Part I

The phenomenon of stress

1 The study of word accent and stress: past, present, and future

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1.1 Introduction

This volume contains ten chapters that all originated from presentations at the First or Second Word Accent Conference held at the University of Connecticut on April 30, 2010 and December 3, 2011, respectively. The first conference brought together phonologists who share an interest in the study of word stress, based on broad typological surveys.[1] In several cases, such surveys have taken the form of digital databases which contain information about stress properties of large numbers of languages. In particular, two such databases (*StressTyp* and *Stress Pattern Database*) are publicly available on the WWW.[2] While the chapters in this volume are based on public talks, the ('hidden') goal of the first conference was to develop a grant proposal which would allow the architects of these databases to merge the two resources into one system, to be named *StressTyp2*.[3] Beyond merger, the goal was to enrich the information, both in terms of depth (detail of encoding) and breadth (number of languages) and to improve quality and accessibility of the data. Like the first conference, the second conference (which occurred after the grant had been obtained) had a part with public lectures and a 'closed door session' which aimed at discussing the design of a new relational database structure and desiderata for a user-friendly front end for StressTyp2. The chapters in the present volume are *not* concerned with the technical details of the StressTyp2 project, but are based on some of the public talks in which more general issues were addressed, relating to typologically based theoretical work.[4] In general terms, these chapters, taken as a whole, reflect on issues concerning the nature of word stress and the

[1] This conference was made possible by a Large Faculty Grant of the University of Connecticut awarded to Harry van der Hulst.

[2] See section 1.9 for a discussion of these projects.

[3] This effort led to NSF grants NSF#1123661 (PI Harry van der Hulst) and NSF# 1123692 (PI Jeffrey Heinz), which allowed us to plan and execute the merger and currently supports ongoing work on StressTyp2, which is accessible at http://st2.ullet.net.

[4] All chapters are the result of a blind double peer-review process and were last updated in September 2012.

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methodology of studying the relevant phenomena, as well as the actual and potential applications of typological data collections in any form, either with reference to theoretical issues or to language contact situations.

In this introductory chapter,[5] my goal is to situate the chapters within the broader context of the study of word stress. I survey relevant areas of research, raise questions, and point to topics that require closer attention. To this end, section 1.2 first discusses some terminological matters. This section is followed by several sections (1.3–1.7) which go over more theoretical issues regarding the distinction between the lexical specification and phonetic exponents of stress, distinctions between levels or kinds of stress, and the role of morphology and of intonation. Section 1.8 reviews some special themes in past and current theoretical work on stress, including the area of learnability and acquisition. Section 1.9 provides factual information about the above-mentioned database projects. In section 1.10, I summarize the chapters in this volume, point out their relevance to the issues that are addressed in this 'Introduction', and highlight some of the ways in which these studies are interconnected. In section 1.11, I conclude with perspectives for future research in this area.

1.2   Terminological issues

In this section I discuss a number of terminological points. While these cannot always be separated from theoretical issues or substantive issues, i.e. distinctions that are 'sensible' to make, even independent of any specific theory, I will try to not get into theoretical issues until section 1.3, realizing that the separation between terminology, substance, and theory is intrinsically unclear, if not unprincipled. Where relevant, I will make references to the chapters in this volume, with a more complete assessment of these being the subject of section 1.10.

This section focuses on the well-known issue that the use of the terms 'stress' and 'accent' is somewhat problematic. This may easily lead to confusion when comparing different traditions or theories. In one respect, the two terms can be understood as being *translations* of each other (as in *stress* being an English term and *accent* a French term for the same thing, whatever that thing is). However, given the widespread use of Romance vocabulary in many Germanic languages and the widespread use of English terms in many more languages, we often end up with *both* terms, either as synonyms or as having acquired their own specialized meanings. Putting aside the translation and synonym instances, let us focus on how the two terms, when used within the same

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5 I would like to thank all contributors to this volume for their comments on earlier versions of this chapter. In addition, I'm grateful for comments from Anthi Revithiadou and Beata Moskal.

language (or theory of language), have come to differ. As Fox (2000: 114), in
his highly informative book on prosody, notes: "The term *accent* is used in a
number of legitimate ways by different scholars, and many of these uses are
mutually incompatible." The same can be said for the term *stress*. If used in
contrast with the term 'stress', perhaps the biggest confusion is that 'accent'
can be something that lies 'below' stress (being 'more abstract' than stress) as
well as something that occurs 'above' or 'later than' stress (being associated
to the realization of stress, in particular in relation to intonational properties):

(1)   Accent (Intonation, i.e. 'pitch-accent')

    ↑

Stress

    ↑

Accent (lexicon)

