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Lexical Accent in Cupeño, Hittite, and Indo-European

A dissertation submitted in partial satisfaction  
of the requirements for the degree  
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by

Anthony David Yates

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## ABSTRACT OF THE DISSERTATION

Lexical Accent in Cupeño, Hittite, and Indo-European

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This dissertation develops optimality-theoretic analyses of word-level stress assignment in two languages with lexical accent, Cupeño (Takic, Uto-Aztecan) and Hittite (Anatolian, Indo-European); it also assesses the implications of word stress in Hittite and the other Anatolian languages for the reconstruction of stress assignment in Proto-Indo-European.

I argue that stress assignment in Cupeño is governed by the BASIC ACCENTUATION PRINCIPLE (BAP; Kiparsky and Halle 1977): stress is assigned to the leftmost lexically accented morpheme, else to the word's left edge. This analysis is compared to that of Alderete (2001c), who argues that Cupeño shows accentual root faithfulness — i.e., that the accentual properties of roots are privileged over non-root morphemes. I show that the BAP analysis is both simpler and attains greater empirical coverage than the root faithfulness analysis, which fails to account for certain attested stress patterns that are captured under the BAP analysis. Thus reanalyzed, Cupeño has two important typological implications. First, without support from Cupeño, root faithfulness may be unattested as a feature of lexical accent systems. Second, Cupeño provides a clear typological parallel for the ancient IE languages on the basis of which the BAP was posited — in particular, Vedic Sanskrit — as well as for Hittite, where I argue that it is also operative.

The analysis of Hittite stress advanced in this dissertation is the first systematic attempt at a synchronic generative treatment of its word stress patterns. Having established that stress assignment in Hittite inflection is governed by the BAP, I also adduce evidence for accentual dominance — i.e., morphemes whose accentual specification “overrides” the BAP. I propose

that accentual dominance in Hittite is a consequence of morphological headedness: the lexical accent of the word's head morpheme is privileged in Hittite, just as Revithiadou (1999) has argued for other lexical accent systems.

Finally, this dissertation addresses the reconstruction of the Proto-Indo-European word-prosodic system. Hittite and the other Anatolian languages are not traditionally viewed as important sources for the reconstruction of this system; however, I contend that the BAP is reconstructible for PIE and that — against this traditional view — this reconstruction depends crucially on the Anatolian evidence, which converges with Vedic Sanskrit in this respect.

The dissertation of Anthony David Yates is approved.

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*For Sam*

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### PUBLICATIONS

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2017. Against Root Faithfulness in Cupeño Stress. *Supplemental Proceedings of the 2016 Annual Meeting on Phonology*.

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2016. Stress Assignment in Hittite and Proto-Indo-European. In *Proceedings of the Linguistic Society of America* 1. 25/1–15.

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2015. Anatolian Default Accentuation and its Diachronic Consequences. *Indo-European Linguistics* 3.

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& Sam Zukoff. June 2016. The Phonology of Anatolian Reduplication. 35th Annual East Coast Indo-European Conference, Athens, GA.

January 2016. On the Evolution of Lexical Accent in Cupeño. 2016 Annual Meeting of the Society for the Study of the Indigenous Languages of the Americas, Washington, D.C.

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## INTRODUCTION

*“Die accentuation ist der veränderlichste theil des sprachlichen organismus, wie man daraus ersieht, daß manche sprachen mit ihren engsten stammgenossen hinsichtlich des accentationsprincip sich entzweit haben, während auch andererseits manche unverwandte sprachen in ihrem accentuationssystem sich begegnen.”*

\* -F. Bopp<sup>1</sup>

This dissertation is concerned with word stress in languages with LEXICAL ACCENT (LA), a type of word-prosodic system in which the distribution of stress within the word is generally described as “free”, “unpredictable”, or “morphological” (see §1.1.2). More precisely, it focuses on the lexical accent systems of two genetically distinct languages: Hittite, which is the oldest and best attested representative of the extinct Anatolian branch of the Indo-European (IE) language family, and was spoken in what is now modern Turkey and northern Syria until it died out in the 12th c. BCE; and Cupeño, which is a member of the Tadic subfamily of the Uto-Aztecan (UA) family, and was spoken until the late 1980s in southern California.

At first sight, the connection between these two languages may seem tenuous — why should these two genetically unrelated, structurally dissimilar languages be treated together, even if they have broadly comparable stress systems? In fact, this dissertation is not the first to draw a comparison between the stress system of Cupeño and those found in the ancient IE languages. In their foundational analysis of Indo-European word prosody, Kiparsky and Halle (1977: 235–6) quoted at length from Hill and Hill’s (1968) pioneering study of lexical accent in Cupeño, calling attention to certain shared features between the Cupeño system as analyzed by the Hills and the system that they reconstructed for Proto-Indo-European (PIE) on the basis of evidence in Greek, Balto-Slavic, and above all, Vedic Sanskrit. This comparison raises several interrelated questions: Exactly what are the properties of the Cupeño word prosodic system? Are the principles of stress assignment fundamentally the same as in Vedic Sanskrit? And should these principles of stress assignment be reconstructed for PIE?

One goal of this dissertation is to address these questions. As a first step toward this end, the Cupeño word prosodic system is examined in detail. I argue that stress assignment in Cupeño is determined by an interaction between the lexically specified accentual properties of roots and affixes and the same BASIC ACCENTUATION PRINCIPLE (BAP) that Kiparsky and Halle identified in Vedic Sanskrit. Yet while the typological parallel with Cupeño ensures that the BAP is a possible feature of PIE stress assignment, the status of the BAP at this stage remains uncertain. I argue here that the BAP was also operative in Hittite and the Anatolian languages, which thus provide crucial evidence in support of Kiparsky and Halle’s reconstruction.

However, this dissertation is also a study in word-prosodic typology and specifically, in the analysis of LA systems, in which respect Cupeño and Hittite are of intrinsic interest. On the

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<sup>1</sup>Bopp (1854: 1): “Accentuation is the most variable part of the linguistic faculty, as one can see from the fact that many languages have diverged from their closest relatives with respect to the principles of accentuation, while on the other hand many unrelated languages resemble one another in their systems of accentuation.”

one hand, the existence of accentual root faithfulness — i.e., a lexical accent system in which the accentual properties of roots are privileged over those of affixes — may depend on Cupeño, which has been argued by Alderete (2001c) to have this feature. However, I contend that an analysis of Cupeño in terms of the BAP alone better predicts Cupeño stress patterns and that Cupeño thus provides no evidence for accentual root faithfulness as a feature of LA systems.

Hittite, on the other hand, bears upon the theoretical analysis of so-called accentual dominance effects in LA systems. While such effects are unattested in Cupeño, Hittite has derivational morphemes that “override” the BAP, imposing their accentual specification on the stem to which they attach. I argue that Hittite provides support for Revithiadou’s (1999) hypothesis that accentual dominance is a function of morphological headedness — i.e., that the lexical accent of a morpheme is privileged in Hittite if that morpheme is the word’s morphological head.

## **Outline of the dissertation**

This dissertation is structured as follows. Chapter 1 lays the groundwork for the synchronic and diachronic analyses of Cupeño and Hittite developed in Chapters 2, 4, and 5. It thus provides a general introduction to the study of lexical accent systems, outlining the typological distribution of these word-prosodic systems and the properties that define them cross-linguistically. It also discusses how lexical accent systems can be analyzed in Optimality Theory (Prince and Smolensky 1993/2004), the theoretical framework employed in this dissertation.

Chapter 2 proposes a new optimality-theoretic analysis of Cupeño stress assignment. I demonstrate that stress assignment in Cupeño is governed by the BASIC ACCENTUATION PRINCIPLE: stress is assigned to the leftmost lexically accented morpheme, else to the word’s left edge. This analysis is then compared to Alderete’s (2001c) root faithfulness-based analysis of Cupeño stress. I show that the BAP analysis is empirically superior to the root faithfulness analysis, which fails to account for stress patterns in Cupeño reduplication that are captured under the BAP analysis, and moreover, that it does so with fewer assumptions.

Chapters 3–4 turn to Hittite, where the analyst is faced with special challenges. Unlike Cupeño, where word stress is well-documented, or like Vedic Sanskrit, where stress was marked as part of the grammatical tradition, Hittite stress is not directly represented in its cuneiform writing system; the position of word stress must be inferred, rather, by its secondary effects on vowel quantity and quality. Diagnosing word stress in Hittite therefore depends on having a theory of how stress interacts with vowel quantity and quality, as well as of how its effects are represented in the writing system. Accordingly, Chapter 3 lays the foundations for such a theory, establishing the criteria used in this dissertation to identify Hittite word stress patterns.

With this foundation in place, Chapter 4 develops a synchronic optimality-theoretic analysis of Hittite stress assignment. Focusing first on stress alternations within inflectional paradigms, I demonstrate that within this domain Hittite stress assignment is governed by the BAP. Within derivation, however, I adduce evidence for accentually dominant morphemes, accented suffixes that defy the BAP by attracting stress in preference to an accented stem to their left. I argue that such dominance effects arise in Hittite as a consequence of morphological headedness: dominant morphemes have head-of-word status and, as such, their lexical accents are privileged by higher-ranked faithfulness constraints.

Finally, Chapter 5 is concerned with diachrony — specifically, the implications of the analysis of Hittite word stress developed in Chapter 4 for the reconstruction of PIE stress assignment. I argue that evidence for a Hittite-like stress grammar can be found in Palaic and Luwian, and accordingly, that a grammar with these properties should be reconstructed for their proximate ancestor, Proto-Anatolian. I then compare this grammar to the one reconstructed by Kiparsky and Halle (1977) for the ancestor of the non-Anatolian Indo-European languages (i.e. Proto-Nuclear Indo-European); since they share the BAP, I argue this feature is reconstructible for PIE. I contend, further, that accentual dominance was a PIE phenomenon, and discuss how it might be analyzed in view of its effects in the daughter languages.

## Conventions

Before proceeding, a few brief notes on the linguistic conventions used in this dissertation are in order. In dealing with the ancient IE languages, I largely employ the orthographic practices and abbreviations standardly used in Indo-European scholarship, which can be found in any IE handbook (e.g. Clackson 2007, Fortson 2010, Meier-Brügger 2010, Weiss 2011). Latin, Sanskrit, and PIE forms — including, for the latter two, in underlying representations — are presented in their standard roman alphabets; Greek forms are presented in transliteration. Hittite forms are primarily given in “broad transcription” (see Hoffner and Melchert 2008: 11), but in all cases in which some aspect of their phonology is relevant I provide accompanying approximate IPA transcriptions (see §3.1 and §4.2.1 for further discussion of the Hittite script). For all other languages — including Cupeño — I use IPA transcription, with a single notable exception: following standard practice in both IE and UA scholarship, I use [y] for IPA [j].

I note also here a few non-standard signs and symbols used in this work. “⇒” and “⇐” indicate synchronic word-formation processes. “>>” and “<<” denote that a combination of phonological and analogical changes have occurred between two historical stages. The symbol “x” marks a form or meaning that never existed at any historical stage, but might be expected under a different phonological or morphological analysis. In other words, “x” is the equivalent of the asterisk (“\*”) in synchronic linguistic scholarship; here, however, I reserve a preceding “\*” for reconstructed forms. Finally, an asterisk following a word (i.e. “x\*”) indicates that the marked word form is not attested, but its existence is securely inferred from other attested forms.



# CHAPTER 1

## Cupeño, Hittite, and Lexical Accent

As a preliminary to the analyses of Cupeño and Hittite word stress carried out in Chapters 2 and 4, this chapter provides an introduction to the study of LEXICAL ACCENT (LA) systems, as well as general linguistic and historical background on these two languages. §1.1 focuses on LA systems and their analysis, discussing the features of LA within the broader typology of word-prosodic systems, and introducing the terminology and theoretical framework employed in this dissertation. The languages under study are the subject of the next two sections, Cupeño in §1.2 and Hittite in §1.3. I situate each language within its historical context, delineating its phylogenetic relationships within its macro-family and locating in time and space its speakers and the historical records of their language. I also provide a basic phonological overview of these languages, and discuss the evidence for word stress in each.

### 1.1 Lexical accent & word-prosodic typology

This section is organized as follows. §1.1.1 introduces the terminological distinction — crucial to the analysis of LA systems — between two types of phonological prominence: STRESS, surface prosodic prominence realized along some phonetic dimension(s); and ACCENT, underlying lexical pre-specification for prominence. §1.1.2 then examines the traditional typological division of word-prosodic systems into FIXED and FREE STRESS systems — in particular, with respect to how LA fits into this typology. Finally, §1.1.3 turns to the analysis of LA systems, discussing how stress assignment in these systems can be modeled in an optimality-theoretic framework.

#### 1.1.1 On “stress” and “accent”

This dissertation is concerned with word STRESS, its distribution within and across words and the grammatical principles by which it is determined. Above all, it focuses on word stress in languages that — like Hittite and Cupeño — have LEXICAL ACCENT (LA) systems, a type of word-prosodic system in which, as the label suggests, lexically specified ACCENT enters into the computation of word stress. Because of the highly variegated and, in some cases, mutually incompatible uses of these terms in the literature, this section presents an explicit definition of how they are used here.<sup>1</sup>

I employ the term STRESS to refer to surface prosodic prominence, a phonological property of syllables: stressed syllables are realized with greater prosodic prominence, realized along

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<sup>1</sup>Fox (2000: 114–50) provides a detailed overview of these terms and the history of their usage (cf. van der Hulst 2014: 3–13).

some phonetic dimension(s), than other syllables within the same phonological domain (for word stress, the prosodic word). This phonological definition of stress makes no reference to how relative prominence is manifested, i.e. the phonetic correlates of stress. These vary cross-linguistically, generally involving some combination of increased duration, intensity, and pitch (raised F0), as well as fuller realization of vowel quality.<sup>2</sup> In a given language, however, stress may be primarily cued by just one or two of these acoustic properties; a case in point are “pitch accent” languages, where stress is principally realized by elevated pitch. Such languages include, beside well-known examples like Tokyo Japanese (Japonic; e.g. Poser 1984b), several members of the IE family, including Vedic Sanskrit (e.g. Allen 1953: 87–93), Ancient Greek (e.g. Allen 1973: 230–6, Devine and Stephens 1994: 157–214), and the Balto-Slavic languages (Olander 2009: 101–52), on which basis “pitch accent” is universally reconstructed for their common ancestor, Proto-Indo-European (PIE) (cf. Weiss 2011: 107–9).

Other ancient IE languages, including those of the Italic (e.g. Allen 1978: 83–6), Celtic (e.g. Thurneysen 1961: 27), and Germanic (Prokosch 1939: 118–9) branches, have innovated a more prototypical “stress accent” (or “dynamic accent”), whose phonetic correlates include some or all of the acoustic properties noted above.<sup>3</sup> Similarly, Cupeño and its closest Uto-Aztecan (UA) relatives are generally described in terms of a “stress accent” (e.g. Seiler 1957, 1965; see further §1.2.4 below). As defined here, however, stress is “substance free” (cf. van der Hulst 2011, 2014); it abstracts away from any phonetic differences, thereby facilitating comparison of the word-prosodic systems of the IE languages to each other, as well as to the UA languages.

Comparison of these languages in fact reveals that their word-prosodic systems share the two phonological properties in (1):<sup>4</sup>

- (1) a. OBLIGATORINESS: Every lexical word has *at least* one syllable marked for the highest degree of prosodic prominence.
- b. CULMINATIVITY: Every lexical word has *at most* one syllable marked for the highest degree of prosodic prominence.

(1b) differentiates the IE and UA word-prosodic systems especially from the majority of tonal systems, which allow multiple syllables — or more precisely, tone-bearing units — to surface with the highest level of prominence. Still other languages — some typically described in terms of tone, such as Somali, others in terms of “pitch accent,” such as Tokyo Japanese — permit lexical words to surface without any prosodic prominence; these languages contrast with IE and UA by their non-observance of (1a). A consequence of the IE and UA languages strictly enforcing both (1a) and (1b) is that every word contains some syllable(s) that are more prosodically prominent than others; these syllables — whether produced louder, longer, and/or with higher pitch — are STRESSED. More specifically, primary stress falls on the most prominent of these syllables, secondary stress on those with “intermediate” prominence — i.e. less than the primary stress, but more than other (unstressed) syllables.

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<sup>2</sup>See especially Lehiste (1970: 125–42) with references to earlier scholarship; more recent work is surveyed by Dogil and Williams (1999).

<sup>3</sup>On the traditional opposition between “dynamic” and “musical” accent, see Fox (2000: 115–20).

<sup>4</sup>According to Hyman (2006), the properties in (1a) and (1b) together constitute a well-defined cross-linguistic type of word-prosodic system that he refers to as a “stress accent” system.

It should be noted that, in referring to (primary) word-level prominence as stress, I depart from standard practice in Indo-European linguistics — and more broadly, in French and German scholarship on word prosody — where this property is referred to as “accent” (Germ. *Akzent*, Fr. *accent*). Two principal considerations motivate abandoning this traditional designation. The first is simply to avoid terminological confusion — in particular, the tendency for “accent” (without additional qualification) to be associated with “pitch accent,” which itself has two at least two distinct meanings. On the one hand, there is its use, noted above, to refer to a particular phonetic correlate of prominence, viz. raised pitch. Using “accent” to describe word-level prominence in a given language may therefore be mistaken for the claim that its primary phonetic correlate is raised pitch in that language.<sup>5</sup> On the other hand, there is the use of “(pitch) accent” to refer to intonational units — for instance, Bolinger (1958; 1972, *et seq.*) applied the term “pitch accent” to intonational pitch contours that may link onto stressed syllables,<sup>6</sup> and Cutler (1984) views “accent” as a property of sentences (in contrast to “stress”, a property of words). These additional associations problematize the use of “accent” as a term for (i) a word-level property and (ii) prosodic prominence independent of its phonetic realization.

A more important consideration relates directly to the analysis of lexical accent systems, where there is a need to distinguish between surface and underlying prominence. The latter corresponds to a third, well-established use of the term “accent”, which is the sense in which I employ this term in this dissertation. To be precise, I use the term ACCENT to refer to abstract lexical specification for prominence, an underlying feature of morphemes. ACCENTED morphemes — i.e. morphemes that bear a lexical accent — are marked by this feature as preferred hosts for surface prominence, and thus tend to attract word stress to their accented syllable. However, an underlying accent may also fail to be realized in the output — in particular, when a morpheme contains multiple accented morphemes, and the surface distribution of stress in the language is restricted by culminativity (in (1b) above). This situation is illustrated with data from Cupeño in (2) and from Vedic Sanskrit (Indo-Iranian, IE) in (3). In both languages, every lexical word is required to bear a single primary stress (cf. §1.1.1). The accented suffixes Cu. /-qá/ (PRS.SG) and Ved. /-á/ (INSTR.SG) attract the primary stress in (2a) and (3a) respectively; however, when suffixed to another accented morpheme, as in (2b) and (3b), satisfying culminativity requires deletion of a lexical accent. In these examples, stress is preferentially assigned to the accented syllable of the root; the lexical accent associated with the suffix is therefore deleted, leaving no trace in the surface form:<sup>7</sup>

- (2) a. Cu. /√yax - qá/ → [ya-qáʔ] ‘(s)he says’ (say-PRS.SG)  
 b. Cu. /√púy - qá/ → [púy-qa] ‘(s)he eats’ (eat-PRS.SG)

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<sup>5</sup>This danger is particularly acute in comparative-historical work on the ancient IE languages, where the proto-language is generally afforded pride of place. In this respect, note that in §3.4 I argue that “stress accent” had probably developed in Hittite and the other Anatolian languages, thus replacing the inherited “pitch accent.”

<sup>6</sup>Bolinger’s (1958)’s designation was adopted by Bruce (1977), Pierrehumbert (1980), and (with some terminological variation) much subsequent work in autosegmental phonology; useful overviews are provided by Gussenhoven (2004: 17–9), Ladd (2008: 43–84), and Arvaniti (2011).

<sup>7</sup>Vedic stress assignment is discussed further in §1.1.2.2, §1.1.3, and §5.3 below; Cupeño stress assignment is treated in detail in Chapter 2.

- (3) a. Ved. /√pad - á̌/ → *pad-á̌* ‘with the foot’ (SHIP-INSTR.SG)  
 b. Ved. /√gáv - á̌/ → *gáv-ā̌* ‘with the cow’ (COW-INSTR.SG)

In §1.1.2.2, I suggest that the existence of such accented morphemes — or more generally, morphemes with some type of underlying pre-specification for prominence (e.g. PREACCENTING suffixes) — is one of the definitional properties of LA systems.

### 1.1.2 “Fixed” vs “free stress”

Traditionally, the word-prosodic systems of the world’s languages are divided broadly into two categories, FIXED STRESS systems and FREE STRESS systems (see, e.g., Hayes 1995: 32). In fixed stress systems, word stress is predictable on the basis of purely phonological factors such as syllable weight, or rhythmic restrictions on the distance between a word’s (left or right) edge and a stressed syllable or between two stressed syllables; word stress is thus also non-contrastive (i.e. non-phonemic), since words with the same phonological shape are assigned the same stress pattern. In FREE STRESS systems, on the other hand, word stress is contrastive, and often depends on what morphemes a word contains and how they are combined (i.e. on its morphological constituency). For this reason, free stress systems are also often described in the literature as “morphological” or “morphology-dependent” stress systems. In some cases, the label “lexical accent” is used synonymously with these two terms; however, in §1.1.2.2 below I present a more restricted definition of LEXICAL ACCENT (LA) systems, which excludes some of the languages that are adequately described as free (or “morphological”) stress systems; under this view, LA systems are a proper subset of free stress systems.

The binary terminological division between fixed and free stress systems does not in fact reflect a categorical opposition, but a gradient one: most or perhaps even all fixed stress systems have “lexical exceptions” — in some cases, a non-trivial minority — to the regular phonologically determined stress pattern; conversely, in free stress systems phonological factors regularly if not always play a role in determining word stress. LA systems have phonological principles (from an optimality-theoretic perspective, constraints; cf. §1.1.3) that, at the very least, function to assign a “default” stress pattern to words that lack accented morphemes, and that potentially also decide which of several accented morphemes receives (primary) stress (cf. §1.1.2.2 below). Because the relevant principles are often similar or identical to those that are prototypically found in fixed stress systems, I discuss fixed systems in greater detail in §1.1.2.1 before returning specifically to the typological properties of LA in §1.1.2.2.

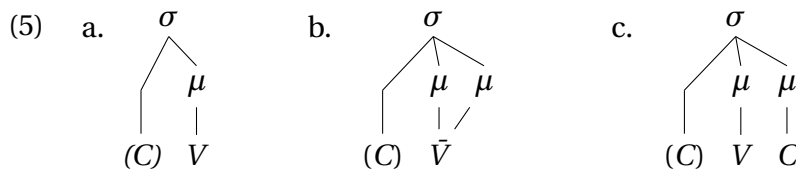
#### 1.1.2.1 Fixed stress systems

In fixed stress systems, the position of primary stress is mostly phonologically predictable, usually falling near the beginning or end of a word — e.g. on the first syllable of (virtually) every word as in Finnish (e.g. Karvonen 2005), or on the antepenultimate syllable (in words of three or more syllables) as in Macedonian (Lunt 1952; Franks 1987):<sup>8</sup>

<sup>8</sup>Finnish also has rhythmic secondary stress (marked with `) on words of four or more syllables; on its distribution, see Karvonen (2005) with references to earlier scholarship. Disyllabic words in Macedonian are regularly stressed

(4)	FINNISH		MACEDONIAN
	[vá.pa:]	‘free’	[krá.va.ta] ‘cow’
	[sí:ka]	‘whitefish’	[vo.dé.ni.t̪ar] ‘miller’
	[má.ta.la]	‘low’	[vo.de.ní.t̪a.ri] ‘millers’
	[ká.len.tèri]	‘calendar’	[vo.de.ni.t̪á.ri.te] ‘the millers’

A somewhat more complex type of fixed stress system is found in Classical Latin, where in words of three or more syllables, stress may fall on either the penultimate or antepenultimate syllable. However, stress is still fixed in the sense that is predictable on the basis of a purely phonological property, viz., the weight of the penultimate syllable, which may be light — i.e. monomoraic (5a) — or heavy, i.e. bimoraic (5b) or (5c):



Traditionally, a distinction is drawn between bimoraic syllables of the type in (5b), which are heavy “by nature” (i.e. because they contain a long vowel), and those in (5c), which are heavy “by position” (i.e. because they contain a moraic coda consonant).<sup>9</sup> However, this distinction has no bearing on the distribution of primary stress; the generalization, according to the Latin grammarians, is that the penultimate syllable is stressed if heavy, otherwise stress falls on the antepenultimate syllable (cf. Quint. *Inst.* I.5.30–1). (6) illustrates this generalization — the penultimate syllable is light in (6a), heavy “by position” in (6b), and heavy “by nature” in (6c):

(6) a.	<i>cá.li.dus</i>	‘hot’	b.	<i>ve.nús.tus</i>	‘attractive’
	<i>i.tá.li.cus</i>	‘from Italy’		<i>m.ori.bún.dus</i>	‘dying’
	<i>á.ri.dus</i>	‘dry’	c.	<i>ur.bá.nus</i>	‘urban; refined’
	<i>gál.li.cus</i>	‘from Gaul’		<i>pe.re.grí.nus</i>	‘foreign’

Predictably, the prosodic split in (6) is between the words in the left column with a light penultimate syllable and antepenultimate stress and those in the right column with a heavy/stressed penultimate syllable.

In some fixed stress systems, moreover, the computation of stress may be sensitive to morphological structure. In particular, it is cross-linguistically common for stress to fall only within

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on the initial(/penultimate) syllable.

<sup>9</sup>The terms used by the Latin grammarians are *naturā* ‘by nature’ and *positu* (or *positione*) ‘by position’; these terms are borrowed from the Greek grammarians, rendering *p<sup>h</sup>úsei* and *t<sup>h</sup>ései* respectively.

a morphologically defined stress domain to which only a subset of morphemes belong. For instance, a property of many Uto-Aztecan languages is that stress is STEM-BOUNDED — i.e., that stress is restricted to the nominal or verbal stem, which generally includes the root plus some or all suffixes but not prefixes. One such language is Cahuilla — the closest linguistic relative of Cupeño (see §1.2.1 below) — where primary stress is fixed on the stem-initial syllable; unprefix forms are given in (7a), prefixed forms in (7b):<sup>10</sup>

- (7) a. Ca. [kí.ki.tam] ‘children’  
           [tá.ka.lì.t̂fem] ‘one-eyed.PL’  
           [pú.kaw.te.mih] ‘gopher snakes.OBJ’  
           [pé.nì:t̂fif] ‘the past’  
       b. [pi\$sí.si.qal] ‘he urinates’  
           [ne\$hí.t̂fe.qal] ‘I go’  
           [pen\$té:w.qal] ‘I see him’  
           [pen\$pé.nì:t̂fì.ni.qa] ‘I translate them’

Yet despite the fact that stress is on the whole phonologically predictable in the languages discussed above, it is also the case that each language has individual lexical items with stress that defies the relevant phonological generalization. Exceptional stress is especially common in loan words, but is often found elsewhere in the lexicon as well; some Macedonian examples are given in (8); Latin in (9); and Cahuilla in (10):<sup>11</sup>

- (8) Mac. [ep.tén] ‘completely’  
           [od.váy] ‘scarcely’  
           [kra.vá.ta] ‘necktie’  
           [li.te.ra.tú.ra] ‘literature’

<sup>10</sup> In (7), the symbol “\$” marks the stem boundary. Seiler (1977: 26–43) provides a full description of stress in (Desert) Cahuilla, including its pattern of rhythmic secondary stress; for a (metrical) analysis of this pattern, see Hayes (1995: 132–40) (cf. Levin 1988; Crowhurst and Hewitt 1995). I follow Hayes (*op. cit.* 137) in the assumption that word-final light syllables do not bear secondary stress.

<sup>11</sup> For the examples in (8), see Lunt (1952: 22) and Friedman (2001: 13); for (9), Lindsay (1891: 375) and Weiss (2011: 110–1); and for (10), Seiler and Hioki (1979: 22, 115, 142, 218). As noted by Seiler and Hioki, the examples in (10) are likely all lexicalized compounds. However, in addition to these cases of stem-internal stress, Cahuilla also shows prefixal stress when a possessor/agreement prefix is attached to a light monosyllabic root, e.g. [t̂fém\$na] ‘our father’ (cf. /na/ ‘father’), or to the root /yax/ ‘say’, e.g. [t̂fém\$yaxwen] ‘we say’. This pattern of “stress shift” is clearly related to the historical development of unaccented (or “stressless”) roots in Cupeño (cf. Mamet 2011), which are treated from a synchronic perspective in §2.2.1.

- (9) Lat. *ad.húć* ‘until now; hitherto’  
*il.líc* ‘he; that.M.NOM.SG’  
*au.dīt* ‘(s)he heard’  
*ē.dúc* ‘lead out!’
- (10) Ca. [mu.tá.mi.ti] ‘early’  
[muʃ.ʔí.val] ‘lazy person’  
[paʃ.wél.iʃ] ‘young man’  
[tu.há.ye.mà.niʃ] ‘always’

It seems likely that such idiosyncratic stress patterns are simply learned on an item-by-item basis (i.e. memorized). One possible way of analyzing their exceptionality is to assume that these words are stored in the lexicon with a diacritic mark of the same type that is associated with stress-attracting morphemes in LA systems, i.e. a lexical accent (cf. §1.1.2.2 below);<sup>12</sup> if this is correct, the underlying representations for the words in (8–10) would be (e.g.) Mac. /eptén/, Lat. /adhúć/, Ca. /mutámiti/. Yet regardless of how these patterns are integrated into the broader analysis of stress in these languages, they serve to confirm the fact that the distinction between fixed and free stress systems is gradient rather absolute.

### 1.1.2.2 Lexical accent systems

The term LEXICAL ACCENT (or “lexical stress”) is often found in descriptions of the word-prosodic systems of certain languages with free stress. A number of Indo-European languages have been described in these terms, both ancient (Vedic Sanskrit, Ancient Greek) and modern (Modern Greek, Lithuanian, Russian, Bulgarian, Spanish, Italian); however, the label has also been applied to a diverse set of languages, which include Thompson Salish (Salishan; Revithiadou 1999: 250–77), Tokyo Japanese (Japonic; e.g. Poser 1984b, Kubozono 2011), Chamorro (Austronesian; Chung 1983), Turkish (Turkic; e.g. Inkelas 1999, Özçelik 2014), Yakima Sahaptin (Plateau Penutian; Hargus and Beavert 2006), and Choguita Rarámuri (Uto-Aztecan; Caballero 2011).

All of these languages exhibit the canonical properties of free stress systems: the position of stress is phonologically unpredictable, contrastive, and morphology-dependent. The first two of these properties are illustrated in (11) with minimal pairs from (11a) Ancient Greek, (11b) Vedic Sanskrit, and (11c) Tokyo Japanese:<sup>13</sup>

<sup>12</sup>According to Revithiadou (1999: 3), such exceptional stress patterns are encoded by “diacritic marking,” which is a different kind of feature than a lexical accent. I am skeptical that a firm distinction can be maintained.

<sup>13</sup>Japanese data is from Kawahara (2015); note that since Japanese allows words with no surface prominence, it is possible to have three-way prosodic contrasts in segmentally identical words — thus, e.g., [kaki-ga] ‘persimmon-NOM’ is distinct from ‘oyster’ and ‘fence’ in (11c).

- (11) a. Gk. *tómos* ‘slice’ *tomós* ‘sharp’  
*hargápē* ‘hook’ *hargapḗ* ‘seizure’  
*lit<sup>h</sup>óbolos* ‘stone-throwing’ *lit<sup>h</sup>obólos* ‘struck by stones’
- b. Ved. *ápas-* ‘work’ *apás-* ‘working’  
*kṛṣṇa-* ‘black antelope’ *kṛṣṇá-* ‘black’  
*rājaputra-* ‘having king(s) as son(s)’ *rājaputrá-* ‘son of a king, prince’
- c. Jap. [ká.ta-ga] ‘shoulder-NOM’ [ka.tá-ga] ‘frame-NOM’  
[ká.ki-ga] ‘oyster-NOM’ [ka.kí-ga] ‘fence-NOM’

Also observed in these same languages is a relatively robust correlation between a word’s stress pattern and its morphological category, which generally indicates that morphology plays a role in stress assignment — viz, that stress is morphology-dependent; this relationship can be seen clearly in (12), where stress surfaces on the derivational suffix in (12), (13a), and (14a), and on the syllable preceding the derivational suffix in (13b) and (14b):

- (12) a. Gk. *ba-tó-s* ‘passable’ (come-ADJ-M.NOM.SG)  
*hru-tó-s* ‘flowing’ (flow-ADJ-M.NOM.SG)  
*poi.ē-tó-s* ‘made’ (make-ADJ-M.NOM.SG)
- b. *as.pi.d-ís.ko-s* ‘little shield’ (shield-DIM-M.NOM.SG)  
*ne.ā.n-ís.ko-s* ‘youth’ (young.man-DIM-M.NOM.SG)  
*k<sup>h</sup>i.tō.n-ís.ko-s* ‘short tunic’ (tunic-DIM-M.NOM.SG)
- (13) a. Ved. *ba.l-ín-as* ‘strong’ (strength-ADJ-M.NOM.PL)  
*so.m-ín-as* ‘possessing soma’ (soma-ADJ-M.NOM.PL)  
*kā.m-ín-as* ‘desirous’ (strength-ADJ-M.NOM.PL)
- b. *ó.j-a.s-as* ‘of strength’ (be.strong-NML-N.GEN.SG)  
*má.n-a.s-as* ‘of mind’ (think-NML-N.GEN.SG)  
*su-má.n-a.s-as* ‘well-disposed’ (well-think-NML-M.NOM.PL)



(14)	a.	Jap.	[ko.do.mo-p.póí]	‘childish’	(child-ADJ)
			[ne.tu-p.póí]	‘feverish’	(fever-ADJ)
			[ki.za-p.póí]	‘snobbish’	(smug-ADJ)
	b.		[yo.çi.dá-ke]	‘family of Yoshida’	(Yoshida.PN-NML)
			[u.rá-ke]	‘family of Ura’	(Ura.PN-NML)
			[ni.çi.mu.rá-ke]	‘family of Nishimura’	(Nishimura.PN-NML)

In this dissertation, I use the term LEXICAL ACCENT in a narrower sense than may be found elsewhere in the literature. As employed here, the designation applies to the word-prosodic systems of all the languages noted above, as well as the two that constitute the focus of this dissertation, Cupeño and Hittite. I define LA systems as word-prosodic systems characterized by the properties in (15):

- (15) (i) Prominence is CULMINATIVE (cf. (1b above)).  
(ii) A subset of morphemes are lexically specified for prominence (see further §1.1.3.1 below).  
(iii) Such lexically-marked morphemes cooccur and thus interact in the computation of primary stress.

Defined in this way, the category excludes by (i) the non-culminative tonal systems discussed in §1.1.1, but properly includes Japanese, where “pitch accent” is culminative but not obligatory. It also excludes the fixed stress systems discussed in §1.1.2.1, which appear to have only a relatively small set of words with idiosyncratic lexically-listed stress patterns; if such patterns are encoded with a lexical accent (and these languages thus satisfy (ii)), they still fail to satisfy (iii), since these morphemes do not cooccur in word-formation. Similarly, this definition excludes certain other languages in which stress is appropriately described as “free” and/or “morphology-dependent.” One such language is English, whose productive morphology (the “level II morphology”; see Kiparsky 1982c) does not generally influence the distribution of primary stress, although it does have the effect of opacifying stress patterns that were phonologically predictable at an earlier level of derivation (i.e. “level I”; cf. Hayes 1995: 31–2).

Yet another type of morphology-dependent stress system that does not meet the definition of lexical accent in (15) is what is referred to by Revithiadou (1999: 22–4) as a “head-stress system without lexical accents.” In word-prosodic systems of this kind, stress is head-marking: stress surfaces on the morpheme that is the word’s morphological head (on this concept, see §1.1.3.3 below) if it has one; otherwise the word is assigned a phonologically determined default stress pattern. The major difference between this kind of HEADSTRESS system and LA systems is with respect to (ii) in (15) above: in latter, the set of stress-attracting morphemes is idiosyncratic and thus lexically specified, while in the former, all morphemes that have the same morphosyntactic properties (fail to) attract stress in the same way. A pure HEADSTRESS system therefore does not require underlying specification for accent, since stress is simply a function of morphological structure and its interaction with phonology.

According to Revithiadou, such a system is attested in Kobon (Kalam, Trans-New Guinea). In Kobon, primary stress falls on one of the last two syllables of the word, and within this domain, is sensitive to the relative prominence of their nuclei; the prominence hierarchy in the language is [a], [ai], [au] > [o], [e], [i], [u] > [ʌ], [ɨ]. The dominant pattern is penultimate stress, as in (16a). But if the penultimate vowel is less prominent than the final vowel, the final vowel is stressed instead, i.e. (16b). Morphological headedness becomes relevant when morphemes that mark tense, mood, or the referential identity of the subject are present; per Revithiadou, such morphemes are morphological heads and therefore attract stress like the DS marker does in (16c):

- (16) a. /alafʌ/ → [aláfʌ] ‘(sp. of) tree’ (tree)  
           /kiyigiɬ/ → [kiyígɨɬ] ‘tattoo’ (tattoo)  
       b. /kidolmaŋ/ → [kidolmáŋ] ‘(type of) arrow’ (arrow)  
       c. /pak-ʌ/ → [paká] ‘you strike and he...’ (strike-DS.2SG/3SG)

The key point here is that in Kobon it is not an arbitrary set of morphemes that attract stress away from the default phonological position; rather, all morphemes attract stress if and when they have head status, and not otherwise.<sup>14</sup>

This issue clearly does not arise for Vedic or Japanese which, as noted in the context of (13–14) above, have both derivational suffixes that attract stress to themselves, and those that attract stress to the immediately preceding syllable. The relevant data is repeated below, sifted into descriptively stress-attracting and pre-stressing morphemes in (17) and (18) respectively:

- (17) a. Ved. *ba.l-ín-as* ‘strong’ (strength-ADJ-M.NOM.PL)  
           *so.m-ín-as* ‘possessing soma’ (soma-ADJ-M.NOM.PL)  
           *kā.m-ín-as* ‘desirous’ (strength-ADJ-M.NOM.PL)  
       b. Jap. [ko.do.mo-p.pó-i] ‘childish’ (child-ADJ-FV)  
           [ne.tu-p.pó-i] ‘feverish’ (fever-ADJ-FV)  
           [ki.za-p.pó-i] ‘snobbish’ (smug-ADJ-FV)

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<sup>14</sup>Pure HEADSTRESS systems appear to be fairly rare; more common, by far, are word-prosodic systems that combine a preference for stressing morphological heads with underlying lexical specification for prominence, as in (the stem-level phonology of) Thompson Salish (Revithiadou 1999: 21–2, 250–80) or — according to Sandell (2015: 181–9) — in Vedic Sanskrit (see §5.3.4 for further discussion).

- (18) a. Ved. *ó.j-as-as* ‘of strength’ (be.strong-NML-N.GEN.SG)  
*má.n-as-as* ‘of mind’ (think-NML-N.GEN.SG)  
*su-.má.n-as-as* ‘well-disposed’ (well-think-NML-M.NOM.PL)
- b. Jap. [yo.ɕi.dá-ke] ‘family of Yoshida’ (Yoshida.PN-NML)  
[u.rá-ke] ‘family of Ura’ (Ura.PN-NML)  
[ni.ɕi.mu.rá-ke] ‘family of Nishimura’ (Nishimura.PN-NML)

Similarly, in addition to the noun and adjective-forming suffixes which attract stress, Ancient Greek has derivational suffixes that consistently fail to attract stress and thus instead show default stress. In Greek, the default stress pattern is “recessive accentuation” (see Probert 2006: 128–44), which assigns stress — realized as high tone — to final vocalic mora of the word’s antepenultimate syllable when the final syllable is light (modulo final consonant extrametricality);<sup>15</sup> (19) provides examples drawn from one category of productively derived nouns that exhibit “recessive accentuation:”

- (19) a. Gk. *gé.ne-si-s* ‘birth; creation’ (become-NML.F-NOM.SG)  
b. *haí.re-si-s* ‘taking’ (take-NML.F-NOM.SG)  
c. *ék.ba-si-s* ‘going out’ (out-go-NML.F-NOM.SG)

It is evident, then, that Greek, Vedic, and Tokyo Japanese exhibit the definitional properties in (15), and in Chapters §2 and §4, it will become clear that Cupeño and Hittite do as well. Within this context, the effects (or lack thereof) that the derivational morphemes in (17–18) exert on the position of primary stress can be explained in terms of typologically well-established features of LA systems: the stress-attracting suffixes in (17) are ACCENTED; the suffixes in (18) that cause stress to surface on the immediately preceding syllable are PREACCENTING; and the stress-neutral suffixes in (19) are UNACCENTED (i.e. unspecified for prominence). Underlying representations for these suffixes are provided in (20):

(20)	ACCENTED	PREACCENTING	UNACCENTED
GREEK	/-tó-/ , /-ísko-/	-	/-sí-/
VEDIC	/-ín-/	/´-as-/	-
JAPANESE	/-ppó-/	/´-ke-/	-

Accented morphemes are almost certainly a universal feature of LA systems and thus require

<sup>15</sup> This formulation of “recessive accentuation” is somewhat simplified and incomplete. See Gunkel (2014) for a concise overview of the Ancient Greek accentual system, and in more detail, Probert (2006: 53–74, 112–23). Theoretical treatments of Ancient Greek “recessive accentuation” include Steriade (1988a), Sauzet (1989), Golston (1990), Noyer (1997), Kiparsky (2003), and Probert (2010). Aspects of its LA system are also treated by Steriade (1988a); see further Kiparsky (2010), Sandell (2015: 166–71, 190–1), and Petit (2016). On the accentual system of Modern Greek, see especially Revithiadou (1999) and references therein.

no further comment. Preaccenting morphemes are less common, but there is strong empirical support for their existence: beyond Vedic and Japanese, preaccenting suffixes have been identified in Turkish (Inkelas 1999), Modern Greek (Revithiadou 1999: 112–6), and Getxo Basque (Hualde and Bilbao 1993).<sup>16</sup> While it may seem unexpected that these suffixes prefer to be adjacent to the site of primary stress, a natural motivation for this preference is suggested in §1.1.3.1 below, where the lexical representation of accented and preaccenting morphemes is discussed in more detail.

Beyond ensuring that accented and preaccenting morphemes preferentially attract stress, all LA systems have some set of language-specific morphophonological principles that are responsible for at least two important functions. First, since morphologically complex words may contain multiple accented morphemes, they determine which of these morphemes receives the single primary stress. Conversely, when a word contains no accented morphemes, they are responsible for assigning it a default stress. In this latter function, these principles are clearly of the same type as in fixed stress systems and are thus sensitive to same kinds of phonological properties (syllable weight, proximity to word edge, etc.; see §1.1.2.1 above). Such purely phonological preferences may also play a role in adjudicating between multiple accented morphemes as they compete for primary stress — for instance, in Vedic Sanskrit, the fact that the leftmost accented morpheme receives primary stress can be straightforwardly linked to the same preference for left edge word stress that is responsible for default word-initial stress in the language (see §1.1.3.2 below). However, it is possible that in other languages with LA the two functions noted above are effected by independent principles in the grammar.<sup>17</sup>

### 1.1.3 Analyzing lexical accent systems

The analysis of Hittite and Cupeño stress assignment developed in this dissertation is grounded in OPTIMALITY THEORY (OT) (Prince and Smolensky 1993/2004). I adopt this formal framework not only because it is currently the dominant paradigm in generative research on the analysis of stress systems, but because in its application to LA systems, it intuitively and explicitly captures the virtual competition for the word's single primary stress between lexically specified prominence(s) and the language's default phonological preferences. This competition can be understood as simply another case of the conflict between faithfulness and markedness constraints that is at the core of theory's architecture.

This section is organized as follows. §1.1.3.1 discusses some general issues that arise in an optimality-theoretic analysis of LA, and more specifically, outlines the major assumptions that guide the analyses of Cupeño and Hittite developed in subsequent chapters. §1.1.3.2 demonstrates how this formal framework can be applied to the analysis of LA systems, focusing in particular on word stress patterns in Vedic Sanskrit. Finally, §1.1.3.3 discusses the concept of morphological headedness, its role in LA systems, and how it can be a source of so-called accentual DOMINANCE effects.

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<sup>16</sup>For the possibility that Hittite has at least one preaccenting suffix, see Ch. 4 n. 19.

<sup>17</sup>For one likely case in Ese'eja (Takanan; Bolivia/Peru), see Rolle and Vuillermet (to appear).

### 1.1.3.1 LA in Optimality Theory

In §1.1.2.2, it was proposed that all LA systems have certain morphemes that are lexically specified for prominence, which in some cases compete with one another for their prominence to be realized as the single primary stress (cf. (15) above). As a consequence, LA systems must also have, at a minimum, some set of morphophonological principles responsible for the functions in (21):

- (21) (i) Ensure that an accented morpheme preferentially attracts stress.
- (ii) Determine which of several accented morphemes is assigned stress.
- (iii) Assign a “default” stress pattern to words with no accented morphemes.

In the discussion above, the nature of these “principles” was (intentionally) left unexplored. In a rule-based framework (such as *SPE*), they would presumably take the shape of a set of (ordered) morphophonological rules. In OT, however, these is a single mechanism by which the functions in (21) are effected: it is the language-specific ranking of markedness and faithfulness constraints. Analyzing an LA system therefore amounts to determining the constraint ranking and the accentual properties of the morphemes in its lexicon that in tandem generate attested word stress patterns.

The existence of underlying specification for prominence has naturally given rise to questions about how it is represented in the lexicon.<sup>18</sup> The representational assumptions adopted have implications for the analysis, since the constraint set will differ depending on (e.g.) whether an accent is an intrinsic attribute of an input vowel or whether it is an independent entity that is somehow associated with it (like an autosegmental feature); in the former case, faithfulness would be enforced by IDENT-type constraints, but in the latter, by constraints like MAX and DEP (see, e.g., McCarthy 2008).<sup>19</sup>

In this dissertation, I adopt a version of the latter view.<sup>20</sup> I assume here that a lexical accent is an underlying prominence hosted by a vocalic peak, and that this prominence is a separate object, an autosegmental feature much like a tone or a mora, whose relationship with its host is encoded by an association line (i.e., an autosegmental link). A lexically accented vowel thus has a representation like (22), where the prominence is indicated by “\*”:



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<sup>18</sup>For detailed discussions of this issue, see Revithiadou (1999: 43–51, 2007) and Alderete (2001b: 20–3), as well as Kabak and Revithiadou (2009).

<sup>19</sup>A closely related point is discussed in Ch. 2 n. 43.

<sup>20</sup>In fact, the analyses developed in this dissertation are likely compatible with any of the (standard) views that have been proposed in the theoretical literature. Nevertheless, for explicitness I outline here the analytic assumptions adopted in the remainder of this work.

If the input prominence in (22) is allowed to persist into the output (i.e., it is not subject to deletion), it becomes a primary stress on the relevant syllable, which is thus realized with the appropriate language-specific phonetic correlates of primary stress (raised pitch, increased duration, etc).<sup>21</sup>

Following a proposal of Revithiadou (1999), I assume also the existence of underlying “weak” prominences, which contrast with “strong” prominences of the type depicted in (22). In languages that have preaccenting morphemes (such as Vedic Sanskrit and Cupeño; see §1.1.2.2 above), these morphemes are lexically specified with a weak prominence. If this prominence is not deleted, primary stress surfaces on the immediately preceding syllable, thus allowing the vowel specified with this feature to be pronounced in the prosodically weak position that directly follows primary stress. The lexically specified vowel of a preaccenting morpheme thus has the underlying representation in (23), where “.” indicates a weak prominence:



Against Revithiadou (1999: 52–3), however, I further assume that strong and weak prominences are governed by exactly the same faithfulness constraints: these constraints are satisfied when a strong prominence surfaces on its associated vowel as primary stress and when a weak prominence surfaces on its associated vowel in the syllable immediately after primary stress, and conversely, are violated when either type of prominence fails to surface in this way.<sup>22</sup>

An apparent typological correlation may shed further light on the theoretical status of weak prominences and the preaccenting morphemes with which they are associated. In several of the languages that have preaccenting morphemes, such as Tokyo Japanese and Modern Greek, there is also independent evidence that the language has TROCHAIC rhythmic structure.<sup>23</sup> In such languages, words are parsed into trochaic metrical feet, left-headed prosodic constituents that are binary at the syllabic or moraic level (cf. Hayes 1995, *i.a.*). These two foot structures are represented in (24a) and (24b) respectively; the prosodically prominent position within the foot — i.e. the foot head — is marked with “×”, while the weak position — the foot tail — is marked with “.”:

<sup>21</sup>Alderete (2001c,b) argues that a lexical accent is a prominence that is projected on a metrical grid (in the sense of Prince 1983 and subsequent work in this vein), where it is aligned with a metrical foot and is then eligible for primary stress. An analysis along these lines would be likely useful (and perhaps necessary) for word-prosodic systems with secondary stress; yet since there is evidence in Cupeño and Hittite only for primary stress, I pursue this approach no further here.

<sup>22</sup>Revithiadou (1999: 52–3) suggests that strong and weak prominences may be subject to different faithfulness constraints — e.g., MAX-PROM<sub>HEAD</sub> vs. MAX-PROM<sub>TAIL</sub> for strong and weak prominences respectively. This hypothesis would predict the existence of languages in which (*ceteris paribus*) a preaccent would surface faithfully in the same position in which a lexical accent fails to do so, because in this language MAX-PROM<sub>TAIL</sub> dominates MAX-PROM<sub>HEAD</sub>. I am aware of no empirical evidence for such a language.

<sup>23</sup>See Revithiadou (1999: 99–117) on Modern Greek, and on Japanese, Poser 1984a, Ito and Mester 2016, and Tanaka 2017, *i.a.*

(24) a.  $\begin{pmatrix} \times & . \\ \sigma & \sigma \end{pmatrix}$

b.  $\begin{pmatrix} \times & . \\ \mu & \mu \end{pmatrix}$

In many fixed stress systems (such as Latin and Cahuilla in §1.1.2.1 above), metrical feet mediate stress assignment:<sup>24</sup> feet are formed according to language-specific phonological preferences (e.g., for alignment between foot and word edge), which also mark one foot as most prominent (i.e., the head foot); the strong position of this foot then serves as the docking site for primary stress (other foot heads may receive secondary stress).

It is to be expected, then, that metrical feet would work similarly in LA systems, but that these differ in that foot formation is influenced by lexical specification for prominence. In particular, it may be hypothesized that (i) underlying prominences are simply features that mark a vowel for preferential incorporation into a (head) foot; and (ii) more specifically, that a strong prominence is one that must be incorporated into a head of a (head) foot, while a weak prominence requires incorporation into the tail of a (head) foot.<sup>25</sup>

Under this hypothesis, it is possible to explain the fact that preaccenting morphemes are found in trochaic languages with LA systems: if a language with trochaic feet has lexically specified weak prominences, it will incorporate them into the weak position of a (syllabic) trochee, thus into the syllable immediately following (primary) stress.<sup>26</sup> Significantly, a strong prediction of this hypothesis is that only languages with trochaic feet will have preaccenting morphemes; an iambic language would instead have post-accenting morphemes, i.e. morphemes that attract stress to a following syllable. Further research is required to determine if this cross-linguistic generalization can be maintained, and for the present, I leave the question open.<sup>27</sup> For the purposes of this dissertation, the only crucial point is that both strong and weak prominences exist in LA systems and are governed by the same faithfulness constraints, which constitute the focus of the remainder of this section.

From an optimality-theoretic perspective, LA systems are characterized by high-ranking faithfulness constraints that ensure that input prominences are preferentially mapped onto output prominences — i.e. that lexically accented morphemes are assigned stress in preference to the default phonological pattern. Having embraced the view above that lexical accents are

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<sup>24</sup>Both languages have moraic trochees; on Cahuilla, see the references cited in n. 10 above, and on Latin, Mester (1994) and Jacobs (2003, 2004), *i.a.*

<sup>25</sup>The distinction between head and non-head foot is relevant only in languages that permit more than one metrical foot within a word. It is unclear whether any of the LA systems treated in detail in this dissertation do so, since they all lack secondary stress, which is often the primary clue that a language has multiple feet in the output. In any case, it is clear that in these languages a word's head foot is preferentially formed around an underlying prominence, since morphemes lexically specified for prominence attract primary stress.

<sup>26</sup>An alternative, more direct approach would be to assume that (trochaic) feet are underlyingly specified in (these) LA systems, as proposed by Inkelas (1999), Ito et al. (1996), and Pater (2000), *i.a.*

<sup>27</sup>Alderete (2001c: 457–60) presents Cupeño as a counter-example to this generalization, contending that it has iambic structure, but the general preference for word-initial stress established in Ch. 2 is *prima facie* evidence that Cupeño is trochaic. Comparative considerations also support this hypothesis: Cupeño's closest relative Cahuilla is manifestly trochaic (see the references cited in n. 10).

akin to autosegmental features, I assume that faithfulness must be enforced by constraints like MAX and DEP, which militate against their deletion or insertion. Accordingly, I adopt here the set of constraints in (25) from the “Prosodic Faithfulness” family (Alderete 1999b *et seq.*), which treat prominence as an autosegmental feature and require corresponding strings to have the same featural value (cf. Revithiadou 1999: 51–4):

- (25) a. MAX-PROM: “A prominence in the input must have a correspondent in the output.”  
 b. DEP-PROM: “A prominence in the output must have a correspondent in the input.”  
 c. \*FLOP-PROM: “Corresponding prominences must have corresponding sponsors and links.”<sup>28</sup>

The functions of (25a) and (25b) are clear: MAX-PROM prevents deletion of underlying prominences, which as a consequence preferentially surface as primary stress, while DEP-PROM blocks the insertion of additional prominence(s) that might compete with underlying prominence(s) for primary stress. The constraint in (25c), however, may call for further comment. The basic function of \*FLOP-PROM is to prevent accentual “migration” — i.e., when a lexical accent associated with one vowel in the input reassociates with a different syllable in the output; association lines that change affiliation in this way incur violations of \*FLOP-PROM. A practical illustration of this constraint’s effects is provided in §1.1.3.2 below.

In LA systems, the faithfulness constraints in (25) are set in conflict with markedness constraints. These constraints are generally of the same kind as in fixed stress systems and thus require, e.g., that stress coincides with the word’s left (or right) edge; that heavy syllables are stressed; that every word must bear at least (and/or at most) one stress; or the like. The position of primary stress within the word then depends on the relative ranking of these constraints, as well as on the lexically specified accentual properties of its constituent morphemes.

The next section provides a practical illustration of the mechanics of OT in its application to LA systems. I develop a constraint-based analysis of word stress patterns in one LA system whose principles of stress assignment are relatively well-understood, Vedic Sanskrit. As will become clear below, moreover, the choice of Vedic is not incidental; rather, the ranking of phonological constraints established on the basis of the Vedic data will prove to be of broader relevance in this dissertation, since I will contend that the same ranking obtains both in Cupeño and in Hittite.

### 1.1.3.2 The Basic Accentuation Principle in OT

One of the principal arguments advanced in this dissertation is that the word-prosodic systems of Cupeño and Hittite are not just typologically similar, but in fact, that word stress in each language is determined by similar morphophonological principles. Specifically, I contend that the BASIC ACCENTUATION PRINCIPLE (BAP) — first proposed by Kiparsky and Halle (1977: 209) in their analysis of stress assignment in Vedic Sanskrit — is also operative in both Cupeño and Hittite. The BAP may be stated as in (26) (cf. Kiparsky 2010: 144):

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<sup>28</sup>This constraint is stated informally here; for a formal implementation in Correspondence Theory (McCarthy and Prince 1995, 1999), see Alderete (2001b: 23–5) and Revithiadou (1999: 53–4).



(26) BASIC ACCENTUATION PRINCIPLE (BAP):

If a word has more than one accented vowel, the leftmost of these receives word stress.  
If a word has no accented vowel, the leftmost syllable receives word stress.

Per Kiparsky and Halle (1977), the effects of the BAP can be observed clearly in the inflection of Vedic root nouns, a type of noun formed by adding nominal inflectional endings — fusional suffixes that mark case, number, and gender — directly to a root (i.e., without any overt intervening derivational suffix).<sup>29</sup> Vedic shows a synchronic prosodic contrast within this category. Some root nouns have stress FIXED on the root within their inflectional paradigms; most, however, exhibit an alternating stress pattern: stress falls on the root in their “strong” cases (NOM.SG, ACC.SG, NOM.PL) and on inflectional endings in their other (“weak”) case forms.<sup>30</sup> This contrast can be explained under the following assumptions:

- (27) (i) The “strong” case endings are unaccented (e.g. ACC.SG /-am/).
- (ii) The “weak” case endings are accented (e.g. INSTR.SG /-ā́/).
- (iii) Roots may be unaccented (e.g. /√pad/ ‘foot’) or accented (e.g. /√gáv/ ‘cow’).

