vowel lengthening + L tone) (Hyman & Monaka 2011:277):

(11)  a.  PLL                          :  declaratives, citation forms
       b.  final vowel devoicing        :  ideophones
       c.  final vowel lengthening      :  paused lists
       d.  Ø (no marking)               :  yes-no questions, WH-questions, imperatives, hortatives,
                                           vocatives, exclamatives, monosyllabic prepausal words

In the examples in (12), an acute accent marks H tone, the grave accent marks a long falling L tone on the penult, and no accent indicates level L tone (even before pause):

(12)  a.  declarative    :  a-bón-á mʊ-lì:mi   'he sees the farmer'
       b.  ideophone      :  a-rɪ bítsɪ̥         'he left in a hurry' ('he went BITSI')
       c.  paused list     :  a-bón-á lʊ-rʊli: ... malílɪ ... lí mʊ-rî:ri
                             'he sees dust... rubbish... and hair'
       d.  interrogative   :  a-bón-á mʊ-lɪmi   'does he see the farmer'
           imperative      :  bón-á mʊ-lɪmi     'see the farmer!'
           vocative        :  ntó Gabalʊxóŋ     'come here, Ghabalogong!'
           exclamative     :  á ꜜʃɪ-xúlʊ         'what a situation!'

As seen in (12a), the only tonal marking of intonation is the L that is inserted on the lengthened penultimate vowel in declaratives. Other intonational marking involves penultimate vowel lengthening (12a), final devoicing (12b), and final vowel lengthening (12c). Interestingly, the pragmatically marked utterance types in (12d) show zero marking: no L tone, no lengthening, no final devoicing. While Ladd's definition would seem to allow the Shekgalagari non-tonal distinctions to be identified as intonation, B&V's strict interpretation of intonation in terms of pitch and phrase breaks would presumably not.

The second reason that Ladd gives for using the term suprasegmental is to be exclusive: He wishes to exclude segmental expressions of the pragmatic/discourse functions normally associated with intonation, e.g. "particles". Some ambiguity may however arise as what might be considered suprasegmental. While breathiness or glottalization are generally viewed as suprasegmental features, how would one interpret an utterance-final glottal stop which is reported to mark imperatives in Lahu (Matisoff 1973:353), questions in Kaingang (Wiesemann 1972, Wetzels 2008) and negatives in Dagbani (Hyman 1988)? Ladd (and everyone else?) may wish to exclude a full segment or syllable as intonational.

Turning to the second italicized term in (10), Ladd refers to *sentence-level* pragmatic meanings, so that he can exclude suprasegmental features that are introduced at the word level:

(13)  By this definition, intonation excludes features of stress, accent, and tone that are determined in the lexicon, which serve to distinguish one word from another. (p.6)

As seen, he clearly wishes to keep lexical tone separate from intonation.

Finally, concerning *linguistically structured*, Ladd (2008a:6) writes:

(14) ... intonational features are organized in terms of categorically distinct entities (e.g. low tone or boundary rise) and relations (e.g. strong than/weaker than). They exclude 'paralinguistic' features, in which continuously variable physical parameters (e.g. tempo and loudness) directly signal continuously variable states of the speaker (e.g. degree of involvement or arousal).

Although Ladd makes it clear that his major focus will be on structural rather than non-structural aspects of suprasegmental marking of sentence-level pragmatic meanings, he is well aware of the difficulty in making such a distinction:

(15) ... paralinguistic aspects of utterances are often exceedingly difficult to distinguish from properly intonational ones, and it is a matter of considerable controversy which aspects are which, or whether such a distinction is even possible. (Ladd 2008a:6)

It is hard to imagine a more complete and unambiguous definition of intonation than the one offered by Ladd in (10), especially as he explains each of the terms used. By being as explicit as he is, Ladd minimizes the aforementioned vagueness and confusion which one recognizes in the OED and certain other definitions. Since it is clear what Ladd will consider as intonation in his study, readers will also find it easy to test phenomena in other languages against this definition, as I have done with Shekgalagari.

Before moving on to define tone and stress-accent, it is necessary to point out that other scholars may prefer to limit intonation to pitch phenomena. However, they too keep tone and intonation separate:

(16) Intonation refers to the structured variation in pitch which is not determined by lexical distinctions as in tone languages. (Gussenhoven 2007:253)

It is of course also possible to consider being more inclusive:

(17) What are the necessary definitional properties of intonation? It seems there are at least three possibilities in determining what should vs. should not be considered "intonation". One might restrict intonation to certain specific realizations (pitch, duration etc.). Alternatively, one might delimit intonation on the basis of a restricted set of functions (declarative, interrogative etc.). A final possibility is that intonation might be identified in terms of its domain or place in a grammar. In this last case, we might say that anything that originates at the intonational phrase or utterance level, or within the "Phonetic Form" module of government-binding theory, is by definition "intonation". In this last approach it would not matter if the mark were a feature, a mora, a segment, or a fuller "particle". (Hyman & Monaka 2011:285-6)

It is important to bear the third possibility in mind as we move on to consider tone, stress-accent and the nature of phonological typology: Intonation does not exist in a vacuum, rather it has a specific place in the overall design of grammar, one that makes it quite different from the tones and metrical structure which are present at the output of the lexical phonology—and with which it may co-occur. In other words, intonation must be distinguished from lexical pitch contrasts, or "tone", to whose definition we now turn our attention.

## 2.2. Tone

In a number of works I have provided the following definition of tone, essentially an update of Welmers (1959:1-2, 1973:80):

(18) A language with tone is one in which an indication of pitch enters into the lexical realization of at least some morphemes (Hyman 2001a:256n, 2001b:1368, 2006:229, 2011:199).

In these works I discuss how I came to this particular formulation and, like Ladd, explain my phrasing and choice of words. The use of the "an indication of pitch" rather than simply "pitch" is designed to be inclusive: The intention of (17) is to identify all cases of word-level pitch contrasts as "tone". This would include the HL or H*L "pitch-accent" of Tokyo Japanese in (19a).

(19)        'pillow'     'heart'      'head'       'fish'
    a.      makura       kokoro       atama        sakana
            |            |            |
            H*L          H*L          H*L
    b.      ma*kura      koko*ro      atama*       sakana

In the first three examples of (19a) the H of a H*L "pitch-accent" is contrastively prelinked to the first vs. second vs. third mora. The fourth example has no H*L. By most definitions, the representations in (19a) based on the approach of Pierrehumbert & Beckman (1988) would be referred to as tonal. Now consider the lexical representations in (19b), proposed by Haraguchi (1977). In this case the first three examples have a diacritic accent (*) on their first, second, or third mora, while the fourth example has no accent. While Haraguchi introduces a HL melody in his analysis, the point is this: What if a linguist proposed the underlying forms in (19b) and only introduced actual pitch representations postlexically? Since (18) specifically refers to lexical representation, Tokyo Japanese would then not satisfy the definition. The question is whether it should. My view has long been that (19b) is none other than a tonal representation in disguise and an asterisk nothing other than "an indication of pitch": The asterisks have no other reality or function other than to determine how H*L should be linked. While this might seem reasonable to those who insist that Tokyo Japanese is not a "tone language", rather a "pitch-accent language", what is to prevent such scholars from substituting asterisks for a H/L contrast in systems which are more densely tonal? The definition in (18) thus has the function of "normalizing" analyses and the potentially arbitrary choices made by different scholars. After all, the goal is to typologize linguistic PROPERTIES, not linguists. (18) thus identifies the shared property of contrastive lexical pitch, i.e. the fact that some morphemes must be entered in the lexicon with an indication of pitch ("tone") in Tokyo Japanese, as in Cantonese and Putonghua vs. English and French.

The reason for the phrase "some morphemes" is also seen in (19), since the lexical entry for *sakana* 'fish' has no indication of pitch, rather its pitch properties will be introduced exclusively at the post-lexical level. Welmers (1959, 1973) was well aware of this problem, and felt that Pike's (1948:3) requirement of "significant, contrastive, but relative pitch on each syllable" was

too strong. It is important to emphasize that the goal here is not to pigeon-hole languages into discrete non-overlapping "types", rather to determine if a given word-prosodic system has tone, stress-accent (§1.3), both, or neither. This point will be further discussed in §4.

Finally, because tone is defined lexically, the definition need say very little, if anything, about the actual phonetic realizations of the tone, which may include accompanying durational, phonational and other components. As we are looking at a whole system which has to hold together, the post-lexical alternations and phonetic realizations of actual utterances can potentially be important in justifying a lexical analysis, for example, in determining in which of the following ways, among others, a two-height tone system system is best analyzed:

(20)　"equipolent"　/H/ vs. /L/　e.g. Baule, Bole, Mende, Nara, Falam, Kuki-Thaadow, Siane, Sko, Tanacross, Barasana

"privative" $\begin{cases} \text{/H/ vs. Ø} & \text{e.g. Afar, Chichewa, Kirundi, Ekoti, Kiwai, Tinputz, Una, Blackfoot, Navajo, Seneca} \\ \text{/L/ vs. Ø} & \text{e.g. Malinke (Kita), Ruund, E. Cham, Galo, Kham, Dogrib, Tahltan, Bora-Miraña} \end{cases}$

both:　/H/ vs. /L/　e.g. Ga, Kinande, Margi, Sukuma, Tiriki, Munduruku,
　　　　vs. Ø　　　Puinave, Yagua

However, characterizing sameness vs. differences in phonetic realizations is logically distinct from establishing whether a system has lexical tone—as B&V's (2011:531) comparison of Putonghua L+H with English L+*H clearly shows. It is clear that you can't study the phonetic properties of lexical tones unless they are pronounced, hence made into at least one-word utterances. However, this does not mean that the best (or only) comparisons of value are are surface-based.