In (1) I indicate that the 'abstract use' of the term 'accent' (as *underlying*
stress) refers to a lexical property of lexemes (morphemes or words) which
marks the *location* of certain types of observable stress properties that occur
in words; often, then, the term 'stress' is simply used as a cover term for
these observable phonetic properties (such as greater duration, greater intensity,
etc.). The following quote from Abercrombie (1976 [1991: 82–3]) is a good
description of this use of the term 'accent':

When I say that such-and-such syllable of a word has an (or the) accent, or is accented
(other syllables therefore being unaccented), I am not saying anything about the phonetic
characteristics of that syllable. All that is being said is that in certain conditions (which
must be specified) in utterances, an accented syllable will show certain characteristics
which can be predicted. The various possible realisations of accent may have nothing
phonetic in common. An accented syllable *may* be realised as stress, with various
features of pitch, of syllable length and segment length, of loudness, and of articulatory
characteristics in various combinations. But none of these are included in the definition
of accent. In other words, accent is ineffable. It plays no part in the phonological analysis
of utterances; its place is in the lexicon. Accent, in fact, is what is indicated by the 'stress
marks' in the *English Pronouncing Dictionary*.

Here, clearly, Abercrombie understands *stress* to be a (possible) phonetic *real-
ization* of *accent*, which itself is said to have no phonetic content. Note that for
Abercrombie stress does not refer to *one* specific phonetic realization. Rather,
various realizations can occur in various combinations. In fact, as we will
see below, if we use *stress* as a cover term for *correlates* of accent (rather
than just realizations of accent), we must also include *phonological correlates*

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(such as, for example, the possibility of a broader range of phonemic distinctions in the accented syllable). Adopting this view, several further questions arise, both with reference to the notion accent and with reference to the notion stress:

(2)   Questions about accent and stress
        a. How do morphemes and complex words come to have their accents?
        b. For both of these domains, are accent locations unpredictable or can there be rules that predict where they occur?
        c. What are accents properties of (candidates include vowels, moras, rhymes, syllables), i.e. what is the 'accent-bearing unit'?
        d. What is the domain of accent (candidates include morphemes, syntactic words, prosodic words, larger units . . .)?
        e. How do accents interact with the morphological structure of the word?
        f. Can lexemes be unaccented or have more than one accent?
        g. What are possible phonetic (i.e. non-contrastive, allophonic) correlates of accent?
        h. What are possible phonological correlates of accent?
        i. Is stress always based on accent or can languages have stress *without* having accent (an option which might be likely for languages in which the placement of stress is fully regular and thus requires no lexical marking)?
        j. Are stress properties locally realized on the accent-bearing unit or globally throughout the whole domain, e.g. in terms of rhythm?
        k. Are there good reasons for separating out systems as somehow different if they specifically exploit one phonetic property such as e.g. pitch?

Obviously, we need a *theory* of accent which gives or entails answers to all these (and likely more) questions, as well as a theory of accent correlates. The former theory will involve a *formal notation* involving local 'marks' (often represented with an asterisk, as in Goldsmith 1975, or with a partial or full metrical structure, as in Liberman and Prince 1977; see section 1.3.1).

Whatever the answers to all these questions are (and many of them have received serious attention, elsewhere as well as in this volume), once we adopt the Abercrombian perspective, there is no problem in appreciating how the terms 'accent' and 'stress' *can* be used distinctively, accent being the term for 'substance-free' lexical marks and stress for phonetic and phonological correlates of accent. Van der Hulst (2011, chapter 11, this volume) follows this Abercrombian tradition, as does Fox (2000). This leaves us with the second use of accent, namely as a pitch or tonal unit of intonation. I will return to this usage in section 1.6.

The Abercrombian tradition comes with the use of compound terms like *stress-accent* and *pitch-accent*, corresponding to more traditional terms like

dynamic accent and *musical accent*. This distinction is based on the idea that among the various possible phonetic correlates of accent, an important distinction exists between 'stress exponents' and non-stress exponents (cf. Beckman 1986), the latter characteristically involving the exclusive use of pitch levels or pitch transitions. While it was originally thought that pitch properties were an important part of the set of stress exponents (see, for example, Mol and Uhlenbeck 1956; Fry 1955), it has been argued that this was often an illusion, arising from the fact that stressed syllables of words 'in focus' position function as anchors for intonational pitch movements (see section 1.6). Since descriptions of stress would often be based on the pronunciation of words in isolation, the stressed syllable would be in focus and thus be associated with an intonational pitch movement. This, then, accounts for the pitch properties that are often (wrongly) argued to be an intrinsic part of the stress package.[6] But investigation of stressed syllables in and outside of focus has shown that these pitch properties are in fact very often *not* part of the set of word-level stress properties. When stressed syllables are measured in out-of-focus position they often do not include pitch as a significant factor, but rather comprise primarily the various consequences of *articulatory force* or *hyperarticulation* which typically enhance intensity ('loudness'), duration, fullness of articulation (with consequences for vowel quality and phonation), and more technical notions such as spectral tilt (or spectral balance), *not* excluding somewhat elevated pitch, but *not* the kinds of pitch movements which are introduced by the intonational system as markers of focus (and domain edges) (see Beckman 1986 and Gordon 2011 for relevant discussion and references). This being so, stress-accent and pitch-accent are almost complementary in their use of phonetic exponents of accent, the former showing various effects of articulatory force, while the latter merely or mainly shows a pitch property.