When the BAP is applied to root nouns formed from morphemes with the properties specified in (27), it yields the fixed root stress pattern when the root is accented, and the alternating stress pattern when the root is unaccented. These contrasting patterns are illustrated below, the fixed type with the root /√pad/ ‘foot’ in (28) and the alternating type with /√gáv/ ‘cow’ in (29):<sup>31</sup>

- (28) a. /√gáv - am/ → *gáv-am* ‘cow’ (M.ACC.SG)
- b. /√gáv - á/ → *gáv-ā́* ‘with the cow’ (M.INSTR.SG)
- (29) a. /√pad - am/ → *pád-am* ‘foot’ (M.ACC.SG)
- b. /√pad - á/ → *pad-ā́* ‘with the foot’ (M.INSTR.SG)

Because the BAP recurs in the analyses developed in subsequent chapters of this dissertation — of Cupeño stress in Chapter 2 and of the synchrony and diachrony of Hittite stress in

<sup>29</sup>In Indo-European literature, the structure of this type is represented schematically as R(OOT) + (E)NDING. Most other nominals contain an overt derivational suffix, thus R + (DERIVATIONAL) S(UFFIX) (+ S...) + E; however, the simpler R + E structure of root nouns is paralleled by Hittite RADICAL verbs, which are discussed in detail in §4.3.

<sup>30</sup>I exclude here the vocative case, which is exceptional. In their vocative case forms, all nouns regardless of morphological category are subject to de-stressing at the word level; they thus surface without a primary stress, except when they stand in clause-initial position, in which case they receive post-lexical stress on their initial syllable.

<sup>31</sup>The quantitative alternations observed in the root of (28–29) historically reflect the operation of BRUGMANN’S LAW (Brugmann 1876: 367–71; cf. Kobayashi 2004: 26–7 with references), which lengthened PIE \*o in non-final open syllables prior to the Indo-Iranian qualitative merger of PIE \*o and \*e as PIIr. \*a (likely \*[ə]). Since these nouns had PIE paradigms with \*o in the strong cases and \*e in the weak, their Vedic reflexes show a corresponding alternation between ā and a (for partial illustration, see (252–253) in §5.3.3). How exactly this morphophonological alternation is to be understood synchronically in Vedic remains uncertain; see Kiparsky (2010) for one proposal.

Chapters 4–5 — the remainder of this section focuses on how this morphophonological principle can be implemented in the optimality-theoretic framework adopted here. The Vedic data presented above provides a natural testing ground for the constraint-based analysis to be developed, and will be used to demonstrate the necessary rankings.

In fact, the functions of the BAP can be derived straightforwardly from the interaction of certain markedness constraints with the prosodic faithfulness constraints introduced in §1.1.3.1 above. Formulated as in (26), one function of the BAP in Cupeño and Hittite is to ensure that each prosodic word has exactly one most prominent (i.e., stressed) syllable. As noted already in §1.1.1, this requirement is typologically common, combining the culminativity (“at most one stress per word”) and obligatoriness (“at least one stress per word”) parameters in (1). Because these parameters are independent, they must ultimately be encoded in the grammar by different phonological constraints (cf. Hyman 2006: 231–2); however, since both are inviolable in the UA and IE languages under examination in this dissertation, for simplicity I assume here a single markedness constraint, CULMINATIVITY, which enforces the “one and only stress” requirement in these languages; this constraint is defined in (30):

(30) CULMINATIVITY (= CULM): “A prosodic word must have exactly one stressed syllable.”

Two different types of phonological repair are driven by (30). First, in words that contain no accented morphemes, it forces a prominence to be inserted between underlying and surface representations. This operation is exemplified with Ved. /√pad-am/ ‘foot’ from (29a) in (31) below:

(31)

$$/ \text{pad} - \text{am} / \quad \rightarrow \quad \overset{*}{\text{pád}} - \text{am}$$

Insertion of this prominence — at the surface level, stress — violates DEP-PROM, which militates against any stressed syllable in the output that does not correspond to an accent in the input. The fact that this insertion nevertheless occurs requires that CULMINATIVITY dominates DEP-PROM, i.e. (32). The tableau in (33) shows that this ranking correctly predicts candidate (a) with inserted prominence — i.e., the mapping depicted in (31) above — to the stressless faithful candidate:

(32) CULMINATIVITY  $\gg$  DEP-PROM

(33)

	/pad - am/	CULM	DEP-PROM
a.	pād-am	*!	
b.	pad-am		*

The other effect of CULMINATIVITY is observed in words with multiple accented morphemes, where it necessitates deletion of all but one lexical accent. Deletion is illustrated in (34) below

with Ved. /√gáv-ǎ/ ‘with the cow’ from (28b):<sup>32</sup>

(34)

$$\begin{array}{ccc}
 \begin{array}{c} * \quad * \\ | \quad | \\ /gáv - \acute{a}/ \end{array} & \rightarrow & \begin{array}{c} * \quad * \\ | \quad \bar{=} \\ g\acute{a}v - \bar{a} \end{array} & \rightarrow & \begin{array}{c} * \\ | \\ g\acute{a}v - \bar{a} \end{array}
 \end{array}$$

Deletion of this underlying prominence violates MAX-PROM, which must therefore be ranked below CULMINATIVITY just like DEP-PROM, i.e. (35):

(35) CULMINATIVITY  $\gg$  MAX-PROM

(36)

/gáv - ǎ/	CULM	MAX-PROM
a. gáv-ǎ	*!	
b. ↗ gáv-ā		*

What is left unspecified in the tableaux in (33) and (36) is why stress surfaces on the root rather than on the inflectional ending. Determining the location of primary stress in these words in fact corresponds to the other major function of the BAP, which selects the leftmost of several accented morphemes as the preferred site of primary stress, or in the absence of accented morphemes, assigns “default” stress to the word’s leftmost syllable. These processes can be unified under the optimality-theoretic approach adopted here: both reflect a general preference for stress to coincide with the left edge of the prosodic word. This typologically common preference — which is also found in fixed stress systems like Finnish, driving regular word-initial stress (cf. §1.1.2.2) — may be effected by a constraint like (37):

(37) ALIGN-L(PK,  $\omega$ ) (= PK-L): “The left edge of every stressed syllable is aligned with the left edge of the word (evaluated gradiently; one violation per intervening syllable).”<sup>33</sup>

The ranking of PK-L relative to CULMINATIVITY, MAX-PROM, or DEP-PROM cannot be established on the basis of the data in (33) and (36), but is clearly shown by words with just one accented morpheme in non-word-initial position. In such cases, prosodic faithfulness constraints and PK-L are in conflict. MAX-PROM and DEP-PROM prefer stress to surface faithfully on the accented non-initial syllable (in violation of PK-L) — i.e., the mapping represented in (38a). In contrast, PK-L prefers initial stress, which requires deletion of the underlying accent (in violation of MAX-PROM) and insertion of a new prominence (in violation of DEP-PROM), which docks to the word-initial syllable; this (incorrect) mapping is depicted in (38b):

<sup>32</sup>The “processual” representation of the input-output mapping in (34) and subsequent examples is intended only for expositional clarity; I assume that the relevant changes occur in parallel.

<sup>33</sup>The proposed analysis assumes gradient evaluation of alignment constraints. McCarthy (2003) has argued that such constraints are unnecessary and thus should be excluded from OT’s universal constraint set; see however Bjorkman (2010) for arguments that analyzing the LA system of Nez Perce (Crook 1999) requires gradient alignment.

- (38) a.  $\begin{array}{c} * \\ | \\ / \text{pad} - \acute{\text{a}} / \end{array} \rightarrow \text{pad} - \acute{\text{a}}$
- b.  $\begin{array}{c} * \\ | \\ / \text{pad} - \acute{\text{a}} / \end{array} \rightarrow \begin{array}{c} * \quad * \\ \vdots \quad | \\ \text{}^x \text{pád} - \bar{\text{a}} \end{array} \rightarrow \begin{array}{c} * \\ \vdots \\ \text{}^x \text{pád} - \bar{\text{a}} \end{array}$

The attested Vedic form *pad-á* with peninitial stress shows that faithfulness is satisfied at the expense of markedness. Specifically, this form is generated if PK-L is dominated by either MAX-PROM or DEP-PROM, i.e. (39); the tableaux in (40a) and (40b) confirm that a constraint grammar with either markedness constraint ranked above PK-L properly yields the observed data:

- (39) { MAX-PROM, DEP-PROM }  $\gg$  PK-L

(40) a.

/pad - á/	MAX-PROM	PK-L
a. $\text{pad} - \acute{\text{a}}$		*
b. $\text{pád} - \bar{\text{a}}$	*!	

b.

/pad - á/	DEP-PROM	PK-L
a. $\text{pad} - \acute{\text{a}}$		*
b. $\text{pád} - \bar{\text{a}}$	*!	

It is clear from these tableaux that the analysis does not strictly require both MAX-PROM and DEP-PROM. In this dissertation, I employ primarily MAX-PROM to do the “work” of these faithfulness constraints, while including DEP-PROM in tableaux only when it is violated by the winning candidate, which occurs only when a word contains no accented morphemes.

I apply this practice in the tableaux in (41–42), which respectively complete the partial derivations in (33) and (36) above; accordingly, DEP-PROM is included in (42) to indicate the faithfulness violation incurred by the winner (b), but is omitted from (42), where it does not:

(41)

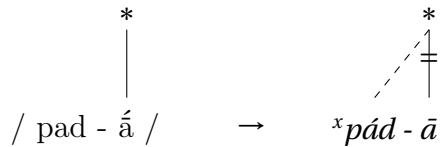
/pad - am/	CULM	MAX-PROM	DEP-PROM	PK-L
a. $\text{pād} - \text{am}$	*!			
b. $\text{pád} - \text{am}$			*	
c. $\text{pād} - \acute{\text{a}}\text{m}$			*	*!

(42)

	/gáv - á̃/	CULM	MAX-PROM	PK-L
a.	gáv-á̃	*!		*
b.	☞ gáv-ā		*	
c.	gáv-á̃		*	*!

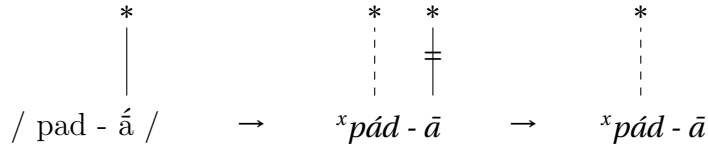
One final point completes the analysis. §1.1.3.1 introduced the constraint \*FLOP-PROM in (25c). This constraint requires that input association lines between underlying prominences and their vocalic sponsors remain intact in the output. In a language with a general preference for left edge stress, the principal effect of this constraint is to prevent leftward accentual “migration” — viz., a case in which a lexical accent sponsored by a word-internal vowel re-associates on the surface with the word-initial syllable. This process is schematized in (43):

(43)



The result of such “migration” would be a (possible) word that is identical on the surface to the one in (38b) above, which involved deletion of the lexical accent of the suffix and insertion of a prominence that links onto the word-initial syllable; for comparison, this surface-identical form is repeated below.<sup>34</sup>

(38b)



Unlike (38b), however, the form derived by migration in (43) violates neither MAX-PROM nor DEP-PROM because it does not involve deletion or insertion of prominence. Rather, the failure of this form to surface must be due to \*FLOP-PROM, which is violated when the association line of the input lexical accent changes its affiliation in the output. To obtain this result, \*FLOP-PROM must dominate (at least) PK-L, i.e. (44); the attested surface form is derived under this ranking in (45):

(44) FLOP-PROM ≫ PK-L

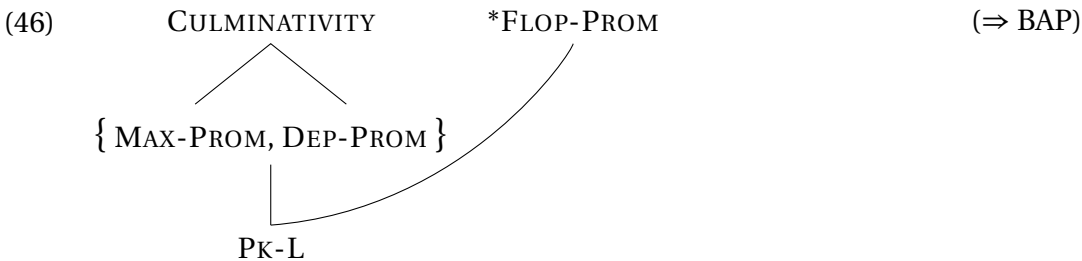
<sup>34</sup>I assume that the delinked prominence observed in the (apparent) intermediate representation in (38b) — if it had instead failed to delete — would violate undominated \*FLOP-PROM, since its association would have changed between input and output.

(45)

	/pad - á̃/	*FLOP-PROM	PK-L
a.	pad-á̃		*
b.	pád-ā	*!	

I am aware of no evidence to suggest that CULMINATIVITY, MAX-PROM, or DEP-PROM outrank \*FLOP-PROM, nor any data that can be explained better by assuming that \*FLOP-PROM is violated; I therefore assume that \*FLOP-PROM is undominated in LA systems in which the BAP is operative, and for simplicity, exclude all candidates that violate this constraint from subsequent tableaux.<sup>35</sup>

The ranking argumentation laid out in this section is summarized in (46):



In (46), \*FLOP-PROM and CULMINATIVITY stand at the top of the grammar; the latter strictly dominates MAX-PROM and DEP-PROM, and at least one of these faithfulness constraints in turn dominates PK-L.

The tableaux presented above have shown that this constraint ranking correctly predicts stress (non-)alternations in the inflectional paradigms of root nouns in Vedic Sanskrit, where stress assignment is governed by the BAP; it follows, then, that the BAP's several functions in stress assignment, which were stated processually in (26), emerge directly from (46) — in other words, that this constraint ranking is equivalent to the BAP. In Chapters 2 and 4, it will therefore be demonstrated that this same ranking obtains in Cupeño and in Hittite.

### 1.1.3.3 Accentual dominance & morphological headedness in OT

In addition to their commonalities, there is also an important difference between the LA systems of Cupeño and Hittite. In Chapters 2 and 4, it will emerge that while the BAP is sufficient to account for the distribution of primary stress in Cupeño, Hittite has morphemes that “override” the BAP, suffixes which attract stress away from an accented stem to their left against the general preference in the language for left edge stress. This interaction constitutes a type of accentual DOMINANCE, a well-known phenomenon in LA systems. Descriptively, this label is applied to cases in which an affix imposes its accentual specification on its base in a way that is inconsistent with the language's general morphophonological principles of stress assignment. Such effects have been identified, in fact, in the three LA systems discussed in §1.1.2.2, Ancient

<sup>35</sup>This assumption obviates the need to include autosegmental representations for surface identical candidates.



dominance derives from morphological headedness.

In her view, LA systems have constraints that work to align a word's MORPHOLOGICAL HEAD (on which concept, see below) with its prosodic head, the syllable that bears primary stress. The preference for these two types of headedness to coincide is expressed by positionally-indexed constraints of the type in (48–49); the constraints in (49) are referred to collectively as HEAD FAITHFULNESS (HEADFAITH) constraints:<sup>40</sup>

- (48) HEADSTRESS: Morphological heads are stressed.
- (49) a. MAX-PROM<sub>HD</sub>: “A prominence in the input sponsored by a morphological head must have a correspondent in the output.”  
b. DEP-PROM<sub>HD</sub>: “A prominence in the output sponsored by a morphological head must have a correspondent in the input.”

Of particular relevance to accentual dominance are the HEADFAITH constraints in (49);<sup>41</sup> per Revithiadou, these positionally-indexed constraints dominate the corresponding general faithfulness constraints in accordance the meta-contrast ranking in (50):

- (50) HEADFAITH  $\gg$  FAITH

Under this hypothesis, dominance effects arise when a lexically accented morpheme is the word's morphological head because the accentual properties of morphological heads are protected by higher-ranked faithfulness constraints — the HEADFAITH constraints in (49) — than those that protect the accentual specification of the stem to which they attach. In other words, the lexical accent of the word's head morpheme is privileged by faithfulness constraints and, as a direct consequence, its accented syllable is preferentially assigned stress.

This approach to the analysis of accentual dominance effects is recommended, moreover, by a robust and still growing body of cross-linguistic empirical support for the role of head faithfulness in LA systems. Revithiadou has demonstrated that accentual dominance effects in Modern Greek, Russian, and Thompson Salish can be explained in terms of head faithfulness. Sandell (2015: 190–1) and Petit (2016) contend that head faithfulness drives accentual dominance effects in Ancient Greek, and still more recently, Patseva (2017) has made the same case for Bulgarian. The position of primary stress in Russian nominal compounds (Roon 2006) and in Japanese lexical blends (Broad 2015) is influenced by head faithfulness too.<sup>42</sup>

Furthermore, at a more general level, evidence has accumulated in recent years that phonological material is privileged in prominent positions, which may be defined phonologically or

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<sup>40</sup>On the role of HEADSTRESS in (48) in some LA systems — in particular, in Kobon — see the discussion in §1.1.2.2 above.

<sup>41</sup>Sandell (2015: 181–9) shows that accentual dominance effects can also be derived in Harmonic Grammar via the combined effect of MAX-PROM and HEADSTRESS in (48); when two accents compete, the candidate that would otherwise be dispreferred under the language's constraint ranking may nevertheless win because its competitor violates both of these constraints and is rendered less harmonic by the sum of these violations.

<sup>42</sup>Outside of LA systems proper, head faithfulness has also been shown to affect stress assignment in English lexical blends (Shaw 2013).



morphologically. Phonological positions that have been shown to be privileged in this way include word-initial syllables (Beckman 1998a; Becker et al. 2012; Becker et al. 2017), syllable onsets (Lombardi 1999), and stressed syllables (Alderete 1995). Morphologically, similar results have been found for proper nouns (Jaber 2011), for roots (see §2.1 below), and — most relevantly — for morphological heads, which outside of stress assignment exhibit positional privilege in Modern Hebrew prosodic morphology (Ussishkin 1999) and in English blend formation (Moreton et al. 2017). This body of evidence strongly argues that head faithfulness constraints like  $\text{MAX-PROM}_{\text{HD}}$  are natural: they are just one type of positionally indexed faithfulness constraint, and lexical accent is just one phonological property that is privileged when it occurs in the prominent position that is protected by higher-ranked constraints.

What is needed, however, to pursue this approach to accentual dominance further is an operational definition of “morphological head.” While a number of issues surrounding this concept remain to be resolved within a broader theoretical context, there is sufficient agreement about the kinds of properties that morphological heads have cross-linguistically that it is possible, at the very least, to arrive at such a working definition.<sup>43</sup> A word’s morphological head is the component of the word that determines the basic morphosyntactic properties of the word as a whole, such as its part of speech (A, N, V, etc.) and (relatedly) its subcategorization frame (see especially Zwicky 1985, 1993). The morphological head thus determines the word’s morphosyntactic behavior — for instance, what inflectional morphemes it selects and what agreement phenomena it triggers. Defined in this way, morphemes that are generally analyzed as derivational may be heads, but inflectional morphemes are never heads. The cross-linguistic evidence cited above for head faithfulness supports drawing a distinction broadly along these lines, and it will become clear in Chapter 4 that the Hittite evidence is also compatible with this approach.

Yet the relationship between headedness and derivation is not one-to-one. On the one hand, a word may contain multiple derivational morphemes. In such cases, it is the derivational morpheme with the highest scope that determines the word’s morphosyntactic properties, its part of speech, etc.; this morpheme is thus the word’s morphological head. Since the IE and UA languages treated in this dissertation are primarily suffixing, the head morpheme will generally be the last derivational suffix to attach. On the other hand, a word may lack (overt) derivational suffixes. It is uncertain whether the root is afforded head status in such underived words, and there may even be variation from language to language about whether a root “counts” as a morphological head (and thus may have its phonological properties privileged by faithfulness constraints).<sup>44</sup>

A further issue that arises with equating derivation with headedness is that the distinction between derivation and inflection is (notoriously) difficult to define (see §4.3.3.1 for discussion), even if the prototypical properties of each are well understood. It is not certain, then, that any clarity is gained by projecting the problematic head/non-head distinction onto a similarly murky division between derivation and inflection. Again, it is beyond the scope of this dissertation to seriously engage with questions about the nature of this division within the grammar; for present purposes, I assume (i) that a morpheme with the capacity to change a word’s lexical

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<sup>43</sup>For a range of views on the concept of “head” in linguistics, see the papers in Corbett et al. 1993.

<sup>44</sup>In Hittite (and PIE), I assume that roots do not have head status (in the relevant sense); see further Ch. 5 n. 104.

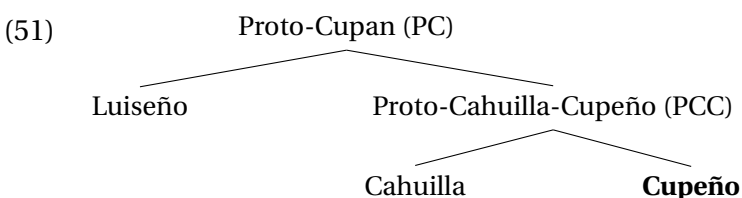
category (e.g.,  $N \Rightarrow A$ ;  $V \Rightarrow N$ ; etc.) is eligible for head status; and (ii) that this morphemes is the word's morphological head if it outscopes all other suffixes with this property in the word. Exceptions to this generalization may arise and will be dealt with on an item-by-item basis.<sup>45</sup>

## 1.2 Cupeño & the Cupan languages

This section provides an introduction to Cupeño and the other Cupan languages (Cahuilla, Luiseño), a branch of the Uto-Aztecan family localized in southern California. §1.2.1 examines the genetic relationships that obtain within the Cupan group and the place of this group within the UA family. The Cupeño people and the attestation of the language are discussed in §1.2.2 in more detail. §1.2.3 presents a concise phonological sketch of the language, while §1.2.4 treats the evidence for Cupeño word stress.

### 1.2.1 Cupëno, Cupan & Uto-Aztecan

The Cupan languages — Cupeño (Cu), Cahuilla (Ca), and Luiseño (Ls) — form (51) a subgroup of the Takic subfamily of Uto-Aztecan (cf. Bright and Hill 1967). Within this group, Cupeño and Cahuilla are more closely related than either is to Luiseño, which suggests that they share a common ancestor, referred to here as Proto-Cahuilla-Cupeño (following Munro 1990). These group-internal relationships are represented in the tree in (51):



As with the other Takic languages (see below), the Cupan speech communities are (or were) located in southern California, where they have remained continuously since their arrival in the middle of the 1st millennium CE (~500 CE per Grenda 1997). Both Luiseño and Cahuilla — the latter of which originally had three distinct dialects (Wanikik, Desert, Mountain) — are now critically endangered, with very few remaining speakers (Golla 2011).<sup>46</sup> There are no living native speakers of Cupeño (on which see further §1.2.2 below).

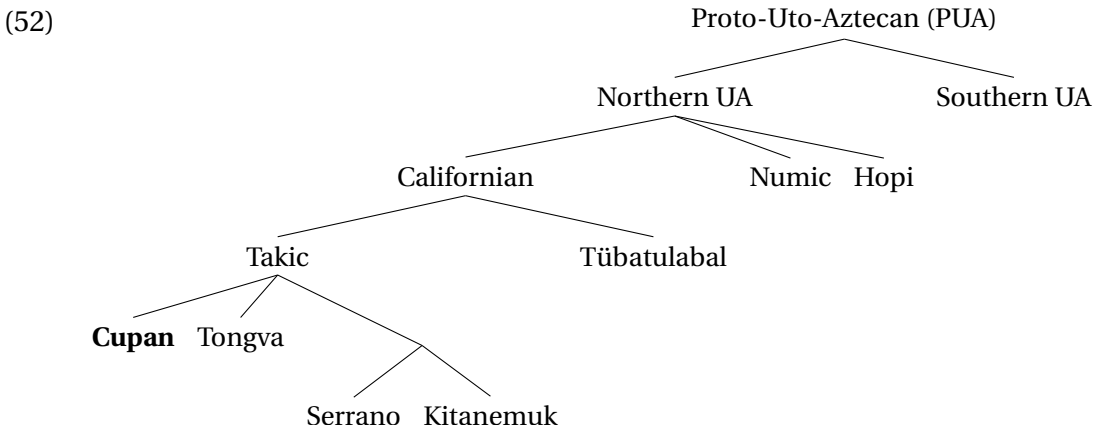
Within the Uto-Aztecan macro-family, the Cupan languages are most closely related to Ser-rano, Kitanemuk, and Tongva (also referred to as Gabrielino and Fernandëño); together, these languages form the Takic subfamily of Uto-Aztecan.<sup>47</sup> The place of Takic in its wider UA context

<sup>45</sup>One exception is found in Hittite, the participle suffix *-ant-*; see §4.3.3.1 below.

<sup>46</sup>For this dialect division of Cahuilla, see Jacobs (1975) (cf. Strong's (1929) "Pass," "Desert," and "Mountain").

<sup>47</sup>It is generally agreed that Takic poses a challenge for subgrouping, the languages exhibiting substantial internal diversity — much more so than (e.g.) the Numic subfamily — especially when measured on lexical grounds (cf. Stubbs 2003: 4, Hill 2011: 268). While the unity of the group has not been seriously challenged, real uncertainties remain about the relationships that hold between them. Note, too, that are some less well-documented

can be observed in the partial family tree in (52):



The next closest relative of Takic is Tübatulabal, which was traditionally viewed as an independent UA branch, but is now generally agreed to share with Takic a common ancestor, which is referred to as Californian (Manaster Ramer 1993a,b; Stubbs 2003, 2011; Hill 2011; cf. Holman et al. 2011).<sup>48</sup> The Northern branch of the UA family is rounded out by its smallest and largest branches: Hopi, the only single language branch of UA, presently spoken in northern Arizona; and Numic, which is traditionally divided into three branches (Western, Central, Southern) whose ancestral speech communities span from California into the Great Basin (Kroeber 1907; cf. Hill 2011: 265–7).<sup>49</sup> Finally, the highest order division within the UA family is between this Northern branch and the Southern UA languages.<sup>50</sup>

### 1.2.2 The Cupēnos and the Cupeño corpus

According to Hill (2005: 5–9), Cupeño was originally spoken in just three villages in northeastern San Diego County: Cupa (now Warner Springs Ranch), Wilaqalpa, and Paluq̄la.<sup>51</sup> Among the

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languages that also likely belong to the Takic group, such as Tataviam and Nicoleño.

<sup>48</sup>The problems of internal subgrouping within Takic mentioned in n. 47 above become still more acute at the Californian node. As pointed out by Hill (2011: 269–73), Tübatulabal shares certain phonological innovations with Cupan and Tongva — e.g. lenition of intervocalic *\*t* (> Cu. [l], Tongva [r]) — to the exclusion of the ancestor of Serran and Kitanemuk (referred to as “Serran” by Hill), but in other respects (e.g. morphology, syntax) is quite different. Further comparative research may shed light on this and other related subgrouping issues.

<sup>49</sup>On the subgrouping of Numic, see Freeze and Iannucci (1979). Hill (2011: 265–7) points out that many of the features traditionally used as evidence for Numic and its subgroups are shared retentions rather than innovations, and suggests that the status of these divisions merit reassessment on the basis of the latter.

<sup>50</sup>The validity of Southern UA as a unitary language branch is a classic controversy in UA linguistics; see Campbell and Langacker (1978) for the original proposal, and for recent assessments of the issue, Campbell (1997), Haugen (2008: 1–16), and Hill (2011: 246–62).

<sup>51</sup>According to Jacobs (1975), there were dialectal differences between these villages, including with respect to a feature of particular interest to the present study, viz., in the treatment of “stressless” roots. Unfortunately, there is not enough data to ascertain what these differences were.

Cupan-speaking peoples, the Cupeños were the smallest, with a population at contact of about 500 inhabiting an area of approximately ten square miles with speakers of Mountain Cahuilla to the north and Luiseño to the west (Kroeber 1925; cf. Strong 1929). In the 19th century, the Cupeños came into conflict with Mexican and American ranchers encroaching on their lands, a struggle which culminated with a violent uprising and the burning of the tribal center at Cupa in 1852. The Cupeños were eventually forcibly removed from their territory by the United States government and in 1903 relocated to a reservation at Pala, where some continue to reside.<sup>52</sup> The last native speaker of Cupeño was Roscinda Nolasquez (of Cupa and Pala), who died in 1987.<sup>53</sup>

The extant corpus of Cupeño is relatively small. The early textual and grammatical material comes mostly from the fieldwork of Paul-Louis Faye, which was conducted primarily in the 1920s with five Cupeño speakers. The continuous texts collected by Faye are among those included in Hill and Nolasquez 1973, supplementing the stories and histories gathered by Hill from Ms. Nolasquez during the early 1960s. Lexical and grammatical materials collected by Faye, by William Bright in the late 1950s (working with Ms. Nolasquez), and by Roderick Jacobs in the 1960s (working with Ms. Nolasquez and Cyrillo Welmas, a speaker of the Wilaqalpa dialect; see Jacobs 1975) are represented in Hill's (2005) grammar of the language alongside her own field notes (mostly from work with Ms. Nolasquez, but also with two other speakers). The extant corpus is thus based mainly on nine speakers, and virtually all of the material can be accessed in just the two publications noted above, Hill and Nolasquez 1973 and Hill 2005.<sup>54</sup>

### 1.2.3 Phonological sketch of Cupeño

A detailed description of the phonology of Cupeño is presented by Hill (2005: 11–60). For easy reference, I briefly summarize here some of the main aspects of its phonological system. The basic phonemic inventory of Cupeño consonants and vowels is given in (53) and (54) respectively:

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<sup>52</sup>For a much fuller discussion of Cupeño history and their forced relocation, see Hyer (2001).

<sup>53</sup>See Hill (2005: 5–9) for a much more extensive description of the history of Cupeño and its speakers.

<sup>54</sup>A comprehensive list of Cupeño source materials is provided by Hill (2005: 9–10).

(53)

	LABIAL	ALVEOLAR	(ALVEO)PALATAL	RETROFLEX	VELAR	UVULAR	GLOTTAL
STOP	p	t			k k <sup>w</sup>	q	ʔ
AFFRICATE			tʃ				
FRICATIVE	β	s		ʂ	x x <sup>w</sup>	ɣ	h
NASAL	m	n	ɲ		ŋ		
LIQUID		l	ɭ				
GLIDE	w		y				

(54)

	FRONT	CENTRAL	BACK
HIGH	i i:		u u:
MID		ə ə:	
LOW		a a:	

In addition to the phonemes given in (53–54), Cupeño also has a small set of marginally phonemic sounds attested primarily or exclusively in loan words. Marginal consonant phonemes include an alveolar tap (*/r/*), a voiceless labiodental fricative (*/f/*), and a voiced interdental fricative (*/ð/*). Marginal vowel phonemes include long and short low-mid front unrounded vowels (*/ε, ε:/*) and high-mid back rounded vowels (*/o, o:/*).

I note also two salient phonological alternations which are encoded in the language’s writing system. The first is characteristic of the Cupan languages: */tʃ/* de-affricates in coda position to *[ʃ]* (orthographic *<ch>* → *<sh>*).<sup>55</sup> Second, the labialized velar */k<sup>w</sup>/* (generally spelled *<kw>*) has a uvular realization *[q<sup>w</sup>]* (spelled *<qw>*) before *[a]* and *[ə]* when these vowels are unstressed. Conversely, it may be noted that glottal stops (spelled *<'>*) are not written in word-initial position; they are clearly audible, however, and “reappear” orthographically when a prefix is added.

Finally, Cupeño has strict phonotactic restrictions on syllable structure. Complex onsets are unattested in the native lexicon, and complex codas categorically prohibited. When complex syllable margins arise due to affixation, they are repaired by epenthesis (see Hill 2005: 20, 29–30; cf. §2.4 below).

#### 1.2.4 The evidence for Cupeño word stress

While there are no longer any living speakers of Cupeño, it is nevertheless preserved in audio recordings and thus can to some extent be directly observed by the analyst. Primary stress was also consistently transcribed by Jane Hill in her extensive fieldwork on the language. This

<sup>55</sup>See Munro and Benson (1973) for discussion of some interesting exceptions to this process in Luiseño.

work led to the early description of its stress system put forth in Hill and Hill (1968); a much fuller revised description can now be found in Hill 2005: 23–9. Primary stress is marked in the language’s orthography (the stressed syllable is underlined), including in the texts collected in Hill and Nolasquez 1973, in documents at the Cupa Cultural Center at Pala, and in all of the examples and texts presented in Hill 2005.<sup>56</sup> These primary sources provide the principal input to the analysis developed in Chapter 2.

As for the phonetic realization of Cupeño stress, the limited availability of recordings prevents a fuller description here. It is likely that the acoustic correlates of primary stress in Cupeño were broadly similar to those in Cahuilla,<sup>57</sup> for which detailed descriptions are available:<sup>58</sup> increased intensity, higher pitch, and increased duration of the primary stress-bearing syllable, as well as fuller realization of vowel quality. The last of these is consistent with several facts reported by Hill (2005: 17–20), such as phonetic reduction in unstressed syllables, including neutralization of the phonemic contrast between /a/ and /ə/ (both [ə]). Note, however, that per Hill and Hill (1968: 236) Cupeño differs from Cahuilla in lacking any overt manifestation of secondary stress (rhythmic or otherwise; cf. Alderete 2001c: 458 n. 4).

### 1.3 Hittite & the Anatolian languages

The various languages of the extinct Anatolian branch of the Indo-European language family are attested primarily in the 1st and 2nd millennium BCE in Asia Minor (i.e. Anatolia). §1.3.1 provides a brief introduction to the languages belonging to this branch, then situates Anatolian within the wider Indo-European family. The lens narrows further in the next three sections, which focus on Hittite: §1.3.2 offers a brief historical account of Hittite and its speakers, and examines the nature of the corpus and its internal chronology in greater detail; §1.3.3 presents a concise phonological sketch; and finally, §1.3.4 discusses the evidence for word stress.

#### 1.3.1 Hittite, Anatolian & Indo-European

Hrozný’s (1915; 1917) decipherment of Hittite brought to light not just a previously unknown IE language but also a new branch of this family, Anatolian. A century later, Hittite remains by far the best attested and best understood member of this branch; its historical background and textual records are discussed separately in §1.3.2 below. Other languages belonging to the Anatolian branch were subsequently identified; ordered by the approximate size of their corpora, these languages are: Luwian, Lycian, Lydian, Carian, Palaic, Sidetic, and Pisidian. For a recent overview of these languages and their attestation, see Melchert (2017b).

Within the Anatolian group, further phylogenetic relationships are difficult to define. In part, the difficulty is due to extensive prehistoric contact between the population groups that

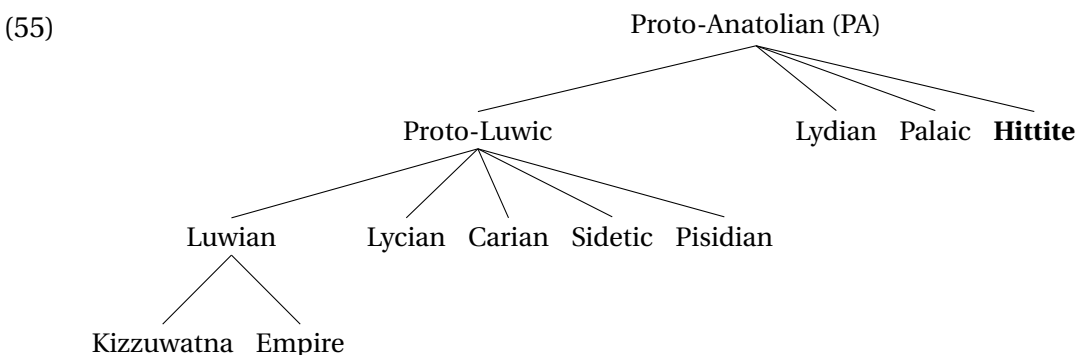
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<sup>56</sup>In her grammar, Hill (2005: 25) uses a simplified version of this practice, leaving stress unmarked when it is word-initial (viz., its most common position), but marking it whenever it falls on a word-internal syllable.

<sup>57</sup>Comparative work on the Cupan languages (e.g. Hill and Hill 1968) does not report any salient differences in the realization of stress across the group.

<sup>58</sup>See Seiler (1957, 1965, 1977: 26) and Mamet (2008: 16–8).

spoke dialects ancestral to these languages, the result of which was the areal spread of linguistic innovations,<sup>59</sup> as ever, such convergence phenomena problematize traditional subgrouping, since it cannot always be determined whether an innovative feature reflects a shared development at a common prehistoric node or developed in just one language and was subsequently spread by contact.<sup>60</sup> Nevertheless, in recent years a general consensus has emerged regarding at least a few points of subgrouping, which are represented in the schematic tree presented in (55):



The major feature of (55) is the recognition of a distinct Luwic subgroup, which definitely includes Luwian and Lycian, very likely Carian, and perhaps also Sidetic and Pisidian, although the very fragmentary nature of the corpora makes their affiliation somewhat uncertain (cf. Melchert 2003, 2017b).<sup>61</sup> Per Yakubovich (2010: 15–74), Luwian — traditionally divided into “Cuneiform” and “Hieroglyphic” varieties after the script in which they are attested — in fact must be separated into distinct Kizzuwatna and “Empire” dialects. The former occurs only in ritual texts in cuneiform script, most of which were redacted in Ḫattuša and date from the 16th–13th centuries BCE. The latter is also marginally represented in cuneiform in the form of “Luwianisms” found in Hittite texts, but is attested primarily in a hieroglyphic script native to Anatolia in monumental inscriptions that date to the Iron Age (11th–8th c. BCE).

Besides Hittite, the languages most relevant to this dissertation are Luwian and Palaic. The cuneiform textual records of these languages provide clues as to the distribution of word stress, which as in Hittite, has secondary effects on vowel quality and quantity.<sup>62</sup> In particular, it is generally assumed that “plene writing” (see §3.1 below) is similarly used to indicate vowel length, which is also an important correlate of word stress in Luwian and Palaic.<sup>63</sup> Due in part to the

<sup>59</sup>As shown especially by Yakubovich (2010: 161–206), there was intensive contact between Hittite and Luwian, and to a lesser extent, between Luwian and Lydian and Luwian and Palaic.

<sup>60</sup>One such innovation is stressed vowel lengthening (see n. 15). Such convergence phenomena are one factor that problematizes Oettinger’s (1978) early *Stammbaum* model of inner-Anatolian subgrouping.

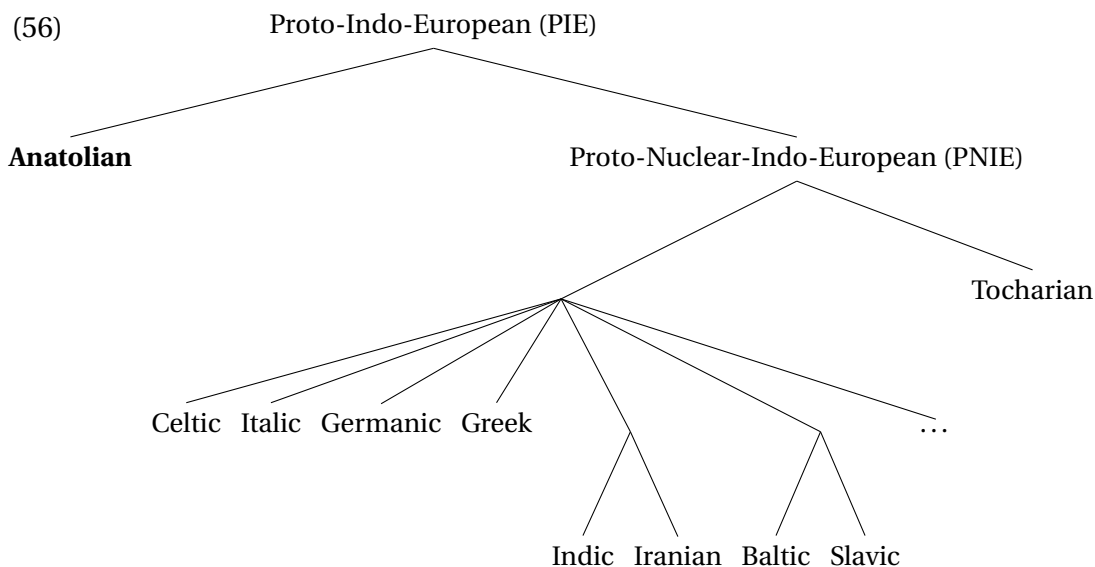
<sup>61</sup>On Carian generally, see Adiego (2007). For arguments in favor of a more articulated inner-Anatolian tree structure, see Yakubovich (2010: 5–6, *passim*).

<sup>62</sup>While Eichner (1986, 1987) — building on West (1972, 1974) — has shown that it is possible to determine the position of word stress in Lydian, the language remains too poorly understood at present to be of much value in reconstructing PA word stress.

<sup>63</sup>See further §5.2.

size of their (cuneiform) corpora, the evidence for word stress is much more limited than in Hittite; however, it will become clear in Chapter 5 (see especially §5.2 that what prosodic information can be extracted from these languages can be profitably compared to data from Hittite and used to reconstruct the distribution of word stress in PA and even the morphophonological principles by which it is determined.

It is essential to arrive at a maximally secure reconstruction of PA word stress — on the one hand, for understanding prosodic innovations that emerge in its daughter languages (cf. Yates 2015a), and on the other, because of its significant role in the step-wise reconstruction of PIE stress assignment. As in other aspects of IE comparative reconstruction, the Anatolian language branch has special importance due to its unique position within the IE family. It is now the consensus view that Anatolian was first to “hive off” (in Watkins’s (1998: 31) memorable phrase) from the other IE language branches, whose period of common unity *after* the departure of Anatolian admits the possibility of shared innovations that are reconstructible for their proximate common ancestor, termed here Proto-Nuclear-Indo-European (PNIE).<sup>64</sup> This position amounts to a version of the “Indo-Hittite hypothesis,” the traditional label for this once controversial split, which was first proposed by Sturtevant (1929, 1933) and later championed by Cowgill (1974, 1979). However, I retain the use of the term PIE for the last stage of the proto-language that is the ancestor of all the IE languages (including Anatolian), which is thus directly reconstructible by application of the Comparative Method (e.g. Meillet 1925; Weiss 2014). This view is represented in the (schematic) family tree provided in (56).<sup>65</sup>



The relationship depicted in (56) between Anatolian and the other IE languages logically admits

<sup>64</sup>For recent assessments of the relationship between Anatolian and PNIE — elsewhere referred to equivalently as “Core PIE” or in German scholarship “*Restindogermanisch*” — see Melchert (to appear a,c), Oettinger (2013–14), and Rieken (2009). On IE subgrouping generally, see Ringe et al. (2002), Ringe (to appear) and Chang et al. (2015).

<sup>65</sup>Also reflected in (56) is the majority (but less universally held) view that Tocharian was in turn the first language branch to depart from PNIE. For two recent discussions of the issue, see Ringe (to appear) and Jasanoff (to appear a).



the possibility that, even if PNIE stress assignment could be securely established via comparison of the Nuclear Indo-European (NIE) languages, word stress at the still earlier stage that includes Anatolian could have operated according to (wholly) different principles. In fact, one could argue on the basis of Anatolian evidence that although the pre-PIE “paradigmatic classes” posited under traditional approaches to IE word stress may exist only in traces in the NIE languages, they were still synchronically productive in PIE itself.<sup>66</sup> In this dissertation, however, I argue that there is no support in Hittite for any such claim; rather, I contend in Chapters 4–5 that word stress in Hittite and the other Anatolian languages broadly converges with the system reconstructed by Kiparsky and Halle (1977) for PNIE (cf. Kiparsky 2010), which can thus be reconstructed for PIE.

### 1.3.2 The Hittites and the Hittite corpus

Among the Anatolian languages, the earliest and by far the most extensive records are of Hittite, which was the official language of the kingdom of Ḫatti. The language is attested continuously from the 16th–13th centuries BCE in multi-genre administrative texts, the majority on clay tablets excavated from the royal archives at Ḫattuša near modern Boğazkale in central Turkey. These dates coincide approximately with the rise and fall of the kingdom of Ḫatti, which took shape in the late 17th or early 16th century BCE under Ḫattušili I, who established its capital at Ḫattuša. The Hittites eventually expanded into western Anatolia and southward into northern Syria, reaching the height of their power during the “New Kingdom” (or “Empire”) period, which lasted from ~1380 BCE until its abrupt end around 1200 BCE, when Ḫattuša was abandoned. The capital’s abandonment likely did not mark the end of Hittite civilization, but the termination of its archives does mark the end of historical records of the language.<sup>67</sup>

The Hittite language is preserved on over 30,000 cuneiform tablets and tablet fragments Hoffner and Melchert (2008: 2). Its fragmentary nature makes the size of the extant corpus extremely difficult to quantify, but a reasonable approximation is about 300,000 words.<sup>68</sup> However, not all tablets that have been found have been published, and not all published tablets are available in reliable transliterated editions; as a result, substantial linguistic material is not accessible except to specialists.<sup>69</sup>

The Hittite language is chronologically stratified into three stages, conventionally referred

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<sup>66</sup>For a recent assessment of the athematic nominal “paradigmatic classes” within the broader context of PIE morphophonology, see Lundquist and Yates (to appear: §3). Overviews of these classes can be found in all standard IE handbooks, e.g. Clackson (2007: 79–89), Fortson (2010: 119–23), Weiss (2011: 257–62), and Meier-Brügger (2010: 336–53); see also Beekes and de Vaan (2011: 191–211) and Kloekhorst (2013) for the closely related classes reconstructed by the “Leiden School.”

<sup>67</sup>A concise historical and linguistic overview is provided by Watkins (2009); for a more detailed historical treatment, see Bryce (2005) with references.

<sup>68</sup>Kloekhorst (2014a: 9–10) reports ~280,000 words in the extensive (but not exhaustive) corpus that serves as the basis for his study. OS manuscripts account for just a small fraction of this material; the vast majority of this material comes from NH texts and NS copies of older texts (on these abbreviations, see (57) below). IEists may find it useful to compare this number to the size of the Homeric epics (~200,000 words for the *Iliad* and *Odyssey* together) or of the *R̥gveda* (~165,000 words); for these figures, see Sandell (2015: 96–8).

<sup>69</sup>Giusfredi (2014) provides a useful recent overview of Hittite digital resources that are available online.

to as Old Hittite (OH), Middle Hittite (MH), and New Hittite (NH). The younger periods are distinguished from the older by linguistic innovations at all levels of the grammar (phonological, morphological, syntactic, lexical, etc.). In assessing the evidence for these linguistic stages, a useful terminological distinction is between TEXT and MANUSCRIPT. A TEXT — a composition produced at a particular point in time during one of these historical periods — can be assigned to a given period on the basis of the linguistic features observed therein. For instance, the use of the modal complementizer *takku* ‘if’ constitutes prima facie evidence for an Old Hittite composition, since *mān* is used in this function in later stages of the language (cf. Hoffner and Melchert 2008: 420).<sup>70</sup> Historical persons or events of known date mentioned in a text can also be used to determine its periodization.

The means of transmission for a text is a MANUSCRIPT, a specific physical object — usually a clay tablet — on which a text is recorded. Manuscripts are generally dated on the basis of the stylistic features of the script in which the text is written and how it is deployed on the physical medium, viz., the shape of individual cuneiform signs, the width of column dividers, the spacing between signs, and the like; these features are referred to collectively as a manuscript’s “ductus.”<sup>71</sup> Like the language itself, the ductus changed over time; three stages are traditionally recognized, which approximately align with the three linguistic periods noted above: Old Script (OS), Middle Script (MS), and New Script (NS).<sup>72</sup> Texts may be transmitted in original manuscripts — i.e. documents contemporaneous with their composition — or in later copies of these original manuscripts; often it is only these copies which survive in the historical record. The six combinatorial possibilities for textual transmission (and their abbreviations) are given in (57):

- (57) **OH/OS:** Old Hittite texts in Old Hittite original manuscripts.
- OH/MS:** Old Hittite texts in Middle Hittite copies.
- OH/NS:** Old Hittite texts in New Hittite copies.
- MH/MS:** Middle Hittite texts in Middle Hittite original manuscripts.
- MH/NS:** Middle Hittite texts in New Hittite copies.
- NH/NS:** New Hittite texts in New Hittite original manuscripts.

The only secure evidence for the synchronic state of the language at a given period comes from texts composed during that period preserved in original manuscripts, since copies may introduce features that reflect the later language spoken by the scribe.

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<sup>70</sup>Occasionally, however, NH scribes consciously (attempt to) use OH features — including *takku* (cf. Hoffner and Melchert 2008: 404) — in NH compositions in an effort to make these texts seem archaic. Such false archaisms simply emphasize the importance of using multiple linguistic criteria in the dating of texts.

<sup>71</sup>The Hittite writing system is discussed further in §3.1 below.

<sup>72</sup>Some scholars recognize a fourth and final stage of the ductus, Late New Script (LNS), which was used in manuscripts made during the final years of the Hittite empire (cf. Kloekhorst 2014a: 6). There is some uncertainty, however, about whether the features characteristic of this stage of the ductus — IIIc in the terminology of Starke (1985: 21–7) (cf. Klinger 1995: 32–9) — can be definitively used as chronological markers; for a concise overview of the question, see Weeden (2011: 49–52).

The stratification of Hittite plays an important role in both Chapters 4 and 5. While the former focuses primarily on synchronic analysis, it is nevertheless informed by diachronic considerations — in particular, it is often necessary to determine whether certain inflectionally related word forms belong to a single synchronic paradigm, or whether they are output of multiple historically distinct grammars; the dating of the text and manuscript in which the word is attested can be crucial in assessing this question (see §4.1 for discussion). Textual dating plays a still more significant role in Chapter 5, where the inner-Hittite development of certain innovative prosodic patterns is traced.

### 1.3.3 Phonological sketch of Hittite

With respect to the sound system of Hittite, the problem is clearly formulated by Hoffner and Melchert (2008: 10): “Because we have no living speaker of the Hittite language, acoustic recording, or transcription of Hittite words in an ancient contemporary alphabetic script, we have no way of knowing the precise sounds of the language. We gain access to Hittite phonology and morphology only through the filter of the conventions the ancient scribes employed when they wrote on clay using the cuneiform syllabary.” To these issues may be added the lack of any descendant languages (living or dead), and the fact that the cuneiform script is in various ways poorly suited for representing Hittite — for instance, it cannot faithfully render complex syllable margins, which are common in Hittite (see further below);<sup>73</sup> these and other consonant clusters are orthographically represented with a phonologically “empty” vowel (e.g. <CV-CV> for [CCV]). In some cases, spelling alternations confirm that this vowel has no linguistic reality, but in other cases, its status can be determined only on the basis of etymological considerations.

These issues clearly impose certain limitations on doing phonological analysis. To a greater extent even than in many other ancient languages, the phonetic interpretation of a given Hittite word is imprecise at best, and more often than not, some fundamental aspect(s) of it are uncertain and/or disputed. Even where an orthographic contrast can be established, it is not always certain whether it is phonologically significant or what phonological feature(s) are being contrasted; each case must be assessed in terms of its synchronic and diachronic linguistic plausibility (cf. Melchert 2015a), thus (e.g.) the typological naturalness of the phonological system thus interpreted; how the relevant features interact with other phonological processes; and the relative likelihood of the historical development of these features.

With these caveats in mind, I present below some basic assumptions about Hittite phonology that are employed in this work. First, I assume that Hittite has the inventory of consonant phonemes in (58):<sup>74</sup>

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<sup>73</sup>See also the discussion of the orthographic representation of vowel length in §3.1 below.

<sup>74</sup>The short uvular fricative is spelled <h> and its long counterpart <hh> (for these phonetic values, cf. Kümmel 2007: 227–36 and Weiss 2016). The (single) affricate is spelled <z(z)>. See Yoshida (1998, 2001) for the possibility of an OH contrast between <z> vs. <zz>, which might then reflect a corresponding length opposition.

(58)

	LABIAL	CORONAL	PALATAL	VELAR	UVULAR
STOP	p pː	t tː		k k <sup>w</sup> kː kː <sup>w</sup>	
AFFRICATE		ts̄			
FRICATIVE		s sː			χ χ <sup>w</sup> χː χː <sup>w</sup>
NASAL	m mː	n nː			
LIQUID		l r lː rː			
GLIDE	w		y		

The only significant controversy in (58) concerns the phonological interpretation of Hittite stops, which is here represented as a contrast between geminate (i.e. [+long]) and non-geminate ([−long]) stops, e.g. coronal [tː] vs. [t].<sup>75</sup>

It has long been established that there is an orthographic contrast in Hittite, most clearly maintained in intervocalic position, between doubled and singleton stops, i.e. coronal <Vt-tV> vs. <°V-tV>. Traditionally, this contrast has been described as an opposition between “fortis” and “lenis,” which are essentially neutral labels that sidestep questions of its phonetic realization and phonological representation. Nevertheless, the issue has not gone unaddressed. One approach to these questions is informed, especially, by the diachronic development of the contrast, about which there is general agreement: in a set of developments referred to collectively as STURTEVANT’S LAW (Sturtevant 1932; cf. Pozza 2011, 2012), the “fortis” stops descend principally from PIE voiceless stops, the “lenis” stops from PIE voiced and aspirated(/breathy) voiced stops.<sup>76</sup> The simplest hypothesis, then, is that Hittite had a synchronic contrast in [voice] just as in PIE (and PA, where the two PIE voiced series had already merged; see Melchert 1994: 13–21).

More recently, however, Kloekhorst (2014a: 544–7) has argued that the contrast was rather one of length (cf. Melchert 1994: 14–21). Two principal arguments support this hypothesis. First, there is evidence to suggest that vowels before “fortis” (but not “lenis”) stops pattern phonologically with vowels in closed syllables, where in contrast to their behavior in open syllables, the non-mid vowels may be long or short under stress (cf. §3.2 below). In addition, this hypothesis allows the orthographic geminate vs. singleton contrast in the stops to be unified with the identical orthographic contrast in the sonorants and fricatives. For the sonorants, a voicing contrast is typologically unlikely, but a length contrast finds natural diachronic explanation: the geminate sonorants arise historically via total assimilation of certain adjacent segments — in particular, of PIE \*h<sub>x</sub> (see Melchert 1994: 76–82).<sup>77</sup> While in my view neither of

<sup>75</sup>Since the glides ([y, w]) alternate with the high vowels ([i, u]) and (arguably) stand in complementary distribution with them, one could analyze just one set as phonemic (cf. Kloekhorst 2008: 29–31; Melchert 2017a: *ad* §1.97). I take no stance on this issue, but for simplicity include both glides and high vowels in underlying forms.

<sup>76</sup>A recent exception is Kloekhorst (2016), who argues that PIE had a stop system that much more closely resembled Hittite (reconstructing, e.g., “\*/tː/” for PIE \*/t/). I do not find this proposal remotely plausible; I intend to treat the subject in more detail elsewhere, but for one problem with his analysis, see Ch. 4 n. 82. See also Weiss (2009) and Kümmel (2012, 2015) for recent insightful discussion of the reconstruction of the PIE (and pre-PIE) stop systems.

<sup>77</sup>Note, however, that \*h<sub>2</sub> does not assimilate to \*s in intervocalic position; rather, PIE \*Vh<sub>2</sub>sV > Hitt. Vh̄s̄V; see,

these facts wholly excludes an analysis of the contrast in stops in terms of [voice] (or some other phonological feature), I provisionally follow Kloekhorst’s view in this dissertation and represent the “fortis” vs. “lenis” opposition as a contrast in length ([±long]).

The phonological analysis of the Hittite vowel inventory is complicated, and beyond the inventory of surface vowels, there is little consensus; this inventory is given in (59):

(59)

	FRONT	CENTRAL	BACK
HIGH	i i:		u u:
MID	e e:		o o:
LOW		a a:	

The Hittite surface vowel inventory also includes falling diphthongs, which contrast for length: [a:y], [ay], [a:w], and [aw]. For extensive discussion of (59) and its synchronic and diachronic analysis, see §3.2 below.

As noted above, like other ancient (and modern) IE languages Hittite allows complex syllable margins, both onsets and codas, but these are more strictly regulated than in the proto-language;<sup>78</sup> falling sonority onsets and rising sonority codas are illicit and thus regularly repaired by insertion of an epenthetic vowel (see Kavitskaya 2001, Yates 2016b; cf. Ch. 4 nn. 60, 69). For further general discussion of Hittite phonology, see Hoffner and Melchert (2008: 24–50) (cf. Melchert 2017a *ad* §1.46–135).