To appreciate this issue, consider one of the most common ways of typologizing tone systems, namely by the number of contrasting tone heights. As Maddieson (1978:338) established, languages can contrast up to five tone heights. Thus Kam (Shidong) contrasts the following minimal quintuplet (Edmondson & Gregerson 1992:566):

(21)　ṭa$^{11}$　　ṭa$^{22}$　　ṭa$^{33}$　　ṭa$^{44}$　　ṭa$^{55}$
　　　'thorn'　'eggplant'　'father'　'step over'　'cut down'

While the Kam (Shidong) case may be clear, how does one count if there are fewer underlying vs. surface tone heights? Some languages have a binary contrast underlyingly, from which up to five surface-contrastive tone heights can be derived. Three ways of deriving a third tone height are indicated in (21).

(22)　a.　lowering of H after L,　e.g. Kom　　(Hyman 2005)　L-H → L-M → M
　　　b.　raising of L before H,　e.g. Ik　　　(Heine 1993)　L-H → M-H → M
　　　c.　raising of H before L,　e.g. Engenni (Thomas 1978)　H-L → ꜛH-L → ꜛH

(22a,b) show two types of "tonal compression" which often characterize input /L-H/: the H can be lowered to M, as in Kom, or the L can be raised to M, as in Ik. The opposite process of "tonal expansion" can apply to /H-L/, whereby a raised H is derived, as in Engenni. As indicated in the

final outputs in (22), in all three of these languages the conditioning tone (L in Kom and Engenni, H in Ik) can be deleted, thereby producing a surface three-height contrast. Thus in Ik:

(23)  A low tone is realized as mid if followed by a high tone in the same word. The mid tone is retained even when the high tone is deleted due to word-final devoicing. (Heine 1993:18)

In each of the above cases one could leave the delinked trigger tone to float in output tonal representations, hence maintain a two-height system throughout. However, this is not always possible. Thus, in Ngamambo, underlying /H, L/ produces a surface-contrastive system of H, M, ↓M, L˚ and L, where ↓M is a downstepped M tone, and L˚ represents a level low (22) tone, which contrasts with a falling (21) L tone before pause (Hyman 1986). Depending on how one interprets the L˚ vs. L contrast, Ngamambo either has four or five surface contrastive tone heights which derive from /H/ vs. /L/. Should the tone system of Ngamambo be "classified" as two-height or five-height? Both levels of representation are clearly needed.

### 2.3. Stress-accent

We now turn to defining stress-accent (or "stress" for short). Below I cite the definitions I have provided in previous works:

(24)  stress = metrical structure present lexically (e.g. at word level) (Hyman 2001a:256)

(25)  A language with stress 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 (Hyman 2006:231, 2009:217)

(26)  In addition to meeting both of these criteria, another inviolable property of stress systems is that the stress-bearing unit is the syllable.... (Hyman 2009:217)

There is no controversy that I know of concerning the above characterization of stress as being structural (metrical) rather than featural:

(27)  ...it does not seem very useful to talk about "stress" as if it were an autosegmental content feature, on a par with tone features, manner features, and place features. Rather, stress is better treated as a syntagmatic property of nodes in the prosodic tree, like the property "syllabic" (which is another way of calling the autosegment that stands as the head of some σ). (B&V 2011:530)

Despite my definitions in (24) and (25), B&V inexplicably claim that I have taken a "suprasegmental" view whereby stress is a "feature" on a par with H tone:

(28) ... [Hyman] maintains that a tenable distinction can still be made between a "tone language" prototype and a "stress-accent language" prototype.[2] His criteria for setting up this distinction require that he treat stress as a "suprasegmental" property on a par with H tone, rather than a structural property on par with syllabicity. That is, he proposes that the prototype stress-accent is one in which "every word has at least one stress accent" and "the stress-bearing unit is necessarily the syllable." (pp. 530-1)

As I will clarify in §3, this quotation continues a longstanding confusion between a "definition" and a "prototype". The relevant definition here is that in (25) above. The quote within (27) from Hyman (2006:252) should thus be corrected to read "every word has AT LEAST AND AT MOST one syllable marked for the highest degree of metrical prominence", or, as usually stated "one and only one primary stress." A word may of course have more than one secondary stress-accent (strong position in the metrical structure). Even without this correction, it is hard to see how B&V can extract from the definitions in (24)-(25) that I had any other than the same structural (metrical) view of stress-accent as they—and everyone else—have. In fact, I quite explicitly borrowed from syntax in a conceptual way not unlike B&V (2011:489):

(29) Of the two criteria in [25], obligatoriness is the more important. It is an absolute universal – DEFINITIONAL – of a S[tress-]A[ccent] system, which requires that an obligatorily headed metrical constituent be built at the word level.... I shall borrow from optimality syntax and refer to obligatoriness as OBLIGATORYHEAD (OBLHEAD). (Hyman 2006:231-2)

Thus, to suggest that I treat stress as "on a par with H tone" is an inexplicable distortion of the consistent position I have taken on this issue, both in the works B&V cite and elsewhere:

(30) ... stress is identified with abstract metrical structure and tone with pitch features present at the word level. Stated this way, stress and tone have virtually nothing in common: Stress is a structural property in which syllables are metrically hierarchized as relatively strong vs. weak (however this contrast is realized phonetically), while tone is a featural property referring to contrastive relative pitch. (Hyman 2009:215)

With this established, we can now move on to prototypes and the question of "pitch-accent" word-prosodic systems.

## 3.    The role of prototypes and canons

B&V's skepticism concerning tone and stress-accent prototypes is clear in (28) and elsewhere. Some of this stems from their reluctance to accept word-prosodic typology as a separable enterprise and, as quoted in (1) above, whether it is "useful" to "classify" prosodic systems "in terms of tonemic function alone" (B&V 2011:531). I will treat their notion of "classification' in §4. In this section I want to clarify the role that prototypes have always played in phonology, and can successfully play a role in prosodic typology.

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[2] Again, as will be further discussed in §4, the object is not to typologize languages, rather their properties. If one occasionally writes "tone language" or "stress language" this stands as a shorthand for "a language which has tone/stress" as defined by (18) and/or (25). Prototypes are discussed in §3.

Let us begin with the following question whose answer may be instructive: What is the prototypical syllable? Instinctively, one would likely follow Jakobson and Halle (1956:20) and answer CV, which has also been referred to as "the canonical syllable".[3] Let us then relate the discussion to what Grev Corbett calls "the canonical approach" to typology:

(31)  The canonical approach means that I take definitions to their logical end point, enabling me to build theoretical spaces of possibilities. Unlike classical typology, only then does one ask how this space is populated with real instances. The canonical instances, that is, THE BEST, CLEAREST, INDISPUTABLE (the ones closely matching the canon) are unlikely to be frequent.... Nevertheless, the convergence of criteria fixes a canonical point from which the phenomena actually found can be calibrated, following which there can be illuminating investigation of frequency distributions. (Corbett 2007:9; my emphasis—LMH)

If we use the term *prototypical* interchangeably with Corbett's *canonical*, to mean "the best, clearest, indisputable" example, we can understand why linguists have traditionally answered the above question as I have indicated: Whether grounded in perception or production, CV is uncontroversially seen as the best, clearest syllable shape, universal or near-universal, and the most distinctly recognizable. Thus CV.CV is unambiguously bisyllabic with the indicated syllabic break. By comparison, CVV could be monosyllabic or bisyllabic CV.V, and CVCCV could be parsed CVC.CV or CV.CCV. It thus would be optimal if languages only had alternating strings of C and V, and if these formed CV rather than VC constituents. As is well-known, the release of a consonant into a following vowel is more perceptually salient than the formant transitions of a V going into a C. Going one step further, all languages have not only Cs and Vs, but more specifically obstruents and low vowels, i.e. segments from the opposite ends of the sonority scale. Since strings alternating these endpoints would represent the most "salient modulations" in the speech signal (Ohala 1992:326), languages are not likely to pass up the opportunity of having voiceless stops and low vowels as CV constituents. The canonical "best clearest, indisputable" syllable thus consists of a voiceless stop + a low vowel.