In (3), I display the dichotomy between phonetic and phonological cues of accent with some typical exponents:[7]

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[6] Hellmuth (2006) discusses the case of Egyptian Arabic in which *every (prosodic) word* bears a 'pitch-accent', despite the fact that this language is usually taken to be a stress(-accent) language. Since it cannot be the case that every word is 'in focus', pitch, in this case, must be an exponent of word-level accent. See Hellmuth (2006) for extensive discussion of what she argues is a specific typological category.

[7] In van der Hulst (2012), I argue that the term 'stress' still covers too many different uses even if the distinction proposed here between accent and stress is observed, proposing to adopt a set of terms such as *accent* (as suggested here), *phonotactic correlates of accent*, *Edge Prominence*, and *rhythm*, leaving the denotation of *stress* to be the various phonetic effects that results from *articulatory force*, which essentially involves 'stretching' or 'exaggerating' the inherent properties of stressed syllables. In this introduction I will not push for this 'extreme' position, however.

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(3)
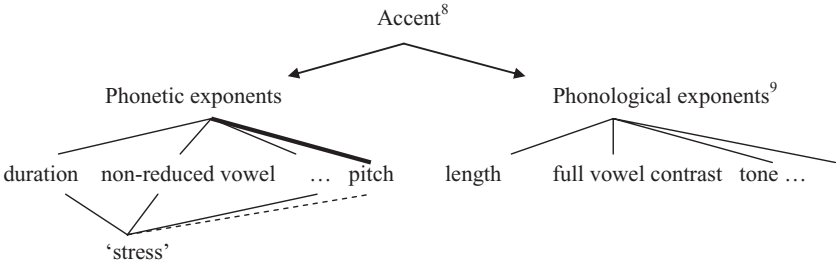
Here we see that, under this perspective, stress is not a very well-defined property but rather a broad cover term for a set of properties that tend to cluster together. In fact, as mentioned and indicated in (3), we must also include the *phonological exponents* under this umbrella. Van der Hulst (2010) elaborates this point and mentions still other correlates of accent such as those occurring when the accent location plays a role in the anchoring of intonational units (see section 1.6), or in morphological processes that are sensitive to it.[10] Given the wide variety of accent cues (beyond the phonetic exponents called stress), Goedemans and van der Hulst (2009) suggest that many more languages may be accentual than the ones that have thus far been recognized as such. They speculate that accent might be a universal trait of words, but that claim might be difficult to prove wrong if accent can in principle exist without any cue at all (see Hyman, this volume).[11]

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[8] Among the exponents, I did not include *rhythm*, which is usually also seen as a 'global' aspect of stress. I will return to this point in section 1.7.

[9] In addition to greater phonological contrast, we can also find greater syllabic complexity. In Dutch, syllables containing a schwa cannot be stressed and they also (with minor exceptions) cannot have a complex onset (see Zonneveld 1993).

[10] When considering such 'extra-phonological' correlates, the question arises whether the correlates in question are correlates of the accent or of its stress manifestation. If stress is a phonetic matter, one would not expect morphology to be sensitive to it, but intonational phenomena could presumably be sensitive to phonetic properties of utterances.

[11] The idea that accent may be a universal property of words comes from a potential identification of the notion 'accent' with the notion *head*. Following principles of Dependency Phonology (Anderson and Ewen 1987; Anderson 2011), the idea might be pursued that all domains *must* have a head, making heads and thus accent obligatory in all words (save minor category words) in all languages. However, a different understanding of accent, also discussed in this chapter, is that accent is a mark of *diacritic weight*, meaning that the accent marks the syllable as *behaving as* a heavy syllable. In that view, there is no issue with words having no accent, or indeed having more than one accent. I refer to van der Hulst (2012) for a reconciliation of these two assessments of the notion 'accent'. In short, diacritic accent, like syllable weight, functions as input to an accent algorithm which can select one accent as the head accent, or can assign a default head accent if no diacritic accent or weight is present. In van der Hulst (2012) I suggest that accentual systems in which accent is both obligatory and culminative are most likely to