### 1.3.4 The evidence for Hittite word stress

Extracting prosodic information from Hittite texts is a difficult task, vexed by philological problems and the limitations of the cuneiform writing system. The basic problem is that word stress is not directly represented in the Hittite orthography in the way that is marked in Cupeño (cf. §1.2.4) or in other ancient IE languages like Vedic Sanskrit or Ancient Greek; instead, the position of primary stress must be inferred by its secondary effects on vowel quantity and quality, which were encoded in the script. Diagnosing word stress therefore depends on having a theory of how stress interacts with vowel quantity and quality, as well as of how its effects are represented in the writing system. However, the problems that arise in developing such a theory are sufficiently complex — and in enough places, controversial — that they merit separate treatment. Accordingly, Chapter 3 lays the theoretical foundation for the analysis of Hittite stress advanced in subsequent chapters.

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e.g., Kloekhorst (2008: 78, 216) (*pace* Melchert 1994: 77).

<sup>78</sup>See Cooper (2014) and Byrd (2015) for recent theoretical discussions of syllabification in PIE and its oldest daughter languages.

## CHAPTER 2

### Analyzing Lexical Accent in Cupeño

#### 2.1 Introduction

The word-level stress system of Cupeño has attracted theoretical and typological interest since the pioneering work of Hill and Hill (1968), who established the basic features of this system: Cupeño has roots and affixes that are “inherently stressed” or “[inherently] stressless”, as well as affixes that “place the stress on the last vowel of [a stressless] root”; the single surface prosodic prominence (STRESS) is assigned to a syllable that is “inherently stressed” (or pre-stressed), or in the absence of one, to the word’s initial syllable. From Hill and Hill’s description, it is clear that Cupeño has LEXICAL ACCENT: the position of a word’s primary stress is determined by a morphophonological computation over the lexically specified accentual properties (i.e. ACCENTED, UNACCENTED, PREACCENTING) of its constituent morphemes.

The primary goal of this chapter is to understand the nature of this computation, i.e. to determine what morphophonological principles were operative in the synchronic grammar of Cupeño and what were the accentual properties of the individual inputs to this system. To this end, I advance a new optimality-theoretic analysis of Cupeño stress assignment which — like other generative work on LA in Cupeño subsequent to Hill and Hill (Crowhurst 1994; Alderete 1999b, 2001b,c; Newell 2008) — begins from the accentual generalizations that they established.<sup>1</sup> These basic generalizations are illustrated in (60). Attraction of stress to an accented vowel can be observed in (60a–c), while (60d) shows the emergence of word-initial stress in the absence of accented morphemes:<sup>2</sup>

- (60) a. /√nəŋú - wənə/ → [nəŋú-wənə] ‘(we) have (have-CUST.PL)  
b. /√ʔámu - wənə/ → [ʔámu-wənə] ‘(we) hunt’ (hunt.CUST.PL)  
c. /√yax - qá/ → [ya-qáʔ] ‘(she) says’ (say-PRS.SG)  
d. /√yax - wənə/ → [yáx-wənə] ‘(they) say’ (say-CUST.PL)  
e. /√nəŋú - qá/ → [nəŋú-qa] ‘(it) has’ (have-PRS.SG)

This chapter is concerned, especially, with the stress pattern in (60e), which has important implications not only for the synchronic analysis of Cupeño stress assignment, but also more broadly, for the typology of LA systems. According to Alderete (2001c), Cupeño has ROOT-CONTROLLED ACCENT (RCA): stress is assigned to the root in examples like (60e) because the

<sup>1</sup>This chapter builds upon the earlier analysis presented in Yates 2016c. In what follows, I cite primarily Alderete 2001c as representative of the analyses developed by Alderete across a series of publications (1999b; 2001b; 2001c).

<sup>2</sup>All primary data cited here is from Hill and Nolasquez (1973) and Hill (2005), unless otherwise noted. Roots are indicated in URs with “√” (i.e. /√x /). I defer discussion of preaccenting morphemes until §2.2 below.

lexically specified accent of the root ( $/\sqrt{nəŋú}/$ ) takes precedence over the accent of the affix ( $/-qá/$ ). Within Optimality Theory (Prince and Smolensky 1993/2004), Alderete interprets this “root dominant” stress pattern as an effect of the privileged status of faithfulness relations in roots relative to other morphemes (McCarthy and Prince 1995, 1999; Beckman 1998b).<sup>3</sup>

Yet even independent of its empirical basis, the RCA analysis gives rise to certain questions. One significant issue is typological. Although privileged root faithfulness has been well established for phonological processes such as vowel harmony (e.g. Ringen 1988, Baković 2000), dissimilation (e.g. Suzuki 1998), and hiatus resolution (e.g. Casali 1996, 1997), its cross-linguistic status in LA systems is less certain; in fact, it appears that Cupeño would be typologically exceptional among languages with LA systems in *requiring* root faithfulness as an independent principle in the grammar to account for the surface distribution of word stress (see 2.5.3 below).

This chapter proposes an alternative approach to Cupeño stress assignment. I argue that stress is assigned to the root in examples like (60e) because it is the leftmost accented morpheme, which optimally satisfies both the general prosodic faithfulness constraints responsible for assigning stress to accented morphemes in (60a–c), and the markedness constraint(s) driving left edge word stress in (60d). In other words, I contend that the distribution of primary stress in Cupeño is consistent with Kiparsky and Halle’s (1977) BASIC ACCENTUATION PRINCIPLE, which was introduced in §1.1.3.2 and is repeated in (26) below:

(26) BASIC ACCENTUATION PRINCIPLE (BAP):

- If a word has more than one accented vowel, the leftmost of these receives word stress.
- If a word has no accented vowel, the leftmost syllable receives word stress.

In this chapter, I develop a constraint-based implementation of the BAP and show that it correctly predicts the observed Cupeño data, including stress patterns observed in partial reduplication, where the RCA analysis falters. The proposed analysis — henceforth, the BAP analysis — is thereby shown to be empirically superior to the RCA analysis; I contend, moreover, that the BAP analysis is to be preferred on the grounds of economy and typological naturalness.

The rest of this chapter is structured as follows. §2.2 introduces the primary data and the core constraints relevant to the BAP analysis; these constraints are then applied to derive the major generalizations about Cupeño word stress. §§2.3–2.4 examine word stress in two prefixing contexts, where both the assumptions and the predictions of the BAP and RCA analyses diverge; it is shown that the BAP analysis correctly predicts word stress in all prefixed words, whereas the RCA analysis cannot generate observed stress patterns in the reduplicated forms discussed in §2.4. §2.5 summarizes arguments in support of BAP (and against RCA), and discusses the implications of this reanalysis of Cupeño word stress for the typology of lexical accent systems and for the historical development of LA in Cupeño.

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<sup>3</sup>This relationship is formalized by McCarthy and Prince (1995) as a meta-constraint on constraint rankings: ROOT FAITH  $\gg$  AFFIX FAITH.

## 2.2 Toward an analysis of Cupeño stress

§2.2.1 provides an overview of word-level stress assignment in Cupeño; I establish the typological properties of its LA system, then proceed to lay out the primary data and identify the principal generalizations about the position of word stress that must be accounted for. The relationship between stress and vowel length in Cupeño is briefly assessed in §2.2.2. The constraints underlying the proposed BAP analysis are introduced in §2.2.3. Finally, §2.2.4 develops a formal analysis of the stress patterns described in §2.2.1.

### 2.2.1 Lexical accent in Cupeño

Word stress in Cupeño is CULMINATIVE and OBLIGATORY (Hyman 2006, van der Hulst 2014, *i.a.*). Every word bears a single primary stress, realized by increased prominence of the stress-bearing syllable along several phonetic dimensions (intensity, pitch, duration), and by fuller realization of vowel quality — for instance, in unstressed positions /a/ is optionally realized as [ə], thus merging with /ə/. There is no secondary stress in Cupeño, or at least no audible manifestation thereof (Hill and Hill 1968: 236; cf. Alderete 2001c: 458 n.4).<sup>4</sup>

Cupeño is an agglutinative language, with just a few prefixes and many suffixes; polysyllabic words containing strings of suffixes are common. (Primary) stress overwhelmingly falls within a word's first three syllables, most often on the initial syllable of the root, but second syllable root stress is also frequent. In addition, there are a few polysyllabic words with stress on the third syllable of the root or later. This surface distribution strongly suggests that stress in Cupeño is UNBOUNDED; examples like (61) and (62) argue against the existence of a right or left edge stress window respectively:<sup>5</sup>

- |      |    |                      |                               |       |
|------|----|----------------------|-------------------------------|-------|
| (61) | a. | [pə-míʔaw-lu-qal]    | (3SG-arrive-MOT-PST.IPFV.SG)  | σóσσσ |
|      | b. | [pə-ámu-ŋiy-qal]     | (3SG-hunt-MOT-PST.IPFV.SG)    |       |
|      | c. | [púliʃ-pə-ya-qal]    | (go.out-3SG-TH-PST.IPFV.SG)   | óσσσσ |
|      | d. | [way-pəm-yi-ŋiy-wən] | (swim-3PL-TH-MOT-PST-IPFV.PL) |       |

<sup>4</sup>The phonetic realization of stress was discussed in more detail in §1.2.4.

<sup>5</sup>Translations for (61): (a) 'he arrived'; (b) 'he was going off hunting'; (c) 'she went out'; (d) 'they were swimming around'. Translations for (62): (a) 'hail'; (b) 'jump several times'; (c) 'cumbersome'; (d) 'he was boiling and boiling and... boiling (it)'. Words with post-peninitial stress are mostly lexicalized compounds like (62ac) (Hill 2005: 23–4; cf. Alderete 2001c: 465 n. 14), or else involve full reduplication, where it is the last repetition of the root that bears stress (Hill 2005: 24, 134–43).



- (62) a. [paqawíλəβə] (hail) σσόςσ  
 b. [putʃaq-pútʃaq-yax] (jump-jump-TH)  
 c. [kitʃiməkúlima-l] (cumbersome-ABSL) (σ...)σσόςσ  
 d. [mul-mul-mul-mul-mul- (boil<sup>7</sup>-3SG-PST.IPFV.SG)  
 mul-múl-pə-qal]

Yet while any syllable of a word may be stressed, it cannot be predicted on the basis of purely phonological factors (e.g. syllable weight, edge proximity) which syllable will bear stress, as is clear from the near-minimal pairs in (63):<sup>6</sup>

- (63) a. [háxa-l] (sand-ABSL) vs. [kaxá-l] (valley.quail-ABSL)  
 b. [tʃála-l] (bark-ABSL) [malá-l] (metate-ABSL)  
 c. [páwi-f] (blue.oak-ABSL) [kawí-f] (rock-ABSL)  
 d. [ʔámu-wənə] (hunt-CUST.PL) [nəŋú-wənə] (have-CUST.PL)  
 e. [nə-təw] (1SG-see) [nə-pəw] (1SG-friend)  
 f. [pəm-tama] (3PL-mouth) [pəm-yáya] (3PL-try)  
 g. [pə-pá-qal] (3SG-drink- PST.IPFV.SG) [pə-ya-qál] (3SG-say- PST.IPFV.SG)

The pairs in (63) not only have the same syllabic structure, but also contain exactly the same affixes, which thus cannot be the cause of their differing stress patterns.

Accordingly, Hill and Hill (1968) have argued that stress contrasts like (63) are due to underlying prosodic differences in the lexical entries of roots. Under their analysis, the Cupeño root inventory is characterized by a binary opposition in accentual properties: “inherently stressed” (i.e. accented) vs. “stressless” (unaccented). The majority of roots are accented on either the first or second syllable, while a much smaller set of roots is unaccented. A sample of accented roots is given in (64), which notably includes all of the roots in (63a–d) as well as those in (63d–g) that are stressed in prefixed and suffixed forms:<sup>7</sup>

<sup>6</sup>Translations for (63): (a) ‘sand’, ‘valley quail’; (b) ‘bark’, ‘metate’; (c) ‘blue oak’, ‘rock’; (d) ‘(when we go) hunt(ing)’, ‘(we) have’; (e) ‘I saw’, ‘my friend’; (f) ‘our tooth’; on [pəm-yáya], see Hill (2005: 160–2); (g) ‘she drank’, ‘he said’.

<sup>7</sup>Noun roots occurring (almost) exclusively with possessor prefixes in (64–65) and in subsequent discussion are marked with a preceding “-”; all other nouns are cited here together with their “absolute” suffix in their underlying representations. The term “absolute” in this sense — traditional in UA linguistics (Sapir 1930–1) — is unconnected with now the more common usage of “absolute” (standardly glossed ABS) in the description of ergative case-marking systems; it refers, rather, to the suffixed “non-possessed form in which a noun is cited in isolation or used as a syntactic subject, possessor, or predicate nominal” (Munro 1990: 219; see also n. 4). Yet since Cupeño also has absolute case in the other sense (Hill 2005: 77–84, 164–5), I gloss the UA “absolute” suffixes here as ABSL. Note that the addition of the absolute suffix may condition the insertion of an epenthetic vowel between the root and itself, e.g. /móm - t/ → [móm-ət] ‘ocean’ (see n. 39 below), and that /tʃ/ always surfaces as [ʃ] in coda position, e.g. /kawí - tʃ/ → [kawí-ʃ] ‘rock’ (cf. §1.2.3 above).

(64)	√ACCENTED NOUN		√ACCENTED VERB	
	/√háxa-l/	‘sand’	/√ʔámu/	‘hunt’
	/√kaxá-l/	‘valley quail’	/√ʔitú/	‘steal’
	/√kawí-tʃ/	‘rock’	/√háʃi/	‘go’
	/√malá-l/	‘metate’	/√híw(ə)n/	‘stand; be there’
	/√móm-t/	‘ocean’	/√híwtʃu/	‘know’
	/√páwi-tʃ/	‘blue oak’	/√náqma/	‘hear’
	/√-pəw/	‘friend’	/√nəɟú/	‘have’
	/√səβá-l/	‘grass’	/√pá/	‘drink’
	/√-ʃáʔi/	‘belly’	/√qá:wi/	‘die’
	/√-ʃú:n	‘heart’	/√súlul/	‘go in’
	/√-táx <sup>w</sup> i/	‘body’	/√təwáʃ/	‘lose’
	/√tóki-tʃ/	‘burrow’	/√túl/	‘finish’
	/√tʃála-l/	‘bark’	/√tʃáŋgnəw/	‘be angry’
	/√kútapi-tʃ/	‘bow’	/√təsíw/	‘play’
	/√-xútʃi/	‘foot’	/√wəl/	‘grow’

As in other LA systems, high-ranking prosodic faithfulness constraints work to ensure that the lexical accent of these roots is realized in the output (see further §2.2.3 below); as a result, stress is attracted to their accented syllable, which explains (e.g.) the contrast in (63a) between nouns like /háxa-l/ and /kaxá-l/, or in (63d) between verbs like /ʔámu-wənə/ and /nəɟú-wənə/.

Accented roots like (64) contrast with unaccented roots, which have been comprehensively collected by Hill (2005: 473); her list is reproduced in (65) and (66), sifted into noun and verb roots respectively:<sup>8</sup>

<sup>8</sup>Note in (66) that the verb roots /k<sup>w</sup>a/ ‘eat’ and /ŋaŋa/ ‘weep’ exhibit some prosodic variation, in some cases behaving like accented roots, while /məq/ ‘kill’ and /nəq/ ‘come’ are morphologically irregular and thus also show an irregular distribution of word stress (Hill 2005: 29, 49–50, 148–51); these verb roots are therefore excluded from further discussion. Cupeño also has one accented pronominal root: /hax/ ‘who’ (on which see again Hill 2005: 378–80, 473).

(65)

## √UNACCENTED NOUN

/-ala/	'louse'	/-pəŋa/	'saliva'
/-hiʎa/	'cheek'	/-paha/	'father's sister'
/-hiŋa/	'saliva'	/-pəla/	'leaf'
/ki-tʃ/	'house'	/-pi/	'breast'
/ku-t/	'fire'	/-puʃ/	'eyes; face'
/-k <sup>w</sup> a/	'mother's father'	/-qa/	'paternal grandrelative'
/-k <sup>w</sup> ala/	'armpit; side'	/-qəna/	'gall'
/-k <sup>w</sup> aʃ/	'tail'	/-qəw/	'forehead'
/-ma/	'hand; arm'	/-qiʎa/	'nape of the neck'
/-məʃ/	'father's brother'	/-ʃəβ/	'acorn hulls'
/-məx/	'navel'	/-ʃu/	'mother's mother'
/-mu/	'nose'	/-ʃula/	'fingernail; claw'
/-muʃ/	'nipple'	/-tama/	'mouth; teeth'
/-muʃu/	'whisker; beard'	/-təwi/	'chest'
/-muβ/	'snot'	/-tə/	'sinew'
/-na/	'father'	/-waqa/	'shoe'
/-naŋ/	'tongue'	/-wiki/	'flight feather; wing'
/-nəʃ/	'mother's young- er sister'	/-yə/	'mother'
		/-yu/	'head; hair'

(66)

## √UNACCENTED VERB

/kuʃ/	'get; take'	/ŋaŋa/	'weep'
/k <sup>w</sup> a/	'eat'	/taβ/	'put down/in'
/max/	'give'	/təw/	'see'
/məq/	'kill'	/tuku/	'carry w/ tumpline'
/mu:/	'shoot w/ bow'	/wəŋ/	'put in'
/nəq/	'come'	/yax/	'say'

Some semantic generalizations can be made about the types of roots that are unaccented (cf. Hill 2005: 25–9). Virtually all of the unaccented noun roots in (65) refer to prototypical inalienably possessed entities, such as body parts or members of one's kinship group. In Cupeño (and the other Takic languages), such inalienably possessed nouns almost always occur in the possessed state, i.e. with prefixes marking possessor agreement (e.g. [nə-ma] 'my hand'; [pə-yə] 'his mother'). Similarly, of the unaccented verbal roots in (66), most fit the typical semantic profile

of “light verbs” cross-linguistically.<sup>9</sup>

Despite these generalizations, I assume (with Alderete 2001c: 457–62) that accentedness is a synchronically arbitrary property of roots. This position contrasts with the alternative hypothesis — advanced especially by Newell (2008: 49–71, 92–101) (cf. Barragan and Newell 2003) — that the unaccented roots in (65–66) form morphosyntactic natural classes. While attractive in certain respects, this hypothesis both under- and overgenerates the membership of the set of unaccented roots in Cupeño.<sup>10</sup> On the one hand, there are verbal roots that do not have prototypical light verb semantics, such as /k<sup>w</sup>a/ ‘eat’ (cf. /pá/ ‘drink’), /mu:/ ‘shoot with a bow’, and /tuku/ ‘carry with tumpline’. On the other, there are both verbal and nominal accented roots that appear to have the same semantic and even morphosyntactic properties as unaccented roots. Semantically “light” accented roots from (64) above include: /√háʃi/ ‘go’; /√híw(ə)n/, ‘stand; be there’; /√nəŋú/ ‘have’; /√súlul/ ‘go in’; and /√túl/ ‘finish’. Similarly, (65) includes a number of inalienably possessed noun roots: /√-ʃáʔi/ ‘belly’; /√-ʃúm/ ‘heart’; /√-táx<sup>w</sup>i/ ‘body’; and /√-xútʃi/ ‘foot’. Such examples constitute evidence that synchronically there is nothing morphosyntactically “special” about unaccented roots, a class which is defined, rather, by the absence of the idiosyncratic lexical specification that is present in accented roots.

The principal diagnostic for a root’s accentedness is whether it exhibits fixed or variable stress in connection with certain affixes. The most common are a set of agreement prefixes that mark the person and number of nominal possessors or certain verbal subjects; stressed and unstressed allomorphs of these prefixes are given in (67):<sup>11</sup>

(67) AGREEMENT PREFIXES

	SG	PL
1	[nə-], [ná-]	[tʃəm-], [tʃóm-]
2	[ʔə-], [ʔó-]	[ʔəm-], [ʔóm-]
3	[pə-], [pó-]	[pəm-], [póm-]

<sup>9</sup>See, e.g., Butt (2003, 2010) for recent discussion of “light verbs” from a typological perspective.

<sup>10</sup>The major advantage of Newell’s (2008) phase-based account of stress in the Cupeño verbal system is that it would significantly reduce (although not eliminate) the need for accentual specification in the lexicon, since it would allow verbal roots that are here assumed to have root-initial lexical accents to instead be left unspecified. Besides the (acknowledged) arbitrariness of treating roots like /k<sup>w</sup>wa/ ‘eat’ as light, an apparent counterexample to her analysis is the root /túl/ ‘finish’ in (66), which not only has “light” semantics, but also never occurs with the theme-class suffixes [-yax-] or [-in-], the latter property being viewed as diagnostic for light verb status (and thus merger in *v*<sup>0</sup>) by Barragan and Newell (2003: 16) (cf. Barragan 2003). Yet even if her analysis can be maintained for the verbal system, a phase-based analysis along similar lines for the nominal system (tentatively suggested by Barragan and Newell 2003) is wholly untenable; there are clearly no morphosyntactic or relevant semantic differences between (e.g.) /√-ʃáʔi/ ‘belly’ and /√-tama/ ‘mouth’ that could be leveraged to explain why only the latter shows shift of stress onto possessor agreement prefixes — cf. [pe-ʃáʔi] ‘his belly’ (3SG-belly) vs. [pó-tama] ‘his mouth’ (3SG-mouth).

<sup>11</sup>When the prefixes in (67) attract stress and the root contains an /u/ vowel, the prefixal vowel assimilates to the root vowel, e.g. [nú-ʃu] (1SG-maternal.grandmother), [pú-puʃ] (3SG-eye), [tʃúm-yu] (1PL-head), [púm-ku] (3PL-fire) (cf. Hill 2005: 28, 42).

Cupeño words that consist only of a root and one of the prefixes in (67) exhibit a prosodic split: most are stressed on the root, but some are stressed on the prefix. The cause of this dichotomy is generally assumed to be the accentedness of the root — i.e., when these prefixes are added to accented roots, stress falls on the root, but when they are added to unaccented roots, it is the prefix that receives stress. This distribution of stress is observed with both nominal and verbal roots, as evident in the illustrative person-number paradigms in (68) and (69) respectively.<sup>12</sup>

(68)	√ACCENTED		√UNACCENTED	
1SG	[nə-xútʃi]	(1SG-foot)	[nə-tama]	(1SG-mouth)
2SG	[ʔə-nəʔə]	(2SG-relative)	[ʔú-puʃ]	(2SG-eye)
3SG	[pə-tíʔi]	(3SG-bone)	[pə-ma]	(3SG-hand)
1PL	[tʃəm-táxwi]	(1PL-body)	[tʃəm-yə]	(1PL-mother)
2PL	[ʔəm-ʃú:n]	(2PL-heart)	[ʔəm-ki]	(2PL-house)
3PL	[pəm-kútapi]	(3PL-bow)	[pəm-na]	(3PL-father)

(69)	+√ACCENTED		+√UNACCENTED	
1SG	[nə-túl]	(1SG-finish')	[nə-təw]	(1SG-see)
3SG	[pə-tʃáɲnəw]	(3SG-be.angry)	[pə-max]	(3SG-give)
1PL	[tʃəm-túk]	(1PL-spend.night)	[tʃəm-yax]	(1PL-say)
3PL	[pəm-súlul]	(3PL-go.in)	[pəm-təw]	(3PL-see)

The accentedness of verbal roots can also be determined by their stress patterns in combination with a particular set of suffixes that encode singular subject number agreement, among other grammatical features. These suffixes surface both stressed and unstressed, as shown in (70):

(70)	[-qa], [-qá]	(PRS.SG)
	[-qal], [-qál]	(PST.IPFV.SG)
	[-qali], [-qalí]	(DS.SG)

The distribution of the stressed and unstressed allomorphs of these suffixes aligns with the pre-

<sup>12</sup>All possessed forms in (68) are semantically compositional, e.g. [nə-xútʃi] 'my foot', [ʔə-nəʔə] 'your relative', etc. Translations for (69): (left column) 'I finished', 'he got angry', 'we spent the night', 'they went in'; (right column) 'I saw', 'he gave', 'we said', 'they saw'.

fixal data in (69): verbal roots that are stressed in prefixed forms (i.e. accented roots) are also stressed in combination with the suffixes in (70), while verbal roots with prefixal stress (i.e. unaccented roots) yield stress to these suffixes. (71) presents data for these suffixes. (71a) shows that this stress distribution obtains in words that contain just a verbal root and one of the relevant suffixes; (71b) shows that the position of stress in words containing these suffixes is not affected by prefixation, but rather remains fixed on the root or suffix respectively:<sup>13,14</sup>

(71)	√ACCENTED	√UNACCENTED
a.	[tʃáŋnəw-qa] (be.angry-PRS.SG)	[ya-qáʔ] (say-PRS.SG)
	[túk-qa] (spend.night-PRS.SG)	[təw-qáʔ] (see-PRS.SG)
	[túl-qa] (finish-PRS.SG)	[max-qáʔ] (give-PRS.SG)
	[nəŋú-qa] (have-PRS.SG)	[taβ-qáʔ] (put-PRS.SG)
b.	[nə-híwtʃu-qal] (1SG-know- PST.IPFV.SG)	[nə-ya-qál] (1SG-say- PST.IPFV.SG)
	[pə-túl-qal] (3SG-finish- PST.IPFV.SG)	[pə-ya-qál] (3SG-say- PST.IPFV.SG)
	[pə-tʃáŋnəw-qal] (3SG-be.angry- PST.IPFV.SG)	[nə-wən-qál] (1SG-put- PST.IPFV.SG)
	[pə-túl-qali] (3SG-finish-DS.SG)	[ʔə-ya-qalíʔ] (2SG-say-DS.SG)

For noun roots, a similar diagnostic is provided by a different set of suffixes which were described by Hill and Hill (1968) as “plac[ing] the stress on the last vowel of the root.” Nominal suffixes of this kind tend to mark inflectional properties such as number (PL), direct object (ACC), and various “local” relationships (ALL, INL, ABL); some common nominal suffixes of this type are given in (72):<sup>15</sup>

<sup>13</sup> Examples like [ya-qáʔ] (in (71a) show epenthesis of a word-final glottal stop, which is regularly inserted after word-final stressed open syllables in Cupeño (cf. Hill 2005: 50–1). This process is probably a strategy for avoiding a word-final degenerate head foot (cf. Mamet 2011: 273. Note that the example [ʔə-ya-qalíʔ] in (71b) is taken from Alderete (2001c: 471), where the form is cited without the epenthetic glottal stop; since glottal stop epenthesis otherwise appears to be exceptionless, I assume that there was a final glottal stop in this form.

<sup>14</sup>Translations for (71a): (left column) ‘is angry’, ‘is spending the night’, ‘finishes’, ‘(it) has’; (right column) ‘(she) is speaking’, ‘(you) are giving’, ‘(he) put’. Translations for (71b): (left column) ‘I did (not) know’; ‘he would finish’; ‘she was angry’; ‘(when) he has finished’; (right column) ‘I was saying’, ‘she was saying’, ‘I was putting’; ‘(what) you said’.

<sup>15</sup>This functional generalization has exceptions — for instance, DIM is not inflectional; there are also at least two verbal preaccenting suffixes, [nin] (CAUS) and [-yəw] ‘do something with’. See Hill (2005: 26–7) for a complete list of preaccenting suffixes.

(72)	[-ʔaw]	(LOC)	[-ma]	(DIM)
	[-i], [-y]	(ACC)	[-ŋa]	(INL)
	[-ika], [-yka]	(ALL)	[-ŋax]	(ABL)
	[-m]	(PL)		

Like the verbal suffixes in (70), these nominal suffixes do not affect stress assignment in combination with accented roots, which again retain stress on their accented syllable. When attached to unaccented roots, however, they prevent stress from shifting onto the agreement prefixes in (67), which otherwise receive stress as in (68). Instead, stress surfaces on the unaccented root — more specifically, on the final syllable of the root, as shown by the unaccented roots that are disyllabic. The stress patterns that arise in words containing these suffixes are exemplified in (73):<sup>16</sup>

(73)	√ACCENTED		√UNACCENTED	
a.	[háxa-ʔaw]	(sand-LOC)	[pə-tamá-ʔaw]	(3SG-mouth-LOC)
b.	[ʔe-nó:ʔə-y]	(2SG-basket-ACC)	[nə-ná-y]	(1SG-father-ACC)
c.	[pá:la-yka]	(Pala-ALL)	[pu-kú-yka]	(3SG-fire-ALL)
d.	[pə-nóʔə-m]	(3SG-relative-PL)	[pə-muʃú-m]	(1SG-beard-PL)
e.	[nə-ʔásis-ma]	(1SG-niece-DIM)	[nə-qá-ma]	(1SG-son-DIM)
f.	[nə-xúta-ŋa]	(1SG-back-INL')	[nə-má-ŋa]	(1SG-hand-INL)
g.	[kúpa-ŋax]	(Cupa-ABL)	[tʃəm-kí-ŋax]	(1PL-house-ABL)

Finally, there are apparently stress-neutral suffixes that like (72) do not attract stress, but unlike (72) do not prefer that stress falls on the immediately preceding syllable, e.g. (74):

(74)	[-wə]	(PRS.PL)
	[-wən]	(PST.IPFV.PL)
	[-wəni]	(DS.PL)
	[-wənə]	(CUST.PL.)

Morphologically, the suffixes in (74) are — with the exception of [-wənə] — the corresponding

<sup>16</sup>Translations for (73): (a) ‘on the sand’, ‘in her mouth’; (b) ‘your basket’, ‘my father’ (c) ‘to Pala’, ‘by his fire’; (d) ‘his relatives’, ‘his whiskers’; (e) ‘my niece’ (DIM may indicate endearment to the speaker; cf. [nə-pulín-ma] ‘my dear child’ ← /pulín/ ‘beget’, ‘my son’s child’, ‘my grandchild’ (cf. /-qa/ ‘paternal grand-relative’); (f) ‘on my back’, ‘in my hand’; (g) ‘from Cupa’, ‘from our homes’.

plural forms of the accented suffixes in (70).<sup>17</sup> When these suffixes attach to bare unaccented roots, stress surfaces on the root, but when they attach to prefixed unaccented roots, stress surfaces on the prefix; these stress patterns are illustrated in (75a) and (75b) respectively:<sup>18</sup>

(75)	√ACCENTED	√UNACCENTED
a.	[híwtʃu-wə] (know-PRS.PL)	[yáx-wə] (say-PRS.PL)
	[pá-wə] (drink-PRS.PL)	[tá-wə] (see-PRS.PL)
	[təwáʃ-wənə] (lose-CUST.PL)	[máx-wənə] (give-CUST.PL)
	[ʔáyə-wənə] (want-CUST.PL)	[wón-wəne] (put.in-CUST.PL)
b.	[tʃəm-nəŋú-wən] (1PL-have- PST.IPFV.PL)	[tʃəm-yax-wən] (1PL-say- PST.IPFV.PL)
	[pəm-ʔáyə-wən] (3PL-want- PST.IPFV.PL)	[póm-yax-wən] (3PL-say- PST.IPFV.PL)
	[pem-kúp-wəni] (3PL-sleep-DS.PL)	[póm-tə-wəni] (3PL-see-DS.PL)

Another way of characterizing the distribution of word stress in (e.g.) [yáx-wə] in (75a) and [tʃəm-yax-wən] in (75b) is that both have initial (or leftmost) stress; this observation is central to the analysis developed in §2.2.4 below.

The data presented above constitutes the core of the Cupeño stress system. What emerges from this data is that while stress is not predictable on purely phonological or purely morphological grounds, it nevertheless submits to some clear generalizations. In particular, there is a synchronic contrast between nominal and verbal roots that have stress fixed on one syllable of the root in combination with certain productive prefixes and suffixes, and those roots that exhibit variable stress patterns within these same morphological categories. Among the former category, moreover, there are roots with stress fixed on their initial syllable, and those with stress fixed on non-initial syllables.

In the remainder of this section, I argue that these systematic prosodic contrasts fall out from the interaction of the accentual properties of roots (accented vs. unaccented), the accen-

<sup>17</sup>Cupeño also has a set of stative suffixes homophonous with the suffixes in (74) that can appear with both singular and plural subjects (cf. Hill 2005: 147); these suffixes behave identically with respect to stress assignment, although I do not explicitly treat them here. For the suffix [-wəni], Hill (2005: 27–8, 406) reports both prefixal and root stress (but crucially, never <sup>x</sup>[-wəni] with suffixal stress; cf. §2.3.2 below) in combination with unaccented roots; however, the only example of root stress that she cites is with /k<sup>w</sup>a/ ‘eat’, which more generally exhibits variation between accented and unaccented behavior (cf. n. 8).

<sup>18</sup>Translations for (75a): (left column) ‘(we) know’, ‘(they) are drinking’, ‘(they) would expend’, ‘(they) like’; (right column) ‘say’, ‘(we) see’, ‘(we never) give away’, ‘(they) would put (them) in’. Translations for (75b): (left column) ‘we had’, ‘they wanted’, ‘(while) they were asleep’; (right column) ‘we said’, ‘they said’, ‘they (DS.PL) having seen’.



tual properties of affixes (accented, unaccented, preaccenting), and the BAP. In §2.2.3, I implement the BAP within an optimality-theoretic framework, and in §2.2.4, apply it to derive the stress patterns observed here. Before proceeding to develop this analysis, however, I turn briefly to the issue of vowel length in Cupeño, which is sometimes claimed to play a role in stress assignment.

## 2.2.2 Stress and vowel length in Cupeño

Previous generative work on Cupeño’s LA system has rightly observed that there is a close relationship between stress and vowel length in the language (Crowhurst 1994; Alderete 2001c). This relationship raises the possibility that although stress assignment is phonologically unpredictable on the whole, it nevertheless may be predictable when a word contains an underlying long vowel. I present evidence here against such a hypothesis, arguing instead that vowel length plays no part in determining the position of word stress in Cupeño.

Cupeño has contrastive vowel length, each phonemic short vowel opposed to an otherwise identical long vowel.<sup>19</sup> Historically, most Cupeño long vowels derive from \*[VhV] or \*[VʔV] sequences via contraction after the (relatively recent) loss of the intervocalic glottal consonant. Synchronically, there are relatively few surface long vowels in the native lexicon, and their distribution is quite restricted;<sup>20</sup> Hill (2005: 19) reports that “[l]ong vowels appear only in stressed syllables.” Alderete (2001c) suggests that this restriction is due to the WEIGHT-TO-STRESS PRINCIPLE (WSP) (Prince 1990), which requires that heavy syllables bear stress. In Cupeño, the WSP could be satisfied in either or both of the ways in (76):

- (76) (i) By attraction of stress to underlying long vowels.  
 (ii) By shortening of unstressed long vowels.

Of these possibilities, more important for the present study is (i), since it would entail that vowel length plays a role in determining stress in Cupeño. The data that bears upon this issue is limited, but there is some evidence that the strong form of (i) — viz., long vowels consistently attract stress, which is therefore predictable in words that contain a single long vowel — is incorrect. Counter-evidence to this hypothesis comes from the verbal system, where there is a root-attaching “aspectual” suffix that surfaces as both [-á:n-] and [-an-], i.e. long when stressed and short when unstressed;<sup>21</sup> examples of these allomorphs are given in (77) and (78) respectively:

<sup>19</sup>Exact minimal pairs are relatively rare, but do exist, e.g. [nə-nó:ʔə] ‘my basket’ (1SG-basket) vs. [nə-nóʔə] ‘my relative’ (1SG-relative); [mó:t-] (gopher-ABSL) vs. [mə=t] (and=2S.ABS).

<sup>20</sup>Long vowels are common, however, in loan words from Spanish, which in Cupeño generally have a stressed long vowel in the same position as the stressed vowel in the donor language, e.g. [ʔá:tu] ‘cat’ (Sp. *gato*), [á:ju] ‘year’ (Sp. *año*); see further Hill (2005: 167). This pattern may indicate that duration plays a greater role in signaling stress in Spanish than in Cupeño (cf. Alderete 2001c: 466 n. 15).

<sup>21</sup>Hill (2005: 133–4, 145–6) discusses the suffix among a set of derivational processes that “yield secondary aspect distinctions,” but points out that it is not very productive, occurring with just a few roots (i.e. low type frequency), and even for these roots, the semantic distinction between suffixed and unsuffixed forms is rarely (if ever) clear. I therefore follow Hill’s practice in glossing this suffix as “AAN”.

(77)

STRESSED/LONG

- 
- a. [taβ-á:n-pə-qal] ‘he placed (it) in’ (put.in-AAN-3SG-PST.IPFV.SG)  
 b. [kuş-á:n-pə-qal] ‘he grabbed (him)’ (take-AAN-3SG-PST.IPFV.SG)

(78)

UNSTRESSED/SHORT

- 
- a. [nə-míx-an-βe] ‘(where) I did (something)’ (3SG-be-AAN-SUB.RL)  
 b. [pə-ʔíx-an-pi] ‘it happens like this’ (3SG-do.like-AAN-SUB.IRL)

Since there are no known vowel lengthening processes in Cupeño, the examples in (77) show that the suffix must contain an underlying long vowel /a:/, which retains its length when stressed. Yet despite this long vowel, the suffix does not always attract stress, as evident in (78). This pattern is corroborated, moreover, by the lone unaccented root with a long vowel /muu/, which yields stress to both the agreement prefixes in (67) and the stress-attracting suffixes in (70) above.<sup>22</sup> In particular, the shift of stress onto the agreement prefixes in combination with this root argues against not only a strong version of (i) in (76), but even against various weaker versions such that vowel length still affects stress assignment; as will become clear in §2.2.4 and §2.3 below, this shift shows that even “default” initial stress is preferred to placing stress on an unaccented underlying long vowel.<sup>23</sup>

In view of this evidence, I assume that the WSP is irrelevant for Cupeño stress assignment (i.e. dominated by all of the constraints discussed in §2.2.3 below),<sup>24</sup> but drives shortening of unstressed long vowels (i.e. WSP >> IDENT-[LONG]), although the latter is less certain (cf. n. 22). If these assumptions are correct, the AAN-suffix may be analyzed as /-á:n-/ and the distribution in (77–78) — i.e., stressed with unaccented roots (/taβ/, /kuş/), unstressed with accented roots

<sup>22</sup> Hill (2005: 123, 393) cites forms like [púʔ-mu:] ‘shoot’ (3PL-shoot) and [mu:-qáʔ] ‘(he) shoots’ (shoot-PRS.SG), where prefix and suffix respectively are stressed in preference to /mu:/. What is surprising, however, is that this root appears to retain its unstressed long vowel on the surface. This conflicts with Hill’s (2005: 15) own statement that long vowels occur only in stressed syllables, as well as the evidence of the AAN-suffix, whose stress-conditioned quantitative alternation between [-á:n-] and [-an-] illustrated in (77–78) appears to be wholly regular. I am therefore inclined to doubt retained vowel length in [mu:]. One possible explanation is that this root is underlyingly disyllabic /muhu/, and that the apparent surface long vowel [u:] is really disyllabic [u.u] (or else the result of post-lexical coalescence). There is at least one other situation in which the general ban on vowel hiatus in Cupeño is violated, and it too involves a “late” deletion of intervocalic /h/ in an unaccented root (see Hill 2005: 21, 28–9). In addition, the historical \*[h] of this root even still occurs in some derivationally related forms, e.g. [muhá:m] ‘shoot w/ bow’ (which also contains the “aspectual” suffix); an underlying form /muhu/ is therefore not implausible.

<sup>23</sup> It would still be possible to claim under the RCA analysis that long vowels are stressed in preference to accented affixes but not in preference to accented roots, i.e. MAX-PROM<sub>RT</sub> >> WSP >> MAX-PROM<sub>AFF</sub>. However, since it is demonstrated in §2.3 that the agreement prefixes are unaccented, an example like [pú-mu:] (cf. n. 22) must involve default left edge stress; the WSP would therefore have to be ranked even beneath Alderete’s (2001c: 490–1) INIT-PROM, which in his analysis is the lowest ranked constraint relevant to stress assignment.

<sup>24</sup> This position in fact aligns with that of Hill and Hill (1968: 237), who state that “long vowels have no relation with the rules for stress placement,” as well as with the more recent assessment of Mamet (2011: 250 n. 4).

(/míx/, /ʔíx/) — predicted by the BAP analysis developed in the remainder of this chapter:<sup>25</sup> the accented suffix is stressed in preference to /qál/ in (77) by virtue of occurring closer to the left edge of the word, but loses to the accented roots in (78) for the same reason. See §2.3.2.3 below for a formal analysis of this stress pattern and further discussion of its implications.

Having excluded the WSP, it is now possible to return, in §2.2.3, to the constraint ranking that is relevant to Cupeño — viz., the ranking by which the accentual generalizations specified by the BAP are instantiated.

### 2.2.3 Implementing the BAP in Cupeño

As discussed in detail in §1.1.3.1, LA systems like Cupeño are characterized by high-ranking faithfulness constraints on the mapping between underlying and surface prominence. The set of constraints adopted here — taken from the “Prosodic Faithfulness” constraint family (Alderete 1999b *et seq.*) — is repeated in (25):

- (25) a. MAX-PROM: “A prominence in the input must have a correspondent in the output.”  
 b. DEP-PROM: “A prominence in the output must have a correspondent in the input.”  
 c. \*FLOP-PROM: “Corresponding prominences must have corresponding sponsors and links.”

The constraints in (25) together ensure that lexical accents are preferentially realized in the output; as a result, stress surfaces on an accented syllable, if any are present in the input.

In Cupeño, these faithfulness constraints interact with the two additional markedness constraints in (30) and (37) (repeated from §1.1.3.1):

- (30) CULMINATIVITY (= CULM): “A prosodic word must have exactly one stressed syllable.”  
 (37) ALIGN-L(PK,  $\omega$ ) (= PK-L): “The left edge of every stressed syllable is aligned with the left edge of the word (evaluated gradiently; one violation per intervening syllable).”

In systems like Cupeño in which stress is both culminative and obligatory (i.e., there is one and only one primary stress per word), the constraint in (30) is undominated; on the one hand, it ensures that if a word contains several accented morphemes, just one single accent will be realized in the output, and on the other, that if no accented morphemes are present in the input, an accent will be inserted between input and output representations.

What remains, then, is a constraint (or constraints) that determine which of several accented morphemes are assigned stress, or in the absence of accented morphemes, the locus

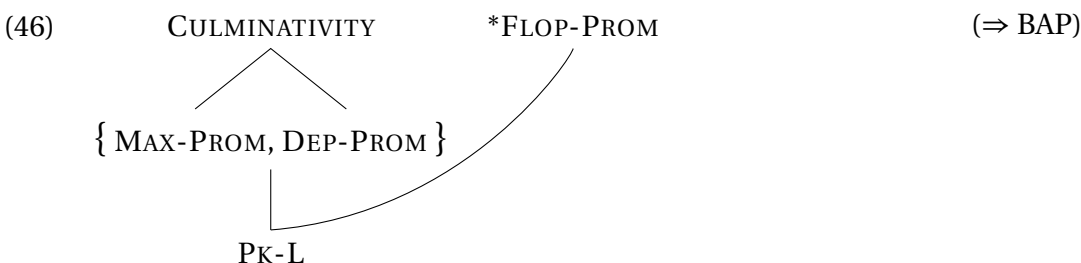
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<sup>25</sup>Just as in (77–78), /-á:n-/ is usually stressed when suffixed to unaccented roots and unstressed with accented roots. However, there are counter-examples in both directions to this accentual generalization — for instance, [táβ-an-pe-n] ‘(he) put (him) in’ (put-AAN-3SG-TH), where stress falls on the unaccented root; or [tʃimi=mix-á:n] ‘you must do for us’ (1PL.O=do.HAB), where /-á:n-/ attracts stress in preference to the accented root /míx/ ‘do’. These variable stress patterns perhaps owe to the low productivity of the suffix, which may have become lexicalized in combination with certain roots, and as a further consequence, eventually subject to prosodic change; see Yates 2015a for discussion.

of default stress. In Cupeño, both of these processes are effected by PK-L, which prefers that stress align with the left edge of a prosodic word. PK-L becomes relevant when multiple candidates are equally harmonic with respect to faithfulness constraints, either because all involve deleting the same number of lexical accents or because none involve deletion; in such cases, the one that is prosodically optimal — i.e. most harmonic with respect to PK-L — is selected, thus the leftmost accented morpheme, or else the word’s leftmost syllable. This morphophonological generalization is of course equivalent to the BAP, which was proposed for Cupeño in §2.1 and is repeated in (26) below:

- (26) BASIC ACCENTUATION PRINCIPLE (BAP):  
 If a word has more than one accented vowel, the leftmost of these receives word stress.  
 If a word has no accented vowel, the leftmost syllable receives word stress.

More specifically, the BAP results from the interaction of PK-L with the constraints in (25) and (30). The constraint ranking necessary to generate these patterns was derived explicitly in §1.1.3.2; in this chapter, I argue that this ranking — repeated in (46) — obtains synchronically in Cupeño:<sup>26</sup>



In §2.2.4, the BAP constraint ranking in (46) is applied to the core Cupeño data laid out in §2.2.1 above, and shown to correctly predict the attested stress patterns.

## 2.2.4 Stress assignment in Cupeño

§2.2.1 established the stress patterns that must be accounted for by any analysis of Cupeño stress assignment. In particular, such an analysis must be able to explain the systematic contrasts that arise in words of the same phonological shape in combination with the same affixes, e.g. [nə-pəw] ‘my friend’ (1SG-friend) vs. [nə-təw] ‘I saw’ (1SG-see) in (63e). This example is instructive not only because it is a phonological near-minimal pair for stress, but because it is representative of the prosodic split that occurs when prefixal agreement markers are added to roots with different accentual properties: words formed from accented roots are stressed on the root, while words formed from unaccented roots have prefixal stress. This divergence was illustrated fully in (68–69) above with both nominal and verbal examples; (79) briefly recapitulates

<sup>26</sup> Per §1.1.3.2, I assume \*FLOP-PROM is inviolable in Cupeño and omit it from subsequent tableaux; DEP-PROM is included only when it is violated by the winning candidate.

the contrasting stress patterns that arise in this environment:<sup>27</sup>

(79)	PREFIX	+√ACCENTED		+√UNACCENTED	
	/nə-/	[nə-pów]	(1SG-friend)	[nó-təw]	(1SG-see)
	(1SG)	[nə-xútʃi]	(1SG-foot)	[nó-tama]	(1SG-mouth)
		[nə-túl]	(1SG-finish)	[nó-yax]	(1SG-say)
	/pə-/	[pə-ʔów]	(3SG-blood)	[pó-təw]	(3SG-see)
	(3SG)	[pə-tíʔi]	(3SG-bone)	[pó-ma]	(3SG-hand)
		[pə-wisík]	(3SG-scratch)	[pó-max]	(3SG-give)

In contrast to Alderete (2001c), I analyze the agreement prefixes in (79) as unaccented; this aspect of the analysis is defended explicitly in §2.3 below.<sup>28</sup>

Under this analysis, the stress patterns in (79) fall out straightforwardly from the BAP constraint ranking. Prefixed accented roots receive stress on the root because it is the only accented morpheme in the word, while prefixal stress emerges with unaccented roots in accordance with the default phonological preference for leftmost stress (i.e. PK-L); illustrative tableaux are provided in (80) and (81) respectively:

(80)

/nə - √túl/	CULM	MAX-PROM	PK-L
a.  nə-túl			*
b. nə-tul		*!	

(81)

/nə - √təw/	CULM	MAX-PROM	DEP-PROM	PK-L
a. nə-təw	*!			
b.  nó-təw			*	
c. nə-tów			*	*!

Another environment identified in §2.2.1 in which accented and unaccented verbal roots contrast prosodically is in combination with certain suffixes, e.g. /-qá/ and /-qál/, which must be analyzed as accented (cf. Hill and Hill 1968: 236, Alderete 2001c: 456, 70). These morphemes attract stress when suffixed to unaccented roots, but not when suffixed to accented roots, which

<sup>27</sup>Translations for (79): (left column) ‘my friend’, ‘my foot’, ‘I finished’, ‘his blood’, ‘his bones’, ‘she scratched’; (right column) ‘I saw’, ‘my mouth’, ‘I said’, ‘she saw’, ‘his hand’, ‘he gave’.

<sup>28</sup>Newell (2008: 93) similarly concludes that the agreement prefixes are unaccented.


are stressed on their accented syllable (cf. (71) above). (82) provides data for the simple case, i.e. words of the structure root plus accented suffix; for morphosyntactic reasons, only /qá/ is found in words of this type:<sup>29</sup>

(82)


SUFFIX	+√ACCENTED		+√UNACCENTED	
/-qá/	[náqma-qa]	(hear-PRS.SG)	[ya-qáʔ]	(say-PRS.SG)
(PRS.SG)	[nəŋú-qa]	(have-PRS.SG)	[təw-qáʔ]	(see-PRS.SG)

By analyzing /-qá/ as an accented suffix, the BAP analysis correctly predicts the distribution of stress in (82): accented roots receive stress due to their position to the left of this suffix, as in (83), but with unaccented roots, the suffix is the only accented morpheme and so is stressed, as in (84):

(83)

/nəŋú - qá/	CULM	MAX-PROM	PK-L
a. nəŋú-qá	*!		***
b.  nəŋú-qa		*	*
c. nəŋu-qá		*	**!
d. nəŋu-qa		**!	

(84)

/√yax - qá/	CULM	MAX-PROM	PK-L
a.  ya-qáʔ			*
b. yá-qa		*!	

The suffix /-qal/ differs from /-qa/ in that it almost always co-occurs with agreement prefixes. Yet as observed in §2.2.1, prefixed words containing this suffix show the same distribution of stress as words suffixed with /-qá/, i.e. root stress with accented roots, but suffixal stress with unaccented roots. This distribution is exemplified in (85) (cf. (71) above):<sup>30</sup>

<sup>29</sup>Agreement prefixes are obligatory in past tense verb forms (and conversely, are not permitted in non-past tense forms), although this distribution is complicated by the fact that marked present tense verb forms may refer to the immediate past; see Hill (2005: 108–10, 124–5) for discussion. Translations for (82): (left column) ‘(I) hear’, ‘(it) has’; (right column) ‘(she) is speaking’, ‘(I) saw’. On the epenthetic glottal stop in the latter two forms, see n. 13 above.

<sup>30</sup>On the suffix /-qalí/, see the separate discussion in §2.3.2.1. Translations for (85): (left column) ‘she drank’, ‘he would finish’; (right column) ‘he was saying’, ‘I was putting’.

(85)	SUFFIX	+√ACCENTED		+√UNACCENTED	
	/-qál/	[pə-pá-qal]	(3SG-drink-	[pə-ya-qál]	(3SG-say-
	(PST.IPFV.SG)		PST.IPFV.SG)		PST.IPFV.SG)
		[pə-túl-qal]	(3SG-finish-	[nə-wən-qál]	(1SG-put-
			PST.IPFV.SG)		PST.IPFV.SG)

The BAP analysis handles the data in (85) in exactly the same way as in (82): the accented suffix attracts stress when it is the only accented morpheme, but an accented root is stressed in preference to the suffix because it is closer to the word's left edge. The tableaux in (86) and (87) provide representative derivations for accented and unaccented roots respectively:

(86)	/pə - pá - qál/	CULM	MAX-PROM	PK-L
a.	pə-pá-qál	*!		***
b.	☞ pə-pá-qal		*	*
c.	pə-pa-qál		*	**!
d.	pó-pa-qal		**!	

(87)	/pə - yax - qál/	CULM	MAX-PROM	PK-L
a.	☞ pə-ya-qál			**
b.	pó-ya-qal		*!	

It is important to note that the unaccented roots in (79), (82), and (85) are not unstressed because they cannot be stressed (i.e. they are stress-rejecting).<sup>31</sup> Rather, unaccented roots can be assigned stress, receiving default stress when affixed only with unaccented suffixes like /-wə/ (PRS.PL), /-wənə/ (CUST.PL), and the related suffixes in (74) (cf. Hill and Hill 1968: 236). Unaccented roots may also receive stress in combination with /'-ɲa/ (INL), /'-ʔaw/ (LOC), and the other suffixes in (72), which are preaccenting (cf. Hill and Hill 1968: 236, Alderete 2001c: 478–9); these suffixes thus place a lexical accent on the immediately preceding syllabic nucleus, which is assigned stress when there are no accented morphemes to its left. Predictably, neither type of suffix has any effect on accented roots, which retain stress on their accented syllable. The distribution of stress in words containing these suffixes is summarized in (88) (cf. (73) and (75) above):

<sup>31</sup>Revithiadou (1999: 46–51) argues that such an accentual feature — termed “unaccentable” — is attested as a property of roots and affixes in other LA systems, including Russian, Modern Greek, and Salish.

(88) SUFFIX	+√ACCENTED	+√UNACCENTED
/-wə/ (PRS.PL)	[híwtʃu-wə] (know-PRS.PL)	[yáx-wə] (say-PRS.PL)
/-wənə/ (CUST.PL)	[təwáʃ-wənə] (lose-CUST.PL)	[máx-wənə] (give-CUST.PL)
/´-ŋa/ (INL)	[nə-xúta-ŋa] (1SG-back-INL)	[pə-tamá-ʔaw] (3SG-mouth-LOC)
/´-ʔaw/ (LOC)	[háxa-ʔaw] (sand-LOC)	[nə-má-ŋa] (1SG-hand-INL)

This distribution is also predicted by the constraint ranking already established. The tableau in (89) shows that, when a word contains an initial unaccented root and no other accented morphemes, the unaccented root (/max/) receives default leftmost stress:

(89)	/√max - wənə/	CULM	MAX-PROM	DEP-PROM	PK-L
a.	max-wənə	*!			
b.	máx-wənə			*	
c.	max-wénə			*	*!

Similarly, a preaccenting suffix may induce stress on an unaccented root, as in (90), but when the root is accented, it is stressed by virtue of being the leftmost accented morpheme, as in (91):

(90)	/pə - √tama - ´ʔaw/	CULM	MAX-PROM	PK-L
a.	pə-tamá-ʔaw			**
b.	pé-tama-ʔaw		*!	
c.	pə-tama-ʔaw	*!	*	

(91)	/nə - xúta - ´ŋa/	CULM	MAX-PROM	PK-L
a.	nə-xútá-ŋa	*!		***
b.	nə-xúta-ŋa		*	*
c.	nə-xutá-ŋa		*	**!
d.	nó-xuta-ŋa		**!	

At this point, all of the stress patterns laid out in §2.2.1 — the core of the Cupeño stress system — are represented in the tableaux presented above. In each case, the BAP analysis was



shown to account for the observed data — in particular, the recurring contrast between accented and unaccented roots. However, all of this data is also consistent with the RCA analysis. Like BAP, the RCA analysis posits left edge default stress to account for (89);<sup>32</sup> meanwhile, root stress in (83), (86), and (91) — the cases in which multiple lexical accents are present in the input — can equally be explained by privileged faithfulness to the accentual properties of roots.

These cases are indicative of a broader problem that arises in comparing the BAP and RCA analyses, viz., that their testable predictions are very similar. Because Cupeño has relatively few prefixes, the descriptive generalization that accented roots strongly tend to be stressed can be attributed either to the fact that they are roots or to the fact that they are typically the word's leftmost constituent morpheme. §§2.3–2.4 therefore examine word stress in two prefixing contexts, where these two properties are independent, and as a consequence, the BAP and RCA analyses diverge. Based on the prefixing data, I argue in §2.5 that the tendency for roots to be stressed is epiphenomenal, the result of their prosodically preferred linear position at left word edge.

### 2.3 Agreement prefixes & the Basic Accentuation Principle

It was proposed in §2.2.4 that the agreement prefixes in (79) — 1SG /nə-/ , 3SG /pə-/ , etc. — are lexically unaccented morphemes. Under the BAP analysis, these prefixes are assigned default leftmost stress when added to unaccented roots, but are unstressed when added to accented roots, because the lexical accent of the root attracts stress. In contrast, Alderete (2001c) analyzes these prefixes as accented morphemes (i.e. “/nḁ-/”, “/pḁ-/”, etc.). This analysis has significant implications for assessing the principles of stress assignment operative in examples like [nə-túl] ‘I finished’ in (80) and [pə-tamá-ʔaw] ‘in his mouth’ in (90). The former would require that the accent of the root dominates the accent of the prefix to its left, while the latter would show that, when multiple lexical accents are present, it is the rightmost that “wins” (i.e. receives stress on the accented syllable).

Both of these patterns can be captured under the RCA analysis,<sup>33</sup> but neither is compatible with the BAP analysis, which would predict that accentual resolution proceeds in exactly the opposite way, yielding unattested <sup>x</sup>[nḁ-túl] and <sup>x</sup>[pḁ-tama-ʔaw]. In the remainder of this section, however, I demonstrate that neither of these patterns withstands scrutiny: §2.3.1 shows that there is no positive evidence that the agreement prefixes are accented, while §2.3.2 presents direct counter-evidence to the alleged “rightmost wins” pattern, and in turn, argues that the agreement prefixes are unaccented.

<sup>32</sup>On the (more complicated) implementation of default stress under the RCA analysis, see n. 33 below.