With this established, we acquire a practical advantage for typology: The canonical syllable can now be used as a reference point from which to "calibrate" the various divergences in syllable types (cf. Clements & Keyser 1983:28, among others). Thus, V lacks an onset, CVC has a coda, CCV has an onset cluster, [li] has a sonorant onset and high vowel, and so forth. The question, of course, is whether we can identify canonical tone, stress-accent, and intonation. Just as the preceding paragraph is far from the whole story,[4] what I shall present in the following subsections will be a partial—but hopefully useful—characterization of the canonical approach to prosodic typology.

## 3.1.    Canonical tone

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[3] To avoid possible confusion, I will refrain from calling CV "the unmarked syllable". See Haspelmath (2006:64-5) who has shown the term "unmarked" to have been used in twelve different senses.
[4] For example, although the discussion has been framed around perceptibility, I do not claim that CV only serves the listener. As will be seen in the discussion of canonical stress-accent, both syllables and word stress also facilitate speech planning, as with constituent structure in general.

With this in mind, let us now consider what a canonical tone system might look like. Here I rely heavily on the work on McCawley (1964, 1970, 1978), who introduced word-prosodic typology into generative phonology. Concerned about the typology of the Tokyo Japanese (TJ) system, McCawley noted that TJ had properties different from the expected (read: canonical) tone system. McCawley's starting point was that (lexical) tone is very much like the features that distinguish consonants and vowels. As stated in (18), tones are features of morphemes at the word level. Their core function is hence to distinguish morphemes. How can they do this in "the best, clearest, indisputable" way? Answer: by being fully available. While this might suggest that canonical tone should contrast the maximum, hence five pitch levels, as in (21), let us limit discussion to two-height systems. Clearly, for H and L to best realize the function of distinguishing morphemes, the canonical system should have at least the following properties:

(32)  a.  binarity : both H and L are phonologically activated
      b.  omniprosodicity : every tone-bearing unit (TBU) has a H or L
      c.  unrestrictedness : all combinations of H and L occur
      d.  faithfulness : every /H/ or /L/ is realized on its underlying morpheme and TBU
      e.  lexical : /H/ and /L/ should contrast on lexical morphemes
      f.  contours? : HL and LH contours should be possible on a single TBU
      g.  floating tones? : H and L tonal morphemes and lexical floating tones should be possible

Let us consider each of these in turn:

(32a) says that a /H, L/ contrast is more canonical than a privative /H/ vs. Ø (or /L/ vs. Ø) system. Chichewa violates the canon in having a /H/ vs. Ø contrast both underlyingly and, according to Myers (1998), in outputs as well.

(32b) says that there should be no underspecification, i.e. no TBUs lacking a tone. A rather striking non-canonical system comes from Fasu, where only one (stressed) syllable per word can be marked for H or L, as in the following examples (May & Loeweke 1964):

(33)              *H tone*                    *L tone*
    a.  σ         mé      'language'          mè      'taro'
    b.  σ–σ       támo    'down below'        tàmo    'matches'
              kikí    'bone'              kikì    'tree type'
    c.  σ–σ–σ     férepe  'bushknife'         èresa   'dark'
              sakáre  'arrow'             hiwàti  'eyelash'
              kenarí  'tree type'         kenarì  'bamboo type'

(32c) adds that the H and L tones should have a free distribution, as the hypothetical Language$_1$ (L$_1$) in (34).

(34)

| | 1σ | 2σ | 3σ | 4σ |
|---|---|---|---|---|
| L$_1$ | H<br>L | H-H, H-L<br>L-H, L-L | H-H-H, H-H-L,<br>H-L-H, H-L-L<br>L-H-H, L-H-L,<br>L-L-H, L-L-L | H-H-H-H, H-H-H-L, H-H-L-H, H-H-L-L<br>H-L-H-H, H-L-H-L, H-L-L-H, H-L-L-L<br>L-H-H-H, L-H-H-L, L-H-L-H, L-H-L-L<br>L-L-H-H, L-L-H-L, L-L-L-H, L-L-L-L |
| L$_2$ | H | H-H, H-L, L-H | H-H-H, H-H-L,<br>H-L-H, H-L-L,<br>L-H-H, L-H-L,<br>L-L-H | H-H-H-H, H-H-H-L, H-H-L-H, H-H-L-L<br>L-H-H-H, L-H-H-L, L-H-L-H, L-H-L-L |
| L$_3$ | L | H-L, L-L | H-H-L, H-L-L,<br>L-H-L, L-L-L | H-H-H-L, H-H-L-L, H-L-H-L, H-L-L-L<br>L-H-H-L, L-H-L-L, L-L-H-L, L-L-L-L |
| L$_4$ | H<br>L | H-L, L-H<br>L-L | H-L-L, L-H-L,<br>L-L-H, L-L-L | H-L-L-L, L-H-L-L, L-L-H-L, L-L-L-H<br>L-L-L-L |
| L$_5$ | H | H-L, L-H | H-L-L, L-H-L, L-L-H | H-L-L-L, L-H-L-L, L-L-H-L, L-L-L-H |
| L$_6$ | H | H-L, L-H | L-H-L, L-L-H | L-L-H-L, L-L-L-H |

(a) L$_1$ (30) has no restrictions on the distribution of H and L.
(b) L$_2$ (19) requires that there be at least one "obligatory" H per word (*[ L$^n$ ]$_{Word}$)
(c) L$_3$ (15) does not allow H tone at the end of a word (*H]$_{Word}$)
(d) L$_4$ (14) does not allow more than one "culminative" H per word (*[...H...H...]$_{Word}$)
(e) L$_5$ (10) requires that there be one and only one H per word (*[ L$^n$ ]$_{Word}$, *[...H...H...]$_{Word}$)
(f) L$_6$ (6) requires that there be one and only one H per word, restricted to the last two syllables.

As seen, the number (*n*) of observed tone patterns in canonical L$_1$ equals $2^\sigma$, hence there are two patterns on monosyllables, four on bisyllables, eight on trisyllables, and so forth. Although a completely free distribution of H and L as in the prototype L$_1$ is possible and attested, far more frequently positional or tonotactic conditions place restrictions on the distributions. Several possibilities are indicated in hypothetic systems L$_2$-L$_6$ in (34), where (a)-(f) are arranged by the overall number of tone patterns observed on words of one to four syllables. From these distributions it is clear that L$_2$-L$_4$ have lexical tone contrasts, and yet they vary from the free distribution prototype in rather significant ways. The typology of L$_5$ and L$_6$, on the other hand, is ambiguous. Since these limit words to one and only one H tone syllable per word, one could either interpret this H as a lexical tone or as the principal (perhaps sole) exponent of primary stress. This is the dilemma which Gussenhoven (2006) faced in his analysis of Nubi, which he regarded as pivotal between the two interpretations.

Finally, (32d) invokes the "faithfulness" property in optimality theory (Prince & Smolensky 1993/2004): the input and output tones should be exactly identical. This is based on the assumption that morphemes are best identified if their exponents are not modified and do not wander far away. A rather extreme case of the latter comes from Giryama (Volk:2011:1):

(35)  'I want ...' (all L tone)          'he/she wants ...' (penult H tone)
      ni-na-maál-a                       a-na-maál-a
      ni-na-mal-a ku-guul-a              a-na-mal-a ku-guúl-a          '... to buy'
      ni-na-mal-a ku-gul-a ŋguuwo        a-na-mal-a ku-gul-a ŋguúwo    '... to buy clothes'
                                         ‡- - - - - - - - - - - - - ▶
                                         H

In the forms on the left, all of the input morphemes are toneless, realized ultimately on a L pitch. In the forms on the right, the single input /H/ on the subject prefix /á-/ 'he/she' shifts to the

penultimate mora of the phrase. In Giryama, both grammatical and lexical morphemes may have such /H/ tones which in turn shift to a fixed number of positions, with interesting complexity (see Volk 2011).

(32e) says that tone should contrast on lexical morphemes for the simple reason that there are more lexical morphemes to distinguish than grammatical morphemes. Systems which have only grammatical tone tend to violate several of the canons in (32). Thus according to Kisseberth (2009), Chimwiini privative /H/ is both limited to the last two syllables and strictly grammatical (no underlying tonal contrasts on lexical morphemes, e.g. noun stems, verb roots. In the following paradigm, final H tone is conditioned by first and second person subject prefixes, while penultimate H occurs with third person subject prefixes:

(36)     *singular*                      *plural*
         n-ji:lé    'I ate'              chi-ji:lé  'we ate'
    ≠  ⎧ ji:lé     'you sg. ate'        ni-ji:lé   'you pl. ate'⎫ =grammatical final H
       ⎩ jí:le     's/he ate'           wa-jí:le    'they ate'    = default penultimate H

To summarize thus far, the best, clearest case of a two-height lexical tone system is one where tone is binary and "omnisyllabic" (Matisoff 1994:116), with no distributional restrictions, and with high tonal density (Gussenhoven 2001:15296, 2004:35) vs. the cases in (33), (34b-f), (35) and (36). The canonical system would also require the H or L to be realized on its sponsoring morpheme. The tonal contrasts would be highly paradigmatic, as in $L_1$ in (34), rather than syntagmatic as in $L_6$, a property which correlates better with stress-accent and intonation (cf. (46) below). In short, the best, clearest case of a two-height system would have lexical properties that were as unambiguously TONAL as possible. Extensive tonal contours such as in Chinese and Vietnamese, seem to add to the same canonical property of distinctive lexical tone, as indicated in (31f), possibly also floating tones, since they expand the potential contrasts on morphemes.