The dichotomy between stress-accent and pitch-accent languages raises a further question, namely whether perhaps an even finer array of accent types should be recognized, including 'duration-accent' if there are clear cases in which specifically duration (and little else) signals the accent location. If there are no clear cases of this sort, the next question is why pitch would be special. The answer that is given by several scholars (Poser 1984; Pulleyblank 1986; Hyman 2007, this volume) is that the alleged pitch-accent systems are *tonal systems*, pitch being the core correlate of tone. If, then, one syllable per word has a high pitch (as in Kinga; Schadeberg 1973), rather than saying that one syllable has an accent which has a pitch exponent, it is claimed that one syllable bears a H tone, making such a system a so-called *restricted tone* system (in which, in this specific case, there is no paradigmatic tonal contrast at all). In this view there are only two *prosodic* properties relevant to the discussion here, namely stress (which then becomes a term both for the lexical mark and for its various correlates) and tone. I refer to Hyman (2006, 2014) and van der Hulst (2011) for various arguments pro and con the idea that 'pitch-accent systems' can (and therefore should) be analyzed as restricted tone systems, which implies that the notion 'pitch-accent' is not a third prosodic property that needs to be distinguished alongside stress and tone.

An in-between position would be to analyze a language like Kinga using *both* accent and tone, marking the specific syllable with an accent and then assigning a H tone to that syllable; this is the approach taken in Goldsmith (1975). This view captures that languages like Kinga are similar to stress-accent languages like English in marking exactly one syllable per word as 'special', as well as the fact that languages like Kinga sound like tonal languages and may even have rules that spread the 'H tone' to neighboring syllables. The approach taken by Poser (1984) and Pulleyblank (1986) denies the similarity between English and Kinga.

A slightly less restricted tone system would allow a tonal *contrast* on one specific syllable. Suárez (1983) mentions Northern Pame and Yaitepec Chatino as languages that have a tonal contrast only in the syllable that is said to be 'stressed' (which is the last syllable in both cases). In the Abercrombian way we would call this syllable accented, although it is possible that there are also stress correlates. Indeed, Hyman (1978) calls this type (with reference to other, similar cases) *tonal accent*. Tone, in this, is a *phonological correlate* of accent since it involves contrastive differences in the accented syllable that are not available in other syllables. As mentioned, it is possible that the designated syllable also shows properties that we associate with stress, in which case we

give rise to stress exponents. In all other cases, accentual systems are more likely to give rise to pitch-accent (or tone accent) systems.

have a language with both stress (or stress-accent) and tone (dependent on accent, i.e. tonal accent). This shows that a language can have combinations of different kinds of accent correlates, a fact that we have already established (see (3)).[12]

There are two kinds of arguments in favor of the use of accents for 'pitch-accent languages'. One argument (alluded to above) regards the fact that in the approach of Poser, Pulleyblank, and Hyman there are unexplained similarities between the distribution of stress and the distribution of 'tones' (in restricted 'tone' systems such as Kinga, i.e. the former pitch-accent cases) which involve the specific *edge oriented* (demarcative) locations, as well as the observance of *culminativity* (both stress and 'tone' being restricted to one designated syllable) and *obligatoriness* (each word must have a H tone). These similarities motivate the use of a common element, accent, for both types of cases. To be sure, there appear to be distributional differences between stress and tone (again in restricted systems) in that stress seems to always be obligatory (all, at least major category, words are stressed), while in certain restricted tone systems words can be toneless (i.e. unaccented in the Abercrombian view), 'violating' obligatoriness.[13] A second type of argument against the tonal analysis of pitch-accent systems could be that the use of the notion 'tone' should be limited to cases of a tone *contrast*. If a language marks one syllable per word with high pitch, it is not obvious that this warrants the postulation of a *phonological* entity 'H' (since the pitch quality of the alleged tone is predicable). Analogously, we would not assign a lexical specification '[+long]' to vowels that are predictably lengthened in a certain position (such as finally or before voiced obstruents). Van der Hulst (2011, 2012) exploits such arguments to support the pitch-accent analysis of languages such as Kinga, as well as the notorious case of Tokyo Japanese.

However, there are also arguments against the use of accent for restricted 'tone' systems. As suggested above, the pitch-accent approach does not account for the apparent fact that pitch is special among the potential accentual correlates. The special nature of pitch is explained if we acknowledge that the pitch is really a phonological tone, since we know that among the phonological properties 'tone is different' (Hyman 2011). Another problem with the pitch-accent analysis is that there are several examples of phonetic or phonological properties (not involving pitch) that reflect some sort of culminativity in that they can occur only once per word. Hyman (2007) mentions various examples:

[12] In this connection, Hyman (2007) argues that it is not correct to classify languages as exclusively belonging to one type of system, Rather, in typological studies, we should rather refer to *properties* of languages.
[13] Van der Hulst (2011, 2012) argues that whereas accent may not be an obligatory property, it can be, and that this specific case triggers stress exponents as a mark of 'wordhood' (following the Prague School).