<sup>33</sup>To reconcile the phonological preference for leftmost stress that is independently necessary under the RCA analysis with this “rightmost accented affix wins” pattern, Alderete (2001c) assumes that Cupeño has a default-to-opposite stress system (cf. Crowhurst 1994), with conflicting directionality at different levels of metrical structure: stress peaks (heads of  $\omega$ ) are preferentially right-aligned, but stress prominences (heads of  $\Sigma$ ) left-aligned (see Baković 1998, *i.a.*). Under this analysis, words with leftmost default stress have only a stress prominence (i.e. no stress peak), although this analytic distinction has no impact on the phonetic realization of stress in Cupeño.

### 2.3.1 Agreement prefixes are not accented

According to the RCA analysis, evidence for the accentedness of the subject/possessor agreement prefixes comes from words containing what Alderete (2001c) refers to as “object markers,” a set of morphemes that function to mark the direct or indirect object of a transitive verb and linearly precede both these agreement prefixes and the verbal root. These morphemes are given in (92):

	SG	PL
1	[ni]	[tʃimi]
2	[ʔi]	[ʔimi]
3	[pi]	[mi]

These morphemes are never stressed, including when attached to a prefixed unaccented root as in (93a–c), to a bare unaccented root as in (93d), or to an unaccented root with unaccented suffixes as in (93e–f):<sup>34</sup>

OBJ + AGR + √UNACCENTED		OBJ + √UNACCENTED	
a.	[mi=nó-təw] (3PL.O=1SG-see)	d.	[ni=yáx] (1SG.O-say)
b.	[mi=tʃóm-təw] (3PL.O=1PL-see)	e.	[mi=tó-wə] (3PL.O-see -PRS.STV)
c.	[ʔi=póʔ-max] (2SG.O=3PL-give)	f.	[mi=máx-wənə] (3PL.O=give -CUST.PL)

Alderete (2001c) argues that examples like (93a–c) show that the agreement prefixes are accented, since they appear to attract stress in preference to the object markers, which would otherwise receive default leftmost stress. This analysis assumes, however, that the object markers are stressable affixes, a hypothesis that is problematized by examples like (93d–f), where they attach instead to an unprefixed unaccented root. In such cases, analyzing the object markers as affixes wrongly predicts that they will be assigned default leftmost stress, which instead falls on the unaccented root.

The stress pattern in (93d–f) thus strongly supports the idea that the object markers are instead clitics — (e.g.) “free clitics” (in the sense of Selkirk 1996), which stand outside the word-level stress domain — as argued by Hill (2005: 111–4) and by Newell (2008: 94–5) on morphosyntactic grounds. A direct consequence of this analysis is that examples like (93a–c) provide no positive evidence that the agreement prefixes are accented: stress will fall on the

<sup>34</sup>Translations for (93): (a) ‘I saw them’; (b) ‘we saw them’; (c) ‘they gave to you’ (d) ‘tell me’; (e) ‘I saw them’; (f) ‘(they) gave to them’.

prefix whether it is accented (per Alderete 2001c) or unaccented, as proposed in section 2.2.4 above. The tableau in (94) shows that the BAP analysis correctly generates the attested stress patterns in (93a–f) under the assumption that the agreement prefixes are unaccented:

(94)

	/mi = nə - √təw/	CULM	MAX-PROM	DEP-PROM	PK-L
a.	mi=nə-təw	*!			
b.	mí=nə-təw	*!		*	*
c.	mi=nə́-təw			*	
d.	mi=nə-tə́w			*	*!

This assumption is defended explicitly in §2.3.2 below, where evidence is adduced against the “rightmost accent wins” pattern claimed by Alderete (2001c); this finding in turn will necessitate that the agreement prefixes be analyzed as unaccented.

### 2.3.2 Against affixal “rightmost wins”

The elimination of all positive evidence for the accentedness of the subject/possessor agreement prefixes also effectively eliminates most of the support for Alderete’s (2001c) claim that, when a word contains multiple accented affixes, stress falls on the rightmost. The principal evidence for this claim comes from unaccented roots (e.g. /√yax/, /√tama/) that are both prefixed with one of the agreement markers discussed in §2.3.1 and also suffixed with an accented or preaccenting suffix (e.g. /-qál/, /-ʔaw/) — thus, for instance, [pə-ya-qál] ‘he was saying’ and [pə-tamá-ʔaw] ‘in his mouth’ (cf. (90) above), where stress is assigned to the lexically accented syllable associated with each suffix in preference to the prefixes to their left. Yet such cases reflect “rightmost wins” only if the agreement prefixes are accented, a hypothesis for which there is no independent support (cf. §2.3.1 above). If these prefixes are instead unaccented, examples like [pə-ya-qál] and [pə-tamá-ʔaw] simply show stress predictably falling on a word’s single accented morpheme.

#### 2.3.2.1 DS markers do not show “rightmost wins”

One other alleged case of “rightmost wins” merits further discussion. Alderete (2001c) argues that the accented suffix /-qál/ (DS.SG) — which is assigned stress when added to unaccented roots, e.g. [ʔə-ya-qálʔ] ‘(what) you said’ in (71b) above — is composed of /-qál/ (PST.IPFV.SG) + an accented “durative subordinator” suffix “/‑í/” (cf. Hill and Hill 1968: 236). If this analysis were correct, it would show “rightmost wins” in affixal accent resolution.

However, this morphological segmentation cannot be correct, at least synchronically. The problem becomes obvious when the suffix /-qál/ is situated in its morphological context. Like many other native languages of California, Cupeño has a switch reference system (cf. Hill 2005: 405–6); in adverbial subordinate clauses, verbs are marked to indicate whether their subject is the same as (SS) or different than (DS) that of the main clause. There are two different-subject markers in Cupeño, /-qál/ for singular subjects and /-wəni/ for plural subjects, the accentual



properties of which were discussed in §2.2. Segmentally, these different-subject markers closely resemble the past imperfective suffixes /-qál/ and /-wən/, which are used for singular and plural agreement respectively. The grammatical functions of these suffixes are schematized in (95):

(95)

	SG	PL
PST.IPFV	/-qál/	/-wən/
DS	/-qalí/	/-wəni/

From (95), it is clear that /-wəni/ stands in the same morphological relationship with /-wən/ as /-qalí/ does with /-qál/. Therefore if /-qalí/ is derived from /-qal/ by addition of an accented suffix “/‑í/”, so must /-wəni/ be derived from /-wən/ by addition of the same suffix. Yet since /-wən/ is an unaccented suffix (cf. (74) above), the outcome of this derivation could only be unattested <sup>x</sup>[-wəní] (under the RCA or the BAP analysis), as shown by the failed derivation in (96):


(96)

/-wən-í/	MAX-PROM
a.  -wən-íʔ	
b.  -wən-i	*!

The fact that that /-wəni/ and /-qalí/ cannot be derived in parallel phonologically fatally undermines the analysis of these items as containing a suffix “/‑í-/' and, in turn, the hypothesis that /-qalí/ constitutes evidence for “rightmost wins.” With respect to these suffixes, I instead follow Hill (2005), who suggests a historical relationship between the different-subject markers and the past imperfective suffixes,<sup>35</sup> but treats the former synchronically as separate non-derived morphemes, i.e. /-wəni/, /-qalí/.

Analyzed in this way, the BAP analysis correctly generates the attested word stress patterns for both suffixes when they combine with accented roots, as in (97), and with unaccented roots, as in (98):<sup>36</sup>

(97) a.

/pəm - kúp - wəni/	CULM	MAX-PROM	PK-L
a.  pəm-kúp-wəni			*
b. pəm-kup-wəni		*!	

<sup>35</sup>Hill (2005: 406): “-qali and -wəni are clearly related to the past imperfective suffixes -qal and -wən. It is possible that they are back formations from realis modalized complements and relative clauses formed on past imperfectives with the *i*-ablauting suffix -*ve*.”

<sup>36</sup>The example in (98a) shows regular degemination of identical consonants (/w-w/ → [w]) at morpheme boundaries (see Hill 2005: 47–8), which clearly points to a highly-ranked OBLIGATORY CONTOUR PRINCIPLE (OCP; McCarthy 1986; Yip 1988, *i.a*); for other effects of the OCP in Cupeño reduplication, see Yates (2017).

b.

	/pə - túl - qalí/	CULM	MAX-PROM	PK-L
a.	pə-túl-qalíʔ	*!		****
b.	☞ pə-túl-qali		*	*
c.	pə-tul-qalíʔ		*	**!*
d.	pó-tul-qali		**!	

(98) a.

	/pəm - təw - wəni/	CULM	MAX-PROM	DEP-PROM	PK-L
a.	pəm-tə-wəni	*!			
b.	pəm-tə-wəni			*	*!
c.	☞ pəm-tə-wəni			*	

b.

	/ʔə - yax - qalí/	CULM	MAX-PROM	PK-L
a.	☞ ʔə-ya-qalíʔ			***
b.	ʔə-ya-qali		*!	

The little remaining evidence alleged to support “rightmost wins” in affixal accentual resolution is rendered non-probative under the analysis in (97–98). As in the case of the prefixal agreement markers, all examples held to show “rightmost wins” in fact involve a single accented suffix, which attracts stress when it is the only accented morpheme in the word, but yields stress to an accented root to its left, as expected under the BAP constraint ranking.

The implications of this finding are significant, because the BAP analysis predicts the opposite pattern of affixal accent resolution, i.e. “leftmost wins.” While words containing multiple accented and/or preaccenting suffixes are relatively rare, there are nevertheless at least three cases that potentially satisfy this morphological condition. §§2.3.2.2–2.3.2.4 examine these three cases in more detail, and shows that each appears to bear out the “leftmost wins” pattern predicted by the BAP.

### 2.3.2.2 Leftmost preaccenting suffix wins


There are at least a few attested examples in Cupeño of words that contain two preaccenting suffixes and thus have multiple lexical accents associated with affixes in the input. The co-occurring suffixes are /´-ŋa/ (INL) and /´-ʔaw/ (LOC) (cf. (72) above).<sup>37</sup> When these suffixes combine with an accented root (e.g. /√sówə-t/ ‘rattlesnake’), the root retains stress: [sówə-t-ŋa-ʔaw] ‘on the rattlesnake’ (rattlesnake-ABSL-INL-LOC).<sup>38</sup> Yet when they combine with an

<sup>37</sup>The combination is discussed by Hill (2005: 27, 189–91) as a preaccenting locative suffix /´-ŋaʔaw/, but given that all other preaccenting suffixes are monosyllabic, it seems formally attractive (and semantically unproblematic) to analyze it as a composite of /´-ŋa/ and /´-ʔaw/.

<sup>38</sup>The presence of the “absolute” suffix in [sówə-t-ŋa-ʔaw] ‘on the rattlesnake’ (← /√sówə-t/) ‘rattlesnake’ distinguishes it from the formation of (e.g.) [háxa-ʔaw] ‘on the sand’ in (73a) above, where the locative suffix attaches

unaccented root (e.g. /təwi/ ‘chest’), it is the lexical accent sponsored by the leftmost of the two preaccenting suffixes that attracts stress: [nə-təwí-ŋa-ʔaw] ‘on my chest’ (1SG-chest-INL-LOC). This leftmost wins pattern of affixal accent resolution is predicted by the BAP analysis, as evident in the tableau in (99):


(99)

/nə - √təwi - ʔŋa - ʔaw/	CULM	MAX-PROM	PK-L
a.  nə-təwí-ŋa-ʔaw		*	**
b. nə-təwi-ŋá-ʔaw		*	***!
c. nó-təwi-ŋa-ʔaw		**!	

### 2.3.2.3 Leftmost wins & the AAN-suffix

Another possible case of affixal accent resolution involves the AAN-suffix, which was discussed in §2.2.2 above. This suffix has two allomorphs, [-an] and [-á:n-], the former usually occurring with accented roots and the latter with unaccented roots. This distribution is imperfect and some roots even appear to show variable stress in combination with this suffix (cf. n. 25); however, the basic distribution of these allomorphs falls out straightforwardly from the BAP provided that this suffix is analyzed as accented /-á:n-/. The tableau in (100) shows that the BAP analysis correctly generates root stress when the verbal root is accented (cf. (78a) above):

(100)


/nə - míx - á:n - βə/	CULM	MAX-PROM	PK-L
a. nə-míx-á:n-βə	*!		***
b.  nə-míx-an-βə		*	*
c. nə-mix-á:n-βə		*	**!
d. nó-mix-an-βə		**!	

More relevant, however, is how stress assignment proceeds when /-á:n-/ is suffixed to unaccented roots — in particular, those cases where this suffix co-occurs with other accented suffixes like /-qál/, e.g. [taβ-á:n-pə-qal] in (77a). In this example, two accented suffixes compete for primary stress, and it is the leftmost (/ -á:n-/) — not the rightmost (/ -qál/) — that receives primary stress; this competition is represented in the tableau in (101), where the BAP constraint ranking properly selects candidate (b), the attested form:

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directly to the root (← /háxa-l/ ‘sand’). For a discussion of the complex factors that determine which nouns show which pattern(s), see Hill (2005: 188–92).

(101)


/taβ - á:n - pə - qál/	CULM	MAX-PROM	PK-L
a. taβ-á:n-pə-qál	*!		****
b.  taβ-á:n-pə-qal		*	*
c. taβ-an-pə-qál		*	**!*
d. táβ-an-pə-qal		**!	

### 2.3.2.4 Leftmost wins & the “nominalizer” suffix

A potential final case of leftmost wins in affixal accent resolution involves words containing what Alderete (2001c: 481–3) — following Hill and Hill (1968: 237) — refers to as the “nominalizer suffix” (discussed by Hill 2005: 42–6 under the label “*i*-ablaut”; see below). This element surfaces as stressed [-í:] when it occurs in between an unaccented root and an accented or preaccenting suffix; thus (e.g.) in [pəwəniβəŋa] ‘in which it lay’ — under this analysis, [pə-wən-í-βə-ŋa] (3SG-lie-NML-SUB.RL-INL) — this stressed element follows the unaccented root /wən/ and precedes the preaccenting suffix /´-ŋá/. Acknowledging that such examples violate the putative rightmost wins pattern, Alderete handles the “special” phonology of the “nominalizer” by positing a morpheme-specific constraint STRESS-TO-í that requires stress to fall on this element; by ranking this constraint below root faithfulness but above the constraints that prefer to stress the rightmost accented affix, the RCA analysis correctly assigns stress to the “nominalizer” rather than the lexical accent to its right, i.e. [pəwəniβəŋa] (not <sup>x</sup>[pəwəniβəŋa]).

Such additional stipulation is unnecessary under the BAP analysis. If the “nominalizer” is an accented suffix /-í/, the fact that it receives stress in this example is just another case of leftmost wins in affixal accent resolution. The tableau in (102) illustrates this scenario:

(102)

/pə - wən - í - βə - ´ŋa/	CULM	MAX-PROM	PK-L
a. pə-wən-í-βə-ŋa	*!		*****
b.  pə-wən-í-βə-ŋa		*	**
c. pə-wən-i-βə-ŋa		*	**!*
d. pə-wən-i-βə-ŋa		**!	

It should be noted, however, that the morphophonology of the “nominalizer” is more complicated than the account sketched above would suggest. A closer examination of this element in fact reveals a more idiosyncratic distribution than would be expected if it really were a nominalizing suffix or even a suffix at all. Hill (2005: 26, 42–6) provides an extensive treatment of this element, referring to it by the label “*i*-ablaut” and arguing explicitly against a suffixal analysis. Hill shows that *i*-ablaut is a morphophonological process; the *i*-vowel is not associated with any particular grammatical function, but is rather regularly inserted into certain morphologically defined contexts, appearing only when two conditions are met: (i) the word contains any one of a set of *i*-ablauting suffixes, which include the “immediate future” suffix /-qat/, the realis subordinator /-βe/, and the desiderative suffix /-vitʃu/; and (ii) this suffix attaches to an

unaccented root or to one of several suffixes that have grammaticalized from roots, e.g. the theme-class suffix /-yax-/, the past imperfective suffixes /-qál/ and /-wən/, or the “motion”-suffix /-neq/ (cf. Jacobs 1975; Heath 1998).<sup>39</sup> When both conditions are satisfied, the *i*-ablaut vowel emerges at the juncture of these two morphemes, and if the former is an unaccented root, this vowel receives stress (i.e. [-í]).

It is beyond the scope of the current study to develop a complete analysis of *i*-ablaut. One possibility is that the affixes of type (i) have lexically listed allomorphs that occur only in the context of morphemes of type (ii) — e.g., /-βə/ (SUB.RL) or /-vit̪u/ (DSD) would have allomorphs /-íβə/ /-ívit̪u/ that are used only when suffixed to morphemes like /max/ ‘give’ or /təw/ ‘see’. Under this assumption, the tableau in (102) above would look essentially the same, with differences only in morphological segmentation. For the sake of clarity, however, (103) provides another example in which the *i*-ful contextual allomorph of an *i*-ablauting suffix serves as the input to the derivation; the output form is [təw-ívit̪u-qa] ‘(I) want to see’ (see-DSD-PRS.SG):

(103)

	/təw - ívit̪u - qá/	CULM	MAX-PROM	PK-L
a.	təw-ívit̪u-qá	*!		*****
b.	☞ təw-ívit̪u-qa		*	*
c.	təw-ívit̪u-qá		*	**!***
d.	təw-ívit̪u-qa		**!	

If a morphological analysis along the lines suggested above is correct, (103) would be another case of the leftmost wins pattern that is expected under the BAP constraint ranking (but not under RCA).<sup>40</sup>

Yet even if too many uncertainties surround *i*-ablaut, there is also the evidence considered in §2.3.2.2 and §2.3.2.3 above; if (either of) the analyses proposed there are correct, then Cu-

<sup>39</sup> Alderete (2001c: 481) cites several examples in which the “nominalizer suffix” allegedly appears with accented roots. For instance, [wíwɪf] ‘acorn mush’ — derived from the root /wíw/ ‘make/prepare acorn mush’ — would contain the “nominalizer” between the root and the absolutive suffix /-t̪f/, but stress would remain on the root due to privileged accentual root faithfulness. In all such cases, however, the unstressed [-i-] element is more likely to be an ordinary epenthetic vowel. Word-final /CC#/ clusters are regularly subject to epenthesis in Cupeño due to its categorical ban on complex codas (cf. Hill 2005: 20–2), and the absolutive suffixes — all of which consist of a single consonant (/l/, /-ɬ/, /-t/, /-t̪f/) — produce such clusters whenever they are suffixed to consonant-final roots in word-final position. The epenthetic nature of the [-i-] in [wíwɪf] is in fact confirmed by its possessed state and illative forms [nə-wíw] ‘my acorn mush’ (1SG-acorn.mush) and [wíw-ɬa] ‘in the acorn mush’ (acorn.mush-INL), where the phonotactic conditions for epenthesis are not met and thus the vowel is absent. Note that phonologically comparable words like [nə-xút̪ɪ] ‘my foot’ (1SG-foot) and [nə-ɬáʔi] ‘my belly’ (1SG-belly) argue against analyzing the absence of [-i#] in such examples as the result of deletion of an underlying root-final vowel (i.e. <sup>x</sup>/wíwi/), even though such a vowel was almost certainly present historically (cf. Munro 1990: 237).

<sup>40</sup>Note, however, that derivations like (102–103) could be reconciled with the RCA analysis if it were assumed that it was instead the roots that had two context-specific allomorphs, e.g. /max/ ~ /maxí/, /təw/ ~ /təwí/. Hill (2005) in fact appears to segment examples of *i*-ablaut in this way.



peño shows leftmost wins — not rightmost wins — when a word contains multiple accented affixes. A further implication of this finding is that the agreement prefixes must be unaccented (as claimed in §2.2.4). For instance, [pə-ya-qál] ‘he was saying’ cannot contain an accented prefix, since such a prefix would be stressed in preference to an accented suffix to its right in accordance with the established leftmost wins pattern (yielding <sup>x</sup>[pə́-ya-qal]). Similarly, the expected form for (99) would be <sup>x</sup>[nə́-təwi-ŋa-ʔaw] rather than attested [nə-təwí-ŋa-ʔaw] ‘on my chest’.

### 2.3.3 Local summary: Agreement prefixes and their implications

It was argued in 2.3.1 that the subject/possessor agreement prefixes need not be analyzed as accented, and in 2.3.2, that these prefixes are in fact unaccented. This result undercuts the primary evidence held to support RCA (against BAP), which comes from prefixed forms like [nə-túl] in (80) that putatively show root accent winning over the accented prefix to its left. Such examples are better understood as cases in which stress is assigned to the word’s single accented morpheme (/nə - √túl/) and therefore consistent with the BAP analysis, just like the rest of the data examined in sections 2.1–2.2 above.

Nevertheless, none of this data directly contradicts the central claim of the RCA analysis, viz., that the accentual properties of roots are privileged over those of affixes. I challenge this claim in section 2.4 below, arguing that Cupeño partial reduplication provides evidence that an accented affix attracts stress in preference to an accented root to its right. This pattern is predicted by the BAP analysis, but runs counter to the RCA analysis.

## 2.4 Reduplication & the Basic Accentuation Principle

Cupeño has several different reduplicative processes described by Hill (2005). This section focuses on the type that is traditionally analyzed as CV-prefixing reduplication, which has grammatical functions that include aspectual modification in verbs and pluralization in adjectives and nouns. The prefixed CV reduplicant is consistently stressed and induces syncope of the first syllable of the root whenever the result would be phonotactically licit;<sup>41</sup> thus syncope does not (e.g.) create complex syllable margins, which are unattested in the native lexicon and repaired by epenthesis in other affixal contexts (cf. Hill 2005: 20, 29–30). Examples of reduplication with and without syncope are given in (104) and (105) respectively:

- (104) a. mǐxəl ‘custom’ : mímxəl ‘customs’  
 b. ʔawəlβə ‘grown-up.SG’ : ʔáʔwəlβə ‘grown-up.PL’
- (105) a. hélʔif ‘wide.SG’ : héhəlʔif ‘wide.PL’  
 b. túlnikif ‘black.SG’ : tútulnikif ‘black.PL’


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<sup>41</sup>Alternatively, Cupeño partial reduplication can be analyzed as an infixing operation, and the reduplicative morpheme as preaccenting; see Haynes (2007) and Yates (2017).

The fact that the reduplicant consistently bears stress falsifies the otherwise sound descriptive generalization that in Cupeño lexically accented roots are always stressed on their accented syllable.<sup>42</sup> This generalization underpins the RCA analysis, which encounters problems, in particular, with examples like (104b) and (105), where an accented root syllable has a correspondent in the output but is nevertheless unstressed.<sup>43</sup> To account for these apparently exceptional stress patterns, the RCA analysis would be forced to introduce additional machinery — (e.g.) a constraint STRESS-TO-RED — and thereby run the risk of stipulation (cf. §2.3.2.1 above).

A more economical approach is to assume that the reduplicative morpheme itself is lexically accented, i.e. /RÉD/. This feature can be seen most clearly in reduplicated forms of unaccented roots, e.g. [pə-yá-yax] ‘(he) repeatedly said’ (3SG-RED-say) (← /√yax/ ‘say’). Such forms exhibit non-default stress, thereby implying that partial reduplication introduces a lexical accent into the input. More specifically, such forms are stressed on the reduplicant, whose stress-attracting behavior is thus exactly parallel to that of other accented morphemes. This analysis of [pə-yá-yax] is schematized in the tableau (106):


(106)

/pə - RÉD - √yax/	CULM	MAX-PROM	PK-L
a.  pə-yá-yax			*
b. pə́-yax		*!	

(106) shows that the BAP analysis correctly generates stress in reduplicated forms of unaccented roots; note that candidate (b) would be preferred under either RCA or BAP if the input contained no lexically accented morpheme.

Still more significantly, the pattern of consistent reduplicant stress observed in (104b) and (105) falls out straightforwardly under the BAP analysis: the accented reduplicative morpheme is stressed because it is closer to the left edge of the word than the accented root, and so better satisfies PK-L. An illustrative tableau for [ʔáʔwəlβə] ‘grown-up.PL’ in (104b) is given in (107):

(107)

/RÉD - √ʔawəlβə/	CULM	MAX-PROM	PK-L
a. ʔáʔwəlβə	*!		*
b.  ʔáʔwəlβə		*	
c. ʔaʔwəlβə		*	*!

In contrast, the stress pattern in (107) cannot be generated under the (unmodified) RCA analysis, which incorrectly predicts that candidate (c) — with stress surfacing faithfully on the lexical accent of the root — would be the winner.

<sup>42</sup>Cupeño reduplication is not discussed by Alderete (2001c).

<sup>43</sup>Under an infixing analysis of reduplication (Yates 2017; cf. n. 41 above), only examples like (104b) with second syllable root accent are problematic for the RCA analysis, since (105) would then show stress realized faithfully on the (first syllable) root accent. The (descriptive) stress shift observed between base and reduplicated form in (104b) is also problematic for Haynes’ (2007) infixing analysis, which assumes that infixation of the reduplicant after the lexically accented root syllable is motivated by avoidance of precisely this kind of stress shift.

Partial reduplication therefore constitutes a clear case in which the BAP and RCA analyses make different empirical predictions. Since few such cases exist in Cupeño, it is non-trivial that only the BAP analysis explains the distribution of word stress in reduplicated forms.

## **2.5 Conclusions & discussion**

The preceding sections have demonstrated that the distribution of word stress in Cupeño can be derived from the interaction of the lexically specified accentual properties of morphemes (accented, unaccented, preaccenting) and the purely phonological preference that stress should coincide with the left edge of the word. This preference is optimally satisfied in the absence of accented/preaccenting morphemes, which attract stress away from the word's left edge due to high-ranking constraints requiring faithfulness to underlying prominence. If several such morphemes are present in the input, stress is assigned to the leftmost because it best satisfies this phonological preference while (i) incurring minimal faithfulness violations and (ii) fulfilling the necessary condition that every word has one (and only one) stressed syllable. These properties are implemented in an optimality-theoretic framework under the BAP analysis, which then correctly predicts word stress in the data examined.

### **2.5.1 BAP vs. RCA in Cupeño**

Compared to Alderete's (2001c) RCA analysis of Cupeño stress, the BAP analysis advanced here attains greater empirical coverage, not only handling the core data considered in §2.2.1, but also accounting for word stress in the reduplicated forms discussed in §2.4. In dealing with this data, the BAP analysis is also more economical than the RCA analysis: both posit a phonological preference for left edge stress (realized in default word-initial stress), but the RCA analysis requires the further supposition that faithfulness relations to the accentual properties of roots are privileged with respect to affixes, an assumption for which there is no positive evidence in Cupeño (cf. §2.3.3 above).

### **2.5.2 Cupeño stress in typological perspective**

Under the BAP analysis, the word-prosodic system of Cupeño is typologically unexceptional among languages with LA systems. The left edge-oriented, default-to-same stress pattern found in Cupeño is equivalent to the BAP, for which Kiparsky and Halle (1977) have adduced evidence in a number of Indo-European languages, both ancient (Vedic Sanskrit, Ancient Greek) and modern (Russian, Modern Greek) (cf. Kiparsky 1982d, 2010). Chapter 4 adds further support for the BAP, demonstrating that it is also operative in Hittite.

Cupeño differs from these IE languages (and others, like Japanese), however, in lacking morphemes that can “override” the accentual properties of the stem to which they attach, a property that Kiparsky and Halle (1977) refer to as “dominance” (cf. §1.1.3.3, §4.4). Among languages with LA, then, Cupeño's word-prosodic system is relatively simple, having only the canonical features of systems of this type: (i) stress-attracting morphemes (i.e. accented, preaccenting); and (ii) purely phonological principles that determine which of several accented

morpheme will bear stress, or in their absence, assign default stress to a prosodically optimal position.<sup>44</sup> The Cupeño system is therefore broadly comparable to LA systems like Pashto or Spanish in having only properties (i) and (ii) (i.e. no “dominance” effects),<sup>45</sup> although the extent to which word stress is determined by the idiosyncratic lexical properties of morphemes (especially roots) is greater in Cupeño than in either of these languages.

### 2.5.3 Toward a restrictive typology of lexical accent

It was pointed out in §2.2.4 that the predictions of the BAP and RCA analyses generally converge because in Cupeño the left edge of the root frequently coincides with the left edge of the word, a context in which the strong tendency for accented roots to attract stress can be plausibly attributed to privileged root faithfulness or to their linear position at the word’s left edge. The same is true for Tokyo Japanese and for Russian, the two principal case studies besides Cupeño treated by Alderete (1999b, 2001b) in his cross-linguistic study of LA systems. Alderete proposes extending the RCA analysis to word stress in these languages, but acknowledges that both can equally be analyzed in terms of a phonological preference for edge-oriented stress.<sup>46</sup> Cupeño therefore constitutes Alderete’s strongest case for RCA in LA systems, since under his analysis, only it requires privileged faithfulness to the accentual properties of roots over affixes.

The principal argument advanced in this chapter is that there is no need to assume privileged root faithfulness to account for the distribution of word stress in Cupeño. These facts are better explained by the BAP analysis, which makes no reference to the morphological distinction between roots and affixes, instead appealing only to the type of phonological principles that are cross-linguistically well-established features both of LA systems and of fixed stress systems.

Reanalysis of Cupeño stress in these terms potentially has significant implications for the typology of LA systems. Without positive evidence from Cupeño, it is not clear that there are any languages in which root faithfulness affects stress assignment. At present, it remains uncertain why this typological gap should exist; without empirical support, however, there is reason to suspect that root faithfulness — regardless of its status in other phonological domains — nevertheless plays no role in the computation of word stress.

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<sup>44</sup>In fact, this conclusion was anticipated by Kiparsky and Halle (1977: 235–6): “[A]ccentual systems with the properties we postulate for IE are by no means unprecedented; one such system has been described by Jane and Kenneth Hill [= (Hill and Hill 1968)]. . . [the Cupeño] stress system differs from that of Indo-European mainly in having no deaccentuation rule. However, the remarkable similarities between the Hills’ system and the one presented here clearly show that we are not dealing with an isolated and unprecedented system.”

<sup>45</sup>On Pashto stress, see Revithiadou (1999: 17–8) with references.

<sup>46</sup>Per Alderete (2001c: 494): “Russian and Japanese. . . show a preference for suffixing morphology, which allows them to be analyzed either as root-controlled accent systems, or in terms of directionality.”

## CHAPTER 3

### Foundations of Hittite Lexical Accent

This chapter establishes the theoretical foundation for the synchronic and diachronic analyses of Hittite stress. The central issue addressed here is that word stress is not directly represented in the Hittite orthography in the way that is marked in (e.g.) Vedic Sanskrit or Cupeño (cf. §1.2.4). Rather, the position of primary stress must be inferred by its secondary effects on vowel quantity and quality, which were encoded in the script. These effects are examined in the remainder of this section. I focus first on vowel length, discussing how it was marked by Hittite scribes (§3.1) and how length relates to word stress (§3.2). Other diagnostics of word stress — in particular, reduction and syncope of unstressed vowels — are then treated in §3.3.

Note that the discussion below — especially in §3.1 — is oriented primarily toward specialists, researchers who are already familiar with the basic principles of the Hittite writing system. Non-specialists with a keen interest in these issues are therefore encouraged to consult first the detailed introduction to Hittite orthography (and its phonological interpretation) presented in Hoffner and Melchert (2008: 9–50). Other non-specialists will likely find sufficient the shorter general introduction to the Hittite cuneiform script that is provided in §4.2.1, which summarizes the principal findings of this chapter with respect to how the orthography indirectly indicates word stress. More generally, it bears repeating that this chapter is focused only on establishing criteria for determining where Hittite words were stressed; readers who are interested primarily in how Hittite stress should be analyzed — i.e. why words were stressed on a particular syllable by Hittite speakers — can freely skip ahead to Chapter 4.

#### 3.1 On the relationship between plene writing & vowel length

By far the most important orthographic diagnostic of word stress is so-called PLENE WRITING, the repetition of an identical *V* sign after a *CV* sign (or word-initially before a *VC* sign) in the spelling of vowels or diphthongs (Kimball 1999: 55, *i.a*). A century ago, at the dawn of Hittite studies, it was proposed by Hrozný (1917: xii) that plene writing was used to indicate contrasts in vowel length: Hittite vowels spelled plene were phonetically longer than non-plene vowels. Hrozný's proposal is now standardly accepted (e.g. Melchert 1994: 27; Kimball 1999: 59; Kloekhorst 2008: 32); however, the exact relationship between plene writing and vowel length remains quite controversial, which is problematic, since it is in fact vowel length — accessed via plene writing — that is informative about Hittite word stress patterns. In other words, plene writing can be used to determine vowel length, and vowel length can in turn be used to determine word stress patterns. A theory of the relationship between plene writing and vowel length is thus prerequisite to any analysis of Hittite stress; accordingly, I present below an overview of the assumptions adopted in this dissertation.

It is generally agreed that there is a strong correlation in Hittite between plene writing and vowel length, but the relationship between them is complicated by the two observations in (108):

- (108) (i) LONG  $\nRightarrow$  PLENE: Not all long vowels are spelled plene.  
(ii) PLENE  $\nRightarrow$  LONG: Not all plene-spelled vowels are long.

I take up these points in turn in §3.1.1 and §3.1.2 below.

### 3.1.1 LONG $\nRightarrow$ PLENE

With respect to the orthographic representation of Hittite long vowels, an important assumption underlying the present study is (109):

- (109) OPTIONALITY OF PLENE WRITING: Long vowels are *optionally* represented with plene writing.

The position in (109) aligns with that of Melchert (1994: 27), who views optionality as an “essential” characteristic of plene writing. Under this view, individual attestations of a word with plene spelling generally indicate that the relevant vowel is long,<sup>1</sup> but non-plene spellings do not necessarily indicate that it is short (cf. Kimball 1999: 56). The latter is particularly true for words attested mostly or exclusively in younger texts, since plene writing is most frequent in OH/OS texts, less so in MH and NH texts and post-OH copies of OH texts;<sup>2</sup> its lower frequency in later texts reflects simply a decrease in the use of an orthographic practice that was, already at the earliest stage, optional.

As a practical illustration of the implications of (109), consider the data in (110). Here, the orthographic contrast between plene and non-plene writing is illustrated with three examples, each of which is presented at three levels of representation: in transliteration (<...>); in so-called “broad transcription,” where vowels spelled plene are indicated by a macron (ˉ); and in an approximate phonetic transcription:

(110)	PLENE	vs.	NON-PLENE	SR
	<ša-a-ak-ki>    šākki		<ša-ak-ki>    šakki	[sá:k:i] ‘knows’ (3SG.NPST.ACT)
	<i-da-a-lu>    idālu		<i-da-lu>    idalu	[itá:lu] ‘evil’ (ADJ.N.NOM/ACC.SG)
	<še-e-eš-zi>    šēšzi		<še-eš-zi>    šēšzi	[sé:stsi] ‘sleeps’ (3SG.NPST.ACT)

The situation depicted in (110) is extremely common in Hittite: virtually all well-attested words with long vowels are found both with and without plene writing. In accordance with (109), I

<sup>1</sup>See §3.1.2 below for discussion of two special cases in which plene writing signals a feature other than vowel length

<sup>2</sup>This distributional feature of plene writing has long been established; see Kimball (1999: 55–6) with references to earlier scholarship.

assume that such orthographic inconsistency has no bearing on the actual length of the vowel in question, which is more faithfully represented in its plene-spelled forms. The frequency with which a given word is spelled plene or non-plene is thus phonologically uninformative, except insofar as (i) multiple attestations with plene spelling effectively exclude the possibility of scribal error, confirming beyond a doubt that the vowel is long; or (ii) plene writing is systematically absent across a large sample of (especially older) attestations, in which case the vowel is likely short.

Yet while (109) expresses the majority view of the relationship between plene writing and vowel length, it should be noted that this position has been seriously challenged by Kloekhorst (2014a). Under his view, plene writing is not optional; rather, long vowels are “in principle” consistently spelled plene. Non-plene spellings of phonetically long vowels in any attestation are due to extra-linguistic factors, such as considerations of tablet space (cf. Rosenkranz 1964: 168), or else more simply to errors or omissions on the part of the scribe. Non-plene spellings of the latter type are thus regarded as equivalent to other misspellings, including aberrant plene spellings of phonetically short vowels, which are generally agreed to constitute a “residue” that lies beyond the domain of phonological explanation.<sup>3</sup>

For Kloekhorst (2014a), then, variable plene spelling of the type observed in (110) requires another explanation. Kloekhorst deals with such data in essentially two different ways, depending on whether the orthographic variation is synchronically or diachronically distributed. He argues that word forms that show synchronic variation — i.e. between manuscripts belonging to the same historical period — contain a vowel that is “half-long” (i.e. [V̄]), and that inconsistent plene writing is the orthographic means to indicate this intermediate degree of vowel length. In contrast, then, to the views of Melchert (1994), Kimball (1999), and others, the relative incidence of plene writing in individual word forms *is* significant, since it distinguishes crucially between long and half-long vowels.<sup>4</sup>

Kloekhorst (2014a) takes a different approach toward words in which variable plene writing is diachronically distributed. Specifically, Kloekhorst points to cases in which a word shows “(almost) consistent” plene writing in the oldest manuscripts, but in younger manuscripts, non-plene spellings are attested beside plene spellings, or else only non-plene spellings are found. Kloekhorst sees in such words a series of historical vowel shortenings; these shortenings affect (half-)long vowels in different environments at different times, but by NH, all OH (half-)long vowels in non-final syllables underwent some degree of shortening. By his account, then, the lower relative incidence of plene writing in post-OH manuscripts is because there were fewer surface (half-)long vowels than in OH — a phonological change rather than the orthographic change assumed in earlier scholarship (and maintained here).

Broadly speaking, Kloekhorst (2014a) argues for a much closer connection between plene writing and vowel length than assumed under the traditional view, which accounts for the data at the expense of a highly imperfect correlation between the two in individual word attestations

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<sup>3</sup>For instance, *paḥhur* [páχ:<sup>w</sup>or] ‘fire’ (N.NOM/ACC.SG) is twice spelled <pa-a-aḥ-hur (KBo 17.10 iii 2; MH/MS); yet since plene writing is otherwise unattested (23x non-plene) and is not predicted under any analysis of Hittite vowel length, this (effectively) single attestation is more plausibly viewed as a scribal error.

<sup>4</sup>According to Kloekhorst (2014a: 181 *et passim*), synchronic long vowels show “(almost) consistent plene spelling”, while half-long vowels shows “plene spelling in ca. 30–50% of the cases”.

(i.e. across tokens). Kloekhorst’s alternative theory, if correct, would be a welcome result for phonological analysis, since it would mean that the length of any vowel at a given historical stage could be determined by examination of just a few examples of the relevant word form(s). However, subsequent scholarship has identified serious issues with Kloekhorst’s theory; see especially Kimball (2015) and Yates (2016a) for critical assessments of the empirical foundations for his claims, and Melchert (to appear d) on its methodological problems. The general take-away from these critiques is that maintaining the hypothesis that the frequency of plene writing is phonologically meaningful, either synchronically or diachronically, requires untenable assumptions about Hittite orthography, phonology, and the relationship between them.<sup>5</sup> In this study, I therefore uphold the traditional view that plene writing is — as stated in (109) — a fundamentally optional orthographic marker of long vowels.

### 3.1.2 PLENE ⇏ LONG

Having dealt in §3.1.1 with the orthographic representation of long vowels, this section turns to second issue raised above, viz., that plene spelling does not strictly imply that a vowel is long.

While plene writing overwhelmingly does function to indicate vowel length, there are circumstances under which this orthographic practice as defined above is not a reliable diagnostic of a long vowel. There are at least two common situations in which such usage is securely established.<sup>6</sup> The first relates to apparent plene spellings employing the combination of signs <ḫu-u>. As argued especially by Kimball (1999: 67–8), this combination had come to be used as a ligature equivalent to simple <ḫu> beginning already in MH and with increasing frequency in NH (cf. Melchert 2017a: ad §1.46).<sup>7</sup> The equivalence of <ḫu> and <ḫu-u> in NH is clearest in prevocalic position, where both spell [χ<sup>w</sup>]. Before consonants, <ḫu-u> may indicate the

<sup>5</sup>Highly implausible, for instance, is the ternary vowel length contrast ([V:] ~ [V̄] ~ [V]) posited by Kloekhorst (2014a); not only are such ternary contrasts typologically rare, but even in the few languages in which they have been established (e.g. Estonian (Odden 1997; Asu and Teras 2009); Dinka (Anderson 1987; Remijsen and Gilley 2008)), they are not encoded in the writing system (cf. Yates 2016a: 242–3). More importantly, a necessary (although not sufficient) condition for establishing this phonological contrast is to provide empirical support for the orthographic contrast, i.e. for three groups distinguished by significant differences in their frequency of plene spelling; yet because Kloekhorst does not subject his data to statistical analysis, the reality of the orthographic contrast is at best uncertain (cf. Melchert to appear d), and in fact, there are reasons to believe that the data does not bear out his conclusions. For instance, Kimball (2015: 25–7) identifies several cases in which the alleged half-long [ā] is spelled plene more frequently than long [á:], e.g. alleged NH [á:] in ḫāli- ‘pen’ (plene in 82% of attestations), gāpina- ‘thread’ (71%), and ašāši ‘(s)he settles’ (69%) is spelled plene as or more frequently than MH [á:] in šākuwa ‘eyes’ (60%) and -ātar ‘(abstract noun suffix)’ (69%), and in the case ḫāriya- ‘valley’, the ratio of plene even increases between MH and NH (60% vs. 74%), thus appearing to contradict Kloekhorst’s (2014a) claim that its vowel was subject to shortening. See also Yates (2016a: 244–45) on the weak evidentiary support for an orthographic distinction between [é:] and [é̄].

<sup>6</sup>In earlier scholarship it was widely held that plene spelling had functions other than marking vowel length, e.g. to indicate that a vowel had *e*- or *i*-quality when the surrounding <CV> and <VC> signs were ambiguous between these two values (see Kimball 1999: 66–7 for an overview). However, compelling positive evidence for any of these usages is lacking; see now Melchert (2017a: ad §1.46) for arguments that, except for the two exceptional cases discussed in this section, the only function of plene writing is to mark long vowels.

<sup>7</sup>The idea that <ḫu-u> was used as a ligature was proposed already by Rosenkranz (1952: 420) and by Kronasser (1962–6: 28), who suggested that it may be used to disambiguate <ḫu> from the similar-looking sign <ri/ital>.



presence of a long vowel [o:], but it may also spell a short vowel [o] just like simple <hu> — for instance, in <me-e-hu-u-ni> [mé:χoni] ‘at the time (of)’ (KUB 13.4 iv 38; NH/NS), which contrasts with the original spelling found in OH/OS texts <me-e-hu-ni> (KBo 3.22 Ro 19). The consequence of this usage for the present study is that <hu-u> spellings in the post-OH period cannot be used as evidence for vowel length; however, I provisionally assume here that OH/OS <hu-u> spellings do indicate the presence of a long vowel [o:].<sup>8</sup>

Another context in which plene writing does not necessarily indicate a long vowel is when it occurs after high vowels and glides ([i, u, y, w]). One of Kloekhorst’s (2014a: 134–161) major findings is that plene spellings of type <°i-e-eC> and <°u/ú-e-eC> do not contrast with non-plene spellings <°i-eC> and <°u/ú-eC>; the former may spell a long vowel [e:], but it may also spell a short vowel [e]. This finding stems from a systematic examination of <°i-e-eC> and <°u/ú-e-eC> spellings, which are well-attested in thematic *ye/a*-verbs, in nouns derived from these verbs with the suffix *-ēššar*, and — as observed already by earlier scholars — especially in stative (suffixed with *-e-*) and fientive (*-ešš-*) verbal stems derived from *i-*, *u-*, and *ya*-stem nouns and adjectives and in the nominative plural forms (*-eš*) of these nominals.<sup>9</sup>

It is the last of these categories that has particular significance, which differs from the others in two important respects: (i) plene spellings of the nominative plural inflectional ending are effectively confined to these stems terminating in [i, u, y, w]; and (ii) in some cases, these plene spellings occur in what are clearly unstressed syllables, e.g. <*i-da-a-la-u-e-eš*> ‘evil.ANIM.NOM.PL’ or <*uk-tu-u-ri-i-e-eš*> ‘eternal.ANIM.NOM.PL’, where plene writing of the penultimate syllable of the stem (*idālu-*, *uktūri-*) indicates that it is long/stressed (cf. §3.2 below).<sup>10</sup> Kloekhorst’s (2014a) proposal accounts neatly for both of these facts: the suffix is not long and so is not spelled plene in other stem types,<sup>11</sup> where plene spelling reliably indicates a long vowel.<sup>12</sup> Moreover, a natural motivation for this orthographic practice is provided by

<sup>8</sup> Of course, if clear OH evidence for prevocalic <hu-u> orthographically representing a short vowel should emerge, it would be necessary to discount even OH/OS spellings of this type as evidence for vowel length.

<sup>9</sup> For discussion of these plene-spelled forms, see Melchert (1984: 121–2) and Sideltsev (2002: 21–4) with references to earlier scholarship.

<sup>10</sup> In §4.4, I provide evidence that neuter noun-forming *-eššar*, stative *-e-*, and fientive *-ešš-* are stress-attracting suffixes. Kloekhorst (2014a) assumes the same, but under his analysis, it is significant that words with *-eššar* and *-ešš-* continue to show plene writing in post-OH manuscripts, since he posits inner-OH vowel shortening in this phonological environment (*op. cit.* 53–4, 60, 94); for him, then, late plene spellings of these endings constitute evidence that <°i-e-eC> and <°u/ú-e-eC> do not spell a long vowel. As noted above, I reject this premise; in my view, these suffixes (almost) always surface with a stressed long vowel [é:] and are therefore non-probative with respect to the phonological interpretation of these spellings. However, there is evidence that the verbal suffix *-ye/a-* in at least some cases is spelled plene <°i-e-eC> when short/unstressed; see §4.3.5 (with n. 74) for discussion.

<sup>11</sup> A principled exception to this generalization is the class of (“oxytone”) *a*-stems with fixed stress on their final syllable, such as *išhā-* [iʃχá:-] ‘master’; in such forms, the nominative plural suffix was stressed/long (i.e. [-é:s]; see, e.g., (120) below), and is thus predictably attested with plene writing in some occurrences of these words (cf. Kloekhorst 2014a: 79).

<sup>12</sup> Previously it had been necessary to assume that the nominative plural suffix had a special allomorph in *i-*, *u-*, and *ya*-stems that was either exceptionally stress-attracting (Catsanicos 1984: 146–50), or else underlying long (Melchert 1994: 107–8, *i.a.*) and thus a persistent exception to the generalization that only stressed vowels are long in Hittite (cf. §3.2). Neither of these assumptions is attractive.

Kloekhorst: lacking “<ye>” and “<we>” signs parallel to <ya> and <wa> in the Hittite syllabary, scribes used <<sup>o</sup>i-e> and <<sup>o</sup>u/ú-e> in this function; spellings like those cited above are thus equivalent to “<i-da-a-la-we-eš>” and “<uk-tu-u-ri-ye-eš>” with no plene writing, and these can be phonologically interpreted [itá:law-es] and [uktó:riy-es] with a short unstressed vowel in the nominative plural suffix.<sup>13</sup>

Kloekhorst (2014a) further contends that plene writing is non-contrastive after the labialized obstruents [k(:)<sup>w</sup>] and [χ(:)<sup>w</sup>] as well; on this basis, he argues that apparent plene spellings like <ku-e-en-zi> ‘kills’ and <ḫu-e-ek-zi> ‘slaughters’ do not indicate a long vowel [e:]. However, the orthographic motivation for this usage is less clear, since there is no glide /w/ to spell. More importantly, this extension of Kloekhorst’s proposal lacks explanatory power — in particular, among the many plene spellings of the nominative plural suffix that he cites (*op. cit.* 79–89, 136–44), there are no cases comparable to <i-da-a-la-u-e-eš> or <uk-tu-u-ri-i-e-eš> in which the nominative plural suffix is clearly unstressed but is nevertheless spelled plene after [k(:)<sup>w</sup>] or [χ(:)<sup>w</sup>]. I therefore follow Kimball (2015: 24–5) and Melchert (2017a: *ad* §1.46) in rejecting this additional assumption.

In sum, then, plene spellings of the type <<sup>o</sup>i-e-eC> and <<sup>o</sup>u/ú-e-eC>, as well as <ḫu-u> in post-OH manuscripts, do not constitute secure evidence that the plene-spelled vowel is long;<sup>14</sup> these spellings are therefore excluded from the analysis of Hittite word stress developed in Chapters 4 and 5.

### 3.2 On the relationship between vowel length & word stress

Having established in §3.1 how vowel length can be determined on the basis of plene writing, it is now possible to consider how vowel length can be used to determine Hittite word stress. As with plene and vowel length, there is general agreement that length and stress are closely correlated in Hittite. From a diachronic perspective, this close relationship is due to a series of processes that shortened unstressed long vowels and lengthened most stressed short vowels in the prehistory of Hittite. Both historical lengthening and shortening are illustrated in (111) with the nominative singular form of the PIE word for ‘earth’:

(111) PIE \**d<sup>h</sup>éǵ<sup>h</sup>ōm* > Hitt. *tēkan* [té:kan] ‘earth’

In (111), the unstressed inherited long vowel \*[o:] in the word’s penultimate syllable was shortened, eventually yielding Hitt. [a], while inherited short \*[é] in the initial syllable was lengthened under stress, giving Hitt. [é:].<sup>15</sup> These phonological developments conspired to align

<sup>13</sup>Note, however, that it was never obligatory to explicitly mark the presence of the glide with “<ye>” or “<we>” signs; thus, e.g., <uk-tu-u-ri-i-e-eš> is attested beside a morphologically and phonologically equivalent form <uk-tu-u-ri-e-eš> without the additional <i> or <e> signs.

<sup>14</sup>In this dissertation, I present words spelled <<sup>o</sup>i-e-eC> and <<sup>o</sup>u/ú-e-eC> in broad transcription without a macron. Per Kloekhorst (2014a), these are not plene spellings in the same sense as other “real” plene spellings; I therefore see no advantage in a transcriptional notation that conflates the two types, and so depart from standard practice in leaving the former unmarked. Because of the somewhat greater uncertainties surrounding the chronology of <ḫu-u> (cf. n. 8), I consistently mark these plene spellings (with a macron).

<sup>15</sup> Per Eichner (1973: 79, 86 n.15), all unstressed inherited long vowels were shortened already in PA (cf. Melchert

vowel length and word stress in synchronic Hittite, producing words like *tēkan* in which there is exactly one long vowel — marked by plene writing (in multiple attestations) — and this long vowel bears primary stress. This situation is in fact very common in Hittite; it is also observed (e.g.) in all of the word forms in (110), *šakki*, *idālu*, and *šēšzi*. These words are all attested with plene writing of just one syllable, which is long/stressed: [sá:kri], [itá:lu], [sé:stsi].

However, it is also clear that length and stress do not stand in a one-to-one relationship. On the one hand, there are well-attested words that never exhibit plene writing, which suggests that they contain no long vowel, including whatever vowel that is stressed, e.g. *walḫzi* ‘strikes’, *sanḫzi* ‘seeks’. Conversely, there are words that are attested with MULTIPLE PLENE spelling, i.e. with more than one vowel spelled plene, e.g. *āppalāweni* ‘we entrap’, *šaktāizzi* ‘performs sick-maintenance’;<sup>16</sup> such spellings suggest that these words contain more than one long vowel, although only one of these vowels can bear (the single) primary stress (cf. §4.2.2.1). The relationship between vowel length and stress is thus captured by the statements in (112):

- (112) (i) STRESSED  $\nRightarrow$  LONG: Not all vowels that bear primary stress are long.  
(ii) LONG  $\nRightarrow$  STRESSED: Not all long vowels bear primary stress.

These facts further complicate the analysis of Hittite stress. Even when plene writing accurately indicates which vowel or vowels are long, determining the position of primary stress is not always straightforward: due to (i), there are Hittite words in which the stressed vowel is short that therefore lack any orthographic correlate of stress; and due to (ii), there are words in which there are “too many” long vowels, thus more than one plene spelling and so more than one plausible candidate for the site of primary stress.

It is therefore clear that any analysis of Hittite word stress also requires an explicit theory of the relationship between vowel length and word stress. While it is beyond the scope of this dissertation to determine how the interaction of length and stress in Hittite is best analyzed synchronically, I provide below an overview of the descriptive generalizations that, in my view, govern the relationship between them, and thus are employed in Chapters 4 and 5 to diagnose Hittite word stress patterns; I also briefly sketch some theoretical analyses that are compatible with these generalizations. §3.2.1 treats the phonological behavior of stressed vowels in Hittite. §3.2.2 then examines the evidence for unstressed long vowels and the conditions under which they are permitted in Hittite.

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1994: 76). The lengthening of inherited short vowels is observed in all of the 2nd millennium Anatolian languages, Hittite, Palaic, and (Cuneiform) Luwian. These three languages show lengthening of all stressed short vowels in open syllables (cf. Melchert 1994: 261), but differ in which vowels are lengthened in closed syllables; because of these differences, it is generally assumed that stressed vowel lengthening was a post-PA development, which may have spread by areal diffusion. For the long vowel in second syllable of the PIE form in (111), cf. Gk. *k<sup>h</sup>t<sup>h</sup>ōn* ‘earth’ (F.NOM.SG).

<sup>16</sup>I distinguish multiple plene spellings from much rarer HYPER-PLENE spellings (cf. Hoffner and Melchert 2008: 12), which involve more than one additional vowel sign, e.g. <*a-a-an*> ‘warm’ (PTCP.N.NOM/ACC.SG). Multiple plene spelling almost always involves two plene spellings (sometimes referred to as “double plene” spelling), but at least a few examples of three plene spellings (“triple plene”) can be found.

### 3.2.1 STRESSED $\Rightarrow$ LONG

Concerning the implicational relationship between stress and vowel length, the empirical facts at least are generally agreed upon:<sup>17</sup> all stressed vowels are long in open syllables, but in closed syllables, Hittite has both long and short stressed vowels.<sup>18</sup> Historically, the former have two sources:<sup>19</sup> (i) inherited short vowels, which were subject to across-the-board lengthening in stressed open syllables; and (ii) inherited bimoraic syllabic nuclei — i.e. PIE long vowels, diphthongs (via contraction), or tautosyllabic \*/Vh<sub>x</sub>/ (via compensatory lengthening) — which retained length under stress. Some secure examples are given in (113–116) below, where the (a) examples show lengthening and the (b) examples length retention under stress:<sup>20</sup>

- (113) a. PIE \**néwom* > Hitt. *nēwan* [né:wan] ‘new’ (ADJ.ANIM.ACC.SG)  
 b. PIE \**méh<sub>2</sub>wr* > Hitt. *mēhur* [mé:χor] ‘time’ (N.NOM/ACC.SG)
- (114) a. PIE \**dóru* > Hitt. *tāru* [tá:ru] ‘wood’ (N.NOM/ACC.SG)  
 b. PIE \**h<sub>1/3</sub>n[ó]h<sub>3</sub>m̃* > Hitt. *lāman* [lá:man] ‘name’ (N.NOM/ACC.SG.)
- (115) a. PIE \**h<sub>1</sub>eh<sub>1</sub>sí* > Hitt. *iššī* [iš:í:] ‘in the mouth’ (N.LOC.SG)  
 b. PIE \**h<sub>1</sub>nokíh<sub>x</sub>* > Hitt. *nakkī* [nak:í:] ‘heavy’ (ADJ.N.NOM/ACC.SG)
- (116) a. PIE \**kúnos* > Hitt. *kūnaš* [kú:naš] ‘of the dog-man’ (ANIM.GEN.SG)  
 b. PIE \**gēusom* > Hitt. *kūšan* [kú:san] ‘daughter/son-in-law’ (ANIM.ACC.SG)

Note that, in contrast to their historical development in closed syllables (see below), both inherited mid vowels like those in (113–114) and non-mid vowels like those in (115–116) were affected by stressed vowel lengthening in open syllables.

<sup>17</sup>See Kimball (1999: 124–7) for an overview of previous scholarship on stress and vowel length in Anatolian, with special reference to the views of Oettinger (1979: 447–9), Eichner (1980, 1982, 1986), Kimball (1983), and Melchert (1994). The views presented here most closely align with those of Melchert (1994: 100–8, 150) — in particular, with respect to the how short vowels develop in closed syllables and how vowel quantity and word stress interact synchronically; I make specific reference to his individual claims below. Note that the radical new interpretation of plene writing advanced by Kloekhorst (2014a) — discussed in §3.1 above — leads him to have very different views on the relationship between stress and vowel length in Hittite than these earlier scholars; because I reject this interpretation, I exclude these views from further discussion here.

<sup>18</sup>In Hittite, a syllable is closed by any consonant cluster, geminate consonant, or the affricate [tʃ] (for the latter two environments, see Melchert 1994: 20, 147 and Kloekhorst (2014a: 21–2, 544–7)); word-final position patterns phonologically with open syllables.