It is important to emphasize that languages are not prototypes, rather it is their properties which individually fit the canons either completely, to a certain degree, or not at all. Compare this with the following interpretation:

(37)  We suspect that the appearance of prototypes comes from looking too closely at just one or two of the functions in which tone participates, as well as from being thoroughly immersed in the consensus assumptions of specialists in just one or two Sprachbund regions. For example, Hyman's tone language prototype looks to us like a description of features which are frequently encountered together in prosodic systems in Bantu and West African Sprachbunds, where tone patterns often function as tonemes.... (B&V 2010:642)

This conclusion is rather puzzling. I assume that B&V are not referring to my definition of tone in (18), to which they also object, but rather to the list of eight properties that are given for prototypical tone in the appendix to Hyman (2001a). There I consider tonal distribution, domain, function, realization, and rules, as well as segmental interactions, morphology, and syntax, i.e. much more than "one or two" functions. In addition, it is hard to see how the highly paradigmatic, omnisyllabic property of the proposed prototype could derive from a Bantu bias, since Hyman (2001a), which they cite, is all about privative Bantu tone systems, e.g. those which

contrast /H/ vs. Ø, sometimes quite sparsely as in Safwa (Voorhoeve 1973), which they cite more than once. A distributional contraint in both Proto-Bantu and many current-day Bantu languages concerns the absence of an underlying tonal contrast occurring between initial and final stem vowels (Meeussen 1961). In a privative H system, which Stevick (1969) reconstructed for Proto-Bantu, this creates such underlying representations of stems as /H-Ø-Ø-Ø/, /H-Ø-Ø-H/, /Ø-Ø-Ø-H/ and /Ø-Ø-Ø-Ø/. In addition, the omnisyllabic prototype characterized by Pike's (1948:3) "significant, contrastive, but relative pitch on each syllable" probably corresponds to Mixtecan and Chinese no worse than it does to the languages of West Africa. B&V in essence acknowledge this by choosing Cantonese and not Putonghua or Japanese to introduce tone:

(38)  The basic "tonemic" function is most easily illustrated with utterances and words from a language such as the standard Hong Kong dialect of Cantonese. In this variety of Chinese, most words are monosyllabic..., and every syllable is specified for one of the tone patterns.... (B&V 2011:521)

In fact, in other writings the concept of a prototypical tone system is not foreign to the first author at least. The following is from a review of Gussenhoven (2004):

(39)  As this list of introductory chapter topics suggests, the guiding principle is to concentrate more on the phonology of intonation than on the phonology of tone. Indicative of this choice is that none of Chs. 9–15 covers a PROTOTYPICAL tone language from either of the clusters covered in the two chapters on tone in Goldsmith 1995. (Beckman 2008:641; my emphasis)

B&V appear to view Cantonese rather than Putonghua as prototypical, since the latter diverges from the omnisyllabic canon by virtue of its stressless (metrically weak) "neutral tone" syllables. That B&V identify Putonghua with English in (3) above also reveals that Putonghua is not the ideal, best example of "a prototypical tone language", to use Beckman's phrase (see §4 for discussion of systems with both tone and stress).
Citing the definition in (18) above, B&V (2010:641) write:

(40)  ... Hyman (2006, p.229) gives a "working definition of tone" which turns out instead to be a definition of a language type....

Given the systems we have just briefly considered (and others surveyed in Hyman 2011), this inclusive definition which subsumes everything from omnisyllabic five-height Shidong in (21) to sparsely tonal Giryama and Chimwiini is quite broad (denecessitating other categories such as "pitch accent system" or "restricted tone system" etc.). In fact, concerning Chimwiini, it turns out that the contrast between first/second person final H vs. third person penultimate H tone is a property of the phonological phrase. In the following examples, which should be compared with (36), /n̪ama/ 'meat' and /matunda/ 'fruit' are both underlyingly toneless:

(41)  a.   jile: n̪amá      'you sg. ate meat'      jile ma-tu:ndá      'you sg. ate fruit'
      b.   jile: n̪áma      's/he ate meat'        jile ma-tú:nda      's/he ate fruit'

What is ruled out from the definition are systems which receive their H or L independently of the canonical function of tone, which is to distinguish morphemes at the lexical level. Languages which assign boundary tones to every instance of a particular domain, or which distinguish "intonemes" to mark declarative, interrogative or other utterance-level distinctions are excluded. Part of the problem may be a potential confusion between a definition vs. a prototype:

(42) Concerning word-prosodic typology, a lot of the vagueness and confusion has stemmed from the lack of an explicit distinction between what constitutes a definition vs. a prototype. A definition provides a minimum requirement that all instances of the phenomenon must meet: If a language does not have word-level metrical structure, it does not have a stress system (as so defined). If it does not have word-level pitch features, it does not have a tone system. (Hyman 2009:215)

To further appreciate this, let us now consider what the canonical properties of a stress-accent system might be.

### 3.2. Canonical stress-accent

In the preceding subsection we reiterated the long held view that the canonical function of lexical tone is to distinguish morphemes. In Saussurian and Prague School terms, the canonical function of lexical tone is PARADIGMATIC. As a result, one can get up to the five-height contrast seen in (21) above. In stark contrast, the canonical function of stress-accent is SYNTAGMATIC: In a canonical /H, L/ tone system, one asks for each TBU: "Is it H or L?" In a canonical stress-accent system, one asks: Which stress-bearing unit bears the primary stress (i.e. is the head syllable of the metrical structure)?

Let us assume that the core function of stress-accent is both to identify and mark off major category words within utterances. In order to be able to tell how many words there are in the utterance and where the word boundaries are, canonical stress should be:

(43) a. obligatory : all words have a primary stress
b. culminative : no word should have more than one primary stress
c. predictable : stress should be predictable by rule
d. autonomous : stress should be predictable without grammatical information
e. demarcative : stress should be calculated from the word edge
f. edge-adjacent : stress should be edge-adjacent (initial, final)
g. non-moraic : stress should be weight-independent
h. privative : there should be no secondary stresses
i. audible : there should be a phonetic cue(s) of the primary stress

The two properties in (43a,b), obligatoriness and culminativity, were already presented as definitional in (25): If metrical structure does not define one and only one primary stress, then the system is not stress-accent. The properties in (43c-h) are canonical, designed to enhance the proper function of word demarcation within an utterance. For this purpose stress-accent should be predictable (43c), i.e. assigned or recoverable by general rule, rather than lexically idiosyncratic. As this might include grammatical information, (43d) further stipulates that grammatical information should not be required in the canonical case. Since the function is to

mark off words, the predictable stress should be demarcative (43e), i.e. calculated from a word edge. Given that there could be varying numbers of prefixes and/or suffixes in different words, assigning the stress instead to the root syllable would not be canonical.

(43f) stipulates that the primary stress should not only be calculated from the edge, but also be edge-adjacent: Initial and final stress are more canonical than peninitial or penultimate.

(43g) says that stress should be assigned without regard to syllable weight (moras)—or any phonetic or phonological criterion. Weight sensitivity has the potential to result in cases where one cannot unambiguously determine the word segmentation from the output. To illustrate less than perfect demarcation, Martinet (1961:87) cites the sequence *bónacalígula*, which has two possible parsings: *bóna Calígula* (the correct one) and *\*bónaca lígula*.

(43h) identifies secondary stresses as non-canonical. Most egregious would be cases of unpredictable secondary stresses, as in English ˈ*ínsèct* vs. *súbject*. While it might seem that building iterative could be an enhancement of the primary stress, the potential would be there for a secondary stress of one word to detract from the primary stress of an adjacent word. Most effective therefore would be not only one primary, but one total stress per word.

Finally, (43i) simply says that the primary stress should be phonetically detectable.

Taken together, the canons conspire to impose "biuniqueness" on stress-accent: One should be able to predict the primary stress from the word boundaries, just as one should be able to predict the word boundaries from the stress. What this means is that perfect demarcative stress is canonical, and anything else represents a divergence from one or more of the canons. In support of this Praguian position, Hyman (1977, 1978) and Bybee, Chakraborti, Jung, & Scheibman (1998) argue that languages first develop demarcative stress, historically, which then can be subjected to further restructuring. As in the case of the tonal canons in (32), few languages will meet all of the canons at once: Thus Bybee et al also point out that multiple phonetic marking of stress tends to occur in languages where stress is not fully predictable. If stress is demarcative and edge-adjacent, packaging and recognition will be more transparent. If stress is unpredictable, the resulting lexical property of individual words or morphemes acquire greater marking.