<sup>19</sup>Per Eichner (1980: 144 n. 65); see Melchert (1994: 131–3) and Kimball (1999: 133–6) for discussion and further exemplification.

<sup>20</sup>For the reconstructions in (113–116), see Kloekhorst (2008: 605) on (113a); Eichner (1973) on (113b) (*pace* Kloekhorst 2008: 567–8); Kloekhorst (2008: 849–50) on (114a); Kloekhorst (2008: 518–9) on (114b) (with underlying PIE \*/e/); Melchert (2010c) on (115a); Widmer (2005) on (115b); Melchert (1989) on (116a); and Rieken (1999: 257–8) on (116b).

An important consequence of these historical lengthening processes was that Hittite vowel length became a predictable function of stress in this environment, i.e. vowels were long when stressed. This situation naturally gave rise to RESTRUCTURING (Kiparsky 1982a): language learners acquired a simpler grammar in which inherited phonemic length distinctions were eliminated, and all surface long vowels in open syllables were derived from underlying short vowels by lengthening under stress (cf. Melchert 1994: 107, 131). While surface long vowels in non-alternating stressed positions are compatible with this reanalysis, the (continued) synchronic operation of stressed vowel lengthening can be observed, especially, in vowels that show regular quantitative alternations in stressed and unstressed positions. (117) provides several examples of affixes that exhibit such alternations, as their stress patterns vary depending on the properties of the word as a whole:<sup>21</sup>

(117)	MORPH	STRESSED / LONG		UNSTRESSED / SHORT	
a.	/-ári/	<i>išduwāri</i>	‘becomes	<i>kīšari</i>	‘becomes;
	(3SG.NPST.MID)	[istuw-ári]	evident’	[kí:s-ari]	happens’
b.	/-í/	<i>iššī</i>	‘in the	<i>mēḫuni</i>	‘at the time
	(DAT/LOC.SG)	[is:-í:]	mouth’	[mé:χon-i]	(of)’
c.	/-t:éni/	<i>šaktēni</i>	‘you know’	<i>pāitteni</i>	‘you go’
	(2PL.NPST.ACT)	[sak:-t:éni]		[pá:y-t:eni]	

Each of the examples in (117) can be straightforwardly accounted for by assuming one set of underlying vowels, which lengthen under stress but remain short when unstressed.

In closed syllables, however, the synchronic situation is considerably more complicated, since both long and stressed short vowels are found in this environment. This complication in fact arises only for the non-mid vowels, where length is contrastive ([í:] vs. [í]; [ú:] vs. [ú]; and [á:] vs. [á]), while mid vowels are uniformly long under stress ([é:]; [ó:]). The historical sources of these synchronic length contrasts are relatively uncontroversial. It is standardly held that the front mid vowel PIE \*/e/ — when not subject to any conditioned qualitative changes — underwent lengthening under stress in closed syllables (cf. Melchert 1994: 133; Kimball 1999: 132–3).<sup>22</sup> This development — parallel to that of the back mid vowel PIE \*/o/ (see below) — yielded Hitt. [é:], the same outcome as PIE \*/e:/, \*/ei/, and tautosyllabic \*/eh<sub>1</sub>/, which retained length when stressed.<sup>23</sup> Similarly, Hitt. [ó:] has both monomoraic and bimoraic historical sources,<sup>24</sup>

<sup>21</sup>In (117), I abstract away from the principles by which stress is determined; see §4.3.4 for a full analysis of the stress patterns shown by the suffix in (117c); see also Ch. 4 n. 37 on (117a) and §5.3.3 on (117b).

<sup>22</sup>This position is also adopted with only minor refinements by Kloekhorst (2008: 95–100), who correctly rejects the notion of a distinct PA phoneme \*/e:/ (< PIE \*eī); see now Melchert 2015a for discussion.

<sup>23</sup>See Yates (2016a) for detailed discussion of the diachronic development and synchronic analysis of Hitt. [é:].

<sup>24</sup>The existence of [ó:] as a contrastive entity — spelled plene with the sign <u> rather than <ú> — has now been established by Rieken (2005) and Kloekhorst (2008: 35–60) (cf. Melchert 2017a: *ad* §1.47); on its historical development, see further Melchert (2010b, 2015a). Because the distinction between [u:] and [o:] is conventionally eliminated in broad transcription (both are transcribed *ū*), I provide transliterations where relevant to the point at hand in this chapter.

which point respectively to historical lengthening and length retention in stressed closed syllables. These developments are illustrated in (118–119):<sup>25</sup>

- (118) a. PIE *\*h<sub>1</sub>ésti* > Hitt. *ēšzi* [é:stsi] ‘is’ (3SG.NPST.ACT)  
 b. PIE *\*h<sub>1</sub>ésti* > Hitt. *ēšzi* [é:stsi] ‘is sitting’ (3SG.NPST.ACT)
- (119) a. PIE *\*w<sub>1</sub>ŕgis* > Hitt. <*u-ur-ki-iš*> [ó:rkis] ‘track’ (ANIM.NOM.SG)  
 b. PIE *\*m(y)óuh<sub>1</sub>-h<sub>2</sub>ei* > Hitt. <*mu-u-uh-ḫi*> [mó:χ:i] ‘I fall’ (1SG.NPST.ACT)

These developments led to a situation in which — just as in open syllables — all mid vowels were long under stress and thus amenable to (re)analysis such that surface [é:] and [ó:] regardless of their historical source were synchronically derived from short /e/ and /o/ via stressed vowel lengthening. Some stress-conditioned synchronic alternations between long and short realizations of these phonemes are given in (120):<sup>26</sup>

(120)	MORPH	STRESSED/LONG	UNSTRESSED/SHORT
a.	/-es/	<i>išhēš</i> ‘masters’	<i>lāleš</i> ‘tongues’
	(ANIM.NOM.PL)	[iʃχ-é:s]	[lá:l-es]
b.	/-ós/	< <i>a-pu-u-uš</i> > ‘those’	< <i>pi-iš-e-en-us</i> > ‘men’
	(ANIM.ACC.PL)	[ap-ó:s]	[pisé:nos]

Hittite mid vowels therefore show the same distribution in stressed closed syllables as in open syllables, consistently surfacing as long in each environment. In addition, there are synchronic alternations between long/stressed and short/unstressed mid vowels in both open and closed syllables, which are economically explained by positing a single set of phonemes /e, o/ and a synchronic lengthening process that applies to these phonemes in stressed syllables. This distribution suggests, moreover, that phonemic length was lacking in the Hittite mid vowels altogether (i.e. no <sup>x</sup>/e:/, <sup>x</sup>/o:/). In my view, this analysis is fundamentally correct, although it is potentially problematized by the issues surrounding unstressed long vowels in the language; I return to this point at the conclusion of this section.

Hittite non-mid vowels, in contrast, may be long or short in stressed closed syllables. Historical sources of short vowels in this environment include PIE *\*i/*, and *\*u/*, and *\*a/*, the

<sup>25</sup>See Melchert (2014c) for the reconstructions in (118); Melchert (1994: 126–7, 132) on (119a) (with updated discussion in Melchert 2015a); and Kloekhorst (2008: 565–6) and *LIV*<sup>2</sup> (445–6) on (119b).

<sup>26</sup>The animate accusative plural ending is clearly [-ó:s] in stressed positions, the regular development of the thematic ending PIE *\*/-ó-ms/* (Kloekhorst 2008: 54, 57). It is likely (although uncertain) that the productive ending in unstressed positions was [-os], which is probably the regular historical outcome of the athematic ending PIE *\*/-ms/* in consonant stems and *\*u-*stems (see Melchert 2015a). The uncertainty stems from the fact that high and mid back rounded vowels are — with only a few exceptions, such as in word-initial position — distinguished from one another orthographically only when they are long (i.e. [u:], [o:]); both [u] and [o] in word-internal position are spelled <*Cu-uC*>.

last of which merged in early pre-Hittite with the conditioned outcome of PIE \*/e/ before certain sonorant-initial consonant clusters;<sup>27</sup> diachronically, these vowels did not lengthen under stress in closed syllables, thus developing into Hitt. [í], [ú], and [á] respectively (Melchert 1994: 131–2, 147). The attested long high vowels in Hittite closed syllables thus descend exclusively from inherited bimoraic nuclei, which retained length under stress: PIE \*/i:/ and tautosyllabic \*/ih<sub>x</sub>/ yielded Hitt. [í], and PIE \*/u:/, tautosyllabic \*/uh<sub>1</sub>/, and \*/eu/ yielded Hitt. [ú].<sup>28</sup> (121) provides representative examples of the historical development of the contrastive short and long high vowels:<sup>29</sup>

- (121) a. PIE \**k<sup>w</sup>is* > Hitt. *kuiš* [k<sup>w</sup>ís] ‘who?’ (ANIM.NOM.SG)  
 b. PIE \**h<sub>1</sub>nokíh<sub>x</sub>s* > Hitt. *nakkīš* [nak:ís] ‘heavy’ (ANIM.NOM.SG)

Similarly, Hitt. [á:] in closed syllable may descend from PIE \*/a:/ or tautosyllabic /eh<sub>2</sub>/. The long vowel from these sources contrasts with the development of pre-Hitt. \*/a/ — whether from PIE \*/a/ or \*/h<sub>2</sub>e/ or from a conditioned reflex of PIE \*/e/ — which yields Hitt. [a] in stressed closed syllables. These differing outcomes are illustrated in (122):<sup>30</sup>

- (122) a. PIE \**h<sub>2</sub>[á]t-or* > Hitt. *ḫatta* [χát:a] ‘cuts’ (3SG.NPST.MID)  
 Pre-Hitt. \**-ánti* > Hitt. *-anzi* [-ántsi] (3PL.NPST.ACT)  
 b. PIE \**dw[á:]m* > Hitt. *tuwān* [twá:n] ‘long (ago)’ (ADV)

However, Hitt. [á:] in stressed closed syllables also has other historical sources, both monomoraic and bimoraic. In parallel to PIE \*/e/, the mid back round vowel PIE \*/o/ underwent lengthening diachronically in both open and closed syllables.<sup>31</sup> Its late pre-Hittite outcome was [ó:], thus identical to that of PIE \*/o:/, tautosyllabic \*/oh<sub>x</sub>/, and tautosyllabic \*/eh<sub>3</sub>/, which retained length under stress. At this pre-Hittite stage, the resulting long vowel \*/[ó:] was affected

<sup>27</sup>It is uncontroversial that the change of PIE \*e to Hitt. a occurred before nasal plus coronal obstruent clusters, e.g. PIE \**-énti* > Hitt. *-anzi* [-ántsi] (see (122a) below); PIE \**dénsu-* > Hitt. *daššu-* [tá:s:u-] ‘strong’. Before other sonorant-initial consonant clusters, the exact developments are less certain, but is likely that this change is also regular when the sonorant is followed by two consonants, i.e. PIE \**eRCC* > Hitt. *aRCC* (see Melchert 1994: 134–7 for discussion; cf. Kloekhorst 2008: 95). PIE \*/e/ is also raised to pre-Hitt. \*i before nasal plus velar obstruent clusters, and thus patterns with PIE \*/i/ with respect to (non-)lengthening, e.g. PIE \**h<sub>1</sub>lén<sup>(c)h</sup>-ti* > Hitt. *linkzi* [líŋk-tsi] ‘swears’.

<sup>28</sup>For [ú:] as the (unconditioned) outcome of PIE \*éu in Hittite, see Rieken (1999: 61–2, 257) and Kloekhorst (2008: 53–7), and Melchert (2010b).

<sup>29</sup>See Kloekhorst (2008: 488–91) for the standard reconstruction in (121a) and Widmer (2005) on (121b).

<sup>30</sup>See Kloekhorst (2008: 189–90, 330–2) for the standard reconstructions in (122a) and Schindler (1972: 37) and Melchert (1984: 30, 2008) on (122b); the last has surface PIE [á:] via Stang’s Law (see Mayrhofer 1986: 163–4) from underlying \*/eh<sub>2</sub>-m/, and is securely attested in the expression *duwān parā* ‘long ago’.

<sup>31</sup>In diphthongs, however, it appears that \*/o/ did not lengthen historically (see the discussion of (127) below). Its failure to lengthen suggests diphthongs — like inherited long vowels — originally satisfied the constraint(s) driving vowel lengthening by virtue of being bimoraic.

by the general qualitative merger of the low central and mid back vowels; pre-Hitt. \*[ó:] thereby merged with pre-Hitt. \*[á:] (cf. (122b) above), both yielding Hitt. [á:].<sup>32</sup> These developments are illustrated in (123), where (a) again shows lengthening and (b) length retention under stress:<sup>33</sup>

- (123) a. PIE \**skórh<sub>2</sub>ei* > Hitt. *iškārhi* [isχá:rχ:i] ‘I pierce’ (1SG.NPST.ACT)  
 b. PIE \**wedōr* > Hitt. *widār* [witá:r] ‘waters’ (N.NOM/ACC.PL)

It is evident from the data above that Hittite has both long and short vowels in closed syllables, and that these length contrasts are explicable in historical terms. However, the question of how these contrasts should be understood synchronically remains unresolved. What is clear, at least, is that a purely diachronic account of the length of non-mid vowels in closed syllables is inadequate — in particular, since these vowels occur in stress-alternating contexts, which condition quantitative alternations in some (i.e. [V̄:] ~ [V]) but no alternations in others ([V̄] ~ [V]). While such stress alternations are relatively rare for the Hittite high vowels, they are very common for Hitt. *a*; examples with corresponding length alternations are given in (124), which thereby contrast with the non-alternating short vowels in (125):<sup>34</sup>

(124)	MORPH	STRESSED/LONG		UNSTRESSED/SHORT	
a.	<i>šakk-</i> ‘know’	<i>šakki</i> [sá:k-i]	‘knows’ (3SG.NPST.ACT)	<i>šaktēni</i> [sak:-t:é:ni]	‘you know’ (2PL.NPST.ACT)
b.	<i>ārš-</i> ‘flow’	<i>āršzi</i> [á:rs-t̄si]	‘flows’ (3SG.NPST.ACT)	<i>aršanzi</i> [ars-ánt̄si]	‘flow’ (3PL.NPST.ACT)
c.	<i>-ānt-</i> (PTCP)	<i>appānteš</i> [ap:-á:nt-es]	‘taken’ (ANIM.NOM.PL)	<i>ānšanteš</i> [á:ns-ant-es]	‘wiped’ (ANIM.NOM.PL)
d.	<i>-āš</i> (GEN.SG)	<i>taknāš</i> [takn-á:s]	‘of the earth’ (N.GEN.SG)	<i>gēnuwaš</i> [ké:nuw-as]	‘of the knee’ (N.GEN.SG)
e.	<i>mān</i> (IRR)	<i>mān</i> [má:n]	‘if/when’ (COMP)	<i>man</i> [man]	(IRR)

<sup>32</sup>The pre-Hittite source of synchronic Hitt. [ó:] — on which see n. 24 above — would have existed at this historical stage, but must have been distinct from pre-Hitt. \*[o:]. It seems likely that the former was a somewhat higher(/close) vowel which — in the spirit of Melchert (1994: 53, *passim*) — could be represented notationally as pre-Hitt. \**ō*; I intend to treat the development of this vowel — in particular, its lengthening behavior under stress, which is interestingly symmetrical to the PIE mid vowels \**e* and \**o* — elsewhere (Yates in prep).

<sup>33</sup>See Kloekhorst (2008: 401) for the standard reconstruction in (123a) and Melchert (2011a: 396–8) on (123b), which develops via pre-PIE \*\**-ór-h<sub>2</sub>* (or perhaps even PIE \*/-or-h<sub>2</sub>/; see Sandell and Byrd 2014).

<sup>34</sup>On the functions of (and distinction between) the (tonic) complementizer *mān* and the clitic (or weakly stressed) particle *man* in (124e), see Hoffner and Melchert (2008: 416, 420–3) and *CHD* (L–N: 139–61); see also the discussion in §4.2.2.1 of stress and vowel length in function words.



(125)	MORPH	STRESSED/SHORT		UNSTRESSED/SHORT	
a.	<i>parḫ-</i> 'chase; rush'	<i>parḫzi</i> [párχi:-t̂si] (3SG.NPST.ACT)	'rushes'	<i>parḫeššar</i> [parχi:-é:s̄ar] (N.NOM/ACC.SG)	'haste'
b.	<i>-anzi</i> (3PL.NPST.ACT)	<i>aršanzi</i> [ap:-ánt̂si] (3PL.NPST.ACT)	'flow'	<i>wekantsi</i> [wé:k-ant̂si] (3PL.NPST.ACT)	'demand'
c.	<i>ḫarš-</i> 'head'	<i>ḫaršar</i> [χárs-ar] (N.NOM/ACC.SG)	'head'	<i>ḫaršnī</i> [χárs-n-í:] (N.LOC.SG)	'at the head'

From the data in (124–125), it is clear that there must be a phonemic contrast between the vowels that are realized under stress as [á:], [í:], and [ú:] in closed syllables and those that are realized as [á], [í], and [ú],<sup>35</sup> but there is no consensus about what feature(s) distinguishes these pairs, nor about what stress-dependent phonological processes are operative in Hittite that map only the former set onto both long and short vowels.

The nature of these processes depends on what underlying representational assumptions are adopted, for which at least the two possibilities in (126) present themselves.<sup>36</sup>

- (126) a. /V:/ vs. /V/  
 b. /V/ vs. /Ṽ/

Under (126a), Hittite would have a phonemic contrast in closed syllables between underlyingly long (/a:, i:, u:/) and short non-mid vowels (/a, i, u/). To account for synchronic alternations between (e.g.) long and short *a*-vowels like (124), it is assumed that these vowels were underlyingly long (i.e. /a:/) and that Hittite had a synchronic stress-conditioned shortening process that targeted long vowels in unstressed syllables.<sup>37</sup> Non-alternating short vowels like (125) would then be just short /a/. Ensuring that these vowels stand outside the scope of the stressed vowel lengthening process that affects /e/ and /o/ in closed syllables would require restricting this process in such a way that it applies only to mid vowels. A more limited version of this lengthening process might apply to all vowels in stressed open syllables, which would all be underlyingly short.<sup>38</sup>

<sup>35</sup>It is important to note that the synchronic distinction between alternating and non-alternating non-mid vowels is not amenable to a purely morphological explanation. While it is generally true that Hittite *ḫi*-verbs with paradigmatic *a*-vocalism like (124a) show length alternations but *mi*-verbs with *a*-vocalism like (125a) do not, there are exceptions to this generalization such as (124b), which is an [á:]/[a] alternating *mi*-verb. Similarly, the Hittite inventory of inflectional endings includes both quantitatively alternating and non-alternating types, e.g. (124c–d) vs. (125b) (on (124c) and (125b), see further §4.3 below).

<sup>36</sup>I use the breve symbol (˘) in (126b) to indicate that the marked vowel is lexically specified [–long]; see further discussion below.

<sup>37</sup>One could plausibly argue that this shortening process was the same as the structurally identical one that shortened unstressed long vowels already in PA (cf. n. 15).

<sup>38</sup>See Yates (2015b) for an analysis along these lines.

While the analysis in (126a) essentially recapitulates the diachronic development of the PIE vowel system into Hittite, the alternative analysis in (126b) posits more extensive phonological restructuring. Under (126b), Hittite would have a phonemic contrast in closed syllables between vowels that are underlyingly underspecified for length (/A, I, U/) and those that are specified as [-long] (/ǎ, ǐ, ǔ/); open syllables would contain only underspecified /A, I, U/ as well as /E, O/, which lack contrasting short vowels. In this scenario, Hittite vowel lengthening would be a general process that targeted all stressed vowels, including non-mid vowels in closed syllables like (124) and (125); the non-alternating short vowels in (125), however, were “immune” (in the sense of Kiparsky 1993) to this process, which is blocked from applying by their [-long] pre-specification (see further below).

I adopt (126b) here.<sup>39</sup> The major results of this dissertation do not depend on this assumption, and if it turns out that (126a) provides a better explanation of other aspects of Hittite phonology, the relevant symbols can be substituted (i.e. /V:/ for /V/; /V/ for /ǘ/) into the formal derivations in Chapters 4 and 5 without materially affecting the analysis of word stress developed there. Nevertheless, I believe that (126b) has a number of advantages which are worth briefly discussing.

First, (126b) straightforwardly explains the close correlation in Hittite between stress and vowel length: long vowels occur in stressed syllables and — other than in the principled exceptions discussed below — not elsewhere because they are not present in the lexicon, but are rather derived on the surface by stressed vowel lengthening; in unstressed syllables, vowels surface as short because there is no motivation for them to lengthen. The environment for stressed vowel lengthening can thus be stated simply: it targets all stressed vowels, even if fails to apply to certain lexically marked items. Relative to (126a), then, (126b) much more directly expresses the generalization that vowel length is mostly a predictable function of stress in Hittite; vowels are stressed when long and unstressed when short except in a single phonological environment — closed stressed syllables — where the unpredictable value is listed in the lexicon. But while it shares with (126a) the need to list vowel length in this context, (126b) differs in that it treats [-long] as the unpredictable (or marked) value for [long] in this position; this view is in fact supported by diachrony — in particular, by the observed tendency for /V/ to spread at the expense of /ǘ/.

What is relevant, here, is the historical development of inherited diphthongs. It is now generally accepted that Hittite inherited short diphthongs that remained diphthongal in Hittite (i.e. did not undergo monophthongization) did not originally lengthen under stress — thus, e.g., PIE \**kóino-* > Hitt. *gaina-* [káyna-] ‘in-law; kinsman’ (x[ká:yna-]), whose *a*-vowel is never spelled plene (Melchert 1994: 148; cf. Kimball 1994, Kloekhorst 2014a: 392–7). These short diphthongs contrast in Hittite with long diphthongs, which come from inherited stressed long diphthongs or from other sources, such as vowel contraction after the loss of intervocalic \**y* or \**h*<sub>1/3</sub> (see n. 48 below). In some cases, regular sound change yielded inflectional paradigms that contained

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<sup>39</sup> I call attention here to an important notational point. For explicitness, I employ in this chapter the notation presented above (e.g. underspecified /A/ vs. short /ǎ/). In Chapters 4–5, however, I use a simplified version of this notation: I continue to mark short vowels in underlying/input forms with breve (/ǎ/), but instead leave underspecified vowels unmarked (i.e. /a/ for /A/). Since surface/output vowels are always fully specified (in accordance with (128a) above), I then use (e.g.) [a] to indicate output [-long] vowels, which contrast on the surface only with [+long] vowels.

both short and long diphthongs — in particular, in the paradigms of diphthongal *hi*-verbs like *dai*- ‘place’ — which appear to be maintained as such in OH (spelled non-plene vs. plene); by NH, however, this contrast had been leveled out within all such paradigms in favor of uniformly long diphthongs. This development is represented in (127):

(127)		OLD HITTITE		NEW HITTITE	
	3SG.PST.ACT	<i>daiš</i> [táy-s]	>	<i>dāiš</i> [táy-y-s]	‘placed
	3SG.NPST.ACT	<i>dāi</i> [táy-y]	>	<i>dāi</i> [táy-y]	‘places’

Both of the analyses in (126) predict paradigmatic leveling in this situation, since under neither analysis can both forms be derived from one underlying representation: under (126a), the past tense form requires /a/, the non-past form /a:/, while under (126b), they require /ǎ/ and /A/ respectively. However, the direction of leveling finds natural interpretation only under (126b): when underspecified /A/ is generalized at the expense of /ǎ/, it simplifies the lexicon by eliminating lexical specification and allowing the unmarked featural value in this context — i.e. [+long] in a stressed syllable — to emerge.<sup>40</sup>

Before turning to the formal implementation of (126b), I note one final advantage of this analysis. Depending on how Hittite unstressed long vowels are treated, it may be desirable or even necessary to operate without a synchronic shortening rule of the type that is crucial to (126a). Moreover, depending on one’s other analytic assumptions, it may also be necessary to posit in Hittite a marginal set of phonemic long vowels, which are consistently long but never stressed. Adopting (126b) opens the door to both of these possibilities, should either or both be required. This issue is discussed further below.

Having argued in support of the lexical representations in (126b), I now outline an optimality-theoretic analysis of Hittite stress and vowel quantity, deriving the observed distribution of long and short vowels from the interaction of ranked phonological constraints with these representations. The analysis advanced here is in the spirit of Inkelas’ (2000) STRUCTURAL IMMUNITY approach to “phonotactic blocking” effects, i.e. the failure of a phonological alternation or phonotactic condition to apply even when its environment appears to be present.<sup>41</sup> The basic intuition behind this approach, which is due to Kiparsky (1993), is that phonological processes may be blocked by pre-specified structure; in the relevant case, it is the [–long] specification of Hittite non-lengthening vowels that plays this role.

The constraint set relevant to implementing (126b) is introduced in (128):

(128) a. HAVE[long]: Segments must be specified for [long] in the output.<sup>42</sup>

<sup>40</sup>Given that the long diphthong would have been phonologically regular only in a single paradigmatic slot — the 3SG.NPST.ACT form in (127) — it would have been reasonable to expect analogy to proceed in the opposite direction. The fact that it did not thus suggests that some other factor — such as the one suggested here — played a role in the change.

<sup>41</sup>Inkelas (2000) employs this approach to account for several different types of blocking effects, including well-known cases of non-derived environment blocking (NDEB) such as Turkish velar deletion (see Kiparsky 1993; cf. Chong 2017 for recent discussion).

<sup>42</sup>On this constraint see McCarthy (2008: 279) with references. It is motivated by FULL SPECIFICATION, the standard

- b. DEP[long]: [long] features in the output must be present in the input.<sup>43</sup>
- c. MAX[long]: [long] features in the input must be present in the output.
- d. \*LONG- $V$  (\* $\bar{V}$ ): [+long] vowels are not permitted in the output.
- e. LONG- $V/\acute{V}$ : For all vowels  $x$ , if  $x$  is [V, +stress], then  $x$  is [+long].<sup>44</sup>

The first fact about Hittite vowel quantity that must be accounted for is that all vowels surface as short in unstressed syllables, including underspecified vowels. It is in this environment that the small but important role of HAVE[long] in (128a) is evident. This constraint — by assumption, inviolable in Hittite — rules out faithful realizations of underspecified vowels, requiring that they surface as either [+long] or [–long] in the output. (129b) provides a partial tableau for the Hittite irrealis particle *man* in (124b) above showing that HAVE[long] must dominate DEP[long] in (128b),<sup>45</sup> which penalizes insertion of [long] features (regardless of its featural value):

(129) a. /mAn/ → Hitt. *man* [man] (IRR)

b.

	/mAn/	HAVE[long]	DEP[long]
a.	mAn	*!	
b.	☞ man		*[–long]
c.	☞ ma:n		*[+long]

An additional constraint is required to explain why candidate (b) with short vowel is preferred to (c) with long vowel, since both equally violate DEP[long] and satisfy HAVE[long]. I assume that the relevant constraint is \*LONG- $V$ , which militates generally against output long vowels. The tableau in (130) thus completes the derivation in (129), with \*LONG- $V$  ruling out candidate (c):<sup>46</sup>

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assumption since *SPE* that the output of the phonological component contains fully specified feature matrices (cf. Steriade 1995); note, however, that is preferable to view full specification as a (set of) violable constraint(s), especially given the growing body of evidence for the idea that underspecification may persist all the way to the surface (see, e.g., Keating 1988, Myers 1998, McPherson 2011).

<sup>43</sup> I follow Inkelas (2000) here in treating features (like [long]) as independent entities (rather than attributes of segments) as assumed in most autosegmental phonology; under this view, feature-changing operations are penalized by MAX and DEP (see McCarthy 2008: 275–7 for discussion).

<sup>44</sup>The constraint schema in (128e) is adapted from Smith (2005), who provides general discussion of the cross-linguistic tendency for stressed syllables to undergo phonological augmentation, including vowel lengthening. (128e) has close analogue in Smith’s HEAVY $\sigma/\acute{\sigma}$ , which is itself equivalent to the well-known STRESS-TO-WEIGHT PRINCIPLE (Prince 1990, Riad 1992; cf. Prince and Smolensky’s (1993/2004) PK-PROM).

<sup>45</sup>DEP[long] in fact does no work in this analysis; it is included in (129b) and (130) only to show faithfulness constraints violated by the winning candidate(s) and will be omitted from subsequent tableaux.

<sup>46</sup>While no strict ranking in fact obtains between HAVE[long] and \*LONG- $V$ . Yet while the former is here assumed to be inviolable, it is clear in (132b) and (134b) that winners may violate the latter.

(130)

	/mAn/	HAVE[long]	* $\bar{V}$	DEP[long]
a.	mAn	*!		
b.	☞ man			*[-long]
c.	ma:n		*!	*[+long]

The next generalization that must be captured is that in stressed syllables underspecified vowels surface as long. Lengthening under stress is driven by  $\text{LONG-}V/\acute{V}$ , which is violated by vowels that remain short in this context (i.e. [V, -long, +stress]). When this constraint is ranked above \*LONG- $V$  as in (131), the analysis derives lengthening of underspecified vowels in stress syllables; this process is illustrated for Hitt. *mān* — the tonic allomorph of *man* in (130) — in the tableau in (132b) (cf. (124b) above):

(131)  $\text{LONG-}V/\acute{V} \gg \text{*LONG-}V$ (132) a. /mAn/ → Hitt. *mān* [má:n] ‘if; when’ (COMP)

b.

	/mAn/	LONG- $V/\acute{V}$	* $\bar{V}$
a.	mÁn	*!	
b.	mán	*!	
c.	☞ má:n		*

In (132b), candidate (c) wins because it violates only low-ranked; candidates (a) and (b) are ruled out because they fail to lengthen under stress, thus incurring violations of higher-ranked  $\text{LONG-}V/\acute{V}$ .

The last point that must be accounted for is that underlying [-long] vowels do not undergo regular lengthening in stressed syllables. Under this analysis, lengthening of underlying [-long] vowels requires insertion of a [+long] feature, which violates DEP[long] and also, more importantly, deletion of its [-long] feature, which violates MAX[long]. In order to block lengthening, MAX[long] must be ranked at the top of the grammar, as in (133); the tableau in (134b) demonstrates that non-lengthening emerges under this ranking:

(133)  $\text{MAX}[\text{long}] \gg \text{LONG-}V/\acute{V} \gg \text{*LONG-}V$ (134) a. /Ars - ántsĪ/ → *aršanzi* [arsántsi] ‘flow’ (3PL.NPST.ACT)

b.

	/Ars - ántsĪ/	MAX[long]	LONG- $V/\acute{V}$	* $\bar{V}$
a.	☞ ars-ántsi		*	
b.	ars-á:ntsi	*[+long]!		*

In (134b), candidate (a) better satisfies  $\text{LONG-}V/\acute{V}$  by lengthening under stress, yet does so by deleting its underlying [-long] specification, thereby violating top-ranked MAX[long]; the faith-

ful candidate (a), which preserves this [-long] feature, is thus selected as the winner despite failing to satisfy LONG-V/Ů.<sup>47</sup>

The proposed analysis of Hittite vowel quantity is summarized in the constraint ranking in (135):

(135) HAVE[long], MAX[long] >> LONG-V/Ů, DEP[long] >> \*LONG-V

### 3.2.2 LONG ⇏ STRESSED

With this analysis in place, I turn now finally to (ii) in (112), viz. the imperfect implicational relationship between vowel quantity and stress in Hittite. The evidence for unstressed long vowels in Hittite is too robust to deny their existence. The clearest cases are words in which more than one vowel is spelled plene in a single attestation of a word form, e.g. (136a); to these may be added word forms in which different vowels are spelled plene across (contemporaneous) attestations, e.g. (136b–c):

- (136) a. *āppalāweni* [a:p:alá:weni] ‘we entrap’ (1PL.NPST.ACT)  
 b. *aššūl* [a:s:ú:l] ‘favor’ (N.NOM/ACC.SG)  
*āššul*  
 c. (*parā*) *ḫandandātar* [χanda:ntá:tar] ‘providence’ (N.NOM/ACC.SG)  
 (*parā*) *ḫandāntatar*

Previous scholarship has recognized the existence of such unstressed Hittite long vowels, which are usually attributed to one of the two factors in (137) (see Kimball 1999: 61–2, 127–9):

- (137) (i) Late/post-PA sound changes (monophthongization, vowel contraction, compensatory lengthening) in unstressed syllables.  
 (ii) Analogy

The basic idea of (i) is that, after the phonological process that shortened inherited long vowels in unstressed syllables had run its course in PA, several mora-preserving sound changes

<sup>47</sup>One type of example that would problematize this analysis involves a stressed non-mid vowel that stands in an open syllable in some slots within a word’s inflectional paradigm but in a closed syllable in others. If underlyingly unspecified for length, this vowel should occur as long in both open and closed syllables, and if [-long], should exceptionally be realized as short even in an open syllable. What is not predicted, however, is a vowel that lengthens under stress in paradigmatic slots where it occurs in an open syllable but not in closed syllable slots. There is one Hittite word that may show this pattern, viz. *kiš-* ‘happen’, which is attested with plene writing in 3SG.NPST.MID *kīša(ri)*, but is never spelled plene in 1SG *kišḫa* or 2SG *kīšta*. The absence of length in the latter two forms is in fact historically unexpected (since it comes from a bimoraic diphthong; see Melchert 1994: 145–6), and the possibility that plene is accidentally unattested cannot be wholly excluded. If, however, these apparent quantitative alternations have linguistic reality, they may be accounted for by positing an additional constraint, STRESS-TO-WEIGHT (SWP; see n. 44), which requires stressed syllables to be heavy; if this constraint dominates MAX[LONG], it would force even underlyingly [-long] vowels to lengthen to satisfy its requirements.

occurred that produced “new” unstressed long vowels: monophthongization of inherited diphthongs; vowel contraction following the loss of intervocalic PIE *\*y* or *\*h<sub>1/3</sub>*,<sup>48</sup> and compensatory lengthening following the loss of tautosyllabic PIE *\*h<sub>x</sub>*.

Yet while (i) is a plausible hypothesis, clear examples that illustrate this phenomenon are lacking. On the one hand, there are words often cited in support of this development in which a single vowel is spelled plene but it is not the vowel that might be expected on comparative-historical grounds. In these forms, however, it cannot be excluded that that plene-spelled vowel is synchronically stressed and has undergone lengthening as a result. For instance, Kimball (1999: 128) cites as an example of compensatory lengthening Hitt. *mūta*-\* — the unattested base of denominative Hitt. *mūtā(i)*- ‘dig; remove’ (cf. 138d below) — from the verbal adjective PIE *\*muh<sub>1</sub>-tó-* (cf. Ved. *mūtá*-\* ‘moved’),<sup>49</sup> if this reconstruction is correct,<sup>50</sup> however, it is clear that stress had shifted onto the initial syllable already in PA, since the word was subject to PA lenition:<sup>51</sup> PIE *\*muh<sub>1</sub>-tó-* > *\*mūta-* > (via lenition) PA *\*mūda-* > Hitt. *mūta*-. Similarly, Kloekhorst (2014a) assumes that Hitt. *tāye/a-* ‘steal’ has peninitial stress, directly continuing a hypothetical PIE *\*(s)teh<sub>2</sub>-yé/ó-* with compensatory lengthening in the initial syllable; yet given that Hittite does have other root-stressed primary thematic *-ye/a-* verbs, there is no compelling reason not to take at face value the word’s plene-spelled initial vowel and assume that is long/stressed, i.e. [tá:ye/a-].<sup>52</sup>

On the other hand, there are words previously thought to contain both a stressed long vowel and an unstressed long vowel from one of these historical sources, but the evidence for the latter’s length has now been rendered non-probative by Kloekhorst’s (2014a) demonstration that <° *i-e-eC*> and <° *u/ú-e-eC*> plene spellings do not reliably indicate vowel length (see §3.1 above). Examples cited often involve the nominative plural suffix — for instance, Kimball (1999: 128) cites <*ma-a-ri-e-eš*> ‘spears’ and <*da-aš-ša-u-e-[eš]*> ‘strong’, which likely just spell [má:riyes] and [tás:awes] with short final vowel.<sup>53</sup>

<sup>48</sup>See Melchert (1994: 65–6, 72–3, 130) with references on the loss of PIE intervocalic *\*y* and *\*h<sub>1/3</sub>* (with updates on *\*h<sub>3</sub>* specifically in Melchert 2011b, 2015a). Melchert dates intervocalic *\*y* loss to pre-Hittite, while tentatively situating intervocalic *\*h<sub>1/3</sub>* loss to PA itself; see however Yates and Zukoff (2016b) for arguments that (at least) intervocalic *\*h<sub>1</sub>* loss was a relatively “late” pre-Hittite change.

<sup>49</sup>Like other *-ta*-participles in Vedic, *mūta-* (← *mīv-* ‘push; move’) must have been stressed on the final syllable, although this pattern is not directly attested (in RV, the *-ta*-participle is attested only in the compound *kāma-mūta-* ‘moved by desire; desire-driven’ (X.10.11c), which is non-probative).

<sup>50</sup>The etymology is Oettinger’s (1979: 377). Kloekhorst (2008: 588) questions his reconstruction on formal and functional grounds, but the former at least are unjustified. The only real difficulty is the PA shift of stress to the initial syllable, but this change in fact corresponds to a known type that is generally associated with words that are not formed by productive morphological processes (see Yates 2015a for discussion); since the adjectival suffix PIE *\*-to-* is not productive in Hittite and the root is not otherwise attested, *mūta-* is by this criterion a plausible candidate for the change.

<sup>51</sup> On PA lenition, see Eichner (1973), Adiego (2001), and Yoshida (2011) (cf. Melchert 1994: 68–9, 2015a).

<sup>52</sup>See further discussion of *tāye/a-* and related forms in §4.3.5. On *sāklāi-* and *sāgāi-* — often interpreted as evidence for (i) in (137) — see n. 58 below.

<sup>53</sup>For the same reasons, one cannot determine the length of the vowels resulting from monophthongized diphthongs which are cited by Kimball (1999: 128), e.g. <*a-ru-ú-e-es-kan-zi*> (← *aruwa(i)*- ‘bow’), <*pal-ú-e-es-kan-zi*> (← *palwa(i)*- ‘recite’).

In contrast, there is compelling evidence that — per (ii) in (137) — Hittite has developed unstressed long vowels by “analogy.” In this respect, an important (but often overlooked) observation was made by Kimball (1999: 129), who noted that “[a]n especially common source” of such long vowels was “analogy in derived forms.” One morphological class in which Kimball identifies evidence for analogical long vowels is denominative verbs formed with the suffix *-a(i)-*, which are fairly well-attested with plene writing in both the nominal base and in the derivational suffix (across attestations); in her view, these verbs were stressed on the *-a(i)-* suffix,<sup>54</sup> but “retained the vowel length of the base word from which they were derived.” This analysis is illustrated in (138):<sup>55</sup>

(138)	DERIVATIVE		BASE
a.	<i>āppalā(i)-</i>	[a:p:alá:(y)-]	← <i>āppala-</i> [á:p:ala-]
b.	<i>mūgā(i)-</i>	[mo:ká:(y)-]	← <i>mūga-*</i> [mó:ka-]
c.	<i>mūtā(i)-</i>	[mú:ta(y)-]	← <i>mūta-*</i> [mú:ta-]
d.	<i>šāktā(i)-</i>	[sa:ktá:(y)-]	← <i>šākta-*</i> [sá:кта-]
e.	<i>šāruwa(i)-</i>	[sá:rwá:(y)-]	← <i>šāru-</i> [sá:ru-]

Kimball’s (1999) analysis is attractive for several reasons. First of all, it must be compared with an alternative analysis whereby the derived form retained the stress pattern of the base, which would account for the long vowel there, but would leave the suffixal long vowel wholly unexplained. Even if one were to assume that Hittite had underlying long vowels (as under (126a) above) and that this suffixal vowel was long, it would still be necessary to explain why it fails to undergo (historical or synchronic) shortening in an unstressed syllable, as is the case for quantity-alternating vowels like those in (124). In contrast, the “analogical” length analysis makes it possible to maintain the implicational relationship between vowel length and word stress in only slightly weakened form: all Hittite long vowels are stressed *in some surface form*.

This analysis also aligns Hittite vowel length with a cross-linguistically well-known set of morphophonological phenomena generally referred to as CYCLIC effects, which involve the transfer (or “inheritance”) of phonological properties from base to derivative. A range of approaches have been developed specifically to account for such effects (within generative frameworks);<sup>56</sup> I discuss below two such approaches, both of which are (essentially) compatible with

<sup>54</sup>This suffix is discussed at length in §4.4.1.2, where I argue that it consistently attracts stress regardless of the accentual properties of its base.

<sup>55</sup>Evidence and glosses for the stems in (138): (a) *āppalāweni* ‘we entrap’ (1PL.NPST.ACT), *āppali* ‘in a trap’ (LOC.SG); (b) *mūgāmi* ‘I incite/urge’ (1SG.NPST.ACT); (c) *mūtaizzi* ‘digs’ (3SG.NPST.ACT), *mutān* ‘neglected’ (PTCP.N.NOM/ACC.SG) (d) *šāktāizzi* ‘performs sick-maintenance’ (3SG.NPST.ACT); (e) *šāruwāit* ‘plundered’ (3SG.PST.ACT), *šāruwawanzi* (INF), *šāru* ‘plunder’ (N.NOM/ACC.SG). For (138c–e), the nominal bases are unattested; the right asterisk implies that this is an accidental gap, but see below for further discussion of this issue. On the interpretation of (138c), see Melchert (2010a), and on (138d), see *CHD* (L–N: 335–6).

<sup>56</sup>See Rubach (2008) for a recent overview of research on these issues within the framework of Lexical Phonology, and within Optimality Theory, Bermudez-Otero (2011) and Kiparsky (2015).



the analysis of Hittite vowel quantity advanced in (126b) above, including its claim that Hittite surface long vowels are not underlying but are rather derived by stressed vowel lengthening. In examples like (138), lengthening would directly explain the stressed long vowels of both base and derivative and, indirectly, the unstressed long vowel of the derivative via cyclic transfer from the base.

It is important, moreover, that these approaches offer a means to encode length transfer into the synchronic grammar, since examples of “analogical” vowel length are not in fact limited to the suffix *-a(i)-*; rather, this phenomenon can be observed in connection with virtually all productive non-primary derivational suffixes,<sup>57</sup> including noun-forming suffixes like *-ul-*, *-atar*, *-ala-*, and *-ai-*, and verb-forming *-ešš-* and *-ahh-*. The evidence is less clear for these suffixes, whose derivatives are generally either attested with plene writing only in the base or in the suffix. For the noun-forming suffixes, at least, there is some direct evidence that the word contains more than one long vowel — (139a) for *-ul-*, (139b) for *-atar*, (139d) for *-ala-*, and (139c–d) for *-ai-*.<sup>58</sup>

<sup>57</sup> A distinction is traditionally made in IE linguistic scholarship between so-called “primary” derivatives, which are formed by affixation directly to the root, and “secondary” derivatives, which are formed by affixation to an already derived stem. I essentially maintain this useful distinction here, but refer to the latter type as “non-primary” to avoid any confusion that may result from the common use of the term “secondary” in historical linguistics in the sense of “non-original” or “historically innovative.”

<sup>58</sup> Evidence and glosses for the stems in (139): (a) *āššul*, *aššul* ‘favor’ (N.NOM/ACC.SG), *āššu* ‘good’ (ADJ.N.NOM/ACC.SG); (b) *parā handandātar*, *parā handāntatar* ‘providence’ (N.NOM/ACC.SG), *handān* ‘providential; blessed’ (ADJ.N.NOM/ACC.SG) (on the base, see further Ch. 4 n. 87); (c) [LŪ.MEŠ] *tawalāleš* ‘one who serves the *t*-drink’ (ANIM.NOM.PL), LŪ *dāwalalaš* (ANIM.NOM.SG), *tā(u)wal* ‘(type of drink)’ (N.NOM/ACC.SG); (d) *sāklāiš* ‘custom’ (ANIM.NOM.SG) (e) *šagāiš* ‘sign; omen’ (ANIM.NOM.SG). The assumed bases for (139d–e) are unattested and controversial. In this respect, an important point to note about the Hitt. *-ai-* is that it makes both primary and non-primary derivatives. The suffix productively derives animate nouns both from verbal roots (e.g. *huwart-* ‘curse’ ⇒ *hurdāi-* ‘curse’) and from verbal stems (e.g. *ištarnink-* ‘make sick’ ⇒ *ištarninkai-* ‘illness’). Hittite also has non-primary derived nouns in *-ai-* from nominal bases, such as *tuhḫuwai-* ‘smoke’ and *zashai-* ‘dream’. Both of these examples arise secondarily from older oxytone *i*-stem nouns, *tuhḫwī-* and *zashī-* (see Röβle 2002: 115–29), which are themselves non-primary derivatives; the immediate base of the former is a thematic stem (see Byrd 2011), and the latter may be as well (< PIE *\*d<sup>h</sup>uh<sub>2</sub>-wó-*; cf. PIE *\*d<sup>h</sup>uh<sub>2</sub>-mó-* ‘smoke’ > Ved. *dhūmá-*, Lat. *fumus*, etc.). What I propose here is that (139d–e) — much like these two nouns — are non-primary derivatives and have their unstressed long vowels by base-derivative transfer. (139d) at least is clearly a non-primary derivative (there is no comparative support for a primary “amphikinetic” suffix *\*-loi-* of the type posited by Kimball 1983: 149 and Kloekhorst 2008: 700–1). I therefore suggest PIE *\*seh<sub>2</sub>k-ló-* > PA *\*sāgla-* (with stress “retraction”; see Yates 2015a) and lenition) > Hitt. [sá:kla-]\* ⇒ (with length transfer) [sa:klí:-] (this form may be attested in OH/MS *šakli(n)=man* and in MH/MS *šaklin*; see CHD, Š: 44) > Hitt. [sa:klá:i-]. For full-grade root and initial stress in a *\*-lo-* stem in Hittite, perhaps cf. *māhla-* ‘branch of a grape-vine’ (see Kloekhorst 2008: 539–40); and for productive derivation in Hittite of *i*-stems from thematic stems, cf. Hitt. *danatta-* ‘empty’ ⇒ *danatti-* ‘desolation’. As for (139e), while there is no formal obstacle besides the double plene spelling to treating *šagāi-* as a primary derivative, it is certainly conceivable that it is non-primary (perhaps ultimately from PIE *\*séh<sub>2</sub>g-o-* or the like; cf. Lat. *sāgus* ‘wise’), and given the dearth of independent evidence for Hittite long vowels via compensatory lengthening in unstressed syllables, it may be simpler to assume that it developed much like *šāklāi-* and so had its unstressed long vowel via transfer from its base.

(139)	DERIVATIVE		BASE	
a.	<i>āššūl-</i>	[a:s:rú:l]	←	<i>āššu-</i> [á:s:rú-]
b.	<i>(parā) ḥandāntātar</i>	[χanda:ntá:tar]	←	<i>ḥandānt-</i> [χandá:nt-]
c.	<i>tāwalāla-</i>	[ta:walá:la-]	←	<i>tāwal-</i> [tá:wal-]
d.	<i>šāklāi-</i>	[sa:klá:y-]	←	<i>šākla-*</i> [sá:kla-]
e.	<i>šāgāi-</i>	[sa:ká:y-]	←	<i>šāka-*</i> [sá:ka-]

Unambiguous examples like (139) with multiple plene spelling are important in confirming that “analogical” length transfer is not confined to *-ai-*. Yet there is other evidence to suggest that this phenomenon is in fact much more robust. As will become clear in §4.4, there is strong reason to believe that all of the non-primary derivational suffixes noted above attract stress regardless of the properties of the base to which they attach, and are thus consistently stressed when no additional derivational suffixes follow.<sup>59</sup> Thus in words formed with these suffixes, a plene-spelled long vowel appearing in the base must be unstressed even if it is the only vowel in the word that happens to be attested with plene writing. For the most productive of these suffixes, there are numerous forms attested that show this pattern, e.g. (140a–c) for *-atar-*, (140d–f) for *-ahḥ-*, and (140g–i) for *-ešš-*.<sup>60</sup>

(140)	DERIVATIVE		BASE	
a.	<i>idāluwatar</i>	[ita:lawá:tar]	←	<i>idālu-</i> [itá:lu-]
b.	<i>lūriyatar</i>	[lo:riyá:tar]	←	<i>lūri-</i> [ló:ri-]
c.	<i>šarāzziyatar</i>	[sra:t̃siyá:tar]	←	<i>šarāzziya-</i> [srá:t̃siya-]
d.	<i>idālawahḥ-</i>	[ita:lawá:χ-]	←	<i>idālu-</i> [itá:lu-]
e.	<i>lūriyahḥ-</i>	[lo:riyá:χ-]	←	<i>lūri-</i> [ló:ri-]
f.	<i>nēwahḥ-</i>	[ne:wá:χ-]	←	<i>nēwa-</i> [né:wa-]
g.	<i>arāwešš-</i>	[ara:wé:s-]	←	<i>arāwa-</i> [ará:wa-]
h.	<i>idālawešš-</i>	[ita:lawé:s-]	←	<i>idālu-</i> [itá:lu-]
i.	<i>tēpawešš-</i>	[te:pawé:s-]	←	<i>tēpu-</i> [té:pu-]

<sup>59</sup>Of the six suffixes listed above, it is uncertain only whether factitive *-ahḥ-* has this stress-attracting property; see Ch. 4 nn. 99 and 101 for discussion.

<sup>60</sup>Evidence and glosses for the stems in (140): (a) *idālawanni* ‘evilness’ (N.DAT/LOC.SG), *idālu* ‘evil’ (ADJ.N.NOM/ACC.SG); (b) *lūriyatar* ‘humiliation’ (N.NOM/ACC/SG), *lūries* ‘disgrace’ (ANIM.NOM.PL); (c) *šarāzziyatar* ‘height’, *šarāzziyan* ‘upper’; (d) *idālawahḥanzi* ‘treat badly’ (3PL.NPST.ACT); (e) *lūriyah* ‘humiliate!’ (2SG.IMPACT); (f) *nēwahḥanzi* ‘renew’ (3PL.NPST.ACT), *nēwan* ‘new’ (ADJ.ANIM.ACC.SG); (g) *arāweššer* ‘became free’ (3PL.PST.ACT), *arāwan* ‘free’ (ADJ.ANIM.ACC.SG); (h) *idālawešzi* ‘becomes evil’ (3S.NPST.ACT); (i) *tēpawešta* ‘became small’ (3SG.PST.ACT), *tēpuš* ‘small’ (ADJ.ANIM.NOM.SG).



tableau in (143):<sup>64</sup>

(143)

	/ItÁlAw - É:s: - t̂sI/	BASE: [itá:lus]	MAX-OO[long]	LONG-V/Ŵ	*Ŵ
a.	italawés:t̂si		*!	*	
b.	italawé:s:t̂si		*!		*
c.	↗ ita:lawés:t̂si				**

The above is, of course, not a complete transderivational analysis of Hittite vowel quantity, which would require (*inter alia*) ensuring that bases are selected in a way that makes the right predictions. This task is in fact non-trivial, since output-output correspondence is necessary to derive overapplication of vowel lengthening in non-primary derivatives like *idālawēšzi* in (143), but is never found in comparable primary derivatives (on the distinction, see n. 57) — for instance, in *makkēšzi* ‘becomes numerous’ (← *mek-* ‘much; many’), which is never realized as <sup>x</sup>*mēkkēšzi* (<sup>x</sup>[mɛ:kɛ:s:t̂si]) despite the availability of surface bases that could cause this formed to be produced by output-output correspondence, e.g. *mēkkan* [mɛ:k:an] ‘much’ (ADJ.ANIM.ACC.SG).<sup>65</sup> Nevertheless, transderivational constraints may provide a viable solution to the base-derivative length transfer problem.

An alternative to output-output faithfulness would be to allow stressed vowel lengthening to apply cyclically. This analytic move would of course require abandoning strict parallelism in favor of a (constraint-based) framework that permits cyclic (re)application of phonological processes over morphosyntactically defined domains, such as COPHONOLOGY THEORY (e.g. Orgun 1996, Inkelas 1998, 2012) or STRATAL OPTIMALITY THEORY (e.g. Kiparky 2000; Kiparsky 2015, Bermúdez-Otero 2012, to appear). However, a potential advantage of this analysis is that — at least under the approach to Hittite vowel quantity adopted here (i.e. (126b) above) — there may be no need to posit any additional machinery beyond the cycle itself. If stress assignment and vowel lengthening apply after the addition of each derivational affix,<sup>66</sup> base-derivative length transfer follows from the constraint ranking already established in (133). An analysis along these lines is sketched in the tableaux in (144), where the output of (144a) functions as the input to (144b):<sup>67</sup>


<sup>64</sup>For simplicity, I ignore here the possibility that MAX-OO[long] is satisfied instead by underapplication of vowel lengthening in the base (i.e. <sup>x</sup>[itá:lus]), which is in any case excluded by the independently necessary constraint ranking LONG-V/Ŵ ≫ \*LONG-V.

<sup>65</sup>See further §4.4.1.2 on the derivation of *makkēšš-* ‘become numerous’.


<sup>66</sup>If derivational affixes are defined as suggested in Chapter 4 as those affixes with the capacity to change an item’s lexical class (N, V, A, etc.), the participle suffix *-ant-* (V ⇒ A) would be the only derivational affix that fails to trigger a cycle in this sense. However, this suffix also has a number of inflection-like morphosyntactic properties (§4.3.3.1) and patterns with inflectional endings with respect to stress assignment (§4.3.4.4); these facts suggest that it is a principled exception, however precisely it is to be accounted for.

<sup>67</sup>From a Stratal OT perspective, both (144a) and (144b) — the latter possibly without inflectional morphology — would likely be assigned to the stem-level phonology, which is generally taken to be the one stratum in which recursion is possible (see especially Bermúdez-Otero (2012, to appear) for detailed discussion).

(144) a.

/ItÁl - Aw/	MAX[long]	LONG-V/Ū	*Ū
a. itálaw		*!	
b.  itá:law			*

b.

/itá:law - És: - ts/	MAX[long]	LONG-V/Ū	*Ū
a. ita:lawés:tsi		*!	*
b. italawés:s:tsi	*!		*
c.  ita:lawés:tsi			**

I leave aside the formal details of the analysis in (144), which will depend on exactly which theory is adopted. The broader point is in any case clear: a cyclic analysis can account for base-derivative length transfer in Hittite. I note, however, two further points. First, the constraint ranking developed in Chapter 4 to account for Hittite stress assignment makes the same (correct) predictions about the distribution of word stress regardless of whether it applies after all morphological operations (as assumed there) or whether it applies each time a derivational affix is added;<sup>68</sup> the motivation for abandoning parallelism in favor of a cyclic approach must therefore come from its ability to better explain phonological phenomena other than stress. Yet relevant here is a second point, viz., that one such phenomenon may be the issue discussed above with *makkēšzi*. This form is unlikely to be problematic under any cyclic approach, most of which share the assumption — which harkens back to Lexical Phonology (e.g. Kiparsky 1982b: 144–5, 1982c: 32–3) — that roots do not constitute cyclic domains. Accordingly, stress assignment and vowel lengthening apply only to fully-formed stems; their first application to the primary derivative *makkēšzi* thus occurs only after the fientive suffix /-és:-/ is suffixed to the root, which thereby escapes stress and concomitant lengthening (which would yield <sup>x</sup>[me:k:é:s:tsi]).

It should be emphasized, though, that it is not my aim here to determine whether a trans-derivational or cyclic analysis provides the superior account of Hittite base-derivative vowel length transfer. For this study, it is sufficient that either approach can capture the important descriptive fact that length transfer from base to derivative is regular and synchronic in Hittite. A significant consequence of incorporating this fact into the synchronic phonology is that (nearly) all surface long vowels can be attributed directly or indirectly to stressed vowel lengthening. Whether long vowels can be eliminated from the lexicon altogether depends on the status of the derivational bases in (138c–e) and (139d–e) above, which are unattested in Hittite. Implicit in the derivations presented above is the claim that these forms — e.g. *mūka*-\* ‘goad’ — are absent from the historical record only by accident of attestation, but were in fact real words known to Hittite speakers, who also used them as bases for further derivation (⇒ *mūgā(i)*- ‘incite’). In this case, this assumption is plausible: the denominative verb is attested beside a noun *mūkeššar*, which suggests the existence of a derivational complex comparable to that of *danatta*- ‘empty’ ~ *danattā(i)*- ‘devastate’ ~ *danateššar* ‘devastation’ (cf. Melchert 2010a: 214).

<sup>68</sup>Adopting a cyclic analysis of Hittite vowel length does however admit the possibility of other analyses of its stress system — for instance, an analysis in which stress is left-edge oriented at the word-level, but right-edge oriented at the stem level — which could not be implemented in a strictly parallel optimality-theoretic framework. I do not pursue any of these analyses here, but raise the possibility for future research.

Nevertheless, the synchronic existence of *mūka*–\* remains uncertain, as do those of the other unattested bases discussed above. If it is in fact the case that these items had only historical reality, having disappeared from the language and thereby left their erstwhile derivatives synchronically isolated, it may be necessary to assume that this relatively small set of exceptional “derived” forms had to be stored with long vowels in their lexical entries.

These cases aside, however, a Hittite speaker would not have needed to learn underlying forms with long vowels, since they are effectively a predictable function of stress and the word’s morphological composition; what must be learned, rather, are which vowels fail to lengthen under stress (i.e. which vowels are underlying [–long]) and the principles by which stress is determined, including the idiosyncratic accentual properties of individual morphemes that factor into this morphophonological computation. Excluding these possible marginal long vowels, then, I assume that Hittite had the vowel phonemes in (145), where I employ the simplified notation that will be used in Chapters 4–5 (i.e. “/a/” for /A/, etc.; cf. n. 39):

(145)

HITTITE VOWEL PHONEMES	
/ĩ, i/	/ũ, u/
/e/	/o/
/ǎ, a/	

At this point, it may be useful to take stock of the implications of the discussion and analyses laid out above for diagnosing Hittite word stress on the basis of vowel quantity and its orthographic correlate, plene writing. One important finding concerns how plene writing can be used as positive evidence for word stress — viz., that morphological structure matters. Determining a word’s stress pattern is easiest in primary derivatives and root-based formations (i.e. words that lack an overt derivational suffix), which contain at most one long vowel, and if so, that long vowel is stressed. Much more difficult, however, are (historical) non-primary derivatives, which may contain more than one long vowel (in fact, as many as one long vowel per derivational suffix). The phonological generalization argued for above is that it is always the *rightmost* long vowel in a word that is stressed. This generalization makes it possible to deal with cases like those mentioned at the beginning of this section in which there is “too much” plene writing, e.g. *āppalāweni* ‘we entrap’, *šāktāizzi* ‘performs sick-maintenance’; the first plene-spelled long vowel is inherited from the base, and the second — the vowel of the derivational suffix — is stressed, i.e. [a:p:alá:weni], [sa:ktá:ytsi].<sup>69</sup> Yet plene writing in non-primary derivatives must also be used with caution, since there are examples like those in (140) — e.g. *idāluwatar* ‘evilness’ — in which the only plene-spelled vowel is the long vowel of the base; in such cases, plene writing is misleading, because it is in fact the orthographically unmarked long vowel of the suffix

<sup>69</sup>In fact, a logical possibility in these words is that stress falls further to the right, on the inflectional ending, but it happens not to be attested with plene spelling (i.e. <sup>x</sup>[a:pala:wé:ni]/<sup>x</sup>[a:pala:weni:]). However, it will become clear in Chapter 4 (see especially §4.3.5 and §4.4) that stress never shifts onto inflectional endings in non-primary derivatives (with the possible exception of “secondary mobility;” cf. Ch. 4 n. 61).

that is stressed, i.e. [ita:lwá:tar]. The real stress pattern can be inferred here only by examining morphologically comparable forms, such as *aššuwātar* ‘goodness’ ([a:s:wá:tar]; see (209a) below), which clearly show that the derivational suffix attracts stress, since its plene-spelled long vowel is otherwise unmotivated (see §4.4.1.2 below for details).

Another finding from the discussion above relates to how the absence of plene writing can — with appropriate caution — be used as negative evidence for word stress. In this respect, two useful diagnostic generalizations emerge from the theory of Hittite stress and vowel length outlined above: (i) stressed vowels are long in open syllables; and (ii) stressed mid vowels are long. In these phonological contexts, then, vowels should be long if stressed and therefore spelled plene. Thus if plene writing is systematically absent across a large number of attestations of the relevant word form — i.e. a sufficient number as to make it highly unlikely that its absence is an accidental gap (ultimately attributable to the optionality of plene spelling; cf. 3.1 above) — it is reasonable to conclude that this vowel is short and therefore unstressed.

With this principle established, it is possible to return at last to the other problematic examples noted at the beginning of this section, *walḫzi* ‘strikes’ and *sanḫzi* ‘seeks’, in which there is “too little” evidence for plene spelling. In each of these forms, if the final *i*-vowel were stressed, it would be long in accordance with (i). Yet *walḫzi* and *sanḫzi* are never attested with plene writing despite multiple occurrences, and perhaps still more tellingly, the 3SG.NPST.ACT ending *-zi* ([-t̪si]) is attested thousands of times but never spelled plene. Moreover, it was also established that *a*-vowels in closed syllables are not necessarily long when stressed. On the basis of this convergent negative evidence, it is therefore possible to conclude on purely synchronic grounds that these verbs forms must be [wáɫχ-t̪si] and [sánχ-t̪si] with initial stress.

I note one final point relevant to these forms before proceeding. In the case of *walḫzi* and *sanḫzi* (and similarly, *parḫzi* ‘rushes’ in (125a) above), synchronic diagnostics simply serve to confirm the stress pattern that is expected historically. It has long been known that all three of these verbs are inherited PIE *\*m*-conjugation verbs — morphologically comparable to *ēšzi* ‘is’ in (118a) above — with *\*é* root vocalism,<sup>70</sup> but due to the sound change exemplified in (122) above (see n. 27), *\*é* merged in this environment in pre-Hittite with PIE *\*á* and thus did not lengthen in closed syllables. Yet even if they seem to add little to the picture in these examples, it is nevertheless crucial that these synchronic diagnostics are available. For instance, I discuss in Chapter 5 a number of words and morphological categories in which the position of stress has changed diachronically; having an explicit theory of vowel length and its relationship to plene writing is essential to identifying such cases of prosodic change.

### 3.3 Vowel reduction & word stress

Besides plene writing, the other major diagnostic for Hittite word stress is vowel reduction, i.e. qualitative and quantitative changes affecting vowels in unstressed syllables. Historically, there is evidence for a wide range of vowel reduction patterns in the prehistory of Hittite, which include: raising of *\*e/* to [i] in pretonic syllables and post-tonic closed syllables; weakening of

<sup>70</sup>For a recent overview of the reconstructed PIE verbal system — and in particular, the morphological distinction between *\*m*- and *\*h<sub>2</sub>e*-conjugations — see Lundquist and Yates (to appear: §4).

*\*/e/* to [a] in post-tonic open syllables;<sup>71</sup> and sporadic syncope of pre- and post-tonic vowels, especially in open-sided syllables (see Melchert 1994: 137–40, 173–4, Kimball 1999: 136–40, 175–93). For some Hittite words, these diachronic changes are the only available evidence for its synchronic stress pattern; it should be emphasized, however, that while such evidence is suggestive, it must be used with caution, given the possibility of subsequent historical shifts in the position of word stress (cf. Yates 2015a).

Better evidence for synchronic word stress patterns comes from vowel reduction processes that are productive in Hittite. Leaving aside the length alternations discussed in §3.2, there are two principal patterns of synchronic vowel reduction. First, there is a strong tendency for */e/* to reduce to [a] in immediately pretonic syllables,<sup>72</sup> which results in intraparadigmatic alternations between stressed [é:] and unstressed [a].<sup>73</sup> The major locus for this alternation is in the class of “*ē/a*-ablauting” *mi*-verbs (discussed in §4.3.2.1 below), such as (146a–c);<sup>74</sup> however, it can also be observed to a limited extent within the nominal system, e.g. (146d):

<sup>71</sup>This change — which explains (*inter alia*) the suffixal *a*-vocalism of Hittite *i*- and *u*-stem nominals (cf. Yoshida 2010: 391) — arguably persists as a synchronic process in OH, where it would account for examples in which the 1/2PL.NPST.ACT endings */-wéni/* and */-t:éni/* surface when unstressed as [-wani] and [-tani] (see further §4.3.1 with n. 26).

<sup>72</sup>See Crosswhite (2001: 25–33) for cross-linguistic discussion of vowel systems — including of several modern IE languages — in which [a] functions as a reduced vowel (unexpectedly, in view of its high sonority). There is also historical evidence that supports viewing Hitt. [a] as a reduced vowel. For instance, Hitt. *ašanzi* in (146a) below has exact cognate in Ved. *s-ánti* (< PIE *\*h<sub>1</sub>s-énti*; see further §§5.3.2.1–5.3.2.2). The Hittite word-initial [a] vowel thus stands in correspondence with ∅ in Vedic Sanskrit, where */a/* (< PIE *\*/e/*) was subject to deletion in this position. The fact that Hitt. [a] emerges diachronically in a deletion environment suggests that it is the reflex of a reduced vowel — likely *\*[ə]* — at a post-PIE stage; for a proposal along these lines for the examples in (146) — and a critical assessment of previous views — see Yates (2014c).

<sup>73</sup>It is possible that when preceded by a labialized obstruent */e/* has a reduced allophone [u] (lowered to [o] after a uvular fricative), which can be observed within the same morphological class as verbs like (146a–b); see Ch. 4 n. 30 for discussion. Note that the same alternation can be observed in interparadigmatically, i.e. between derivationally related words — compare, e.g., *adātar* ‘eating’ (N.NOM/ACC.SG) with (146b).

<sup>74</sup>Because of the ambiguities inherent to the Hittite writing system (cf. §1.3.3 above), it is unclear whether certain other verbs that belong historically to this class, such as *mer-/mar-* ‘disappear’ (e.g. 3SG.IMPACT *mērtu* vs. 3PL *marandu*), show reduction of the unstressed root vowel as in the examples in (146) (thus [mar-]) or deletion as in (147d) (thus [mr-]). The latter would continue the PIE situation, but I am inclined to think that the former is correct for synchronic Hittite, especially in view of the behavior of verbs belonging to this class in which the root begins with a labialized obstruent (see Ch. 4 n. 30 for discussion). This point requires further investigation within the broader context of the (morpho)phonological conditions on */e/* reduction and deletion in Hittite (cf. n. 75 below).



(146)	a.	/Es/	<i>ēšmi</i>	[é:s-mi]	vs.	<i>ašanzi</i>	[as-ántsi]
			‘be’	‘I am’		‘are’	
				(1SG.NPST.ACT)			(3PL.NPST.ACT)
	b.	/Et/	<i>ētmi</i>	[é:t-mi]		[a]zzastē[ni]	[ats-t:émi]
			‘eat’	‘I eat’		‘you eat’	
				(1SG.NPST.ACT)			(2PL.NPST.ACT)
	c.	/sEs/	<i>šēšzi</i>	[sé:s-tsi]		<i>šāšanzi</i>	[sas-ántsi]
			‘sleep’	‘sleeps’		‘sleep’	
				(3SG.NPST.ACT)			(3PL.NPST.ACT)
	d.	/tEkAn/	<i>tēkan</i>	[t:é:kan]		<i>taknāš</i>	[takn-ás]
			‘earth’	‘earth’		‘of the earth’	
				(N.NOM/ACC.SG)			(N.GEN.SG)

In (146a) and (146d), in particular, pretonic reduction of /e/ to [a] is corroborated by plene writing of the immediately following vowel, which confirms that it is stressed. Phonologically, it would be implausible to separate this pattern of reduction from the diachronic changes affecting \*/e/ described above, all of which have the same effect, i.e. eliminating \*[e] in unstressed syllables (cf. Melchert 1994: 133); this type of “conspiracy” suggests that already in pre-Hittite there was a highly ranked markedness constraint against unstressed [e], which persists in the language’s synchronic grammar.<sup>75</sup> However, I leave aside for the present a formal analysis of this pattern of vowel reduction; for the purposes of this dissertation, it is crucial only that alternations between Hitt. *ē* and *a* are indicative of the presence vs. absence of stress (i.e. [é:] vs. *a* ([a])

Also common in Hittite is vowel reduction in its extreme form, i.e. deletion (cf. Crosswhite 2001: 3). Specifically, Hittite shows deletion of /e/ and /a/ in pretonic syllables. While the exact conditions under which deletion is permitted remain uncertain, there is robust evidence for deletion of /a/, which is common especially in diphthongal *hi*-verbs (see (167–168) in §4.3.2.1 below) such as (147a–c), but also found in nouns like (147c); there are fewer examples of /e/-deletion, but one clear one is (147e) (see (209d) in §4.4.1.2):<sup>76</sup>

<sup>75</sup> This constraint must be connected at a deeper level with PIE \*/e/ø quantitative ablaut, which viewed in generative terms amounts to a process deleting \*/e/ in unstressed syllables (see, e.g., Lundquist and Yates to appear: §3.3). However, it remains highly uncertain at present in exactly what (morpho)phonological environments /e/ was deleted at the directly reconstructible stage of PIE. Evaluating how the Anatolian evidence bears on this question is an important task for future research.

<sup>76</sup> On the historical development of (147d) see Melchert (2010c) (contra Kloekhorst 2008: 166–7); building on his analysis, I propose here that the raising of pretonic \*/e/ to [i] in pre-Hittite made it possible for the original PIE \*/o/ ~ \*/e/ qualitative alternation in the root to be restructured as a deleting [a] ~ [ø] synchronic alternation.

(147)	a.	/sʎAi/	<i>išhāi</i>	[isʎá:y]	vs.	<i>išhianzi</i>	[isʎi-yántsi]
		‘bind’	‘binds’	(3SG.NPST.ACT)		‘bind’	(3PL.NPST.ACT)
	b.	/tAi/	<i>dāi</i>	[tá:y]		<i>tianzi</i>	[ti-yántsi]
		‘place’	‘places’	(3SG.NPST.ACT)		‘place’	(3PL.NPST.ACT)
	c.	/ʔsai/	<i>zāi</i>	[zá:y]		<i>zištēn[i]</i>	[ʔsi-st:é:ni]
		‘cross’	‘crosses’	(3SG.NPST.ACT)		‘you cross’	(2PL.NPST.ACT)
	d.	/Ais:/	<i>āiš</i>	[á:ys]		<i>iššī</i>	[is:í:]
		‘mouth’	‘mouth’	(N.NOM/ACC.SG)		‘in the mouth’	(N.LOC.SG)
	e.	/pIsĒn/	<i>pišēnuš</i>	[pisé:n-os]		[p]išnāš	[pisn-á:s]
		‘man’	‘men’	(ANIM.ACC.PL)		‘of the man’	(ANIM.GEN.SG)

In (147c–e), the plene-spelled long vowel of the inflectional ending once again confirms that the site of the deletion is the immediately pretonic syllable.

Vowel-deleting alternations like (147) have important effects on the distribution of primary stress in Hittite, especially in its nominal system. In particular, deletion of stem-final stress-attracting vowels like in (147e) licenses an otherwise dispreferred rightward shift of stress onto the inflectional ending, a process that Kiparsky (2010, to appear) refers to as “secondary mobility” in his analysis of Vedic Sanskrit word stress (cf. Ch. 4 n. 61).<sup>77</sup> A full analysis of the conditions on deletion in Hittite is beyond the scope of this dissertation; what is relevant for this study, rather, is simply that pretonic vowels tend to delete, and that deleting alternations can therefore be used as a synchronic diagnostic of the position of word stress.

### 3.4 On the phonetic realization of word stress

In the absence of living speakers or of audio recording, it is of course impossible to be certain about how stress was phonetically realized in Hittite. From a purely historical perspective, it would be reasonable to suppose that (high) pitch played an important role, since there is general agreement that the primary phonetic correlate in PIE was raised pitch (see §1.1.1). Under this view, the PIE situation is directly continued in Vedic Sanskrit and Ancient Greek, whose ancient grammarians described the primary prominence as *udātta* ‘raised’ and *oxeīa* ‘sharp; shrill’ respectively; among modern languages, a close typological parallel is Tokyo Japanese.

However, the phonological processes treated in preceding sections give strong reason to believe that Hittite has innovated in this respect. In Hittite, only two correlates of word stress can directly be observed in the historical record: (i) increased duration; and (ii) fuller realization of vowel quality. The former is reflected in the lengthening of most stressed vowels, which are

<sup>77</sup>“Secondary mobility” in Hittite is not fully explored in this dissertation, since it focuses primarily on the Hittite verbal system and this phenomenon is, as noted above, mostly confined to (athematic) nominal derivation; still, I note here that an example like (147e) is amenable to an analysis along the lines of Kiparsky’s (2010) treatment of the Vedic data.

optionally orthographically encoded with plene writing of the resulting long vowel (§3.2). The latter is reflected in the reduction of unstressed vowels, which can be most clearly observed in stress-alternating inflectional paradigms. Since the qualitative difference between [e] and [a] is orthographically represented, examples in which [a] occurs as a reduced allophone of /e/ in unstressed position are readily identifiable; similarly, in deleting alternations the deleted vowel is simply absent from the word's orthographic representation (cf. §3.3).

Cross-linguistically, these two correlates of word stress are associated with canonical “stress accent” languages such as Modern English (see, e.g., Bybee et al. 1998, Hyman 2009: 217–18).<sup>78</sup> On typological grounds, then, it is probable that stress was phonetically realized in Hittite, as in other “stress accent” languages, with a combination of increased intensity, higher pitch, increased duration, and fuller articulation of vowel quality.<sup>79</sup> The innovation of a “stress accent” is hardly unique to Hittite, the development of which is paralleled in Armenian, Albanian, and Modern Greek, as well as in the Italic, Celtic, and Germanic branches of the IE family. The emergence of this feature in Hittite and in these last three “Western” IE branches may even be attributed to areal convergence, although given its development elsewhere in the family, the possibility of independent innovations cannot be excluded.<sup>80</sup>

A further question is exactly when this innovation occurred. A “stress accent” better explains the patterns of pre-Hittite patterns of vowel reduction described in §3.3 above, but reconstructing it back further is uncertain. The most compelling evidence for the change are the quantitative developments: lengthening of short stressed vowels, which is usually taken to be a post-PA innovation; and shortening of unstressed vowels, which is datable to PA (cf. n. 15 above). Kloekhorst (2014a) has argued that PA lenition (see n. 51 above) must have been conditioned by “stress accent” and thus that the innovation must be dated to this PA stage, but see Yoshida (2011: 101–5) for an alternative proposal under which lenition is conditioned by tone. In my view, it is likeliest that a prototypical “stress accent” had developed already in PA, but the issue merits further investigation.

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<sup>78</sup>Deletion alone is of course not a sufficient criterion for “stress accent,” especially in the ancient IE languages, nearly all of which exhibit patterns of vowel deletion as an inherited reflex of PIE quantitative ablaut (*\*e/∅*, *\*o/∅*), including those with “pitch accent” (Vedic Sanskrit, Greek, Balto-Slavic). However, when deletion is taken together with lengthening of stressed vowels and the prehistoric changes affecting unstressed *\*e* that are not clearly linked to inherited ablaut (described in §3.3 above), the evidence collectively points strongly toward “stress accent” rather than “pitch accent.”

<sup>79</sup>Kloekhorst (2014a: 172, 218) arrives at the same conclusion.

<sup>80</sup>See Puhvel (1994) and Melchert (2016b) for discussion of shared features that support a “Western IE” areal group. On areal convergence in IE generally, see Ringe et al. (2002), Garrett (2006), and Ringe (to appear).

## CHAPTER 4

### Analyzing Lexical Accent in Hittite

#### 4.1 Toward an analysis of Hittite word stress

Over the last four decades, philological and comparative-historical linguistic scholarship on Anatolian prosody — e.g. Hart (1980), Carruba (1981), Kimball (1983, 1999), Melchert (1984, 1992, 1994), and most recently Kloekhorst (2008, 2014a) — has made significant progress in determining the surface patterns of word stress that obtained in the Anatolian languages, a task made difficult by the nature of the textual evidence: word stress is not directly encoded in the orthography of any of these languages, but instead must be inferred from its phonological effects on stressed vowels and neighboring segments. This body of research has succeeded in clarifying, especially, the distribution and function of so-called “plene writing,” and how it can be used to diagnose the position of stress in Hittite and, to a lesser extent, in the other Anatolian languages attested in cuneiform script, Palaic and Cuneiform Luwian (cf. §5.2). The Hittite stress patterns described by these scholars — together with those identified using the methods developed in their work — are the primary object of study of this chapter, which develops a novel synchronic analysis of Hittite word stress and the grammatical principles by which it is assigned.<sup>1</sup>

The goals of this chapter — and so in turn, the primary data on which it focuses — differ from those of most previous research on Anatolian word stress. A major objective of this research has been to determine what surface stress patterns are observed in inherited lexemes and morphological categories in the Anatolian languages, and in turn, what implications these patterns have for the reconstruction of the corresponding words and categories in PIE (and beyond). Such diachronic questions are, of course, of interest in this dissertation, and one important purpose of the approach to word stress adopted here — which is, to the extent possible, purely synchronic — is to establish a more secure foundation for addressing them in Chapter 5. Toward this end, the primary aim of this chapter is to provide a descriptively adequate account of Hittite word stress, which must therefore generalize across its whole morphology, capturing speakers’ knowledge of how all possible words are stressed, not only the subset of lexical items that are likely to be directly inherited; this chapter is thus (relatively) less concerned with those areas of morphology that have previously attracted the bulk of Indo-Europeanists’ attention (above all, athematic primary nominal derivatives), and more so with the stress patterns observed in verbal inflection and in non-primary nominal and verbal derivational processes that have become or remained productive in Hittite.<sup>2</sup>

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<sup>1</sup>The analysis advanced here builds upon (and supersedes) the earlier one presented in Yates 2016c.

<sup>2</sup>On the distinction between “primary” and “non-primary” derivation (the latter traditionally referred to as “secondary”), see Ch. 3 n. 57.

These productive categories play a very important role in understanding the systemic morphophonological principles that govern Hittite stress assignment. The Hittite language is attested over the course of several centuries, and for numerous individual word forms there is evidence for more than one stress pattern. Because Hittite texts can generally be organized into historical strata (cf. §1.3.2) this variation can in some cases be attributed to diachronic change.<sup>3</sup> In other cases, however, no clear diachronic trajectory can be ascertained within the historical record; the differing stress patterns then appear to — and indeed, may in fact — reflect inter-speaker (or even intra-speaker) variation.<sup>4</sup> Individual word forms thus confirm the existence of a problem that becomes particularly acute when examining inflectionally and derivationally related forms of a single lexeme: it cannot always be determined which attested word forms are the output of a single grammar, and which instead reflect the operation of multiple grammars. Yet when productive morphological categories are viewed holistically, certain prosodic generalizations clearly emerge. For instance, §4.3 discusses a class of verbs that show a well-defined prosodic split: there are some verbs in which the position of stress depends on what inflectional suffixes are present, and others in which stress always surfaces on the stem. Although there are some verbs within this class which present ambiguous or conflicting evidence for word stress,<sup>5</sup> there are numerous verbs for which these generalizations hold across all attestations, as well as others for which all of the oldest attested forms exhibit such uniform behavior.<sup>6</sup> I take broad

<sup>3</sup> For instance, the oldest attested genitive plural form of the word for ‘foot’ is *padān* ([patá:n]), but in younger texts is found *pātan* ([pá:tan]) with initial stress (cf. Kloekhorst 2014a: 409), which must reflect a diachronic change in word stress within the historical period of the language. This change in fact conforms to a well-established diachronic trajectory in Hittite from non-initial to initial stress, the evidence and motivation for which is discussed in detail in Yates (2015a). Morphological renewal often also induces changes in word stress, e.g., the frequent conversion of original radical *mi*-verbs (cf. §4.3 below) into suffixed verbs of the highly productive “*ḫatrae*-class” (Oettinger 1979: 30–4; Kloekhorst 2008: 132–4), which results in a shift of stress onto the *-a(i)-* suffix (on which see §4.4.1.2 below).

<sup>4</sup> The issue is further complicated extra-linguistic factors — in particular, by the (extensive) orthographic ambiguities inherent to the Hittite cuneiform script (on which see §3, as well as §4.2.1 and §4.4.1.3 below), and by the errors introduced as a natural result of the textual transmission process (viz. scribal errors). Such circumstances lead to “phantom data,” word forms with no phonological reality which cannot (and should not) be accounted for by a linguistic analysis.

<sup>5</sup> Well-attested radical verbs that show a mixture of stress patterns often owe this diversity to a diachronic shift in morphological class, e.g., into the productive “*ḫatrae*-class” mentioned in n. 3 above. This change may obscure a verb’s original distribution of stress, since it is not always possible to assign a given attestation to the paradigm of the older radical verb stem or to the younger suffixed verb stem except on the basis of their stress patterns. Meanwhile, in less well-attested verbs, poverty of attestation may obscure an even less detectable diachronic change, such as analogical generalization of some surface allomorph (usually “strong” singular stem form; for a clear case of this type, see n. 6 below).

<sup>6</sup> For instance, the oldest 1st person plural non-past forms of *ē/a*-ablauting *mi*-verbs (cf. §4.3.2.1) receive stress on their inflectional endings (conditioning reduced *a*-vocalism in the root), e.g. *šašweni* ‘we sleep (OH/OS) to *šeš/šaš-* ‘sleep’. However, in younger texts some of these verbs are attested with root stress (as shown by *e*-vocalism and plene spelling of the root), e.g. *šēšweni* ‘id.’ (LNS). In other verbs, the evidence is not sufficient to observe such a clear diachronic trajectory — e.g. the oldest attested 1st plural form of *eš/aš-* ‘be’ is *ēšwani* ‘we are’ (OH/NS). Yet the fact that this trajectory is observed for *šēš/šaš-* — and in fact, other verbs within this class, e.g. *[a]ppuēni* (MS) vs *ēppuēni* (NH/NS) to *epp/app-* ‘take’ — makes it highly plausible to assume that the *ēšwani* is the result of the same prosodic change (even putting aside comparative-historical considerations, which support this view; see further §5.3.1), but that this change is accidentally omitted from the historical record, having taken place prior to the earliest attestation of this word form. It is therefore not necessary (nor likely desirable) to suppose that the

generalizations of this kind to reflect synchronic Hittite stress assignment, and in this chapter, I aim primarily to explain why such generalizations obtain within this and other morphological categories.

This chapter is broadly organized as follows. §4.2 provides a basic introduction to the Hittite stress system. After briefly reviewing the evidence for word stress (§4.2.1), I show that Hittite has the definitional properties of a LEXICAL ACCENT (LA) system: individual morphemes have lexically specified accentual features that enter into the computation of word stress (§4.2.2). These morphophonological interactions are the subject of the next two sections, where I advance the three empirical claims in (148) about the operation of its LA system:

- (148) (i) Hittite morphemes may be lexically specified as ACCENTED or unspecified (i.e. UNACCENTED).  
(ii) Hittite has a phonological preference for leftmost stress.  
(iii) Hittite has DOMINANT affixes that “override” (ii), attracting stress away from an accented morpheme/stem to their left.

§4.3 treats the interaction between (i) and (ii) in Hittite, focusing especially on stress (non-)alternations in verbal inflection. Within this domain, I show that stress assignment in Hittite is governed by Kiparsky and Halle’s (1977) BASIC ACCENTUATION PRINCIPLE, which was introduced in §1.1.3.2 and which was shown in Chapter 2 to be operative in Cupeño as well. This morphophonological principle is repeated in (26) (cf. Kiparsky 2010):

- (26) BASIC ACCENTUATION PRINCIPLE (BAP):  
If a word has more than one accented vowel, the leftmost of these receives word stress.  
If a word has no accented vowel, the leftmost syllable receives word stress.

I implement the BAP within an optimality-theoretic model of Hittite stress assignment, and demonstrate that it correctly generates attested patterns of word stress in Hittite verbal inflectional paradigms, as well as in other productive inflection-like morphological categories.<sup>7</sup>

However, like the other ancient IE languages (cf. §1.1.3.2), Hittite also has a class of accentually DOMINANT morphemes that systematically violate (26), attracting stress away from an accented stem to their left and thus “overriding” the phonological preference for leftmost stress. §4.4 assesses the evidence for this class, whose stress-attracting properties can be clearly observed in non-primary nominal and verbal derivation. I demonstrate that affixes belonging to this class are prototypical (i.e. lexical class-changing) derivational suffixes. In view of this distribution, I propose attributing the superficially exceptional stress-attracting properties of these suffixes to their status as morphological heads (cf. §1.1.3.3), which are thus subject to privileged faithfulness constraints (HEADFAITH; cf. Revithiadou 1999). I show that positing such constraints, which make direct reference to morphological structure, allow Hittite stress patterns in both derivation and inflection to emerge from a single constraint ranking.

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same synchronic grammar generates both *šašwani* and *ēšwani*.

<sup>7</sup>The historical implications of this finding are assessed in the next chapter (§5.3.2.2), where I argue that the convergent evidence of Hittite and the NIE languages supports the reconstruction of the BAP for PIE as hypothesized by Kiparsky and Halle (1977).

§4.5 concludes: I summarize the principal findings of this chapter and briefly discuss some of their implications for the broader questions investigated in this dissertation.

## 4.2 Word-prosodic typology & Hittite word stress

This section lays the foundation for an analysis of Hittite stress. §4.2.1 provides a concise overview of the primary diagnostics for word stress in Hittite. §4.2.2 then establishes the general properties of the Hittite word-prosodic system, situating it in Indo-European and cross-linguistic perspective.

### 4.2.1 Evidence for Hittite word stress

The textual evidence for Hittite word stress is highly complex and dependent on a number of philological and phonological assumptions concerning the interpretation of Hittite orthography. The set of assumptions that guide the analysis developed in this chapter were discussed at length in Chapter 3, which specialists are encouraged to consult. This section is intended primarily for non-specialists: it provides a short overview of the basic principles of the Hittite writing system and — on the basis of the generalizations established in Chapter 3 — a brief summary of how word stress is orthographically encoded.

Hittite is written in a cuneiform mixed syllabic-logographic script. Syllabic signs may have the value *CV*, *VC*, *V*, or (less commonly) *CVC*. Word stress is not directly represented in this orthographic system; however, Hittite scribes did encode the effects of stress on vowel quantity and quality, which make it possible to indirectly diagnose the position of primary stress. The first and most important of these diagnostics is so-called *PLENE WRITING*, the optional repetition of an identical *V* sign after a *CV* sign (or word-initially before a *VC* sign) in the spelling of vowels or diphthongs (Kimball 1999), which is now generally agreed to mark vowel length in Hittite (as proposed already by Hrozný 1917: xii), as well as in the other Anatolian languages attested in cuneiform script, Palaic and Cuneiform Luwian.

The contrast between plene and non-plene writing is illustrated in (149), where each example is presented at three levels of representation: in transliteration (<...>); in so-called “broad transcription,” where vowels spelled plene are indicated by a macron (ˉ); and in an approximate phonetic transcription:

(149)	PLENE	vs.	NON-PLENE	SR
	<ša-a-ak-ki> šākki		<ša-ak-ki> šakki	[sá:k:i] ‘knows’ (3SG.NPST.ACT)
	<i-da-a-lu> idālu		<i-da-lu> idalu	[itá:lu] ‘evil’ (ADJ.N.NOM/ACC.SG)
	<še-e-eš-zi> šēšzi		<še-eš-zi> šešzi	[sé:stsi] ‘sleeps’ (3SG.NPST.ACT)

(149) also shows that the same word may be attested both with and without plene writing. I assume that this orthographic inconsistency has no bearing on the actual length of the vowel in question, which is more faithfully represented in its plene-spelled forms; thus because of its

fundamental optionality, only the systematic absence of plene writing across a fairly large sample of attestations can be phonologically informative, viz. that a given vowel is phonologically short.<sup>8</sup> The reader should be aware, then, that some of forms cited in broad transcription here may appear to “mismatch” their accompanying phonetic transcription with respect to vowel (or consonant)<sup>9</sup> length; in these cases, the length of the relevant segment is inferred from paradigmatically related forms.

Also reflected in (149) is the relatively strong implicational relationship in Hittite between vowel length and primary stress. In general, each Hittite lexical word contains at most one long vowel (spelled plene), and this vowel is stressed. Exceptions to this generalization — words containing multiple long vowels — are effectively confined to non-primary derivatives of the type discussed in §4.2.2.4 and §4.4.1 below, which appear to “inherit” the vowel length of their derivational base.<sup>10</sup>

From a diachronic perspective, the close relationship between vowel length and stress is due to a series of historical processes that shorten unstressed long vowels and lengthen many stressed short vowels. These processes persist in the synchronic grammar, but in modified form — in particular, I proposed in §3.2 that certain alternations between long and short vowels that historically involved shortening have been reanalyzed such that the long vowel allophones are derived synchronically via stressed vowel lengthening. Yet however exactly these forms are to be analyzed, it is clear that the correlation between vowel length and word stress is maintained: alternating vowels are long when stressed long (written plene), short when unstressed.

Besides plene writing, the other major diagnostic for Hittite word stress is vowel reduction. There is a strong tendency for non-peripheral vowels (/e, o/) to reduce to peripheral vowels in unstressed syllables ([i, a, u]), as well as a limited pattern of vowel deletion (/e, a/ → ∅) in pre- and post-tonic syllables.

#### 4.2.2 Hittite stress in IE and typological perspective

Evaluation of the textual evidence on the basis of the diagnostics laid out in §4.2.1 suggests that the Hittite word-prosodic system shares a number of typological properties with those of other ancient IE languages — above all, with Vedic Sanskrit and Ancient Greek, the two languages generally agreed to preserve the inherited stress system most faithfully. These properties include:

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<sup>8</sup>The optionality of plene writing is defended explicitly in §3.1.1; for other recent defenses of this view, see Kimball (2015), Yates (2016a), and Melchert (to appear d).

<sup>9</sup>Contrastive length in consonants is faithfully encoded when they occur in intervocalic position, but in consonant clusters, “simplified” spellings of geminate consonants are often found. The length of such consonants can only be determined, then, by examining a large sample of attestations. A particularly striking example is the [k:] of the Hittite imperfective suffix /-sk:é-/ (cf. §4.3.3.1), which is overwhelmingly spelled with a singleton sign (19x <-Vš-ke/i-> in OS texts); yet specifically when an epenthetic vowel is inserted between /s/ and /k:/ of the suffix, its underlying geminate is sometimes realized orthographically (1x <-ik-ke/i->, 1x <-i-ke/i-> in OS texts) (cf. Yates 2016a: 243–4). There is no synchronic phonological consonant length contrast in word-initial nor likely in word-final position (Melchert 1994: 18–20, 85; but cf. n. 23).

<sup>10</sup>For a more thorough discussion of how these unstressed long vowels can be analyzed, see §3.2.



- (150) (i) Stress is CULMINATIVE.  
(ii) Stress is OBLIGATORY.  
(iii) Stress is FREE.  
(iv) Stress is UNBOUNDED.  
(v) Stress is MORPHOLOGY-DEPENDENT.  
(vi) Stress is ACCENT-CONDITIONED.

Because its word-prosodic system is characterized by the properties in (150) — in particular, (i), (iii) and (v–vi) — Hittite has an LA system as defined in §1.1.2.2. The remainder of this section discusses the evidence for these properties; its results are briefly summarized in §4.2.2.5.

#### 4.2.2.1 Hittite stress is culminative, obligatory

Despite the poverty of available prosodic information, there is strong reason to believe that both culminativity (“at most one primary prominence”) and obligatoriness (“at least one primary prominence”) were strictly enforced in Hittite. As a result, every prosodic word had one and only one most prominent syllable, the locus of primary stress. Primary stress was probably phonetically realized by a combination of higher pitch increased intensity and duration, and fuller realization of vowel quality, although only the last two of these correlates are observable in the historical record (see §3.4 above).

Evidence for culminativity comes from allomorphy. Many morphemes have both full and reduced variants — traditionally referred to as “strong” and “weak” — which can naturally be explained as the result of alternations in the position of the single primary stress: full allomorphs are stressed, reduced allomorphs unstressed. Some representative examples are given in (151):

(151)	MORPHEME	FULL/STRESSED	REDUCED/UNSTRESSED
a.	<i>ēš-/aš-</i>	<i>ēšmi</i> ‘I am’ [é:s-mi] (3SG.NPST.ACT)	<i>ašanzi</i> ‘are’ [as-ántsi] (3PL.NPST.ACT)
b.	<i>pāt-/pat-</i>	<i>pātu[s]</i> ‘feet’ [pá:t-us] (ANIM.ACC.PL)	<i>patān</i> ‘of the feet’ [pat-á:n] (ANIM.GEN.PL)
c.	<i>dā-/da-</i>	<i>dāi</i> ‘takes’ [tá:y] (3SG.NPST.ACT)	<i>dattēni</i> ‘take’ [ta-t:é:ni] (3PL.NPST.ACT)
d.	<i>-ānt-/ant-</i>	<i>ašān</i> ‘being’ [as-á:n] (PTCP.N.NOM/ACC.SG.)	<i>papreššan</i> ‘unclean’ [papr-é:s:-an] (PTCP.N.NOM/ACC.SG.)

In some cases, the alternations between full/stressed and reduced/unstressed allomorphs in Hittite are matched by directly observable stress alternations in other ancient IE languages. For instance, compare (151a) and (151b) with their Ancient Greek and Vedic Sanskrit cognates in (152a) and (152b) respectively:

(152)	MORPHEME	FULL/STRESSED	REDUCED/UNSTRESSED
a.	<i>as/s-</i>	Ved. <i>ás-mi</i> ‘I am’	<i>s-ánti</i> ‘are’
b.	<i>pod-</i>	Gk. <i>pód-as</i> ‘feet’	<i>pod-ôn</i> ‘of the feet’

It is evident from (152) that Hittite long vowels stand in correspondence with stressed vowels in Greek and Vedic. The only exception is the 3rd plural form in (151a), where Hittite lacks a long vowel to match Ved. *á*. However, both Hittite and Sanskrit show reduction of the root vowel, the former to [a] and the latter to [ø]; vowel reduction here must be driven by the shift of stress away from the root, which is directly attested in Vedic and can similarly be assumed for Hittite.<sup>11</sup>

It is well-established that Greek and Vedic stress alternations of the type in (152) are one consequence of the strict enforcement of culminativity in these languages, which allow only a single primary stress (realized principally by increased pitch) to surface (cf. §1.1.1). The fact that Hittite surface stress patterns like (151a) and (151b) agree with those of Vedic in (152a) and Greek in (152b) suggests that the distribution of primary stress in Hittite was similarly restricted. More generally, there is broad comparative support across the ancient IE languages for culminativity, which is universally agreed to be reconstructible for PIE; it is therefore simplest to assume that this property was stably maintained in Hittite.<sup>12</sup>

The other ancient languages also provide comparative support for obligatoriness, although in this case, the Hittite evidence is even more ambiguous. Two factors conspire to make the issue difficult to evaluate: (i) not all stressed vowels are lengthened; and (ii) vowel length is only optionally marked. Thus rather than indicating that a given word is stressless, the absence of plene spellings may simply be an accidental gap in attestation, or else be due to the fact that the word is stressed in a position where vowel length is unexpected on historical grounds. Because there are relatively few lexical words which are both sufficiently well-attested to exclude (i) and which cannot be explained by (ii), I assume that obligatoriness is satisfied by all prosodic words.

It should be noted, however, that Hittite does have certain morphemes belonging to non-lexical categories whose systematic lack plene writing may be phonologically meaningful. The majority of these are items whose exceptional syntactic behavior supports analyzing them as clitics — e.g., enclitic personal pronouns like 1SG.ACC/DAT =*mu* ([mu]), 3PL.ANIM/N.NOM.PL =*e* ([e]), and various “local particles,” such as =*apa* ([apa]) or =(š)*san* ([s:an]);<sup>13</sup> their lack of plene spellings is plausibly attributed to stresslessness. Plene writing is also absent in certain function words, such as the clause-linking adverb *nu*, which do not behave syntactically as clitics; it is uncertain whether these are truly stressless (proclitic, per Kloekhorst 2014a: 224–6), or whether

<sup>11</sup>Note that Hitt. /a/ or /i/ would be expected to lengthen in a stressed open syllable (cf. §3.2); the absence of plene spellings in a well-attested word like *ašanzi* ‘are’ can therefore be taken as evidence that stress is neither initial nor final, but occurs rather on the medial syllable, i.e. [asántsi] as in (151a).

<sup>12</sup>Among the (non-cuneiform) Anatolian languages, It is likely that Lydian also provides comparative support for culminativity; for this argument, see Kloekhorst (2014a: 5), who draws especially on the work of Eichner (1986, 1987).

<sup>13</sup>For a thorough description of Hittite enclitic pronouns and “local” particles, see Hoffner and Melchert (2008: 135–6, 277–83, 364–84, 411–12); the (morpho)syntax of the enclitic pronouns is analyzed in greater detail by Garrett (1990, 1996).

(certain types of) function words are exempt from vowel lengthening because of other facts about their prosodic structure.<sup>14</sup>

There is no clear evidence in Hittite for secondary stress, rhythmic or otherwise. The analysis developed in this chapter therefore focuses only on primary stress (henceforth simply “stress”).

#### 4.2.2.2 Hittite stress is free

All Hittite words were stressed, but within the word the position of stress was FREE. The near-minimal pairs in (63) demonstrate that the surface distribution of stress cannot be predicted on the basis of purely phonological factors such as syllable weight, metrical structure, or proximity to word-edge:

(153)	a.	<i>uddar</i>	‘word’ (N.NOM/ACC.SG.)	vs.	<i>uddār</i>	‘word’ (N.NOM/ACC.PL.)
		[ú:t̪ar]			[ut̪:á:r]	
	b.	<i>āppan</i>	‘behind, after’ (ADV)		<i>appān</i>	‘taken’ (PTCP.N.NOM/ACC.SG)
		[á:p̪an]			[ap̪:á:n]	
	c.	<i>wātar</i>	‘water’ (N.NOM/ACC.SG)		<i>widār</i>	‘water’ (N.NOM/ACC.PL)
		[wá:t̪ar]			[wit̪á:r]	
	d.	<i>dākki</i>	‘resemble’ (3SG.NPST.ACT)		<i>nakkī</i>	‘important’ (ADJ.N.NOM.SG)
		[t̪á:k̪i]			[nak̪:í:]	
	e.	<i>ārraz</i>	‘arse’ (ANIM.ABL.SG)		<i>šarrāš</i>	‘portion’ (ANIM.NOM.SG)’
		[á:r:r̪ats̪]			[sar̪:á:s]	
	f.	<i>ēšḫar</i>	‘blood’ (N.NOM/ACC.SG)		<i>išḫāš</i>	‘master’ (ANIM.NOM.SG)
		[é:s̪χ:ar]			[is̪χ:á:s]	
	g.	<i>pēdan</i>	‘place’ (N.NOM/ACC.SG.)		<i>patān</i>	‘foot’ (ANIM.GEN.PL)
		[pé:tan]			[pat̪á:n]	
	h.	<i>āššuš</i>	‘good’ (ADJ.ANIM.NOM.SG)		<i>āššūl</i>	‘favor’ (N.NOM/ACC.SG.)
		[á:s̪:us]			[a:s̪:ú:l]	

In (153) can be observed the robust but imperfect correlation in Hittite between word stress and vowel length: in all of the examples except *uddar* in (153a), the stressed syllable contains a long

<sup>14</sup>Compared to lexical words, function words cross-linguistically tend to undergo phonological reduction and, conversely, resist augmentation; these properties are generally attributed to differences in prosodic structure (see especially Selkirk 1996 on the prosodic structure of functional categories). According to Kloekhorst (2014a: 224–6, 402–5), the large post-OH decrease in the frequency of plene writing in certain function words — in particular, the postposition/adverb *peran* ‘before; in front’ — is due to the “loss of accent” in these words, which have become “clitics.” For reasons laid out in §3.1.1, changes in the frequency of plene writing are generally better attributed to changes in orthographic practice; in this case, however, the numerical drop off is sufficiently striking that it may point to a real linguistic change. Whether this apparent change is really from stressed to stressless (as per Kloekhorst) remains unclear in my view.

vowel; and in all of the examples except *āššūl* in (153h), the unstressed vowels within the word are short.

This type of correlation might suggest an analysis whereby long vowels preferentially attract stress (an effect of the WEIGHT-TO-STRESS principle; Prince 1990). However, such an analysis cannot be correct for Hittite. This point is clear, especially, from examples like (151a) above, where stress falls on a long vowel in one paradigmatic form (*ēšmi* [é:smi]), but shifts to a short vowel in another (*ašanzi* [asántsi]). The same pattern can be observed in other verbal paradigms, e.g. (154):

- |       |    |              |                           |     |                 |                           |
|-------|----|--------------|---------------------------|-----|-----------------|---------------------------|
| (154) | a. | <i>dākki</i> | ‘resemble’ (3SG.NPST.ACT) | vs. | <i>takkanzi</i> | ‘resemble’ (3PL.NPST.ACT) |
|       |    | [tá:k:-i]    |                           |     | [tak:-ántsi]    |                           |
|       | b. | <i>ākti</i>  | ‘die’ (2SG.NPST.ACT)      |     | <i>akkanzi</i>  | ‘die’ (3PL.NPST.ACT)      |
|       |    | [á:k-t:i]    |                           |     | [ak:-ántsi]     |                           |
|       | c. | <i>ārki</i>  | ‘divide’ (3SG.NPST.ACT)   |     | <i>arkanzi</i>  | ‘divide’ (3PL.NPST.ACT)   |
|       |    | [á:rk-i]     |                           |     | [ark-ántsi]     |                           |

Examples like (154) confirm that vowel length does not determine stress; rather, it is the opposite relationship that obtains: stress determines vowel length, and the position of stress within the word depends on other factors. In §4.3.2 below, I show that the distribution of stress in (154) submits to a morphological generalization, viz. that stress falls on the root in the singular non-past forms of these verbs, and on the inflectional suffixes in the plural.

Once it is established that vowel length is dependent on stress, it becomes clear that stress in Hittite is phonemically contrastive, minimally distinguishing (at some underlying level of representation) between (e.g.) /ú̇t:ar/ ‘word’ and /ú̇t:ár/ ‘words’.<sup>15</sup> This result has important implications for the analysis of Hittite stress assignment, strongly suggesting that underlying specification for prominence (i.e. accent) plays a role in determining the surface distribution of stress. This role is explored further in the remainder of this chapter.

#### 4.2.2.3 Hittite stress is unbounded

A further question that arises in free stress systems concerns the extent to which the position of stress is free: can it occur on any syllable within the word, or is it BOUNDED, i.e. free within some smaller phonologically defined domain? Typically, free stress systems in which stress is bounded require that stress falls within an edge-oriented “stress window” — for instance, within the last three syllables of the word, as in Greek (both Ancient and Modern; cf. Ch. 1 n. 15), or much less commonly, within its first three syllables, as in Choguita Rarámuri (Tarahumaran, Uto-Aztecan; Caballero 2008, 2011). There is no clear evidence for window restrictions of this kind in Hittite. That no left edge oriented window constraints stress is evident from the examples in (155), where stress freely shifts rightward as word length increases, occurring at least as far as the fifth syllable from the left edge of the prosodic word:

<sup>15</sup>A breve (˘) indicates that a vowel is underlyingly short (i.e. [–long]), and thus does not lengthen under stress; see §3.2 for discussion.

(155)	a.	<i>lātar</i>	‘releasing’	[l-á:tar]	óσ
		<i>šātar</i>	‘resentment’	[s-á:tar]	
	b.	<i>aggātar</i>	‘death’	[ak:-á:tar]	σóσ
		<i>appātar</i>	‘taking’	[ap:-á:tar]	
		<i>ḫa(š)šātar</i>	‘procreation’	[χas:-á:tar]	
	c.	<i>alwanzātar</i>	‘sorcery’	[alwant̃s-á:tar]	σóσσ
		<i>antuḫšātar</i>	‘humanity’	[antuχ:s-á:tar]	
	d.	<i>kukupalātar</i>	‘deception’	[kukupal-á:tar]	σσσσσ
		<i>annitalwātar</i>	‘capacity for motherhood’	[an:italw-á:tar]	
	e.	<i>išḫanattarātar</i>	‘marriage bond’	[iσχ:anat:ar-á:tar]	σσσσσσ

Whether there are restrictions on the distance between stress and the right edge of the word is less clear. A confound here is the general tendency in Hittite for derivational morphemes — like *-atar* ([ -á:tar ]) in (155) above — to attract stress (cf. §4.2.2.4 below).<sup>16</sup> Because polysyllabic words are generally morphologically complex and most derivational morphology in Hittite (as in other IE languages) is suffixing, stress in these words is often attracted rightward, surfacing on a derivational suffix at or near the word’s right edge. Nevertheless, there are a number of relatively secure examples which suggest that stress could fall at least four syllables from the word’s right edge, e.g. (156)

(156)	<i>pēdumeni</i>	‘we bring’	[pé:tumeni]	óσσσ
	<i>pūnuššanzi</i>	‘interrogate’	[pónus:ants̃i]	
	<i>tittanuwanz[i]</i>	‘install’	[tít:nuwant̃si]	
	<i>tāštašiyaizzi</i>	‘whispers’	[tá:stasyayts̃i]	
	<i>wewagganzi</i>	‘demand’	[wé:wak:ants̃i]	

Since four syllable (or greater) stress windows are cross-linguistically unattested (Kager 2012, *i.a.*), the stress patterns in (156) argue against the existence of a right-edge oriented stress window in Hittite.

<sup>16</sup> I treat the suffix *-atar* in this chapter as a single morpheme with two allomorphs, /-á:tar-/ in the strong nominal cases and /-án:-/ in the weak cases (cf. Hoffner and Melchert 2008: 57–8). Although it does not materially affect the analysis, the suffix is synchronically a composite of an accented derivational suffix /-át-/ and the neuter *r/n*-stem class suffixes, which are found attached to roots (i.e. primary neuter *r/n*-stems) and as a part of other complex derivational suffixes, e.g. *-eššar/-eššn-* (*op cit.* 124–30). On the diachrony of *-atar*, see Melchert (1994: 86) (cf. Eichner 1973: 79–80), who derives it from PIE *\*-/é/h<sub>2</sub>-t̃r/*; Kloekhorst’s (2008: 226) alternative derivation from a putative *\*-ó-t̃r* cannot be correct, since PA *\*ó* does not lenite a following voiceless stop (Melchert 2012: 175–6).

#### 4.2.2.4 Hittite stress is morphology-dependent, accent-conditioned

The productive abstract noun suffix *-atar* discussed in §4.2.2.3 just above is also informative in another way. All of the examples examined in (155) — and more generally, all words containing this suffix in which the position of stress can be clearly determined — show the same stress pattern: stress falls on the first syllable of the suffix, i.e. [-á:tar]. This pattern appears to hold regardless of the phonological shape of the stem to which it is suffixed; the position of stress thus appears to be indifferent to the presence of (e.g.) preceding heavy syllables, which cross-linguistically tend to attract stress.

Similar stress-attracting behavior can be observed with the deverbative neuter noun-forming suffix *-ul-*, e.g. (157):<sup>17</sup>

- |       |    |               |                   |              |     |
|-------|----|---------------|-------------------|--------------|-----|
| (157) | a. | <i>taksūl</i> | ‘peace’           | [taks-ú:l]   | σó  |
|       |    | <i>āššūl</i>  | ‘favor’           | [a:sɪ-ú:l]   |     |
|       | b. | <i>išhiul</i> | ‘binding; treaty’ | [isχ:iy-ú:l] | σσó |
|       |    | <i>immiūl</i> | ‘mixture’         | [im:iy-ú:l]  |     |

As in (155) above, stress in (157) can be seen to freely shift rightward when suffixed to stems of increasing length, in each case surfacing on the suffix *-ul-* ([-ú:l]). The fact that the suffix’s (single) stressed syllable stands in word-final position provides further evidence that the penultimate stress pattern of (154–155), although a common pattern in Hittite, is nevertheless epiphenomenal. Rather, what (155) and (157) show is that there is a strong correlation in Hittite between a word’s stress pattern and its morphological structure — in other words, that word stress is MORPHOLOGY-DEPENDENT. The examples in (154) similarly submit to a morphological generalization: stress falls on the first syllable of the 3pl.npst.act. suffix *-anzi* ([-án̄tsi]).

Such morphological dependency is a characteristic feature of languages in which certain morphemes are lexically specified as preferred hosts of word stress, i.e. accented. This lexical feature would offer a natural explanation for the stress-attracting property of Hittite morphemes like *-atar*, *-ūl-*, and *-anzi*: these suffixes are accented (/ -á:tar-, / -ú:l-, / -án̄tsi/). Yet accentedness is not the only explanation for the distribution of word stress in morphology-dependent systems; an alternative possibility is suggested by Revithiadou’s (1999: 23–4) treatment of Kobon (Kalam, Trans-New Guinea; see §1.1.2.2 for further discussion). According to Revithiadou, stress in Kobon is regularly assigned to the morpheme that constitutes the word’s morphological head, thus preferentially to a derivational morpheme, if one is present.

At least two considerations argue against a purely head-marking analysis of this kind for Hittite. First, it is not the case that all Hittite derivational suffixes attract stress — for instance, the noun- and adjective-forming suffixes in (158) do not ever appear to attract stress, since they systematically lack plene writing in an environment in which stressed vowel lengthening would otherwise be expected:<sup>18</sup>

<sup>17</sup>As demonstrated by Rieken (2008), the Hittite suffix *-ul-* arose historically in Pre-Hittite from words of 3+ syllables ending in *\*-úlo-*; the stressed vowel was then subject to vowel lengthening in an open syllable (*\*ú > \*ú̄*) prior to deletion of the nucleus of the word-final syllable.

<sup>18</sup>All disyllabic suffixes in Hittite which are stress-attracting (as witnessed by plene spelling) appear to be stressed

- (158) a. *ētri* ‘food’ (N.ACC.SG)  $^x-rī-$  ( $^x[-rī:-]$ )  
*ēšri* ‘shape’ (N.ACC.SG)  
*auri(ya)* ‘observation  
post’ (ANIM.DAT-LOC.SG)
- b. *šannapili* ‘empty’ (ADJ.N.NOM/ACC.SG)  $^x-īli$  ( $^x[-í:li]$ ),  $^x-ilī$  ( $^x[-ilí:]$ )  
*karūili* ‘former’ (ADJ.N.NOM/ACC.SG)
- c. *tetḥimas* ‘thunder’ (ANIM.NOM.SG)  $^x-īma-$  ( $^x[-í:ma-]$ ),  $^x-imā-$  ( $[-imá:-]$ )  
*wawarkimaš* ‘door-pivot’ (ANIM.NOM.SG)  
*[l]ālukkimaš* ‘brightness’ (ANIM.NOM.SG)

In (158a), in particular, it is clear that the derivational suffix fails to attract stress. Unlike non-primary derivatives, which may inherit long vowels from their derivational base (cf. §4.4.1.3 below), primary derivatives like (158a) have long vowels only when stressed; when unstressed, the weak allomorph of the root instead occurs, which for (158a) would be *ad-* ( $[-ad-]$ ), *aš-* ( $[-aš-]$ ), and *u-* ( $[-u-]$ ) respectively (see further §4.3.2.1 below). These forms must therefore be stressed as in (159):<sup>19</sup>

- (159) *ētri* ‘food’ (N.NOM/ACC.SG) [é:tri]  
*ēšri* ‘shape’ (N.NOM/ACC.SG) [é:s:ri]  
*auri(ya)* ‘observation post’ (ANIM.DAT/LOC.SG) [áwri(ya)]

Another argument against a purely head-marking analysis of Hittite stress is that certain inflectional suffixes also tend to attract stress, e.g. the 3pl.npst.act suffix *-anzi* in (154) noted above. It is problematic to attribute this behavior to the suffix’s status as the word’s morphological head.<sup>20</sup> Following Zwicky (1985) and others, Revithiadou (1999: 184–7) contends that inflectional suffixes are non-heads cross-linguistically, a conclusion that is supported by her

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on the first syllable of the suffix (Yates 2016b: 174–5); thus if *-ili-* and *-ima-* were stress-attracting, the expected surface forms of these suffixes would be  $^x[-íli-]$  and  $^x[-í:ma-]$  with lengthening of the stressed vowel in an open syllable. However, if these suffixes defied this generalization and attracted stress to the second syllable, lengthening would nevertheless be expected for *-ili-* in case-forms like those in (158b) (i.e. absolute word-final position) and for *-ima-* in most case-forms (< Pre-Hitt. *\*-mo-*), yielding  $^x[-ilí:]$  and  $^x[-imá:-]$ . On the origin and development of the latter suffix, see Oettinger (2001).

<sup>19</sup> In fact, the suffix *-ri-* is probably the strongest candidate for a Hittite morpheme that is synchronically PREAC-CENTING, i.e. induces a lexical accent on the final syllable of the stem to which it attaches. Primary derivatives of this suffix like (159) are athematic nouns that appear to retain stress on the root throughout their inflectional paradigm, which is diagnostic of a lexical accent (see the discussion of *aššu-* in §4.4.1.2 below), but this lexical accent cannot come from these roots, which are unaccented: /et/ ‘eat’, /es/ ‘be’, /au/ ‘see’ (cf. §4.3.2.1, §177 below). See further discussion of preaccenting morphemes in §1.1.2.2, §1.1.3.1, and §2.2.1, and for the root derivations of the forms in (159), Hoffner and Melchert (2008: 59) and Kloekhorst (2008: 260–1).