I should emphasize that the specifics of this canonical approach is different from what I proposed in Hyman (2009:216-7). There I took what one might call "the kitchen sink approach" to prototypes: The more tones you have, the better; the more stress marking, the better. According to this view, the kitchen-sink prototype for stress-accent might be as follows:

(43) a.  stress location is not reducible to simple first/last syllable
     b.  stressed syllables show positional prominence effects
         i.   consonant-, vowel-, and tone oppositions are greater on stressed syllables
         ii.  segments are strengthened in stressed syllables (e.g. Cs become aspirated or geminated, Vs become lengthened, diphthongized)
     c.  unstressed syllables show positional non-prominence effects
         i.   consonant-, vowel-, and tone oppositions are fewer on unstressed syllables
         ii.  segments are weakened in unstressed syllables (e.g. Cs become lenited, Vs become reduced)
     d.  stress shows cyclic effects (including non-echo secondary stresses)
     e.  stress shows rhythmic effects lexically/postlexically (cf. the English "rhythm rule")
     f.  lexical stresses interact at the postlexical level, e.g. compounding/phrasal stress

g.   lexical stress provides the designated terminal elements for the assignment of intonational tones ("pitch-accents")

h.   other arguments that every syllable is in a metrical constituent which can be globally referenced

In this quite different approach, I was motivated by the indeterminacies and analytical difficulties posed by some systems. My goal was to define the most UNAMBIGUOUS lexical tone vs. stress-accent system possible. The result in (43) quite accidentally resembles English, which has long been described as having what can be called a multi-property stress system. Contrast this with the opposite extreme, where stress is less systemically-integrated, minimal, and stand-alone:

(44)  a.   [in Hungarian] stress does not play a significant role in the word level phonology…. (Kenesei, Vago & Fenyves 1998:428)

b.   in Turkish, stress can be identified mostly on the basis of $f_0$ (Levi 2005), but not a single phonological constraint or rule refers to stress.

I now think that English is an outlier, an example of a language that just happens to care alot about stress (vs. Hungarian and Turkish). The better approach is to consider the core function of (lexical) tone vs. stress-accent, as I did in Hyman (1978:7), following the Prague School tradition (Jacobson 1931, Trubetzkoy 1939, Martinet 1954, Garde 1968). The main correction concerning these and my own earlier works on which I would insist is that we are not talking about classifying languages, rather about characterizing their properties. This is consistent both with the notion that few if any languages will be completely canonical, and that systems can be quite mixed (see §4 below). Thus, any use of terms like "tone language" or "stress language" is necessarily a short hand for "a language whose prosodic system meets the definition of tone in (18)" and "a language whose prosodic system meets the definition of stress-accent in (25)".[5]

## 3.3.   Comparing definitions and canons

To summarize the preceding two subsections on canonical tone and stress-accent, consider the following updated and expanded version of the table that appears in Hyman (2009:216), where P stands for "property":

(45)

|  | *P-form* | *P-bearer* | *inventory* | *system* | *level* | *domain* |
|---|---|---|---|---|---|---|
| *tone* | featural | mora | varied | paradigmatic | URs | input morpheme |
| *stress* | structural | syllable | s-w | syntagmatic | lexical | output word |
| *intonation* | featural | syllable | H, L | syntagmatic | post-lexical | utterance |

Of the properties considered in (45), *featural* is the only one which appears to be definitional of tone, i.e. required in order to be a lexical tone system. Leaving aside the question of inventory, the others are canonical properties. Tone is canonically a property of the mora in languages which make the distinction, but in many tone systems the TBU is the syllable. In Somali, whose culminative and privative H is limited to the final or penultimate mora of the word, the tonal

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[5] If we do not speak of "intonation languages" it is presumably because of an assumption that all languages have intonation—as defined, for example, by Ladd (2008:4), cited in (10) above.

contrasts are syntagmatic rather than paradigmatic. It also turns out, borrowings aside, that most of the penultimate and final H tones can be predicted from the morphology and syntax, thus possibly denecessitating a H feature on input morphemes in underlying representations—not to mention the possibility of using asterisks instead of H tones, as I regrettably did in Hyman (1981). Although meeting the definitional "indication of pitch" on input morphemes, Somali is far from canonical.

In contrast to tone, the properties of stress in (45) are ALL definitional. Stress is structural by definition, assigned to syllables, and syntagmatic. With so-called "fixed" or demarcative stress arguably not present in underlying representations, and not morpheme-specific, the definitionally required metrical structure need only be present on the lexical output word.

The properties of intonation in (45) also appear to be definitional, especially if we adopt Ladd's formulation in (10) above. One might question whether intonational features are always assigned to syllables, an empirical question which in unclear cases may be subject to analytical interpretations (e.g. whether a boundary tone links or not). Be that as it may, even languages which assign lexical H tones by mora have been described with syllable-based intonational tone, e.g. prepausal L% in Haya (Hyman 1999:154).

Still looking at (45), observe that tone shares no properties with stress (cf. (30)). It does share with intonation that both involve pitch features or elements such as H and L. However, the pitch inventories are potentially different. Recent work on intonation within the autosegmental-metrical framework, e.g. the chapters in Jun (2005a), suggests that that the tonal elements H and L must both be present in all systems—and no other tonal elements. As one can see most clearly from the summary table in Jun (2005b:434-5), this includes not only languages which do not have lexical pitch contrasts, e.g. English, German, Italian, but also languages which have contrastive lexical tone (Cantonese, Mandarin), or lexical "pitch-accents" (Japanese, Serbo-Croatian). In other words, intonation typically requires a ternary system of H vs. L vs. Ø, which is only one of the possibilities of two-height lexical contrasts considered in (20).

This observation raises two questions: (i) Can an intonational system be strictly privative, either H vs. Ø or L vs. Ø? (ii) Can an intonational system contrast more than two tone heights? With respect to the first question, /H/ vs. Ø lexical tone systems are quite common, and, although less common, /L/ vs. Ø is also attested. With respect to the second question, it is of course quite common for a lexical tone system to contrast three tone heights, less so four or five. The following table shows how many underlying two-, three-, four- and five-height systems I have tentatively identified out of a total tonal database from 650 languages (74 of which I have yet to interpret):

(46)

| | 2 heights | 3 heights | 4 heights | 5 heights | TOTALS: |
|---|---|---|---|---|---|
| Africa | 142 | 50 | 9 | 1 | 202 |
| Asia | 79 | 53 | 10 | 6 | 148 |
| Pacific | 66 | 4 | 1 | 0 | 71 |
| N. America | 32 | 3 | 0 | 0 | 35 |
| Mexico | 19 | 31 | 7 | 4 | 61 |
| S. America | 48 | 4 | 0 | 1 | 53 |
| Europe | 6 | 0 | 0 | 0 | 6 |
| TOTALS: | 392 | 145 | 27 | 12 | 576 |

Although some of the materials on which (46) is based are admittedly sketchy, a sizable number of systems, 184 out of the 576 or 31.4%, contrast more than two tone heights. Most of these are three-height systems occurring in Africa, Asia and Mexico—this last being the only area where multi-height outnumber two-height systems (42 to 19), although Asia is close (69 vs. 79). There have been a few descriptions of three-height "intonemes" in the literature. Thus, Pike (1951:101) characterizes Mazahua with the following intonational contrasts on the final syllable of an utterance:

(47)
| Intoneme | Meaning | Intoneme | Meaning |
|---|---|---|---|
| L% | "colorless finality" | MH% | "surprise" |
| H% | "is that what you said/mean?" | ML% | "anger, disgust" |
| M% | "something is expected to follow" | H:L% | "calling, shouting" |

Particularly since the lexical tonal contrasts are between /H/, /L/ and /HL/, i.e. two-height, it is possible that (47) will be amenable to an analysis in terms of Hs and Ls alone. It may also be that one or more of the above contrasts should be interpreted not as structured, but as "paralinguistic" (Ladd 2008a:34). The ultimate typological question is whether we should regard the H, L requirement and limitation to be definitional or canonical, i.e. universal or prototypical. This in turn would depend on whether any third (fourth, fifth) contrastive pitch level cannot be reanalyzed in terms of H and L. For recent experimental evidence supporting a H% vs. M% or ↓H% contrast in Catalan, see Prieto, Torres-Tamarit & del Mar Vanrell (2011).