<sup>20</sup> See §1.1.3.3 for a theoretical discussion of the concept of “morphological head,” as well as §4.4.2.1 below on headedness in Hittite.

analyses of head-dependent stress in (e.g.) Modern Greek and Russian.<sup>21</sup> Yet even if one were to assume that inflectional suffixes had head status in Hittite root-based formations like (154), an analysis that attributes attraction of stress to *-anzi* to this status would encounter issues with those inflectional suffixes that never attract stress in paradigmatically related forms, such as the 3sg.npst.act. suffix *-i* ([*-i*]) in (154ac) above, or 2pl.pst.act. *-ten* ([*-t:en*]) in (e.g.) *ākten* ([*á:k(:)ten*]) ‘you died’.

In contrast, the stress-attracting property of *-anzi* can be explained straightforwardly by the assumption that — like *-atar* (/ *-átar-* /) and *-ul-* (/ *-úl-* /) — this suffix is accented (/ *-ántsi* /). A broader consequence of this analysis is that stress in Hittite is ACCENT-CONDITIONED, i.e. attracted to accented morphemes. Note, however, that rejecting the head-marking analysis for Hittite does not necessarily exclude the possibility that morphological headedness plays a role in stress assignment. On the contrary, I propose in §4.4 below that the accentual properties of morphological heads are privileged by faithfulness constraints, which accounts for the fact that inflectional suffixes like *-anzi* attract stress less consistently than derivational suffixes like *-ul-* and *-atar-*: *-anzi* is unstressed (e.g.) in the verbal forms in (156), whereas *-atar* appears to always bear stress.

#### 4.2.2.5 Lexical accent in Hittite

It was shown in the preceding sections that every prosodic word in Hittite had a single most prosodically prominent syllable, the bearer of primary stress (CULMINATIVE + OBLIGATORY; cf. §4.2.2.1). Any syllable of a word could bear stress (UNBOUNDED; cf. §4.2.2.3), but within the word, its position was phonologically unpredictable and contrastive (FREE; cf. §4.2.2.2). A word’s surface stress pattern depends instead on its morphological constituency, and more specifically, stress falls preferentially on accented morphemes (MORPHOLOGY-DEPENDENT + ACCENT-CONDITIONED; cf. §4.2.2.4).

With these properties established, it is now clear that Hittite has an LA system as defined in §1.1.2.2. In LA systems, stress is determined by an interaction between the lexically specified accentual properties of morphemes and language-specific morphophonological principles. Such principles are generally responsible for two important functions in stress assignment: (i) for determining which of a word’s several accented morphemes receives word stress; (ii) for assigning “default” stress when a word contains no accented morphemes.

Analyzing LA systems therefore requires determining both the accentual properties of each morpheme, as well as these language-specific morphophonological principles, which may be understood as a set of rules or — as here — of ranked constraints. I turn to this task below in §4.3–§4.4, where I examine the primary data, and develop a formal analysis of Hittite stress assignment.

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<sup>21</sup>The Hittite facts also support Revithiadou’s (1999) hypothesis; see the discussion in §4.4.2.1 below. On the effects of morphological headedness on stress assignment in Ancient Greek and Sanskrit, see Sandell (2015: 161–214).



### 4.3 Hittite inflectional stress & the Basic Accentuation Principle

This section is concerned with the stress patterns observed within inflectionally related word-forms in Hittite. Nouns, adjectives, and verbs in Hittite are specified for various morphosyntactic features (e.g. nominal case, verbal tense); as in other ancient IE languages, these features are marked by inflectional suffixes (“endings”) added to the nominal or verbal stem, which may itself be a root or else may be derived from a root via affixation. Within their inflectional paradigm — i.e. the set of word-forms that share a common stem in this way — some Hittite nouns and verbs exhibit stress alternations: stress falls on the stem in some word forms, on an inflectional ending in others. This *MOBILE* stress pattern contrasts with the pattern evident in other nouns and verbs, which have stress *FIXED* on one syllable of the stem throughout their inflectional paradigm.

Mobile stress — or historical traces thereof — is evident in virtually all ancient Indo-European languages, and remains productive, especially, in the Hittite verbal system. Stress mobility is a feature of most Hittite verbs formed by adding inflectional endings directly to a verbal root (i.e. root = stem; R + E in IEist terms), a type referred to here as *RADICAL* verbs. Yet even within this type, some verbs instead have fixed root stress. This section develops a principled explanation for why, on the one hand, there is a synchronic contrast between mobile and fixed stress within radical verbs and, on the other, why mobile stress is not found in other stem types. I argue that these surface stress patterns are due to the synchronic operation of the BAP (given in (26) above) in Hittite. Specifically, I contend that this contrast emerges from the interaction of this morphophonological principle with the differing accentual properties of verbal stems: unaccented stems have mobile stress, while accented stems have fixed stress.

The rest of this section is structured as follows. §4.3.1 provides some background on Hittite verb inflection, and on the distribution of stressed and unstressed allomorphs of verbal inflectional suffixes. The evidence for fixed and mobile stress patterns within the inflectional paradigms of radical verbs is laid out in §4.3.2. Having established this synchronic contrast, §4.3.3 looks beyond the inflectional paradigm proper, examining the stress patterns exhibited by the imperfective stems and participles formed from these same verb; within these categories, I identify two distinct stress patterns, one of which is associated with mobile radical verbs, the other with fixed radical verbs. §4.3.4 develops an optimality-theoretic analysis of this systematic contrast, which I show can be reduced to a minimal difference in the accentedness of verbal roots and their interaction with the set of morphophonological constraints that underlie the BAP. In §4.3.5, I extend this analysis to explain the fixed stem stress pattern found in derived verbal stems. §4.3.6 provides explicit arguments that the BAP is synchronically operative in Hittite. Finally, the results of this section are briefly summarized and discussed in §4.3.7.

#### 4.3.1 Verbal inflection in Hittite

Five grammatical categories are distinguished in Hittite verbal inflection: person (1st, 2nd, 3rd), number (singular, plural), tense (non-past, past), voice (active, middle), and mood (indicative, imperative). These features are encoded by fusional inflectional endings suffixed to the verbal stem. All Hittite verbs belong — arbitrarily, from a synchronic perspective — to one of two conjugational classes, the *mi-* or the *hi-*conjugation, so-named after the 1SG.NPST.ACT ending

characteristic of each class, *-mi* and *-hi* respectively. These two conjugational classes are more generally associated with phonologically distinctive fusional inflectional endings in their active singular forms, while employing identical endings in their corresponding plural forms (except for a marginal distinction in the 2pl.). The productive inflectional endings prototypical of these classes are given in (160–161):<sup>22</sup>

(160)

		<i>mi</i> -CONJUGATION ENDINGS			
		SINGULAR		PLURAL	
NON-PAST	1ST	<i>-mi</i>	[-mi]	<i>-weni</i>	[-wé:ni], [-weni]
	2ND	<i>-ši</i>	[-si]	<i>-tēni</i>	[-t:é:ni], [-t:eni]
	3RD	<i>-zi</i>	[-t̄si]	<i>-anzi</i>	[-ánt̄si], [-antsi]
PAST	1ST	<i>-(n)un</i>	[-(n)on]	<i>-wen</i>	[-wen]
	2ND	<i>-š</i>	[-s]	<i>-ten</i>	[-t:en]
	3RD	<i>-t(a)</i>	[-t(:a)]	<i>-er</i>	[-er]

(161)

		<i>hi</i> -CONJUGATION ENDINGS			
		SINGULAR		PLURAL	
NON-PAST	1ST	<i>-hi</i>	[-χ:i]	<i>-weni</i>	[-wé:ni], [-weni]
	2ND	<i>-ti</i>	[-t:i]	<i>-(š)tēni</i>	[-(s)t:é:ni], [-(s)t:eni]
	3RD	<i>-i</i>	[-i]	<i>-anzi</i>	[-ánt̄si], [-antsi]
PAST	1ST	<i>-hun</i>	[-χ:on]	<i>-wen</i>	[-wen]
	2ND	<i>-(š)t(a)</i>	[-st(:a)], [-t(:a)]	<i>-(š)ten</i>	[-st:en], [-t:en]
	3RD	<i>-š, -t(a)</i>	[-s], [-t(:a)]	<i>-er</i>	[-er]

Some generalizations can be made with respect to the stress-related behavior of these endings that extend across both conjugational classes. The singular endings of both *mi*- and *hi*-conjugations are never stressed; those that lack a syllabic nucleus obviously cannot bear stress,<sup>23</sup>

<sup>22</sup>The tables in (160-161) simplify the actual Hittite situation; for a much fuller treatment, see Hoffner and Melchert (2008: 180–4). I note here just three salient details. First, there is extensive mutual analogical influence between the two conjugational classes, both prehistorically and within the historical period. For instance, the 2sg. *hi*-conjugation endings *-ti* and *-t* occur frequently in *mi*-verbs in NH texts, and conversely, the 1sg.npst. *mi*-conjugation ending *-mi* not infrequently occurs in *hi*-verbs, especially those with stem-final *-(h)h* (e.g. *zahmi* 'I strike', *nahmi* 'I fear'). Second, these tables ignore all phonologically regular changes these endings undergo when suffixed, such as dissimilation in the 1PL.ACT suffix, which surfaces as *-meni/-men* after stem-final rounded vowels. Finally, certain endings have archaic variants attested exclusively in OH texts, e.g. *hi*-conjugation 1sg.npst.act. *-he* ([-χ:e]), 3sg. *-e* ([-e]).

<sup>23</sup> The synchronic phonological interpretation of the 3SG.PST.ACT ending — spelled *-t*, *-ta*, and *-tta* — is much

while those that do have one are never spelled plene despite occupying a position in which stressed vowel lengthening would be expected.<sup>24</sup>

The non-past plural endings, in contrast, have both stressed and unstressed allomorphs. This allomorphy is most evident in 2/3PL forms, where the suffixal vowel is subject to lengthening when stressed.<sup>25</sup> Moreover, in older texts unstressed allomorphs of these endings are preserved, 1pl. *-wani* ([-wani]) and 2pl. *-(š)tani* ([-(s)t:ani]), which are the result of a regular sound change that reduced unstressed *\*e* in this environment.<sup>26</sup> These allomorphs are likely archaisms already at the earliest attested stage of the language; already in Old Hittite, unstressed *-weni* and *-šteni* (i.e. [-weni], [-(s)t:eni]) are also regularly found, and by the later period, the older *a*-ful forms have been wholly replaced by the *e*-ful forms with vocalism analogical after the corresponding 2pl.pst. forms ([-wen], [-(s)t:en]). When attested, however, these archaic allomorphs provide a clear diagnostic that stress remains fixed on the verbal stem in plural forms, which is in some cases the only evidence for the word's stress pattern.

The stressed and unstressed allomorphs of the non-past plural endings in (160–161) are asymmetrically distributed. The unstressed endings are found in verbal stem types of all types, whereas the stressed allomorphs are restricted to radical verbs. Among radical verbs, their distribution is also skewed, but in the opposite way: most radical verbs appear with the stressed allomorphs of these inflectional endings, but a few radical verbs instead occur with their unstressed allomorphs.

A broad generalization that emerges from this distribution is that the plural non-past endings — in contrast to the singular non-past and all past tense endings — have a tendency to attract stress, even if they do not do so consistently. In §4.3.4.1, I pursue the hypothesis, proposing that that plural non-past inflectional endings are underlying accented. However, the next section focuses first on radical verbs, treating the inflectional stress patterns of this stem class in greater detail.

### 4.3.2 Stress (im)mobility in radical verb inflection

Two distinct stress patterns are attested within the inflectional paradigms of radical verbs in Hittite. In mobile radical verbs, stress alternates between the verbal root in singular non-past and

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disputed; for differing views, see Melchert (1994: 175–6) and Yoshida (1991, 1993, 2001) with references to earlier scholarship. If the so-called “prop vowel” *-a* reflected in the latter two spellings is indeed linguistically real (i.e. [-a]), it is nevertheless always unstressed.

<sup>24</sup>For expected lengthening of word-final stressed vowels, see §3.2, and for the absence of stress in singular non-past inflection endings, see especially the discussion of 3SG.NPST.ACT *-zi* (/t͡si/) therein.

<sup>25</sup>Per §3.1.2, I accept Kloekhorst's (2014a: 134–161) synchronically-based arguments that apparent plene spellings after high vowels and glides (*i, u, y, w*) are non-contrastive, i.e. that they do not reliably indicate vowel quantity. However, this issue does not arise with the dissimilated *m*-ful allomorph of the ending, where plene-spelled *-mēni* confirms that the inflectional ending contains a stressed/long vowel ([-mé:ni]).

<sup>26</sup>The *-wani* and *-tani* endings arose via a regular sound change whereby unstressed /e/ was reduced to [a] (or \*[ə]); see W. Cowgill *apud* Melchert (1994: 137–8), as well as Yoshida (2010: 391), who suggests that the change occurred only before sonorants. Given that productive inflectional categories are regularly renewed in accordance with productive morphophonological processes, this sound change must have run its course within the shallow prehistory of Hittite or even within the historical period.

in past tense paradigmatic forms, and the inflectional suffixes in plural non-past tense forms, e.g. (162a). In contrast, these intraparadigmatic stress alternations do not occur in fixed radical verbs, which consistently have stress on the verbal root in all inflected forms, e.g. (162b):

(162)	3RD SINGULAR NON-PAST			3RD PLURAL NON-PAST		
a.	<i>šěšzi</i>	[sé:s-t̂si]	'sleeps'	<i>šašanzi</i>	[sas-ánt̂si]	'sleep'
	<i>kānki</i>	[ká:nk:i]	'hangs'	<i>kankanzi</i>	[kank:i-ánt̂si]	'hang'
b.	<i>wěkzi</i>	[wé:k-t̂si]	'demands'	<i>wekanzi</i>	[wé:k-ant̂si]	'demand'
	<i>ānši</i>	[á:ns-i]	'wipes'	<i>ānšanzi</i>	[á:ns-ant̂si]	'wipe'

The next two sections survey the evidence for these two stress patterns: mobile radical verbs of the *mi*- and *hi*-conjugations are examined in §4.3.2.1, then fixed radical verbs in §4.3.2.2.

#### 4.3.2.1 Radical verbs with mobile stress

Mobile stress is the dominant pattern in radical verbs of both conjugational classes. Within the *mi*-conjugation, stress mobility can be seen most clearly in so-called “*ē/a*-ablauting” radical verbs; verbs in this class exhibit not only stress-conditioned quantitative alternations in the root (long/stressed vs. short/unstressed), but also concomitant qualitative changes, the /e/ vowel of the root undergoing reduction to [a] when unstressed.<sup>27</sup> This class includes a number of very common verbs belonging to the core of the lexicon, such as *epp/app*- ‘take’, *eš/aš*- ‘be’, *ed/ad*- ‘eat’, *eku/aku*- ‘drink’, and *šěš/šaš*- ‘sleep’. Attested forms of these verbs are given in (163):<sup>28</sup>

<sup>27</sup>This pattern of vowel reduction is discussed in more detail in §3.3.

<sup>28</sup>Some of the forms given in (163) and (165) contain an ending that is proper to the other conjugational class; these forms are marked to indicate the source of these endings (<sup>-mi</sup>, <sup>-hi</sup>).

(163)	SINGULAR		PLURAL		
1 <sup>ST</sup>	<i>ēpmi</i>	[é:pɪ:-mi]	<i>[a]ppuweni</i>	[apɪ:-wé:ni]	‘take’
	<i>ēšmi</i>	[é:s-mi]			‘be’
	<i>ētmi</i>	[é:t-mi]	<i>adweni</i>	[at-wé:ni]	‘eat’
	<i>ekumi</i>	[é:k <sup>w</sup> -mi]	<i>akueni</i>	[ak <sup>w</sup> -wé:ni]	‘drink’
	<i>šešmi</i>	[sé:s-mi]	<i>šašweni</i>	[sas-wé:ni]	‘sleep’
2 <sup>ND</sup>	<i>ēpši</i>	[é:pɪ:-si]	<i>apteni</i>	[apɪ:-t:é:ni]	‘take’
	<i>ēšši</i>	[é:s-si]			‘be’
	<i>ēzši</i>	[é:t̃si]	<i>[a]zzastē[ni]</i>	[at̃s-t:é:ni]	‘eat’
	<i>eukši</i>	[é:k <sup>w</sup> -si]			‘drink’
	<i>šešti<sup>(-hi)</sup></i>	[sé:s-t:ɪ]			‘sleep’
3 <sup>RD</sup>	<i>ēpzi</i>	[é:pɪ:-t̃si]	<i>appanzi</i>	[apɪ:-ánt̃si]	‘take’
	<i>ēšzi</i>	[é:s-t̃si]	<i>ašanzi</i>	[as-ánt̃si]	‘be’
	<i>ēzzazi</i>	[é:t̃s-t̃si]	<i>adanzi</i>	[at-ánt̃si]	‘eat’
	<i>ekuzi</i>	[é:k <sup>w</sup> -t̃si]	<i>akuanzi</i>	[ak <sup>w</sup> -ánt̃si]	‘drink’
	<i>šešzi</i>	[sé:s-t̃si]	<i>šašanzi</i>	[sas-ánt̃si]	‘sleep’

In their plural forms, the verbs (163) consistently show the unstressed allomorph of the root with the reduced vowel [a]. This allomorphy is important, since within this class it constitutes the only evidence for mobility in the 3rd plural, where the inflectional suffix does not lengthen under word stress. In addition, their 2nd plural forms are in a few cases attested with plene writing of the suffix (i.e. *-tēni*), thus indicating lengthening under word stress ([-t:é:ni]).

There is also evidence for stress mobility in a number of other radical *mi*-verbs, including those in (164):

(164)	SINGULAR		PLURAL		
a.	<i>mērtu</i>	[mé:r-t:u]	<i>marandu</i>	[m(a)r-ántu]	‘disappear’
b.	<i>kuēnzi</i>	[k <sup>w</sup> é:n-t̃si]	<i>kunanzi</i>	[k <sup>w</sup> (u)n-ánt̃si]	‘kill’
	<i>kuērzi</i>	[k <sup>w</sup> é:r-t̃si]	<i>kuranzi</i>	[k <sup>w</sup> (u)r-ánt̃si]	‘cut’
	<i>ħuēk[mi]</i>	[χ <sup>w</sup> é:k-mi]	<i>ħukanzi</i>	[χ <sup>w</sup> ok-ánt̃si]	‘slaughter’
c.	<i>āršzi</i>	[á:rš-t̃si]	<i>aršanzi</i>	[ars-ánt̃si]	‘flow’

Like the verbs in (163), *mer/mar-* in (164a) show *ē/a* ablaut, which is diagnostic of alternating

stress in singular and plural forms.<sup>29</sup> The verbs in (164b) show very similar — in fact, historically identical — alternations; the exact phonological interpretation of *kun-*, *kur-*, *huk-* in their third plural forms is uncertain, but it is uncontroversial that these spellings reflect unstressed, reduced allomorphs of the roots /k<sup>w</sup>en/, /k<sup>w</sup>er/, and /χ<sup>w</sup>ek/.<sup>30</sup> Finally, (164c) shows a purely quantitative alternation which, although irregular in the *mi*-conjugation, is found in many radical *hi*-verbs with mobile stress (cf. (165–166 below); as in these verbs, it is straightforwardly explained as the result of stress shifting from the root in the singular to inflectional endings in the plural.

Similarly, most radical verbs belonging to the *hi*-conjugation exhibit mobile stress. Robust evidence for stress alternations comes from *ā/a*-ablauting *hi*-verbs, which regularly have a long vowel in the root in singular forms, and a short vowel in the root in plural forms. These quantitative alternations are clearly the result of mobile stress: the root vowel is long when stressed ([á:]), short when unstressed ([a]). The intraparadigmatic alternations characteristic of this class are exemplified in (165):

<sup>29</sup> In (164a), imperative (instead of indicative) forms are given for *mer/mar-*; with respect to their accentual behavior, the 3SG.IMPACT suffixes *-tu/-u* (in *mi*-/*hi*-verbs) and 3PL *-antu* are identical to indicative *-zil/-i* and *-anzi* (cf. §4.3.4.1 below). On the verb's root [a]-vocalism in the plural form see Ch. 1 n. 75.

<sup>30</sup> Historically, 'kill' and 'cut' in (164) are of the same morphological type as (e.g.) *ēš/-aš-* 'be', *šēš-/šaš-* 'sleep', all being inherited PIE root presents with mobile stress and *\*e/∅* ablaut (cf. §5.3.2.2), and the former differing only in that they have a root-initial labiovelar *\*k<sup>w</sup>*. The question is whether these forms were produced with word-initial complex onsets, as they were in PIE (*\*g<sup>wh</sup>n-énti*, *\*k<sup>w</sup>r-énti*), or whether an epenthetic vowel had developed in the word-initial cluster in Hittite, i.e. [k<sup>w</sup>un-], [k<sup>w</sup>ur-]. Evidence for the latter hypothesis — which is, in my view, more likely — comes from diachronic changes in the imperfective stems of these verbs. The oldest imperfectives of these verbs are *kuwaške-* ([k<sup>w</sup>ask:é:-]) and *kuwarške-* ([k<sup>w</sup>arsk:é:-]), which are the expected outcome of PIE *\*g<sup>wh</sup>n-ské-* and *\*k<sup>w</sup>r-ské-* via vocalization of the syllabic sonorants (Kloekhorst 2007: 456). However, /k<sup>w</sup>er-/ has a younger "renewed" imperfective stem spelled <*kur-as-ke/i-*> and <*ku-ra-aške-*>. Such forms could not have been pronounced [k<sup>w</sup>rsk:é:-] (illicit onset) or [k<sup>w</sup>ṛsk:é:-] (no synchronic syllabic sonorants; also orthographically unlikely) and thus likely spells [k<sup>w</sup>uršké:-]. I tentatively propose, then, that these renewed forms point to the emergence in Hittite of a new allophonic relationship between /e/ and [u] such that [u] was the reduced allophone of /e/ after labialized obstruents (e.g. /k<sup>w</sup>er-sk:é-/ → [k<sup>w</sup>ur-sk:é:-]) rather than [a] as in /es/ 'be', etc. Moreover, the ablaut alternation in /χ<sup>w</sup>ek/ — which never had a complex onset in the weak stem (< PIE *\*h<sub>2</sub>ug-*) — may fall under the scope of the same synchronic process; modulo the regular lowering of /u/ to [o] in Hittite (cf. Rieken 2005; Kloekhorst 2008: 35–60), this alternation is directly parallel to the one observed in /k<sup>w</sup>en/ and /k<sup>w</sup>er/ and so may be derived in exactly the same way. On the fusion of PIE *\*h<sub>2</sub>w* into Hitt. [χ(:)<sup>w</sup>] see Kloekhorst (2006: 97–100, 106).

(165)	SINGULAR		PLURAL		
1 <sup>ST</sup>	<i>dāhhi</i>	[tá:r-χ:i]	<i>tumēni</i>	[tu-mé:ni]	‘take’
	<i>ārhi</i>	[á:r-χ:i]			‘arrive’
	<i>ākmi</i> <sup>(-mi)</sup>	[á:k-mi]	<i>akkuweni</i>	[ak:r-wé:ni]	‘die’
	<i>ištapphi</i>	[ist:á:p-χ:i]			‘stop up’
2 <sup>ND</sup>	<i>dātti</i>	[tá:r-t:i]	<i>dattēni</i>	[ta-t:é:ni]	‘take’
	<i>ārti</i>	[á:r-t:i]	<i>artēni</i>	[ar-t:é:ni]	‘arrive’
	<i>ākti</i>	[á:k-t:i]			‘die’
3 <sup>RD</sup>	<i>dāi</i>	[tá:r-y]	<i>danzi</i>	[t-ántsi]	‘take’
	<i>āri</i>	[á:r-i]	<i>aranzi</i>	[ar-ántsi]	‘arrive’
	<i>aki</i>	[á:k-i]	<i>akkanzi</i>	[ak:r-ántsi]	‘die’
	<i>ištāpi</i>	[ist:á:p-i]	<i>ištappanzi</i>	[ist:ap:-ántsi]	‘stop up’

Additional evidence for mobile stress in (165) is provided by forms of these *hi*-verbs attested with plene writing of plural inflectional suffix(es); just as in radical *mi*-verbs, these suffixal long vowels arise via lengthening under word stress. 2nd person plural forms of these verbs are sporadically attested with plene spelling of the inflectional suffix, e.g. *dattēni* ‘you take,’ *artēni* ‘you arrive’. The effects of stressed vowel lengthening can also be clearly observed in 1pl.npst.act. *tumēni* ‘we take’, a rare instance in which a radical verb occurs with *-mēni*, the dissimilated allomorph of the 1st person plural ending *-weni*. Such forms are important, since only the dissimilated allomorphs of the 1st person plural endings (npst. *-mēni*, pst. *-men*) — unlike their basic forms *-weni*, *-wen* — present an environment in which plene writing functions as a reliable diagnostic of vowel length (cf. n. 25). Given the scarcity of relevant forms, the fact that unambiguous plene spellings (like *tumēni*; cf. *umēni* in (167) below) are attested at all is significant, and strongly suggests that the 1PL.NPST.ACT suffix was regularly subject to stressed vowel lengthening in radical verbs (thus orthographically ambiguous *-weni* = [-wé:ni]). Positing mobile stress in (165) therefore accounts not only for the distribution of plene writing in the root (frequent in the singular non-past, virtually absent in the plural), but also for its presence within inflectional endings in this class.

A relatively large number of Hittite *hi*-verbs pattern like those in (165), showing quantitative alternations — root *ā/a*-ablaut and in some cases also long vowels in plural inflectional endings — that point to mobile stress; this class includes the verbs in (166):

(166)	SINGULAR	PLURAL	
	<i>hāši</i> [χá:s-i]	<i>haššanzi</i> [χas:-ántsi]	‘beget; give birth’
	<i>kānki</i> [ká:nk:-i]	<i>kankanzi</i> [kank:-ántsi]	‘hang’
	<i>lāhui</i> [lá:χ <sup>w</sup> -i]	<i>lahuanzi</i> [laχ <sup>w</sup> -ántsi]	‘pour’
	<i>mārkahhi</i> [má:rkχ:-i]	<i>markanzi</i> [mark-ántsi]	‘separate’
	<i>nahti</i> [ná:χt:-i]	<i>nahtēni</i> [naχ:-t:é:ni]	‘fear’
	<i>sākhi</i> [sá:k:χ:-i]	<i>šaktēni</i> [sak:-t:é:ni]	‘know’
	<i>iškārhi</i> [iská:rχ:-i]	<i>išgaranzi</i> [iskar-ántsi]	‘pierce’
	<i>išpāri</i> [ispá:r-i]	<i>išparanzi</i> [ispar-ántsi]	‘spread’
	<i>dākki</i> [tá:k:-i]	<i>takkanzi</i> [tak:-ántsi]	‘resemble’
	<i>wāki</i> [wá:k-i]	<i>wakkanzi</i> [wak:-ántsi]	‘bite’
	<i>zāhi</i> [tá:χ:-i]	<i>zahhueni</i> [tsaχ:-wé:ni]	‘hit’

Radical *hi*-verbs with diphthongal nuclei — i.e. verb roots with underlying /ai/ and, in at least one case, /au/ — also regularly exhibit mobile stress in their non-past inflectional paradigms. The basic inflectional pattern of this class is exemplified in (167) with forms of *dai*- ‘place’ and *au(š)*- ‘see’.<sup>31</sup>

(167)	a. ‘place’	1SG	<i>tēhhi</i>	[té:χ:-i]	3SG	<i>dāi</i>	[tá:-y]	3PL	<i>tianzi</i>	[ti-yántsi]
	b. ‘see’	1SG	<i>ūhhi</i>	[ó:χ:-i]	2SG	<i>autti</i>	[áw-ti]	1PL	<i>umēni</i>	[u-mé:ni]

As evident in (167), diphthongal radical verbs show fairly complex root allomorphy. In the singular, the underlying diphthong surfaces in 2nd and 3rd person forms,<sup>32</sup> but undergoes monophthongization in the 1st person singular, yielding a long mid vowel. In the plural, the shape of the root is *-i-* ([i]) or *-u-* ([u]), with deletion of /a/ and resultant vocalization of the semivowel. Since this deletion occurs in the same environment in which other mobile radical verbs show reduced allomorphs of the root, it is naturally viewed as an extreme case of vowel reduction (i.e. reduction to zero), and in turn, attributed to the same cause as in these verbs, viz. the shift of stress onto inflectional endings in plural forms.

Additional radical *hi*-verbs that display stress-conditioned *ai/i*-ablaut are given in (168):

<sup>31</sup>The only Hittite verbal roots containing the diphthong /au/ are *au(š)*- ‘see’ and poorly attested *mau(š)*- ‘fall’. Both exhibit a number of irregularities, including 3SG forms *aušzi*, *maušzi*, with unexpected *mi*-verb inflection and *-š(š)*- inserted between root and inflectional ending; see Hoffner and Melchert (2008: 228–9) for an overview of forms.

<sup>32</sup>As discussed in §3.2, it is very likely that inherited diphthongs that remained diphthongal in Hittite did not originally lengthen under stress (cf. Melchert 1994: 148 with references), as shown especially by the absence of OH plene spellings of *ai* and *au* in this environment. However, within inflectional paradigms that had both long and short outcomes of these diphthongs, it appears that the former spread analogically at expense of the latter, since the previously short diphthongs are often spelled plene in younger texts. For simplicity, I present such stressed diphthongs in phonetic transcription as uniformly long (i.e. [á:y], [á:w]).



(168)	SINGULAR		PLURAL	
	<i>huwāi</i> [χ <sup>w</sup> á:y]		<i>hu(i)yanzi</i> [χ <sup>w</sup> i-yántsi]	‘run’
	<i>parāi</i> [prá:y]		<i>parianzi</i> [pri-yántsi]	‘blow’
	<i>išhāi</i> [isχá:y]		<i>išhianzi</i> [isχi-yántsi]	‘bind’
	<i>išpāi</i> [ispá:y]		<i>išpiyanzi</i> [ispi-yántsi]	‘be satiated’
	<i>zāi</i> [zá:y]		<i>zištēn[i]</i> [tsi-st:é:ni]	‘cross’

As in the other radical classes treated above, the stress pattern expected on the basis of root allomorphy is corroborated by occasional plene writings of the plural inflectional endings, e.g. *zištēni* ‘you cross’ in (168).

#### 4.3.2.2 Radical verbs with fixed stress

Not all Hittite radical verbs had mobile stress; some instead had stress fixed on the root throughout their inflectional paradigm. Fixed stress is a minority pattern in both conjugational classes, and is especially uncommon in the *mi*-conjugation; nevertheless, there are at least three radical *mi*-verbs in which the evidence for fixed root stress is incontrovertible: *pai*- ‘go’; *wek*- ‘demand’; and *ašš*- ‘remain.’ (169) provides attested singular and plural forms of these verbs in which their non-alternating stress pattern is manifest.<sup>33</sup>

(169)	SINGULAR		PLURAL	
a.	<i>paimi</i> [pá:y <sup>mi</sup> ]		<i>paiwani</i> [pá:y <sup>wani</sup> ]	‘go’
	<i>paiši</i> [pá:y <sup>si</sup> ]		<i>paittani</i> [pá:y <sup>tani</sup> ]	
b.	<i>wēkzi</i> [wé:k <sup>tsi</sup> ]		<i>wekanzi</i> [wé:k <sup>antsi</sup> ]	‘demand’
c.	<i>āšzi</i> [á:s <sup>tsi</sup> ]		<i>āššanzi</i> [á:s <sup>antsi</sup> ]	‘remain’

Fixed radical verbs crucially differ from mobile verbs in their non-past tense plural forms, retaining stress on the verbal root rather than yielding it to the plural inflectional endings. The evidence for fixed stress is clearest for *pai*- ‘go’ in (169a): in contrast to the mobile diphthongal verbs in (167–168) above, the root diphthong is maintained in 1st and 2nd person plural forms, and is even found in post-OH texts with plene spelling; moreover, it is attested with the archaic unstressed allomorphs of the respective inflectional endings, *-wani* and *-tani*. For *wek*- ‘demand’ in (169b), it is the verb’s consistent *e*-vocalism; the failure of /e/ to undergo reduction in its plural forms as in most radical *mi*-verbs — e.g. *epp/app*- ‘take’ in (163) — is most plausibly explained by assuming that stress is fixed on the root.<sup>34</sup> Finally, the root syllable of *ašš*- ‘remain’

<sup>33</sup>On the (long) diphthong in the root of (169a), see n. 32 above.

<sup>34</sup>The invariant root-final singleton velar stop *-k-* ([k]) — in particular, in imperfectives containing the suffix *-ške-* (cf. Melchert 2014c: 255 n. 8) — is indicative of a prehistoric \**ē* in both singular and plural paradigmatic forms (whether original or analogical); fixed root stress was thus inherited in this verbal paradigm. On the historical development of Hitt. /wék/, see further §5.3.2.3.

in (169c) contains an invariant long vowel, which is spelled plene in both singular and plural forms; the absence of the *ā/a* quantitative alternations observed in mobile radical verbs — in particular, in mobile *hi*-verbs like (165-166), but also in the exceptional *mi*-verb *ārš-* ‘flow’ in (164) — is consistent with fixed root stress.

Within the *hi*-conjugation radical verbs with fixed stress are somewhat more common, but are still by far the minority type. (170) illustrates the inflectional paradigms of seven verbs for which there is strong positive evidence of membership in this class:

(170)	SINGULAR		PLURAL		
a.	<i>ānši</i>	[á:nsi]	<i>ānšanzi</i>	[á:nsant̪si]	‘wipe’
	<i>ārri</i>	[á:rri]	<i>ārranzi</i>	[á:r:rant̪si]	‘wash’
	<i>hāni</i>	[χá:ni]	<i>hānanzi</i>	[χá:nant̪si]	‘draw (liquid)’
b.	<i>šipānti</i>	[sip:ánti]	<i>šipanduwani</i>	[sip:ántwani]	‘libate’
c.	<i>karāpi</i>	[krá:pi]	<i>karepanzi</i>	[kré:pant̪si]	‘devour’
	<i>šarapi</i>	[srá:pi]	<i>šrepanzi</i>	[sré:pant̪si]	‘sip’
d.	<i>nāi</i>	[ná:i]	<i>nē(y)anzi</i>	[né:yant̪si]	‘turn; lead’

Once again, it is in plural non-past tense forms that fixed stress verbs can be clearly distinguished from mobile verbs. Fixed root stress accounts for the root long vowel (*ā*) in the plural of the three *hi*-verbs in (170a), which contrasts with the short vowel (*a*) of the mobile *hi*-verbs in (165-166). It also explains why *šippand-* ‘libate’ in (170b) — like *pai-* ‘go’ in (169a) above — occurs with unstressed *-wani*.<sup>35</sup>

The two *hi*-verbs in (170c) exhibit a synchronically irregular qualitative alternation in their root syllable (*ale*), likely one of the few remaining traces of inherited *\*ó/é*-ablaut in the *hi*-conjugation (cf. Jasanoff 1979, 2003: 71, 89; Melchert 2013a).<sup>36</sup> However exactly this alternation is to be analyzed synchronically, it is clear that the inherited fixed root stress pattern of this category is faithfully preserved in these verbs since — like *wek-* ‘demand’ in (169b) — their plural forms show root *e*-vocalism.

Finally, there is the diphthongal root *nai-* ‘turn; lead’ in (170d), a very well-attested verb with abundant evidence for fixed root stress. Not only does 3pl. *nē(y)anzi* have *e*-vocalism and

<sup>35</sup>In addition, there is a single late spelling of the 3rd plural form with plene *šipāndan[zi]* (<šī-pa-a-an-da-a[n-zi]>; *fide* Kloekhorst 2008: 404). While *šippand-* behaves like a root synchronically, I assume that historically it is morphologically complex, ultimately reflecting a reduplicated form PIE *\*se-spónd-* (Jasanoff to appear b, Melchert 2016a; see further §5.3.2.3). However, the synchronic analysis of *šippand-* advanced here does not depend on this diachronic development; if *šippand-* instead diachronically continues a root formation (as contended by, e.g., Yakubovich and Kassian 2002), it may have secondarily developed fixed root stress (i.e. acquired a lexical accent /sip:ánt/; cf. §4.3.4.1 below) in the same way as the *hi*-verbs in (170a). For further discussion, see §5.3.2.3.

<sup>36</sup>Kloekhorst (2012, 2014b) disputes this claim, arguing that the *hi*-conjugation in Hittite reflects only *\*o/∅*-ablaut. However, his alternative inner-Hittite derivation of the weak stem *e*-vocalism of this class cannot be maintained — for instance, the root *e*-vowel in the verbs in (170) cannot be epenthetic, since there is no plausible phonological or morphological motivation for epenthesis in this environment (see Melchert 2013a; cf. Yates 2015a: 154–5, 166 n. 43). Moreover, Melchert (2015b) has since identified additional traces of *\*o/e*-ablaut in the *hi*-conjugation.

multiple plene spelling of the root, but 1pl. *naiwani* is attested with the unstressed 1st person plural ending *-wani*.<sup>37</sup> Furthermore, the verb exhibits fixed root stress in its middle paradigm, despite the fact that middle endings tend to attract stress — compare 3SG.NPST.MID *nē(y)a(ri)* ([né:(y)-a(ri)]) ‘turns oneself’ with (e.g.) *ištuwāri* ([istuw-á:ri]) ‘becomes evident’, *lagāri* ‘bows’ ([lak-á:ri]).<sup>38</sup>

Collectively, the verbal forms in (163–170) demonstrate that radical verbs in Hittite show two distinct stress patterns within their inflectional paradigms, mobile stress and fixed stress. Within both the *mi-* and the *hi-*conjugations, there are radical verbs of each type, thus excluding a purely morphological analysis of these divergent stress patterns. Rather, whether a given radical verb has fixed or mobile stress appears to be an idiosyncratic property of the verbal stem — or more precisely, of the verbal root, since radical verbs are unaffixed.

This analysis is recommended by the behavior of these roots outside of their inflectional paradigm proper. Because it attributes the contrasting stress patterns of fixed and mobile radical verbs to some feature of their verbal roots, it predicts that this contrast will not be specific to their inflectional paradigms, but will recur in morphologically related forms. This prediction is in fact borne out: §4.3.3 identifies two additional morphological categories in which the fixed vs. mobile contrast systematically aligns with different surface stress patterns.

### 4.3.3 Radical verbs beyond the inflectional paradigm

§4.3.2 established the existence of a contrast in Hittite between fixed and mobile radical verbs, which exhibit distinct stress patterns within their inflectional paradigms. Yet this contrast is observed not only within verbal inflection proper; rather, it extends into productive morphological categories with inflection-like properties, which include (at least) imperfective stems formed with the suffix *-ške-* and participles formed with the suffix *-ant-*. §4.3.3.1 provides some background on these Hittite suffixes, and argues for their inflectional nature. The stress patterns of these suffixes in combination with mobile radical verb roots and fixed radical verb roots are treated in §4.3.3.2 and §4.3.3.3 respectively.

#### 4.3.3.1 Imperfective & participle formation in Hittite

The verbal suffix *-ške-* is highly productive in Hittite, attaching freely both to verbal roots (e.g. *appiške-* [ap:-iské:-] ‘take-IPFV’) and to derived stems (e.g. *šuppiyahhišk:e-* [sup:riy-áχ:-isk:e-] ‘pure-FACT-IPFV’).<sup>39</sup> The *-ške-* suffix modifies the lexical aspect of the verbal stem to which it

<sup>37</sup>The fact that *naiwani* cannot be original — an inherited *\*ói* diphthong would have monophthongized to Hitt. [é:] before *\*w* — but rather must be formed by productive morphophonological processes strengthens the claim that this root is synchronically accented, i.e. /néi/ (or /nái/).

<sup>38</sup>In general, the middle inflectional endings tend to attract stress; a systematic analysis of the accentual properties of these endings is not attempted here, but is an important task for future research.

<sup>39</sup>The productivity of the suffix in Hittite contrasts with the other NIE languages, where reflexes of PIE *\*-ške(o)-* have a more restricted distribution. These reflexes suggest that in PNIE *\*-ške(o)-* operated on grammatical aspect, deriving imperfective (“present”) stems especially to root aorists, although some further innovations and extensions can be observed in daughter languages; see Zerdin (1999, 2002) with special reference to Greek.

attaches, indicating that iteration, pluractionality, durativity, or related notion is a property of the event that it denotes.<sup>40</sup> Besides its high productivity and predictable semantics, the suffix has several properties that distinguish it from prototypical derivational suffixes.<sup>41</sup> First, *-ške-* never changes the syntactic category of its base: it subcategorizes for verbs and the resulting complex stem selects verbal inflectional endings (i.e.  $V \Rightarrow V$ ).<sup>42</sup> Second, *-ške-* never occurs between the verbal root and any suffixes that are unambiguously derivational (e.g. factitive *-ahh-*, denominal *-ye/a-*),<sup>43</sup> and it is followed only by verbal inflectional endings and other suffixes that are plausibly analyzed as inflectional, such as the infinitive marker *-wanzi* or participial *-ant-* (on which see below). This distribution is consistent with Greenberg’s (1963: 93) generalization that inflectional suffixes are ordered after derivational suffixes cross-linguistically. Finally, there are certain morphosyntactic environments that condition the use of *-ške-*.<sup>44</sup> One such context is the so-called “supine construction” (cf. Hoffner and Melchert 2008: 338), a type of auxiliary verb construction in which an inflected form of *dai-* ‘place’ (later also *tiya-* ‘step’) co-occurs with a verbal stem terminating in the “supine” suffix *-(u)wan* with the meaning ‘begin to X’ (vel sim.);<sup>45</sup> this construction requires a marked imperfective verbal stem, which is typically formed by suffixation of *-ške-*.<sup>46</sup> Such agreement-like phenomena provide support for treating *-ške-* (and the other less frequent imperfective markers, *-anna/i-* and *-šš(a)-*) on par with other

<sup>40</sup> Functionally, *-ške-* is closely comparable to partial reduplication in Hittite, and often appears suffixed to reduplicated stems, “reinforcing” their imperfective semantics (Dempsey 2015: 60–70, 331). See also Bechtel (1936), Dressler (1968), Melchert (1998), Hoffner and Melchert (2002), and Cambi (2007) for detailed treatments of the semantics of *-ške-* (and the other imperfective suffixes) in Hittite.

<sup>41</sup> Whether it is possible to define cross-linguistically adequate criteria that rigidly distinguish between inflection and derivation is a notoriously problematic question in morphological theory, and many languages have “borderline” affixation processes that cannot be neatly classified into either category; for recent overviews of the question, see (e.g.) Booij (2000), ten Hacken (2014).

<sup>42</sup> The capacity of an affix to change the syntactic class of its base is standardly associated with derivational (rather than inflectional) morphemes. The strong form of this claim — viz., that only derivational morphemes are class-changing (or “transpositional”) — can be found in the literature (e.g. Scalise 1984: 103), but likely cannot be maintained in view of the issues raised by (e.g.) Haspelmath (1996). Conversely, it is also not the case that being class-changing is sufficient condition for derivational status; see the discussion of participial *-ant-* below.

<sup>43</sup> In just two exceptional cases, *-ške-* precedes the causative suffix *-nu-* (contrary to the usual ordering *-nu-ške-*): *lahlahheškenu-* ‘cause (horses) to run’; *uškenu-* ‘cause to inspect’ (cf. Hoffner and Melchert 2008: 175). It is likely that in each case the base is a lexicalized stem (i.e. *lahlahheške-\** ‘run’; *uške-* ‘inspect’), thus comparable to (e.g.) *tuške-* ‘be happy’ or *paške-* ‘fix; fasten’, which historically contain *-ške-* (Petersen 1937: 211; Puhvel 2011: 189–90 with references), but this suffix is no longer perceived synchronically and so the verbs productively form new imperfective stems *duškiške-*, *paškiške-*. The existence of imperfective *uškiške-* ( $\Rightarrow$  *uške-*) may similarly support the lexicalized status of the base stem (although it could just be doubly-marked imperfective, which are occasionally found; see Hoffner and Melchert (2008: 323).

<sup>44</sup> Lexicalist theories of morphology generally assume that inflection interacts directly with syntax in a way that derivation does not (see, e.g., Anderson 1982: 587).

<sup>45</sup> Melchert (2017c) identifies another context in which the imperfective suffix interacts with (morpho)syntactic processes: when an unaccusative verb that otherwise selects active endings is suffixed with *-ške-*, it instead surfaces with middle voice inflection. This interesting pattern still awaits formal analysis.

<sup>46</sup> Hoffner and Melchert (2008: 322, 338) note only “extremely rare exceptions” in which the “supine” does not condition a marked imperfective stem; see also Ose (1944) and Kammenhuber (1955) for fuller treatment and exemplification of this construction.

inflectional suffixes.<sup>47</sup>

Most of these inflectional properties are also exhibited by the Hittite participle suffix *-ant-*. Participles may be used attributively or predicatively as stative verbal adjectives, which exhibit grammatical agreement with the noun that they modify (cf. Hoffner and Melchert 2008: 339–40). When built to transitive verbs, participles express a resultant state of the modified noun, most frequently with passive sense (e.g. *app-ant-* ‘taken’), although “generic” active readings are also found (*ad-ant-* ‘having eaten’); participles to intransitive verbs typically indicate an attained state (*akk-ant-* ‘having died; dead’), or in some cases, an ongoing state (*huw-ant-* ‘running’).<sup>48</sup> Like *-ške-*, the participle suffix is extremely productive, with no evident selectional restrictions on verbal stem type; it therefore attaches to derived stems (e.g. *šuppiy-ahh-ant-* ‘pure-FACT-PTCP’) in addition to the root formations noted above, again with semantics predictable from the meaning and transitivity of the stem. With respect to its ordering, *-ant-* is followed only by suffixes that are clearly inflectional, the fusional endings that encode number, gender, and case features in the nominal system.<sup>49</sup>

The only apparent issue for an inflectional analysis of the participial suffix is therefore its capacity to change the syntactic category of its base (i.e.  $V \Rightarrow A$ ). Yet while this class-changing status may be associated primarily with derivational morphemes, there are also established cases of otherwise prototypical inflectional suffixes that are transpositional (Haspelmath 1996); such cases often include participles, which frequently have both verb-like and adjective-like syntactic properties (cf. Booij 2000: 361–2). The verbal properties of the Hittite participle are evident, especially, in its regular use in the “analytic perfect” construction, a structure formally and functionally comparable to the HAVE(/BE)-perfects found in modern Germanic and Romance languages. The Hittite construction employs an inflected form of *har(k)-* ‘hold; have’ or *eš/aš-* ‘be’ as an auxiliary verb together with a participial form (stem + *-ant-*).<sup>50</sup> Significantly, the participial verb form acts as the main verb in this construction (i.e. its morphosyntactic head);

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<sup>47</sup>The imperfective stem may also be conditioned by nominal full reduplication (traditionally termed *āmredita*, following the Sanskrit grammarians; cf. Klein 2003); for details, see Yates (2014b) (cf. Hoffner and Melchert 2008: 291, 320). The imperfective suffixes *-anna/i-* and *-šš(a)-* are treated no further here. Both are etymologically opaque (cf. Kloekhorst 2008: 175–6, 688–90), and there is no synchronic evidence to suggest that either attracts stress (see Kloekhorst 2014a: 296–8 for attestations of *-anna/i-*).

<sup>48</sup>Traces of the participle suffix in the other Anatolian languages show essentially the same function (cf. Hitt. *akkant-*, Luw. *walant(i)-/ulant(i)-*, Lyc. *lāta-* ‘dead’). Anatolian thereby diverges strikingly from the NIE situation, where reflexes of PIE *\*-ont-* (> Hitt. *-ant-*) are the regular means for building present active participles — compare, for instance, Hitt. *kun-ant-* ‘killed’ with its exact cognate Ved. *ghn-ánt-* ‘smashing, killing’. In functional terms, the Hittite participle instead most closely resembles PNIE *\*-to-* and *\*-no-* adjectives (cf. Lundquist and Yates to appear: §§2.5, 4.4.1). How exactly the Anatolian or non-Anatolian attested function can be derived from the other remains an unsolved problem (see Melchert (to appear e) and Fellner and Grestenberger (to appear) for possible step-by-step diachronic scenarios).

<sup>49</sup>For a full description of Hittite nominal inflection, see Hoffner and Melchert (2008: 64–131); the patterns of intraparadigmatic stress mobility found in some noun classes is also discussed further in §5.3.3.

<sup>50</sup>In the “analytic perfect,” the participle exhibits grammatical agreement with the subject when the auxiliary is *eš/aš-*; with *hark-*, it appears without further overt inflection (formally, the neuter nominative-accusative singular case form). A concise overview of the form and meaning of this construction is provided by Hoffner and Melchert (2008: 310–12); for more detailed treatments, see Boley (1984, 1992) and Cotticelli-Kurras (1991, 1992) with references to earlier scholarship.

as pointed out by Garrett (1990: 102–3, 1996: 102–6), the lexical properties of this verb determine which of the two auxiliaries are selected (and if *eš/aš-*, trigger agreement-marking subject clitics in the absence of an overt DP subject), as well as potentially condition the appearance of certain particles associated with particular lexical meanings of the verb.<sup>51</sup> Thus not only does the Hittite participle play a “paradigmatic” role in the formation of the analytic perfect, it also exhibits the morphosyntactic properties of a verb in this locus (*viz.*, as if no class-change had occurred); this construction therefore provides strong evidence for analyzing Hittite participle formation as an inflectional process, just as (e.g.) the similar use of the English past participle in the HAVE-perfect has generally been taken as support for its inflectional status (e.g. Blevins 2006: 523–4).

Accentually, the properties of imperfective *-ške-* and participial *-ant-* most closely resemble those of the plural non-past inflectional endings, which have a tendency to attract word stress, but do not do so in all stem types. I argue in §4.4.2 that this behavior should be attributed to their inflectional nature — more specifically, to the fact that inflectional suffixes are not morphological heads; yet however it is to be analyzed, it is descriptively true that *-ške-* and *-ant-* pattern prosodically with inflectional endings rather than with the explicitly derivational suffixes treated below. In fact, the distribution of word stress in imperfectives and participles formed to a given verbal stem appears to correlate perfectly with the (im)mobility of word stress within that verb’s inflectional paradigm: in mobile radical verbs, stress is attracted to the imperfective or participle suffix (§4.3.3.2); but in fixed radical verbs, stress remains on the root in imperfective and participial forms (§4.3.3.3).

#### 4.3.3.2 Stress in imperfectives & participles of mobile radical verbs

(171) illustrates that stress surfaces on the participle suffix in combination with mobile radical verb roots of both conjugational classes (*mi*-verbs in (171a), *hi*-verbs in (171b)), as clearly shown by its plene spelling in these forms. Corresponding plural non-past verbal forms are also provided in (171) for side-by-side comparison; these forms simply confirm that the same verbal roots show mobile stress in their inflectional paradigms, as established already in §4.3.2.1:<sup>52</sup>

<sup>51</sup>For extensive discussion of these particles and their usage, see Hoffner and Melchert (2008: 357–84).

<sup>52</sup>The initial plene spelling of the participle of ‘die’ in (171b) is a scribal error, as confirmed by the appearance of the root’s weak allomorph with geminate *-kk-/-gg-* (cf. 3SG *aki* ‘dies’ in (165) above). On the non-geminate/geminate alternation in singular/plural forms of ‘die’ and other *ā/a*-ablauting *hi*-verbs, see Melchert (2012). Neuter nominative accusative singular forms in *-ān* show deletion of /t/, which is the phonologically regular outcome of /-nt#/ (cf. Melchert 1994: 85, 179).

(171)	PARTICIPLE	cf.	PLURAL NON-PAST
a.	<i>appānteš</i> [apɪ-á:nt-es]	<i>appanzi</i>	[apɪ-ántsi] ‘take’
	<i>ašān</i> [as-á:n]	<i>ašanzi</i>	[as-ántsi] ‘be’
	<i>adān[za]</i> [at-á:nts]	<i>[a]zzastē[ni]</i>	[ats-t:é:ni] ‘eat’
	<i>ḥugāntan</i> [χ <sup>w</sup> ok-á:nt-an]	<i>ḥukanzi</i>	[χ <sup>w</sup> ok-ántsi] ‘slaughter’
	<i>tarāntes</i> [tar-á:nt-es]	<i>taranzi</i>	[tar-ántsi] ‘say’
b.	<i>āggānza</i> [akɪ-á:nts]	<i>akkanzi</i>	[akɪ-ántsi] ‘die’
	<i>naḥḥān</i> [naχɪ-á:n]	<i>naḥtēni</i>	[naχɪ-t:é:ni] ‘fear’
	<i>isgarān</i> [iskar-á:n]	<i>išgaranzi</i>	[iskar-ántsi] ‘pierce’
	<i>tiyān</i> [ti-yá:n]	<i>tianzi</i>	[ti-yántsi] ‘place’

In other mobile verbs, plene writing of *-ant-* is unattested, but suffixal stress can be safely inferred from root allomorphy — e.g. *akuwant-* ‘having drunk’ ([ak<sup>w</sup>-á:nt-]) to the *mi*-verb *eku/aku-* ‘drink’, or *išḥiyant-* ‘bound’ ([isχiy-á:nt-]) to the *ḥi*-verb *išḥai-* ‘bind’.

Exactly the same pattern is observed in *-ške-* suffixed imperfectives. Radical verbs with mobile stress within their inflectional paradigm are also regularly stressed on this suffix.<sup>53</sup> Despite the general paucity of evidence for plene writing in this category, there are nevertheless attested forms like (172) in which *-ske-* is spelled plene, clearly confirming suffixal stress:<sup>54</sup>

(172)	IMPERFECTIVE	cf.	PLURAL NON-PAST
a.	<i>akkuškēši</i> [ak <sup>w</sup> -usk:é:si]	<i>akuanzi</i>	[ak <sup>w</sup> -ántsi] ‘drink’
	<i>azzikkī</i> [atsik:í:]	<i>[a]zzastē[ni]</i>	[atst:é:ni] ‘eat’
b.	<i>daškēmi</i> [ta-sk:é:mi]	<i>dattēni</i>	[ta-t:é:ni] ‘take’
	<i>zikkēt</i> [tsik:é:t]	<i>tianzi</i>	[ti-yántsi] ‘place’

As in the participle, other radical verbs are not attested with plene writing, but exhibit root

<sup>53</sup>Hoffner and Melchert (2008: 205) register a few aberrant forms with *a*-vocalism of the imperfective suffix, e.g. *uškattēni* (← *au-* ‘see’), *pišgawēni* (← *pai-* ‘give’), including at least one with plene spelling of the inflectional suffix, *dāšqatēni* (← *da-* ‘take’). On the basis especially of the last, Hoffner and Melchert raise the possibility (*loc cit.* n. 109) that these forms have *a*-vocalism because they were stressed on the inflectional ending (i.e. [-skat:é:ni]). However, the probative value of *dāšqatēni* is compromised by its irregular plene of the initial syllable. It is more likely, then, that these forms with *a*-vocalism are simply errors, or else perhaps due to some kind of analogy with verbs containing the suffix *-yela-* (on which type see §4.3.5 below), where *a*-vocalism spreads diachronically (see Yoshida 2010).

<sup>54</sup>The 2nd singular imperative *azzikkī* ‘eat!’ in (172a) shows regular raising(/lengthening) of word-final stressed /e/ (→ [-í:#]; cf. Melchert 1994: 185).

allomorphy that is consistent with stress on the *-ške-* suffix — e.g. IPFV *appiške-* ([app-iské:-]) to the *mi*-verb *epp/app-* ‘take,’ or IPFV *išhiške-* ([isχi-sk:é-]) again to the *hi*-verb *išhai-* ‘bind’.<sup>55</sup>

Noteworthy, too, are the plural imperfective forms in (173) below, both paradigmatically related to the forms in (172) above:

(173)

	IMPERFECTIVE PLURAL	cf.	RADICAL PLURAL	
a.	<i>akkuškēwani</i> [ak: <sup>w</sup> -usk:é:-wani]		<i>akueni</i> [ak <sup>w</sup> -wé:ni]	‘drink’
b.	<i>daskēwen[i]</i> [ta-sk:é:-weni]		<i>tumēni</i> [tu-mé:ni]	‘take’

The plural imperfective forms in (173) — which show plene spelling of the suffix and, in the case of (173a), also the reduced 2nd plural ending *-wani* — positively demonstrate that stress is fixed on *-ške-* suffix throughout the inflectional paradigms of these verbs. These forms are particularly interesting, because in general the plural verbal inflectional endings tend to attract stress, as observed with the same roots when *-ške-* is absent. The *-ške-*imperfectives thus more closely resemble fixed radical verbs, where stress also persists on the final syllable of the verbal stem. Within both categories, then, the stem-final syllable is preferred to the inflectional endings as the site of primary stress, but the motivation for this cross-categorical symmetry remains unclear thus far. A unified phonological explanation is developed in §4.3.4 below.