## 3.2. There is no canonical pitch-accent

In the preceding section mention was made of the fact that H and L function as intonational tones in languages with all types of word-prosodic systems. So far this has meant tone and/or stress-accent. A third word-prosodic system already referred to is "pitch-accent" which, I have argued, is not a coherent category. Those believing in the unity of such systems have failed to come up with a definition which characterizes all and only all of those systems that have been so labeled. In order to observe this, all one has to do is look at the chapters in van der Hulst & Smith (1988) and ask, "Why is this prosodic system included in a collection on pitch-accent?" Among the possible answers:

(48) a. Tokyo Japanese: only one indication of one specific tonal representation is needed per lexical word, and ultimately accentual phrase (Haraguchi 1988:127)
   b. Copala Trique: the five tone heights and contour tones contrast only on the final (stressed) syllable of the word (Hollenbach 1988:170)
   c. Ijo: The tonal identity of the first word determines the tones of a whole tone phrase (Williamson 1988:254)
   d. Zulu: The contrast is between privative /H/ vs. Ø, hence pitch-accent (Clark 1988:56)

Concerning (48a), the question that arises is: What if two indications of tone are needed per lexical entry? As is well-known, this is the case in Osaka, which is similar to Tokyo, except that in addition to the possibility and place of a H to L drop, lexical entries must indicate whether the form starts H or L. Thus, H-H-L contrasts with L-H-L. Recall also the Fasu case in (33), where

one unpredictable (stressed?) syllable per word can contrast /H/ vs. /L/. It seems that "pitch-accent" can refer to a single indication of one tone, or the restriction of a tonal contrast to a single position within a lexical entry. We can of course regard that syllable as metrically strong, as in the case of the final stress in Copala Trique (48b). So now "pitch-accent" comes to mean tone AND metrical structure, something which we have long known to co-exist in some languages. Moving on to Ijo (48c), the tone pattern of a tone phrase is determined by the first word, with the tones of subsequent words being unrealized. This of course is reminiscent of Shanghai tone phrases (Zee & Maddieson 1979:109) and similar phenomena in other parts of the world (Hyman 2011:225-227). Concerning Zulu (48d), Clark (1988:56) writes: "... Zulu is a tonal pitch-accent language with the tonal melody 'H'." The intuition appears to be that an accent is present vs. absent, so a privative H should be treated as an accent (and a melody). So now we have HL (or H*L) in Tokyo Japanese, the same in Osaka but with a contrastive initial %L boundary tone, five heights and eight tones total contrasting on one syllable per word in Copala Trique, phrasal tonal reduction in Ijo, and privative H vs. Ø in Zulu. What do these systems have in common? To salvage the notion, about all we can say is the following:

(49)  ... 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. (Bybee, Chakraborti, Jung & Scheibman 1998: 227)

Even if we substitute the designation "restricted tone system" (Voorhoeve 1973) for some or all of the systems in (48), the result is no more precise: We already mentioned in connection with $L_2$-$L_6$ in (34) that all tone systems have distributional restrictions of one kind or another. In order for a "pitch-accent" or "restricted tone" system to mean something, one would have to be explicit about which restrictions are definitional.

It is thus virtually impossible to come up with an explicit definition of "pitch-accent system" that will include the incoherent set in (48) and all other systems which various scholars have labeled as such. As I like to put it, some word-prosodic systems must be analyzed with lexical tone, as defined in (18), some must be analyzed with metrical stress, as defined in (25), some with both, and some with neither. However, no language MUST be analyzed with a third device called pitch-accent. A tonal and/or stress interpretation is always available. As Gussenhoven puts it, accent differs from tone and stress in being a strictly analytic notion:

(50)  "Accent"... is an analytical notion and cannot be measured. [It is] thus different from stress, which is typically an observable phenomenon, and different also from tone, whose existence is equally measurable.  (Gussenhoven 2004:42)

While the starred tone notation has a clear motivation, especially when H* or L* is affiliated with a metrically strong position, it would be quite superfluous to star all eight tones in Copala Trique, or star every /H/ in Zulu. Clearly such an interpretation is not required.

If there is no coherent definition of a third word-prosodic type called "pitch-accent", it will be hard to identify a core function and hence establish a prototype or canons from which to calibrate the different properties in (48), among others. And yet there are frequent designations such as "typical pitch accent languages like Japanese... and Serbo-Croatian..." (Gordon 2005:304). However, as nicely shown by Jun's (2005b:434) summary comparison, these two languages show major differences: TJ has a H*+L "pitch accent" as well as H-, L% and %L at the accentual

phrase level, while Serbo-Croatian has two contrasting pitch-accents L*+H and H*+L and the two boundary tones %L and %H at the word level. Not indicated is that Serbo-Croatian has stress-accent, while TJ does not:

(51)  ... the A[utosegmental]M[etrical] model does not directy specify information about lexical prosody or timing units. For example, it does not distinguish languages which have lexical pitch accent only (e.g. Japanese) from languages which both lexical pitch-accent and stress (e.g. Serbo-Croatian) (Jun 2005b:439)

If we follow B&V and identify the "types" by their surface phrasal properties, these two languages must certainly be "classified" differently:

(52)  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).

In other words, TJ and Serbo-Croatian do not provide a single prototype. While one can set up a "Tokyo type" and "Stockholm type" as reference points, as Hualde, Elordieta, Gaminde & Smiljanić (2002:578-9) suggest, this approach would ultimately lead to a proliferation of "types" whose properties, in fact intersect. So how should we typologize prosodic systems? Should we even try? These and other questions are taken up now in §4.

## 4.     More on property driven typology

In much of the preceding discussion I have tried to be consistent in placing such words as "type", "classify" and "tone language" in quotations. This is because of widespread misunderstandings concerning the goals of typology, both generally as well as specifically with respect to prosody. Recalling B&V's reliance on the *Concise Oxford English Dictionary* definitions of *tone* in (8) as referring either to lexical tone or postlexical intonation, consider their further comment:

(53)  A third aspect of the COED definition is more controversial. The two parts of the definition refer to two different sets of languages, reflecting the claim in many broad-stroke surveys such as Hyman (2006b) that particular values along the dimensions of form and function tend to coincide in ways that are conducive to a one-dimensional classification of language types, with "some languages, such as Chinese" at one end and "some languages, such as English," at the other. Careful descriptions of specific languages at every point along the purported continuum, on the other hand, typically use the terms together in ways that defy the typology. (B&V 2011:486)

There are several reasons to take issue with the above characterization of work in word-prosodic typology. As I make abundantly clear in Hyman (2006) and elsewhere, the goal of typology is not to assign languages to "types", nor is it the case that I advocate a "one-dimensional classification of language types". Both should be abundantly clear from the very articles that they cite:

(54)  The question is whether there is any reality in classifying languages rather than analysing 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.... 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. (Hyman 2006:226)

On the next page of the same article I go on to clarify:

(55) In order to appreciate the complexity involved in doing proper typology, consider the question of what phonologists might seek to typologise. There are at least three dimensions to this issue:
(i)   What are the properties to be typologised? Segments? Systems? Rules ?
(ii)  At what level should the properties be typologised? Underlying (morphophonemic)? Lexical (phonemic)? Surface (phonetic)?
(iii) Within what domain should the properties be typologised? The morpheme? Word? Phrase?

It is clear that my emphasis is on linguistic PROPERTIES, not on giving labels to languages. I identify this approach as "property-driven typology":

(56) In this paper I argue for a property-driven approach to phonological typology. Rather than seeking to classify or label languages, the central goal of phonological typology is to determine how different languages systematize the phonetic substance available to all languages.  (Hyman 2009:213)

While I take the view that "there is little, if any, difference between doing phonological typology and doing phonological theory" (Hyman 2006:226), typologists who define the field differently see their work as establishing and explaining the nature and distribution of linguistic properties, not classifying languages:

(57) Typology... is not so much about the classification of languages as about the distributions of individual traits—units, categories, constructions, rules of all kinds—across the linguistic universe; these distributions, not languages as such, are the primary objects of comparison. (Plank 2001: 1399)

In other words, typology should be property-driven, whether one's goal is to determine what is humanly possible in phonology, morphology etc., or to ask "what's where why?" (Bickel 2007:239).

In order to appreciate this, consider how we might "typologize" the linguistic exploitation of nasality. As seen in (58), there appear to be at least five distinct ways of structuring nasal-oral contrasts in languages (cf. Cohn 1993, Clements & Osu 2003):

(58)      Nasality may be underlyingly contrastive
   a.  on consonants only:          /m, n, ŋ/           e.g.  Lahu
   b.  on vowels and consonants:    /ĩ, ũ, ã/, m, n, ŋ/  e.g.  Bambara
   c.  on vowels only:              /ĩ, ũ, ã/           e.g.  Klao
   d.  on whole morphemes:          /CVC/$^{N}$         e.g.  Barasana

e.   absent entirely:                                    e.g.  Lushootseed

While it might be practical in certain contexts to be able to refer to (58b,c) as "nasalized vowel languages", (58d) as "nasal prosody languages", and maybe even (58e) as "oral languages", these are just shorthands for awkward references like "a system which lacks underlying (and surface) nasal-oral contrasts" etc. One should not confuse the analysis of linguistic properties with terminological or taxonomic labeling. The goal is not to name languages. Or, as I like to put it: "No name calling!"

One other thing should be clear from (58): Even though only one dimension is involved (raising vs. lowering of the velum), the structural differences in (58) cannot be characterized in terms of a "one-dimensional classification", e.g. with nasality at one end and orality at the other. The same is even more true in the case of lexical "tone" and "stress", a point I have made for a number years. To begin with, it is clear that a word-prosodic system can have tone (18) and stress-accent (25), even contrastive stress (Remijsen 2002). This produces the following four combinations from Hyman (2006:237) (cf. Ladd 1996:156, 2008a:165, Fox 2000:65):

(59)                         *+stress-accent*                    *-stress-accent*

| | *+stress-accent* | *-stress-accent* |
|---|---|---|
| *+tone* | Maꞌya, 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... |

The parenthetical languages which are said to be *+tone, -stress-accent* are among those whose analysis has been subject to the most variation.[6]  One reaction to (59) which I have heard has to do with the feeling that these languages should not be grouped with Yoruba, Igbo, Cantonese etc., but rather with the *-tone, +stress-accent* group, i.e. that W. Basque should have more in common with Spanish than with Yoruba (José Hualde, personal communication). I share that intuition and note that there will be other criteria by which the indicated prosodic systems will align differently. The mistake is to think that (59) is a global typology of languages, or even of prosodic systems. All it is is an indication of how the different languages are typologized according to the definitions of tone and stress-accent in (18) and (25) above. That is, it groups word-prosodic systems with respect to whether they have contrastive morphemic tone and/or metrical structure. Recall from (52) that Beckman (1986) recognizes a difference between English (Spanish etc.) and Tokyo Japanese (W. Basque etc.) in that the former have "stress-accent" and the latter "non-stress-accent". If we set aside cases of "stress-accent" and focus on /H/ as a potential "accent", all four combinations of obligatoriness and culminativity are attested:

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[6] Hopefully it wasn't my use of *±tone* and *±stress-accent* that made B&V mistakenly conclude that I was somehow treating stress as "a 'suprasegmental' property on a par with H tone". As can be clearly seen in all of the writings of mine which they cite, *+stress-accent* (or simply "stress") appears as a shorthand referring to the presence of word-level metrical structure, and *-stress-accent* as its absence, as per the definition in (25). Cf. my hopefully not confusing use of *±obligatory* and *±culminative* in (60).

(60)

|  | +*culminative* | -*culminative* |
| --- | --- | --- |
| +*obligatory* | Kinga (Nubi) | Creek (Iquito, Chuave) |
| -*obligatory* | Somali (TJ, W. Basque) | Seneca |

In (60) the languages not in parentheses appeared in the table in Hyman (2006:245). To these I have added Nubi with a similar obligatory and culminative /H/ to Kinga, as well as TJ and W. Basque which joins Somali as a system with culminative but non-obligatory /H/. By these properties English and Spanish would be placed with Kinga and Nubi. The shared syntagmatic property of culminativity thus accounts for the intuition we have that Spanish and Basque are similar.

The problem is what happens with obligatoriness: Not only do Spanish and Basque differ, which I attribute to the latter's not having stress-accent, but Spanish and English now share the obligatoriness property with Iquito and Chuave. Concerning the former, Michael (2010:66) writes:

(61) All prosodic words in Iquito bear at least a single H tone, and if a given prosodic word lacks lexically specified high tones (a common occurrence), a high tone is assigned to the syllable bearing primary stress.

In his analysis, some morphemes bear a lexical /H/, as in the case of /túuku/ 'tumpline' in (52a).

(62)

|  |  |  |  |  |  | *-ya* '*plural*' | *kí-* '*my*' |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | lexical initial H | : | /túuku/ | túuku | 'tumpline' | túuku-ya | kí-túuku |
| b. | default penult H | : | /tuuku/ | tuúku | 'ear' | tuukú-ya | kí-tuuku |

Other morphemes are underlyingly toneless, e.g. /tuuku/ 'ear' in (62b). Just in case there is no /H/ in the last four moras of the word, a H tone is inserted on the penultimate mora. While this guarantees that every word will have at least one H, some words may have more than one, as when /kí-/ 'my' is prefixed to /túuku/ 'tumpline' in (62a). Further examples illustrating Michael's analysis with moraic trochees are given in (63).

(63) a. /pirusu/ → (pi)(rúsu) 'electric eel' (moraic trochees)
b. /pirusu-ka/ → (piru)(súka) 'electric eels'
c. /kí-pirusu/ → (kípi)(rusu) 'my electric eel' (no penultimate H)
d. /kí-pirusu-ka/ → kí(piru)(súka) 'my electric eels'
e. /kí-pirusu-ka-hata/ → kí(piru)(suka)(háta) 'with my electric eels'

Thus, it is within the final colon (last four moras) that H is obligatory (but not culminative).

Since Iquito has a metrical system and its H tones are relatively sparse, its classification with other obligatory H systems may or may not be a concern. A more problematic case arises with respect to Chuave. As Donohue (1997:355) shows, based on Swick (1966), all words have at least one obligatory H. However, as seen in the distributions in (54), these Hs are not sparse:

(64) schema:

| | /H/ | /HL/ | /LH/ | /HLH/ | /LHL/ |
|---|---|---|---|---|---|
| 1σ =1 | H | | | | |
| 2σ =3 | H-H | H-L | L-H | | |
| 3σ =7 | H-H-H | H-H-L | L-H-H | H-L-H | L-H-L |
| | | H-L-L | L-L-H | | |
| 4σ =15 | H-H-H-H | H-H-H-L | L-H-H-H | H-H-L-H | L-H-H-L |
| | | H-H-L-L | L-L-H-H | H-L-H-H | L-H-L-L |
| | | H-L-L-L | L-L-L-H | H-L-L-H | L-L-H-L |

In fact, Chuave falls just short of a canonical. Thus, I wrote:

(65)  Whether words have one, two, three or four syllables, all combinations of H and L are observed except an all-L pattern. Since there are so many tone patterns (e.g. 15 out of 16 possibilities on four-syllable words), it is highly unlikely that this is a "pitch-accent" system. Rather, it is a tone system that happens to have a restriction that no word can be all L. (Hyman 2009:220)

I then provided the table in (66) to show that lots of fully tonal systems have an obligatory H property:

(66)  a.  /H, LH/        Manding (general) (Creissels & Grégoire 1993:109), Foe (Rule 1993), Hup (Epps 2005)

 /H, HL/        Crow (Kaschube 1954), Acoma (Miller 1965), Kaure? (Dommel & Dommel 1991), Kham (H vs. H+L?) (Watters 2002)

 /H, HLH/       Choctaw (Ulrich 1989)

 b.  /H, HL, LH/    Dom (Chida 2001), Yuhup (Ospina Bozzi 2002), Prinmi (Ding 2001)

 c.   /H, HL, LH,    Kairi (Newman & Petterson 1990), Dogon-Jamsay (Heath 2008),
 LHL/          Barasana (Gomez & Kenstowicz 2000), Wanano (Stenzel 2007)

Since Hakha Lai contrasts /HL/, /LH/ and /L/, a L feature also has the potential to be obligatory (there is no /H/ in this language) (Hyman & VanBik 2004). Note that while culminativity is necessarily syntagmatic, obligatoriness is not necessarily so. Obligatoriness is thus not by itself a reliable criterion for capturing linguists' intuitions of prosodic relatedness. (For arguments against culminativity, see Hyman 2006, 2009.)

The unavoidable conclusion of the above demonstration is that there is no single dimension by which word-prosodic systems can be placed on a continuum with stress and tone as logical endpoints. Thus, I twice provided and explicitly argued against the following schema in Hyman (2009:214, 232):

(67)  English----------W. Basque-----------Tokyo Japanese-----------Luganda-----------Mandarin

Despite their attributing such a view to me in (53), I am in complete agreement with B&V on this issue: There is no reality to such a scale, "nor can prosodic systems be treated as a continuum placed along a single linear dimension." (Hyman 2009:213).

While we agree on this much, it is not clear how to interpret their downplaying of word-prosodic typology. Do we disagree on actual facts, or are the apparent differences due to different assumptions, emphases, or goals? Let us return to their statement in (1), which I repeat as (68).

(68) There is no useful classification of prosodic types that falls out from the classification of languages in terms of tonemic function alone. (B&V 2011:531)

In presenting this earlier I asked: Not useful for what? or for whom? Most phonologists and, I assume most phoneticians, would certainly find it important to know how a word-prosodic system is organized: Does it have stress-accent? tone? both? neither? If it has tone, are the contrasts lexical or grammatical? Does every word have at least one /H/? at most one /H/? Should the lexical contrasts be interpreted as /H/ vs. /L/, /H/ vs. Ø, /L/ vs. Ø, or /H/ vs. /L/ vs. Ø? What are the word-level restrictions on the distribution of lexical contrasts? Is it free, or are there distributional constraints as in $L_2$-$L_6$ in (34) above? There are obviously a lot of linguists who care about such questions.

It should therefore be non-controversial that there is value, i.e. "usefulness", in knowing what the lexical properties are of a prosodic system. Figuring out what the lexical contrasts are and how they are affected by morphophonemic rules (or "tone sandhi") can be quite complex, as seen in such monographs as Bao (1999) and Chen (2000). Much, if not most, of Hyman (2011) concerns morphotonemics, i.e. relations between underlying and surface representations, which is clearly not the focus of the B&V chapters, which seem to be most interested in surface representations of Hs and Ls and their phonetic realization. While work on complex tone systems requires a careful examination of the morphohonemic statements that are required to predict the output tones from their lexical representations, B&V take the output Hs and Ls as a starting point:

(69) While we find it useful to adopt these tagging conventions, however, we must emphasize that the symbol strings in (1), (2), and (3) are not narrow phonetic transcriptions. Moreover, they are not even broad phonemic transcriptions until they are construed as names of meaningful configurations of parameter settings in an analysis-by-synthesis model for the speaker's dialect of (1) Japanese, or of (2) British English, or of (3) Mandarin Chinese.

Doing this kind of work is quite distinct from figuring out what makes Iquito H tones appear where they do. When Lev Michael first showed me the system in (61)-(63), I responded, "It's beautiful, it's so simple." I had already preplanned my next sentence, but he beat me to it: "Yes, it is simple, but it wasn't simple until we worked it out." Since this is often the case when one works on a language from scratch, it's worth contrasting this with the study of better known languages. Consider in this context what Sapir wrote, perhaps with some exaggeration, the following concerning the Tone 1, Tone 2 etc. of standard varieties of Chinese:

(70) In Sarcee, an Athabaskan language with significant pitch differences, there is a true middle tone and a pseudo-middle tone which results from the lowering of a high tone to the middle position because of certain mechanical rules of tone sandhi. I doubt very much if the intuitive psychology of these two middle tones is the same. There are, of course, analogous traps for the unwary in Chinese. Had not the Chinese kindly formalized for us their intuitive feeling about the essential tone analysis of their language, it is exceedingly doubtful if our Occidental

ears and kymographs would have succeeded in discovering the exact patterning of Chinese tone. (Sapir 1925:45n).

## 5.      Conclusion: Phonology is inherently typological

In going through B&V in such detail, I have indicated puzzlement at different points. I could understand an objection to one or another proposal in Hyman (2001a, 2006, 2011), if another approach to word-prosodic typology had been proposed. That isn't what B&V offer. They seem to be saying they have a different way of taxonomizing the use of pitch in language which collapses both the lexical and intonational functions as well as underlying vs. surface representations. As the quote from Jun (2005b) in (51) shows, the surface H and L mark-ups can't tell you if the starred tones got there lexically or post-lexically or whether the language has metrical stress or not.

In short, I frankly don't understand why there should be a controversy here. I do not see how working out the rules that assign, change or move tones around is in conflict with the interests of B&V in accurately reflecting surface realizations. Recall the Chimwiini facts from (36) and (41), where final vs. penultimate phrasal tone was determined by first and second vs. third person subject prefixes, respectively. This example nicely illustrates the special status of phonology as a mediator between grammar and phonetics. The concerns of word-prosodic typology are more grammatical than they are phonetic, since the output of the lexical phonology is not yet ready to be phonetically implemented—it must interact with the postlexical phonology and be further specified in various ways. One of these involves linking the phrase-final vs. phrase-penultimate Hs of Chimwiini. There are thus the questions of what level and what domain we wish to address. I suspect that B&V would answer the questions in (55ii, iii) as "surface" and "utterance". This is fine, we all have different interests, but it should not detract from the study of other levels and domains, specifically, the underlying lexical representations that are posited to account for morphophonemic alternations.

The issues I have just raised rely heavily on one's conception of phonology and hence of phonological typology. Concerning phonology, a major issue is whether one accepts that there is value in recognizing an underlying (e.g. morphophonemic) level of representation. It is clear that some linguists do not accept even the less abstract traditional phoneme:

(71)  ... the phoneme is not an entity on any level — functional, phonetic, psychological or even metaphorical. Rather, at best "phoneme" is merely a terminological expedient (Silverman 2006:215)

B&V are part of the laboratory phonology movement which Pierrehumbert, Beckman & Ladd (2000) have characterized as follows:

(72)  The modularization of phonetics and phonology that was still assumed by most laboratory phonologists up through the early 1990s is no longer universally accepted, and we ourselves believe that the cutting edge of research has moved beyond it. (pp.284-5)

... knowledge of sound structure appears to be spread along a continuum. Fine-grained knowledge of continuous variation tends to lie at the phonetic end. Knowledge of lexical contrasts and alternations tend to be more granular. (p.287)

The first quote refers specifically to the integration of phonetics and phonology, which would thus avoid identifying differences with levels—which I have however recognized throughout this response (and in my work in general). The second quote recognizes that there are differences between categorical (or "granular") contrasts and alternations vs. gradient (or "continous") variation, which many would identify as phonology vs. phonetics. At a time when phonology has become so much more instrumental, statistical, experimental and computational, I would hope for recognition that one cannot do this work without serious phonological analysis—which in turn means understanding the complex tone sandhi of Chinese, the tonal perturbations of Oto-Manguean languages, long-distance H tone mobility in Bantu tone systems, and so forth.

The following quote from Ladd still however reminds us of a misconception he rightly criticizes:

(73)  Because of the general lack of agreement and the notable absence of instrumental evidence for impressionistic descriptions, adherents of the instrumental approach often felt that their work was somehow more rigorous or more scientific, or at the very least more complete. (Ladd 2008a:11)

Spending years working out the tonal alternations in Bantu languages requires no less rigor than working instrumentally. In addition, the fact that certain morphemes in Chimwiini cause a H tone to be placed on the final syllable of a phonological phrase is no less real than a ToBI mark-up or anything one might measure. And similarly for Iquito, Giryama, Fasu, Tonga, and so forth.

Depending on one's view of phonology, one is likely to take a different approach to phonological typology. That B&V (2010:641) end their chapter with the rhetorical question: "Is typology needed?" suggests they are considering the possibility that one can do without prosodic typology entirely. While not everyone may agree that "the goal of linguistics is... to explain why languages have the properties they do" (Evans & Levinson 2010:2740), this characterization comes close to capturing how a lot of us see the typological approach. To reiterate a point that I made in Hyman (2007), phonology has always been typological. The phonemic principle established early on that phonologies may organize the same phonetic material quite differently (recall also the discussion of nasality in (58)):

(74)  ... it almost goes without saying that two languages, A and B, may have identical sounds but utterly distinct phonetic patterns; or they may have mutually incompatible phonetic systems, from the articulatory and acoustic standpoint, but identical or similar patterns. (Sapir 1925:43)

To deny word-prosodic typology would thus be akin to rejecting the insights that we teach in every introductory linguistics course, e.g. that English [pʰ] and [p] do not contrast, while Thai /pʰ/ and /p/ do. Despite refinements in our understanding of what listeners actually listen to (e.g. English /b/ may be gradiently devoiced), the insights of structural phonology live on—and, I would claim, are foundational: Try doing the phrasal tonology without having first mastered a Bantu language's complex lexical tonology! One might feel that it is more urgent to do instrumental phrasal work, given the gap in knowledge that we have of word-prosodic systems vs. intonation, which B&V however conflate:

(75)  ... we must emphasize that there are thousands of languages in the world, and we have in-depth descriptions of the tone and intonation systems of fewer than two dozen of them. Until we have a much more thorough [read: surface] taxonomy, along with more extensive comparative work within and between languages, any typology is bound to be premature. (B&V 2010:643)

As AM and ToBI-inspired intonational phonology has largely focused on major languages and their dialects, it is a pity that more field workers are not filling the gap. However, as I have tried to argue in the above paragraphs, there is a lot of other stuff to do, and word-level tone must be established first if one really wants to see how the whole system holds together. Still, this is not an excuse to hold back on sorting out sameness vs. differences in typological properties—as Roman Jakobson aptly put it several decades ago:

(76)  No doubt a more exact and exhaustive description of the languages of the world will complete, correct, and perfect the code of general laws. But it would be unsound to postpone the search for these laws until a further broadening of our factual knowledge. The question of linguistic, particularly phonemic, universals must be broached. Even if in some remote, newly recorded language we should find a peculiarity challenging one of these laws, this would not invalidate the generalization drawn from the imposing number of languages previously studied. (Jakobson 1971:526)

As my final point, I return to the issue of what the nature is or ought to be of phonological typology. As I have tried to make clear in the above discussion and have argued elsewhere, phonological typology does not consist in the comparison of surface inventories, whether surface consonants and vowels or tags such as L+H and H*L:

(77)  Phonological typology involves the comparative study of linguistic systems — i.e., paradigmatic and syntagmatic properties of inputs, outputs, and their relations. While phonological typology and phonetic typology are sometimes not distinguished, a surface inventory is not a system in the sense intended here. (Hyman 2007:265)

As Ladd (2008b:373-6) effectively argues, serious disagreements concerning theory, transcription, and interlanguage comparability must be overcome for the AM and ToBI-inspired studies to make a deep contribution to typology, which necessarily involves the relation of underlying function to surface realization. Whether concerning the complexities of Wuxi tone sandhi (Chan & Ren 1989), Nanti stress assignment (Crowhurst & Michael 2005), or Ladd's (2008b:374) "sustained level phrase-final pitch" intonation, phonology AND phonological typology necessarily involve a relation between underlying function and output. For this purpose it is important to recognize that Putonghua L+H $\neq$ English L+H* and that Japanese H*L $\neq$ English H*L. As Gussenhoven (2007:256) aptly put it in (5), such resemblances are "entirely accidental".

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