#### 4.3.3.3 Stress in imperfectives & participles of fixed radical verbs

The stress patterns observed in the *-ške-*imperfectives and *-ant-*participles of mobile radical verbs contrast sharply with those of fixed radical verbs. Within these inflection-like categories, fixed radical verbs of both conjugational classes appear to show consistent root stress. This stress pattern can be observed in the participial forms of the *mi*-verbs in (174a) and the *hi*-verbs in (174b):

<sup>55</sup>An apparent exception to regular vowel reduction is the imperfective stem *šeške-* (← *šeš/šaš-* ‘sleep’), which is clearly stressed on the suffix in 3SG.IMPACT *šeškēddu* ([sesk:é:t:u]) ‘let him/her/it sleep’ (MH/MS; KUB 13.1 i 27). On the basis of this example, I assume that the oldest form of the imperfective stem 3PL.NPST.ACT *šeškanzi* ‘the sleep’ (KUB 29.35 iv 6, 7; OH/OS) has expected suffixal stress (i.e. [seskántsi]) and is thus aberrant only in failing to show reduction of pretonic /e/ to [a]. The younger form 2SG.IMPACT *šēške* ([sé:ske]) ‘sleep!’ (KUB 33.8 iii 19; OH/NS) with a long/stressed vowel in the root is almost certainly a later development, likely related to the general tendency for historically mobile verbs to generalize the stressed root allomorph within their inflectional paradigms (cf. n. 6). A separate question is why the root vowel does not undergo reduction. Possibly relevant is the fact that already in its oldest attestation (cited above) *šeške-* has the specialized sense ‘sleep with; have sexual intercourse with’ (see *CHD* Š: 443–4); the irregular vocalism may then reflect an attempt to formally differentiate it from the basic verb.



(174)

	PARTICIPLE	cf.	PLURAL NON-PAST	
a.	<i>wekantan</i> [wé:k-ant-an]	<i>wekanzi</i>	[wé:k-antsi]	‘demand’
	<i>āššanza</i> [á:s:-ants]	<i>āššanzi</i>	[á:s:-antsi]	‘remain’
b.	<i>ānšantes</i> [á:n-sant-es]	<i>ānšanzi</i>	[á:ns-antsi]	‘wipe’
	<i>ārranza</i> [á:r:-ants]	<i>ārranzi</i>	[á:r:-antsi]	‘wash’
	<i>karepandan</i> [krép-ant-an]	<i>karepanzi</i>	[kré:p-antsi]	‘devour’
	<i>nē(y)antes</i> [né:y-ant-es]	<i>nē(y)anzi</i>	[né:y-antsi]	‘turn; lead’

Root stress in the participles in (174) is indicated by the same diagnostics (outlined in §4.3.2.2 above) as in the corresponding 3rd plural non-past forms listed beside them. Moreover, the total absence of plene spellings of the participle suffix strongly suggest that it is unstressed, and therefore point to root stress.

An even greater number of fixed radical verbs have imperfective forms that show the same stress pattern: when suffixed with *-ške-*, the root retains stress. This pattern is illustrated in (175):

(175)	PARTICIPLE	cf.	PLURAL NON-PAST	
a.	<i>wekiškizzi</i> [wé:k-isk:e-tsi]	<i>wekanzi</i>	[wé:k-antsi]	‘demand’
	<i>āšškizzi</i> [á:s:k:e-tsi]	<i>āššanzi</i>	[á:s:-antsi]	‘remain’
	<i>paiškitta</i> [pá:y-sk:et:a]	<i>paittani</i>	[pá:i-t:ani]	‘go’
b.	<i>ānšikizzi</i> [á:n-sik:e-tsi]	<i>ānšanzi</i>	[á:ns-antsi]	‘wipe’
	<i>ārrēškizzi</i> [á:r:-iske-tsi]	<i>ārranzi</i>	[á:r:-antsi]	‘wash’
	<i>[h]āniškizzi</i> [χá:n-isk:e-tsi]	<i>hānanzi</i>	[χá:nantsi]	‘draw (liquid)’
	<i>nāiškenun</i> [ná:y-sk:e-nun]	<i>nē(y)anzi</i>	[né:y-antsi]	‘turn; lead’

Yet again, all positive evidence in (175) supports root stress, which also explains the lack of plene spellings of the *-ške-* suffix in the imperfective stem of any of these verbs.

#### 4.3.3.4 Fixed and mobile stress as cross-categorical asymmetry

The data examined in §§4.3.3.2–4.3.3.3 provide empirical support for two fundamental points. First, imperfectives and participles of radical verbs show two distinct stress patterns: stress is attracted to the inflection-like suffixes instantiating these categories (*-ške-*, *-ant-*), or else it remains fixed on the verbal root. Moreover, which of these two stress patterns that a given rad-

ical verb will show is determined by the (im)mobility of stress within that verb's inflectional paradigm: mobile  $\Rightarrow$  suffixal stress; fixed  $\Rightarrow$  root stress. This implicational relationship strongly indicates that the category-internal contrast within radical verbs between fixed and mobile stress is not a specific morphological property of these verbs' inflectional paradigms, as appears to be implied in most traditional discussions; rather, whatever feature distinguishes between these two types has systemic consequences for word stress, extending beyond a verb's inflectional paradigm into certain morphologically related forms to produce corresponding contrastive stress patterns.

What, then, is this feature, and how is it represented in the synchronic grammar of Hittite speakers? In the next section (§4.3.4), I argue that the minimal contrast between mobile and fixed radical verbs is in the accentual properties of their verbal roots — specifically, unaccented vs. accented — and develop an analysis that correctly generates these two distinctive intraparadigmatic word stress patterns. Furthermore, I show that this analysis can be extended straightforwardly to explain the identical contrast that arises in imperfectives and participles formed to these verbs.

#### 4.3.4 Stress assignment in Hittite radical verbs

This section proposes an optimality-theoretic analysis of synchronic Hittite stress assignment within the verbal inflectional system. The three major components of this analysis, including the relevant constraint inventory, is laid out in §4.3.4.1. These are applied to derive mobile and fixed stress patterns in Hittite radical verbal inflection in §4.3.4.2 and §4.3.4.3 respectively. In §4.3.4.4, this analysis is extended to the corresponding imperfective stems and participles, where it is shown to correctly predict the parallel stress contrast in these productive morphological categories. §4.3.4.5 applies this analysis to verbal prefixation.

##### 4.3.4.1 Components of the analysis

The synchronic contrast between mobile and fixed root stress in Hittite radical verb inflection falls out from three basic assumptions. The first of these is an underlying accentual contrast in verbal inflectional endings: the singular non-past endings are unaccented, the plural endings accented, i.e. (176).

(176)	<i>mi</i> -CONJUGATION				<i>hi</i> -CONJUGATION			
	SINGULAR		PLURAL		SINGULAR		PLURAL	
1ST	<i>-mi</i>	/-mi/	<i>-weni</i>	/-wéni/	<i>-hi</i>	/-χ:i/	<i>-weni</i>	/-wéni/
2ND	<i>-ši</i>	/-si/	<i>-tteni</i>	/-t:éni/	<i>-tti</i>	/-ti/	<i>-(š)teni</i>	/-(s)t:éni/
3RD	<i>-zi</i>	/-t̂si/	<i>-anzi</i>	/-ánt̂si/	<i>-i</i>	/-i/	<i>-anzi</i>	/-ánt̂si/

The second assumption is that there is a parallel accentual contrast in verbal roots. Specifically, I propose that Hittite radical verbs which show mobile stress are built to unaccented roots, while in the restricted set of verbs with fixed root stress, the verbal root is accented. A represen-

tative set of roots are given in (177) with their lexically specified accentual features:

(177)	UNACCENTED		ACCENTED	
	/ep:/ ‘take’	/kank:/ ‘hang’	/wék/ ‘demand’	/áns/ ‘wipe’
	/ses/ ‘sleep’	/ta/ ‘take’	/pái/ ‘go’	/ár:/ ‘wash’
	/ars/ ‘flow’	/skar/ ‘pierce’	/ás:s/ ‘remain’	/sip:ánt/ ‘libate’
	...	...		...

The third and final component of the analysis is a ranking of (morpho)phonological constraints that correctly generates the attested surface stress patterns (cf. §§4.3.2–4.3.3 above). It will be demonstrated in §§4.3.4.2–4.3.4.3 below that Hittite inflectional stress is consistent with the operation of Kiparsky and Halle’s (1977) BASIC ACCENTUATION PRINCIPLE, which is repeated in (26) below (cf. §4.1):

(26) BASIC ACCENTUATION PRINCIPLE (BAP):

If a word has more than one accented vowel, the leftmost of these receives word stress.

If a word has no accented vowel, the leftmost syllable receives word stress.

Within an optimality-theoretic framework, (26) can be understood as the result of an interaction between the markedness and faithfulness constraints in (178):<sup>56</sup>

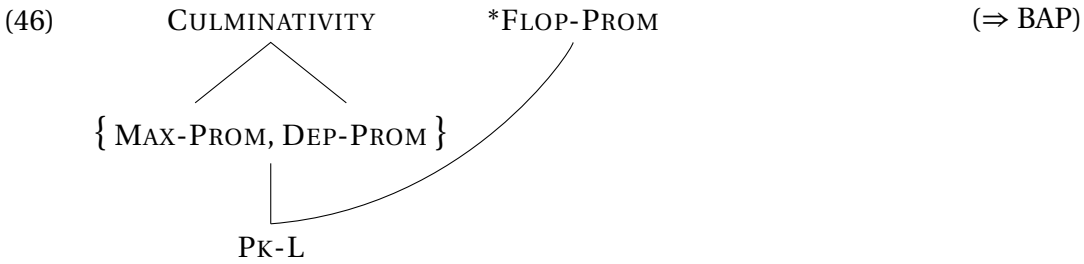
- (178) a. ALIGN-L(PK,  $\omega$ ) (= PK-L): “The left edge of every stressed syllable is aligned with the left edge of the word (evaluated gradiently; one violation per intervening syllable).”
- b. CULMINATIVITY (= CULM): “A prosodic word must have exactly one stressed syllable.”
- c. MAX-PROM: “A prominence in the input must have a correspondent in the output.”
- d. DEP-PROM: “A prominence in the output must have a correspondent in the input.”
- e. \*FLOP-PROM: “Corresponding prominences must have corresponding sponsors and links.”

When ranked as in (46), with CULMINATIVITY at the top of the grammar, and MAX-PROM dominating PK-L, the left edge oriented stress pattern dictated by the BAP emerges: the leftmost accented syllable of a prosodic word will bear word stress, or else stress defaults to its left edge.<sup>57</sup>

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<sup>56</sup>See §1.1.3.2 for a more extensive discussion of this constraint-based implementation of the BAP, and more generally, of issues related to the modeling of lexical accent systems in OT.

<sup>57</sup>The BAP constraint ranking in (46) is repeated from §1.1.3.2, where it was explicitly derived.



The next two sections turn to the data discussed in §4.3.2 above; I show that this constraint ranking, when applied to the inputs in (176) and (177), yields the observed contrast between mobile and fixed stress within the inflectional paradigms of radical verbs.

#### 4.3.4.2 Deriving mobile stress

A natural starting point for analysis is the mobile stress pattern found in the majority of radical verbs. If the analytic assumptions introduced in §4.3.4.1 are adopted, the characteristic property of radical verbs with intraparadigmatic stress mobility is that their verbal roots are unaccented. More precisely, their mobile stress pattern is simply an effect of how unaccented roots interact with the accentual properties of the verbal inflectional endings and the BAP constraint ranking in (46).

These interactions may be exemplified using the verb *šes/šas*– ‘sleep’, which is representative for all mobile radical verbs of the *mi*-conjugation. According to the proposed analysis, this verb is based on an unaccented verbal root /ses-/. When this root combines with singular inflectional endings, which are also unaccented (e.g. 3SG.NPST.ACT /-t̄si/; cf. (176) above), the resulting forms exhibit root – or equivalently, leftmost — stress, e.g. *šěšzi* [sé:st̄si]. (179) shows that this pattern is derived straightforwardly when the constraint ranking in (46) is applied to an input with these accentual properties:<sup>58</sup>

(179) a. Hitt. /ses - t̄si/ → *šěšzi* [sé:st̄si] ‘sleeps’ (3SG.NPST.ACT)

b.

/ses - t̄si/	CULM	MAX-PROM	DEP-PROM	PK-L
a. sest̄si	*!			
b. sé:st̄si			*	
c. sast̄sí:			*	*!

(179) is more generally representative of what occurs when a word contains no accented morphemes. In the tableau in (179b), the faithful candidate (a) is ruled out by CULMINATIVITY, which must be satisfied by insertion of an accent. Candidate (b), where the inserted accent associates with the root syllable, is then preferred to (c), which gratuitously violates PK-L. (179)

<sup>58</sup>This analysis crucially requires DEP-PROM only for stress assignment in words containing the “prothetic” vowel, which are discussed in §4.3.4.2 below (see especially the tableaux in (186–187)); it is thus included only in (179b) and in subsequent tableaux in which it is violated by the winning candidate to show the faithfulness violations that this candidate incurs (cf. Ch. 2 n. 26).

thus shows “default” stress, i.e. the emergence of the general phonological preference for left edge stress.

In plural forms of /ses/, however, stress falls instead on the plural non-past inflectional endings, which are accented; an illustrative example is given in (180), where the root is suffixed with the 3rd plural ending /-ántsi/:

(180) a. /ses - ántsi/ → *šášanzi* [sasántsi] ‘sleep’ (3PL.NPST.ACT)

b.

/ses - ántsi/	CULM	MAX-PROM	PK-L
a. sesántsi	*!	*	
b. ☞ sasántsi			*
c. sé:sántsi		*!	

The tableau in (180b) shows that, when a word contains exactly one accented morpheme, the faithful candidate is optimal — in this case, (b) violates only low-ranked PK-L, while candidate (c), which better satisfies PK-L, is excluded because it violates higher-ranked MAX-PROM.

The same analysis successfully accounts for the mobile stress pattern observed in most radical verbs of the *hi*-conjugation. Like mobile *mi*-verbs, all mobile *hi*-verbs are based on unaccented roots, e.g. *da-* ‘take’ from /ta/; and similarly, the singular inflectional endings of the *hi*-conjugation are — at least synchronically — unaccented, e.g. 1SG.NPST.ACT /-χ:i/.<sup>59</sup> Singular forms of these verbs are correctly predicted to receive leftmost stress, as seen in (181):

(181) a. /ta - χ:i/ → *dāhhi* [tá:χ:i] ‘I take’ (1SG.NPST.ACT)

b.

/ta - χ:i/	CULM	MAX-PROM	DEP-PROM	PK-L
a. taχ:i	*!			
b. ☞ tá:χ:i			*	
c. taχ:í:			*	*!

The attested shift of stress onto the accented non-past plural endings of *da-* and other mobile radical *hi*-verbs — e.g. 2PL.NPST.ACT /-t:éni/ — is also expected under the hypothesized constraint ranking:

(182) a. /ta - t:éni/ → *dāhhi* [tat:éni] ‘you take’ (2PL.NPST.ACT)

b.

/ta - t:éni/	CULM	MAX-PROM	PK-L
a. tat:eni	*!	*	
b. ☞ tat:éni			*
c. tá:t:eni		*!	

<sup>59</sup>It is likely that the inflectional endings of the *hi*-conjugation had different accentual properties in PIE, since as noted in §4.3.2.2, PIE *\*h<sub>2</sub>e*-conjugation verbs had fixed root stress within their inflectional paradigm; see Ch. 5 n. 34.

Once again, the accented plural ending (/ -t:éni/) is assigned stress because of the high-ranking faithfulness constraint MAX-PROM, which requires its underlying accent to surface despite the violation it incurs of lower-ranked PK-L.

The proposed analysis therefore accounts for stress mobility in most radical verbs of the *mi*- and *hi*-conjugations. There is, however, one set of forms that appear to pose a problem for this analysis: mobile radical *hi*-verbs that contain the “prothetic vowel” #*i*-, e.g. *iškar*- ‘pierce’, *išpar*- ‘spread’, *išhai*- ‘bind’. As observed already in §4.3.2.1, these verbs show the same basic stress pattern as other verbs of this class, with regular stress alternations between root and inflectional endings in singular and plural forms, i.e. (183):

(183)	3SG.NPST.ACT		3PL.NPST.ACT	
	<i>iškāri</i>	[iská:ri]	<i>išgaranzi</i>	[iskarántsi] ‘pierce’
	<i>išpāri</i>	[ispá:ri]	<i>išparanzi</i>	[isparántsi] ‘spread’
	<i>išhāi</i>	[isχá:i]	<i>išhianzi</i>	[isχiyántsi] ‘bind’

These forms derive historically from PIE roots with initial \**sT* (*T* = obstruent) clusters; at some prehistoric stage, the Anatolian languages developed more restrictive phonotactics, which eventually resulted in phonological repair of syllable margins that do not conform to the SONORITY SEQUENCING PRINCIPLE (SSP; Clements 1990, *i.a*) — in Hittite, by insertion of an epenthetic vowel.<sup>60</sup> It is this epenthetic vowel that seems to problematize the analysis — specifically, in singular forms of these verbs. In other mobile radical *hi*-verbs, singular forms contain no accented morphemes and so are assigned stress by default, which surfaces on the root because is the word’s leftmost syllable. However, in the singular verb forms in (183) it is not the root, but the epenthetic vowel that is closest to the word’s left edge; at first glance, one might then expect this (historically) epenthetic vowel to receive stress, which would yield an unattested form like <sup>x</sup>[iskari]. Alternatively, the attested peninitial stress of [iská:ri] could reflect a root lexical accent, i.e. /*(i)skár*/; yet such a lexical representation is incompatible with the plural forms in (183), since the root accent would attract stress in accordance with the preference for left edge stress. These failed derivations are sketched informally in (184a) and (184b) respectively.<sup>61</sup>

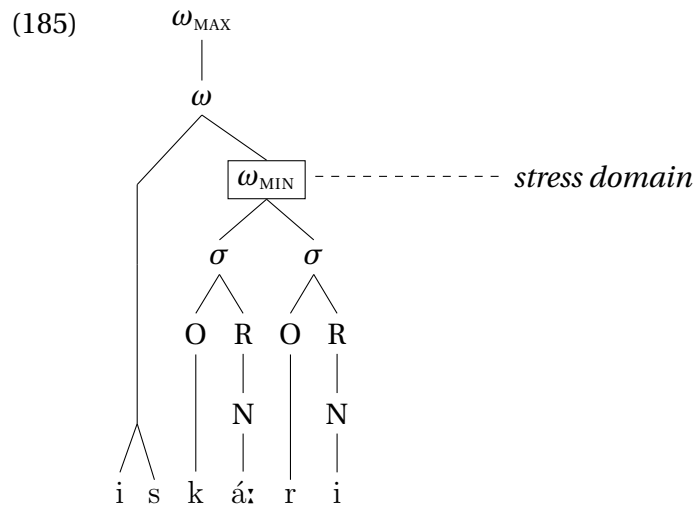
(184)	a.	/ <i>(i)skar</i> - <i>i</i> /	→	<sup>x</sup> [iskari] ‘pierces’ (3SG.NPST.ACT)	cf.	[iská:ri]
	b.	/ <i>(i)skár</i> - <i>ántsi</i> /	→	<sup>x</sup> [iskárantsi] ‘pierce’ (3PL.NPST.ACT)		[iskarántsi]

<sup>60</sup>See Kavitskaya (2001) and Yates (2016b) on sonority-driven epenthesis in Hittite, as well Melchert (2013b) on epenthesis in *ške*-imperfectives formed to sonorant-final stems (cf. n. 81). Yates (2014a) discusses the diachrony of Hittite epenthesis and its relationship to innovative phonotactic restrictions in the Anatolian languages.

<sup>61</sup>For formal analysis of derivations like (184b) —i.e. cases in which the verbal root bears a lexical accent — see §4.3.4.3 below. IEists may note that the stress pattern ostensibly seen in (183) resembles that which is posited for “hysterokinetic” athematic nominals (cf. §5.3.3). Under the BAP constraint ranking, however, real “hysterokinetic” mobility of this kind — viz. an intraparadigmatic shift in stress from a non-word initial, stem-final vowel onto an inflectional ending to its right — is impossible; such a shift can occur if and only if the stem-final vowel — the preferred site of word stress — is subject to syncope, a pattern referred to by Kiparsky (2010) as “secondary mobility” (which is, more generally, a type of “pseudo-mobility”; cf. Sandell 2015: 173–4). Once the prothetic vowel in (183) is analyzed as extraprosodic (as proposed below), these forms are consistent with this prediction.

The simplest solution to this problem is that the prothetic vowel is not just historically but also synchronically epenthetic (thus, e.g., /skar/ ‘stab’ per (177) above), and as such is “invisible” to stress assignment. Such invisibility is often a property of epenthetic vowels cross-linguistically (cf. Hall 2006: 396, 2011: 1586); close typological parallels for the Hittite situation are found in Spanish (Harris 1970; McCarthy 1980), Brazilian Portuguese (Mateus and d’Andrade 2000: 45–6), and (Classical) Armenian (DeLisi 2015b: 72–4, 96–8), all of which show insertion of an epenthetic vowel in word-initial /sT/-clusters ( $\rightarrow$  [#VsT-]) that is ignored in the phonological computation of word stress.<sup>62</sup>

To account for this invisibility, I propose that [#i-] in Hittite words like (183) is extraprosodic — more specifically, an adjunct to the minimal prosodic word (in violation of Strict Layering; Selkirk 1981, 1984, 1996, *i.a.*), which is the domain of stress assignment in Hittite; this structure is represented for [iská:ri] ‘pierces’ in (185) (cf. Ito and Mester 2007):



I assume that assigning stress to prothetic [#i-] violates CULMINATIVITY, which is satisfied only when stress surfaces within the minimal prosodic word.<sup>63</sup> The superficially problematic singular forms of /skar/ can then be derived straightforwardly as in (186):<sup>64</sup>

(186) a. /skar - i/  $\rightarrow$  *iskāri* [iská:ri] ‘pierces’ (3SG.NPST.ACT)

<sup>62</sup>See DeLisi (2015b: 96–102) for an explicit proposal as to how learners acquire extraprosodic parsing of [#VsT-] in such cases.

<sup>63</sup>A constraint like HEAD-DEP (Alderete 1999a), which penalizes primary stress-bearing epenthetic vowels, could also capture the avoidance of stress on the prothetic vowel. However, it is not the case that all epenthetic vowels cannot be stressed in Hittite, since word-internal epenthetic vowels (at least historically) are licit phonological hosts of default left edge stress (see Melchert 2013b; Yates 2015a, 2016b). This asymmetry suggests that the prothetic vowel has a different prosodic status than other epenthetic vowels.

<sup>64</sup>Extraprosodic constituents in (186b) and subsequent tableaux are marked with angle brackets (<...>).

b.

	/skar - i/	SSP	CULM	MAX-PROM	DEP-PROM	PK-L
a.	⟨is⟩kari		*!		*	
b.	ská:ri	*!			*	
c.	☞ ⟨is⟩ká:ri				*	*
d.	⟨is⟩karí:				*	**!
e.	⟨ís⟩ká:ri				**!	*
f.	⟨ís⟩kari		*!		*	

In the tableau in (186b), inviolable CULMINATIVITY does double duty: it rules out the unstressed candidate (a), but also candidate (f) with stress assigned to the extraprosodic epenthetic vowel, since this vowel would not satisfy the requirement that the minimal prosodic word contains at least one stressed syllable. Candidate (b) contains a falling sonority onset, and is thus ruled out by the SSP; this illicit sequence is repaired by epenthesis in candidates (c–e). Of these, candidate (e) loses because it gratuitously violates DEP-PROM; candidate (c) then wins by best satisfying PK-L.<sup>65</sup>

Furthermore, because the singular can be accounted for without positing a lexically accented root, the plural forms of these verbs can be analyzed in exactly the same way as in other mobile radical verbs, i.e. (187):

(187) a. /skar - ántsi/ → *išgaranzi* [iskarántsi] ‘pierce’ (3PL.NPST.ACT)

b.

	/skar - ántsi/	SSP	CULM	MAX-PROM	DEP-PROM	PK-L
a.	⟨is⟩karántsi		*!	*		
b.	skarántsi	*!				*
c.	☞ ⟨is⟩karántsi					**
d.	⟨is⟩ká:rantsi			*!	*!	*
e.	⟨ís⟩karántsi				*!	**
f.	⟨ís⟩karántsi		*!	*	*	

Once the prothetic vowel is treated as synchronically epenthetic rather than underlying, forms like those in (183) become effectively unexceptional: they are ordinary unaccented roots, and show the synchronically (and historically; cf. §5.3.1) regular alternating stress pattern associated with mobile radical verbs. Yet this analytic assumption not only offers an economical account of stress assignment in these forms, it is also supported by evidence from other morphophonological processes — in particular, by partial reduplication.

In recent years, increased attention has been paid to the formal phonological aspects of verbal reduplication in PIE and its oldest daughter languages, among them, the Anatolian lan-

<sup>65</sup>It is unclear whether the winning candidate (c) in (186b) and (187b) in fact incurs a violation of PK-L (as given in these tableaux), which could be assessed over the maximal or minimal prosodic word; candidate (c) is correctly predicted to win regardless.



guages, where partial reduplication has now been analyzed by Yates and Zukoff (2016a,b).<sup>66</sup> Within these languages, there is relatively robust evidence that radical verbs could form partially reduplicated stems that inflect according to the *hi*-conjugation.<sup>67</sup> Examination of Hittite radical verbs that are synchronically paired with reduplicated stems reveals four different consonant copying patterns; these schematic types are laid out in (188) with representative examples:<sup>68</sup>

(188)	SHAPE	RED SHAPE	BASE	REDUPLICATED STEM
a.	CVX- ⇒ <u>CV</u> -CVX-	<u>CV</u> -CVX-	<i>wars̃-</i> ⇒ <i>wawars̃-</i>	[ <u>wa</u> -wars̃:-]
b.	TRVX- ⇒ <u>TRV</u> -TRVX-	<u>TRV</u> -TRVX-	<i>parai-</i> ⇒ <i>parip(p)arai-</i>	[ <u>pri</u> -p:r(a)i-]
c.	sTVX- ⇒ <u>isTV</u> -sTVX-	<u>isTV</u> -sTVX-	<i>ištu-</i> ⇒ <i>išdušdušk[e]-</i>	[ <u>istu</u> -stu-]
d.	VCX- ⇒ <u>VC</u> -VCX-	<u>VC</u> -VCX-	<i>ark-</i> ⇒ <i>ararkiške-</i>	[ <u>ar</u> -ark-]

Significant to the problem at hand is the evident distinction between (188d), the VC-consonant copying pattern observed in vowel-initial roots, and (188c), which is found in bases containing the prothetic vowel. Such a distinction would be unexpected if (e.g.) Hitt. *ištu-* ‘become evident’ were underlying <sup>x</sup>/istu/, since it should then show the same VC-copying pattern as vowel-initial roots (like *ark-* ‘mount’), i.e. <sup>x</sup>[is-istu-]. The attested reduplicative pattern for *ištu-* thus argues that this root is not underlying vowel initial, but rather cluster-initial /sT/. Moreover, Yates and Zukoff (2016b) show that by adopting the /sT/-hypothesis the reduplicative patterns in (188b) and (188c) can be analyzed synchronically as a unitary type: both are bases with initial consonant clusters (CCVX-), which exhibit full cluster copying in partial reduplication (i.e. CCVX- ⇒ CCV-CCVX-).

There is thus convergent evidence in Hittite from two morphophonological processes, reduplication and stress assignment, that the prothetic vowel is synchronically epenthetic. This finding makes it possible to reconcile the superficially different patterns of intraparadigmatic stress mobility exhibited by /sT/-initial radical verbs with those of “ordinary” mobile radical verbs: both involve a shift in stress between the leftmost syllable within the stress domain and the initial syllable of the non-past inflectional endings. This pattern falls out directly from the assumptions outlined in §4.3.4.1: (i) accented non-past plural inflectional endings; (ii) unaccented roots; and (iii) the BAP constraint ranking in (46).

<sup>66</sup>Yates and Zukoff (2016a,b) develop optimality-theoretic analyses of partial reduplication in the Anatolian languages and of its diachronic development within this branch (on which see further Zukoff 2017a). Recent phonological analyses (of aspects) of IE reduplication include: Fleischhacker (2005); Keydana (2006, 2012); Sandell (2011, 2013); DeLisi (2015a); Zukoff (2014, 2015, 2017a,b); Zukoff and Sandell (2015). See also Steriade (1982, 1988b).

<sup>67</sup>Functionally, such forms have prototypical reduplicative semantics, i.e. iteration, pluractionality, durativity, etc. (cf. n. 40). The functional aspects of Anatolian (partial) reduplication are treated by Dempsey (2015), who also provides a comprehensive collection and philological assessment of relevant forms.

<sup>68</sup>Glosses for (188): (a) ‘wipe’; (b) ‘blow’ (cf. (168) above); (c) ‘become evident’; (d) ‘mount (sexually)’. The symbol “X” denotes an optional string of additional segments; segments in the reduplicant are underlined.


#### 4.3.4.3 Deriving fixed stress

Under the analysis developed in §§4.3.4.1–4.3.4.3, the contrast between mobile and fixed radical verbs can be reduced to a single phonological feature, viz. the underlying accentedness of their verbal roots. Fixed intraparadigmatic stress — the minority type in radical verbs of both conjugational classes — emerges as a direct consequence of being based on accented roots, the marked value for this feature.

The consequences of root accentedness can be observed clearly in the non-past plural forms of radical verbs, where fixed and mobile types exhibit different stress patterns. This contrast arises because in fixed radical verbs — but not mobile radical verbs — the lexical accent of the verbal root competes with the accent of the non-past inflectional endings for primary stress; this competition is exemplified with the *mi*-verb /wék/ ‘demand’ in (189):

(189) a. /wék - ántsi/ → *wekanzi* [wé:kantsi] ‘demand’ (3PL.NPST.ACT)

b.


/wék - ántsi/	CULM	MAX-PROM	PK-L
a. wékántsi	*!		*
b.  wé:kantsi		*	
c. wakántsi		*	*!
d. wekantsi	*!	**	

In the tableau in (189b), satisfying top-ranked CULMINATIVITY necessitates deleting an accent; PK-L then adjudicates between the two candidates that incur only a single violation of MAX-PROM, (b) and (c), and prefers the latter because stress is situated closer to the left edge of the prosodic word.

Fixed radical verbs of the *hi*-conjugation are derived in exactly the same way. The accent of the root is preferred to that of the non-past plural inflectional endings because it better satisfies PK-L, as the tableau in (190b) depicts for the *hi*-verb *ans*– ‘wipe’:

(190) a. /áns - ántsi/ → *ānšanzi* [á:nsantsi] ‘wipe’ (3PL.NPST.ACT)

b.

/áns - ántsi/	CULM	MAX-PROM	PK-L
a. á:nsántsi	*!		*
b.  á:nsantsi		*	
c. ansántsi		*	*!
d. ansantsi	*!	**	

In the corresponding singular forms of most fixed radical verbs — including of (189–190) above — assignment of stress to the root is trivial: since the single lexical accent perfectly satisfies PK-L, there is no impetus for deletion (in violation of MAX-PROM) or insertion (in violation of DEP-PROM). The only exceptional case is the *hi*-verb *šippand*– ‘libate’, which has a lexical accent on the second syllable of the root. This accent is nevertheless correctly predicted to attract stress in both singular and plural forms, i.e. (191–192):

(191) a. /sip:ánt - i/ → *šipānti* [sip:ánti] ‘libates’ (3SG.NPST.ACT)

b.

/sip:ánt - i/	CULM	MAX-PROM	PK-L
a. ☞ sip:ánti			*
b. síp:anti		*!	
c. sip:anti	*!	*	

(192) a. /sip:ánt - wéni/ → *šipanduwani* [sip:ántwani] ‘we libate’ (1PL.NPST.ACT)

b.

/sip:ánt - wéni/	CULM	MAX-PROM	PK-L
a. sip:ántwéni	*!		***
b. ☞ sip:ántwani		*	*
c. sip:antwéni		*	**!
d. síp:antwani		**!	

In (192b), candidate (d), which best satisfies PK-L, is ruled out by its double violation of MAX-PROM; that leaves candidate (b) — “intermediate” with respect to PK-L, incurring just a single violation of this constraint — to be selected as the winner over candidate (c), which violates it twice.

The phonological generalization that emerges from examples (189–190) and (192) is that when two lexical accents compete for primary stress, it is the leftmost that “wins,” i.e. attracts stress. This pattern of accent resolution is due to PK-L, which prefers word stress to fall as close as possible to the word’s left edge. The difference between radical verbs with mobile and fixed stress can be reduced to whether or not such competition occurs in their non-past plural forms. When the verbal root is unaccented, as in mobile verbs, there is no competition: the lexical accent sponsored by the non-past plural inflectional ending is the only one present, and receives stress due to the high-ranking faithfulness constraint MAX-PROM. Yet when a verbal root is accented, as in fixed verbs, its accent competes with the accent sponsored by the inflectional ending. Because verbal roots linearly precede (i.e. occur to the left of) inflectional endings, root accent is always preferred to ending accent by PK-L; this preference yields fixed root stress even in the non-past plural forms of radical verbs based on accented roots.

#### 4.3.4.4 Leftmost wins in imperfectives & participles

The interaction between the constraint ranking in (46) and the underlying accentual specification of roots ([± accented]) therefore accounts for the synchronic stress contrast between radical verbs with fixed and mobile stress. However, the explanatory power of this analysis is not limited to the basic inflectional paradigms of these verbs; rather, it makes general predictions about the stress behavior of these verbal roots in morphologically complex formations with multiple (accented) affixes, including the highly productive *-ške*-imperfectives and *-ant*-participles discussed in §4.3.3 above.

A major locus for interactions between accented morphemes in Hittite is in the formation

of *-ške-* suffixed imperfective stems. As shown already in §4.3.3.2, such imperfectives exhibit fixed suffixal stress when combined with mobile radical verb stems — in other words, when the suffix *-ške-* is added to unaccented verbal roots. This pattern is explained straightforwardly by assuming that the imperfective suffix is accented, i.e. /-sk:é-/; (193) shows that this analysis correctly yields suffixal stress in the singular imperfective forms of mobile radical verbs such as *eku-aku-* (cf. (172) above):<sup>69</sup>

(193) a. /ek<sup>w</sup> - sk:é - si/ → *akkuškēši* [ak<sup>w</sup>usk:é:si] ‘you drink’ (IPFV.2S.NPST.ACT)

b.

	/ek <sup>w</sup> - sk:é - si/	SSP	CULM	MAX-PROM	PK-L
a.	ek: <sup>w</sup> usk:esi		*!		
b.	ak: <sup>w</sup> usk:é:si				**
c.	ak: <sup>w</sup> sk:é:si	*!			*
d.	ék: <sup>w</sup> usk:esi			*!	

In singular forms like (193), stress is assigned to the suffix because — like the accented non-past plural inflectional endings in combination with the same verbal roots — it is the only accented morpheme. A more significant data point, however, is the corresponding non-past plural form in (194a), where there are two accented morphemes; in this case, the same constraint ranking correctly predicts that the imperfective suffix will bear word stress, as evident in the tableau in (194b):

(194) a. /ek<sup>w</sup> - sk:é - wéni/ → *akkuškēwani* [ak<sup>w</sup>usk:é:wani] ‘we drink’ (IPFV.1PL.NPST.ACT)

b.

	/ek <sup>w</sup> - sk:é - wéni/	SSP	CULM	MAX-PROM	PK-L
a.	ak: <sup>w</sup> usk:é:wé:ni		*!		*****
b.	ak: <sup>w</sup> usk:é:wani			*	**
c.	ak: <sup>w</sup> sk:é:wani	*!		*	*
d.	ak: <sup>w</sup> usk:awé:ni			*	***!
e.	ék: <sup>w</sup> usk:ewani			**!	

It was pointed out in §4.3.3.2 that forms like (194) are comparable to the non-past plural forms of fixed radical verbs, where the verbal stem retains stress despite the general tendency for it to be attracted to inflectional endings in these forms. In fact, comparison of the tableau in (194b) with those in (189–190) and (192) above shows that their stress patterns are to be explained in

<sup>69</sup> The [u] vowel appearing between the root and imperfective suffix in (193–194) is epenthetic, with additional “coloring” by the adjacent labiovelar stop (cf. Kavitskaya 2001: 287–92); its insertion is driven by the SSP (cf. n. §60 above), which would be violated when this root-final stop is parsed into a complex coda with the following /s/, or alternatively, when /s/ is parsed into a complex onset with the following /k:/ of the imperfective suffix. Note also that in these examples the labiovelar stop is subject to a morphophonological gemination process (/k<sup>w</sup>/ → [k:<sup>w</sup>]) conditioned by the imperfective suffix; this process historically reflects devoicing of \*/g<sup>w</sup>/ — the root-final segment in PIE — by the following \*/s/ of the imperfective suffix (cf. Melchert 1994: 57, 62–3).

the same way: both are cases of leftmost accented affix wins, receiving stress because it minimally violates MAX-PROM while better satisfying PK-L than the lexical accent of the affix to its right.

A still more interesting result of this analysis is that it accounts for the previously unexplained fact that the imperfective stems of fixed radical verbs are consistently stressed on the verbal root (rather than the *-ške-* suffix) just as in their basic inflectional paradigm (cf. §4.3.3.3 above).<sup>70</sup> Provided that these verbal roots and the imperfective suffix are accented, this exact surface stress distribution is in fact predicted by the analysis, as illustrated by the *mi-* and *hi-* verb-forming roots /wék/ ‘demand’ and /áns/ ‘wipe’ respectively in (195) and (196):

(195) a. /wék - sk:é - tsi/ → *wekiškezzi* [wé:kisk:é:tsi] ‘demands’ (IPFV.3SG.NPST.ACT)

b.

/wék - sk:é - tsi/	SSP	CULM	MAX-PROM	PK-L
a. wékisk:é:tsi		*!		**
b. wé:kisk:é:tsi	*!		*	
c. wé:kisk:é:tsi			*	
d. wakisk:é:tsi			*	*!*

(196) a. /áns - sk:é - tsi/ → *ānšikezzi* [á:nsik:é:tsi] ‘wipes’ (IPFV.3SG.NPST.ACT)

b.

/áns - sk:é - tsi/	CULM	MAX-PROM	PK-L
a. á:nsik:é:tsi	*!		**
b. á:nsik:é:tsi		*	
c. ansik:é:tsi		*	*!*


Once again, the accented root is assigned stress in (195–196) by virtue of occurring closer to the left edge of the word than the accented imperfective suffix /-sk:é-/.

<sup>70</sup> In previous literature, it appears to be assumed that Hitt. *-ške-* bears stress whenever it is present — for instance, Kloekhorst (2014a: 634) states that “within the paradigm of the *-ške/a-* imperfectives the suffix *-ške/a-* is in principle always accented.” Yet explicit treatments of the Hittite suffix focus only on cases in which *-ške-* attaches to roots (e.g. Kimball 1999: 132–8, Kloekhorst 2008: 135–6, 767–70), and seem to overlook the accented verb roots discussed in §4.3.3.3 above. The assumption that *-ške-* is always stressed appears to be guided by comparative-historical considerations — in particular, the accentual behavior of its cognate *-(c)cha-* (< PIE *\*-skē(o)-*) in Vedic Sanskrit, which is the only other IE language that provides direct information about the suffix’s accentual properties. Ved. *-(c)cha-* is clearly stress-attracting (e.g. 1SG.PRS.IND.ACT *i-chā-mi*; 2PL.INJV *i-chā-ta* to /iṣ/ ‘desire’), but is significantly less productive than Hitt. *-ške-*, attaching only to verbal roots, and moreover, only to a subset of these, none of which show evidence for underlying accentedness. It is therefore a priori unclear whether Ved. *-(c)cha-* is like Hitt. *-ške-* and is thus stressed only when the verbal stem to which it attaches is unaccented, or whether it attracts stress away even from an accented verbal stem, like the past passive participle suffix Ved. /-tá-/ (e.g. /táḥ - tá - m/ → Ved. *taṣṭám* ‘fashioned.N.ACC.SG’; cf. Kiparsky to appear). In the absence of positive evidence from Vedic for the latter, I assume that the Hittite situation is original, and thus that PIE *\*-skē-* patterned with the participle suffix *\*-(o)nt-*, which in both Hittite and Vedic attract stress only when suffixed to unaccented stems (cf. n. 71 below).

Hittite participles formed with the suffix *-ant-* show the same prosodic split as *-ške-* imperfectives (cf. §4.3.3.2), which can therefore be derived in the same way. Participles to mobile radical verbs of the *mi-* and *hi-* conjugations (e.g. /ep:/ ‘take’; /skar/ ‘pierce’) are consistently stressed on the participle suffix because — like imperfective /-sk:é-/ — this suffix is accented, i.e. /-ánt-/; this stress pattern is derived in (197–198):


(197) a. /ep: - ánt - es/ → *appānteš* [ap:á:ntes] ‘taken’ (PTCP.ANIM.NOM.PL)

b.

/ep: - ánt - es/	CULM	MAX-PROM	PK-L
a. ep:antes	*!	*	
b.  ap:á:ntes			*
c. é:p:antes		*!	

(198) a. /skar - ánt - an/ → *iskarāntan* [iska:rá:ntes] ‘pierced’ (PTCP.ANIM.ACC.SG)

b.


/skar - ánt - an/	SSP	CULM	MAX-PROM	PK-L
a. iskarantan		*!	*	
b.  iskará:ntan				**
c. skará:ntan	*!			*
d. ískarantan			*!	

However, when the accented participle suffix combines with accented roots, stress surfaces on the root.<sup>71</sup>

(199–200) give derivations for the participles formed to the same accented roots as the imperfectives treated in (195–196) above; as expected, the same suffixal stress pattern emerges:

(199) a. /wék - ánt - an/ → *wekantan* [wé:kantan] ‘demanded’ (PTCP.ANIM.ACC.SG)

b.

/wék - ánt - an/	CULM	MAX-PROM	PK-L
a. wéká:ntan	*!		*
b.  wékantan		*	
c. waká:ntan		*	*!

(200) a. /áns - ánt - es/ → *ānšanza* [á:nsants̄] ‘wiped’ (PTCP.ANIM.NOM.PL)

<sup>71</sup> The Hittite reflex of the PIE participle suffix *\*(o)nt-* thus shows exactly the same stress distribution as its Vedic cognate *-(a)nt-*, which attracts stress away from unaccented verbal roots (e.g. Ved. *sas-ánt-* to /sas/ ‘sleep’; cf. Hitt. /ses/ ‘id’), but not from accented verbal roots (e.g. Ved. *tákš-ant-* to /takš/ ‘fashion’), or from other (i.e. derived) accented stems (e.g. Ved. *bhára-nt-* to /bhára-/ ‘bear’; on Hittite participles to derived stems, see §4.3.5 below). Note that this accentual behavior distinguishes Ved. *-(a)nt-* from the Vedic past participle suffix *-ta-*, which also attracts stress away from accented stems (cf. n. 70 above).

b.

/áns - ánt - es/	CULM	MAX-PROM	PK-L
a.      á:nsá:ntes	*!		*
b.      ☞ á:nsantes		*	
c.      ansá:ntes		*	*!

The tableaux in (197–200) mirror violation profiles already seen in the corresponding imperfective forms. When there is one accented morpheme as in (197b) and (198b), stress is assigned to this morpheme; and when there are multiple accented morphemes as in (199b) and (200b), it is the leftmost that attracts primary stress.

#### 4.3.4.5 Leftmost wins in prefixation

The “leftmost wins” generalization that obtains within radical verb inflection can also be observed when these verbs occur in other morphological contexts. One such context is verbal prefixation. Prefixing operations are very limited in Hittite, and only a few prefixes in the language are likely to be synchronically segmentable. One of these prefixes is *pe-* (/pé-/), which indicates motion away from a speaker. As (201) shows, this prefix is accented, attracting stress in preference to an accented inflectional ending when attached to an unaccented root:

(201) a. /pé - ta - t:éni/ → *pēdatteni* [pé:tat:éni] ‘you take there’ (DIR.2PL.NPST.ACT)

b.

/pé - ta - t:éni/	CULM	MAX-PROM	PK-L
a.      pé:tat:éni	*!		**
b.      ☞ pé:tat:éni		*	
c.      petat:éni		*	*!*

What (201) crucially demonstrates is that Hittite has a preference for leftmost stress, not root stress, which is found in other stress systems, e.g. Chukchee (Chukotkan) or Nisgha (Tsimshianic) (see Alderete 2001b: 70). Candidates (b) and (c) in (201b) are both equally harmonic with respect to an alternative constraint, ALIGN-L(Pk; Root), that would require stress to fall on the first syllable of a root; however, PK-L (= ALIGN-L(PK, ω)) properly selects candidate (b), the attested Hittite form, as the winner.

#### 4.3.5 Fixed stress in derived verbal stems

Whereas radical verbs exhibit a prosodic split (mobile vs. fixed), it is generally accepted that all Hittite derived verbal stems have fixed stem stress across inflectionally related forms. This stress pattern is found both in productively derived verbal stems, such as *-ahh-*factives, *-ešš-*fientives, and *-a(i)-*denominatives, and in other historically derived stems, such as primary thematic *ye/a-*verbs and *nin-*infix verbs. Consistent stem stress in these categories is suggested by the virtual absence of plene writing in the same accented suffixes that attract stress in mobile

radical verbs, i.e. the plural non-past inflectional suffixes, imperfective *-ške-*, and participial *-ant-*.<sup>72</sup> For at least some of the productively derived type, there is also relatively robust positive evidence for fixed stem stress. I defer further discussion and analyses of these forms until §4.4 below, where they are treated within the broader context of Hittite derivation. The remainder of this section thus focuses on the latter type which, although clearly derived from a historical perspective and perhaps still segmentable for Hittite speakers, are not formed by productive morphological processes, and can thus be viewed synchronically as invariant stems.<sup>73</sup>

Positive evidence for stem stress in such historically derived verbs is (perhaps surprisingly) limited;<sup>74</sup> nevertheless, the examples in (202) show that the verbal stem retains stress even when followed by an accented suffix or suffixes:

<sup>72</sup>A general exception to this rule are participles and third plural non-past of *ḫatrae*-class verbs (cf. Kloekhorst 2014a: 275 n. 1020; on this class, see §4.4.1.2 below), where the stem-final stressed vowel coalesces with the suffix initial vowel and is thus often spelled plene. Outside of this class, the participle suffix is never spelled plene in derived verbs, while imperfective *-ške-* is attested with plene in just two hapax forms: *memiskēm[i]* ‘I say’ (IBoT 2.35 obv. 6; OH/MS) to reduplicated *memai-*; *ariškēnun* ‘I consulted the oracle’ (KUB 14.13 i 53; NH/NS) to thematic *ariye/a-*. I assume that both are nonce creations, formed by trivial analogy to imperfectives with suffixal stress rather than by regular principles of the grammar; in the case of the latter, this assumption is corroborated by *mēmiski* ‘say!’ and *memiskiwani* ‘we say’ (with the unstressed [-wani] ending), both of which point to fixed initial stress in this stem, i.e. [mé:mi-]. Similarly, the non-past plural suffixes are overwhelmingly spelled non-plene in derived stems, but occasional plene forms of 2PL *-(š)teni* and dissimilated 1PL *-meni* are also found; Kloekhorst (2014a: 207-11) provides a nearly exhaustive list of these irregular plene spellings (hapax *īštēni* ‘you do’ (KBo 22.I obv. 27; OH/OS) should be added; cf. Melchert to appear b: n. 4) along with some possible explanations.

<sup>73</sup>Primary thematic verbal stems are historically derived from verbal roots, and a few such inherited pairs can still be found in Hittite (e.g. *karp-* ‘lift’ ~ *karpīye/a-* ‘id.’), although without synchronic functional differentiation (see Melchert 1998 on the PIE implications of such pairs). However, in most cases the roots that served as the original derivational bases for Hittite primary thematic verbs have been lost prehistorically, including for the verbal stems cited in (202a–d). In my view, it is highly unlikely that such stems are synchronically derived, even though a suffix *-ye/a-* may be still be segmentable on the basis of extant pairs (like ‘lift’). For arguments that *nin*-infix verbs (like (202e) below) are also non-derived in Hittite see Yates (2015a: 169–74).

<sup>74</sup>Until recently, it was thought that primary and non-primary *ye/a*-verbs showed robust evidence for suffixal stress — principally, apparent plene spellings of the *e*-ful allomorphs, e.g. <*ti-e-ez-zi*> ‘steps’ to *tiye/a-* ‘step’. However, such spellings are rendered non-probative by Kloekhorst’s (2014a) finding that plene writing does not reliably indicate vowel length after glides (cf. n. 25 above). Furthermore, it appears that the *a*-ful allomorphs of the *-ye/a*-suffix are never spelled plene; this absence is somewhat unexpected, since the stressed vowel would occur in an open syllable in several paradigmatic cells, e.g. 1SG.NPST.ACT <*-ya-mi*> (<sup>x</sup><*-ya-a-mi*>), <*-ya-ú-e-ni*> (<sup>x</sup><*-ya-a-ú-e-ni*>).



(202)	a.	<i>weriyanzi</i>	‘call’	[wé:riya-t̪si]	(3PL.NPST.ACT)
	b.	<i>wemiyanzi</i>	‘find’	[wé:miya-nt̪si]	(3PL.NPST.ACT)
	c.	<i>šūniyant[eš]</i>	‘immerse’	[sú:n̪i:ya-nt-es]	(PTCP-ANIM.NOM.PL)
	d.	<i>dāyaškan</i>	‘steal’	[tá:y-a-sk-an]	(PTCP.N.NOM/ACC.PL)
		<i>tāitteni</i>		[tá:y-t̪:eni]	(2PL.NPST.ACT)
	e.	<i>hūninkanza</i>	‘batter’	[χó:n̪ink-ants̪]	(PTCP-ANIM.NOM.SG)

The forms in (202a–d) are primary thematic *ye/a*-verbs, two formal types of which were likely inherited into Hittite: one with suffixal stress and zero-grade of the root; and one with stressed full-grade of the root (cf. Yoshida 2010).<sup>75</sup> At least synchronically, these verbs belong to the latter type, as shown by the paradigmatic root *e*-vocalism of (202a–b), and by plene writing of the root in (202c–d).<sup>76</sup> Plene spelling also indicates initial stress in (202e), a *nin*-infix verb;<sup>77</sup> while (202e) is the only positive evidence for fixed stem stress in this category, it is nevertheless likely that other *nin*-infix verbs show the same stress pattern, e.g. *šarnink*- ‘compensate’ ([sárnink-]), *ninink*- ‘mobilize’ ([nínink-]) (see Yates 2015a: 151–3 for detailed discussion).

Having motivated the prosodic split between fixed and radical verbs in §4.3.4, a straightforward explanation for the prosodic behavior of historically derived verbal stems is now available. It was argued in §§4.3.4.3–4.3.4.4 that fixed stress emerges in radical verbs because their verbal roots are lexically accented. Fixed stress in historically derived verbs is thus similarly expected if they are based on accented verbal stems: (a) /wémiye/a-/ ‘find’; (b) /wériye/a-/ ‘call’; (c) /súniye/a-/ ‘immerse’; (d) /táye/a-/ ‘steal’; (e) /χónink-/ ‘batter’. A sample derivation for (202a) is provided in (203):<sup>78</sup>

<sup>75</sup>Both types are reconstructed for PIE by LIV<sup>2</sup> (19); under the general approach to LA advocated in this dissertation, this would amount to reconstructing two suffixes, accented \*/-yé(/ó)-/ and preaccenting \*/-ye(/o)-/ (cf. n. 19). Yoshida (2010) provides a detailed treatment of the historical development of each type in Hittite; see also more generally Yoshida (2009) on the prehistory of Anatolian thematic verbs.


<sup>76</sup>The origins of (202b–c) are disputed; see the discussion and references in Kloekhorst (2008: 998–9, 1002–3). The strongest case for a directly inherited formation is (202a), which is cognate with Gk. *eirō* ‘speak’ (< \*wérh<sub>1</sub>-yelo-) and — in PIE terms — would be the derived present stem beside the root aorist continued by Pal. *wérti* ‘said’ (although LIV<sup>2</sup> (690) classifies Hitt. *weriyela-* as “Neubildung”). Kloekhorst (2008, 2014a) appears to be skeptical of the root stressed type in Hittite, and assumes suffixal stress in (202a–b) and (202d) (2014a: 696), despite the *e*-vocalism of the root in (202a–b), the root plene in (202d) and the absence of evidence for suffixal plene spelling in all three verbs; nevertheless, he does concede the existence of *ye/a*-verbs with root stress — in particular, for (202c) and *karūššīye-* ‘be silent’ (2014a: 274, 498–9) — which are attested with plene spelling of the root syllable.

<sup>77</sup>Per §3.1.2, Hittite plene spellings of the type <hu-u> as in (202e) must be interpreted with caution, since at least by the NH period this sequence of signs had come to function as a ligature functionally equivalent to simple <hu> rather than as a marker of vowel length (cf. Kimball 1999: 67–8). However, because the form in (202e) is attested in OS texts, I provisionally assume that plene writing of the initial syllable is indicative of a stressed long vowel (i.e. [ó:]) in this position.

<sup>78</sup>In (203), I assume that the verbal stem is synchronically non-derived (cf. n. 73), and that non-derived stems — like roots (cf. n. 104) — do not have morphological head status in Hittite. Of course, if such stems were treated as heads — and as consequence, have their lexical accent privileged by higher-ranked faithfulness constraints —

(203) a. /wériya - ántsi/ → *weriyanzi* [wériyantsi] (3PL.NPST.ACT)

b.

/wériye - ántsi/	CULM	MAX-PROM	PK-L
a. wériyántsî	*!		**
b.  wériyantsî		*	
c. wariyántsî		*	*!*

The tableau in (203b) recalls those of the fixed radical verbs treated in §§4.3.4.3–4.3.4.4 above. Once the faithful candidate is ruled out by CULMINATIVITY, the winner is selected by PK-L, which prefers candidate (b) because stress surfaces closer to the word’s left edge than in candidate (c).

The prosodic behavior of historically derived verbal stems can therefore be explained using the same tools as were employed in the analysis of radical verbs. Their fixed stem stress pattern is outwardly comparable to that of fixed radical verbs, and so can be explained along exactly the same lines — i.e., by assuming that verbal stem bears a lexical accent; when this stem combines with accented or unaccented inflectional suffixes to its right, it is expected to receive stress under the BAP constraint ranking in (46).

#### 4.3.6 Synchronic status of the BAP?

Even if empirically valid, the BAP-driven analysis developed in §§4.3.4–4.3.5 might be challenged on other grounds. An alternative approach to these stress patterns might view them as purely historical “residue” — viz. lexically listed surface forms transmitted directly (modulo sound change) from a still earlier prosodic system that operated according to different principles — rather than the result of a synchronic interaction between the ranked phonological constraints in (46) and the accentual properties of morphemes.<sup>79</sup>

Without native speaker intuitions, it is of course impossible to be certain whether the proposed analysis has any cognitive reality, i.e. reflects speakers’ knowledge about their language. Nevertheless, there are several good reasons to prefer it to the wholly historical account. While it is perhaps conceivable that the basic inflectional paradigms of many radical verbs are holistically stored,<sup>80</sup> this is still less plausible for imperfectives and participles, which could be formed by a Hittite speaker at any point in time to any verbal stem, each with its own idiosyncratic accentual properties. Rather, stress patterns in these productive categories are much more likely to reflect the operation of synchronic morphophonological processes.

Even more telling, though, is a subset of Hittite imperfective stems that have multiple attested forms, some of which are likely to be archaic and thus potentially inherited, while others

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the analysis would still correctly predict fixed stem stress (cf. §4.4 below). Note, also, that I make no claim about how the allomorphy of the suffix *-ye/a-* is best analyzed synchronically.

<sup>79</sup>Under traditional “paradigmatic” approaches to IE word stress, radical verbs exhibiting mobile stress are sometimes categorized as accentually “hysterokinetic;” however, see n. 61 above and further discussion in §5.3.3.

<sup>80</sup>While many of these are common verbs situated at the core of lexicon — e.g. ‘be’, ‘take’, ‘drink’, etc. — I nevertheless view this scenario as highly unlikely.

are younger, showing changes in their phonological shape driven by Hittite-internal phonotactic innovations.<sup>81</sup> Significantly, both the older forms in (204a) and younger forms in (204b) of accented roots display the exact same surface stress patterns (cf. Kimball 1999: 198–9; Melchert 2013b: 179):<sup>82</sup>

- (204) a. *ānšikezzi* [á:nsik:et̪si] ‘wipes’ (IPFV.3SG.NPST.ACT)  
*āršiketta* [á:r:sik:et:a] ‘washes’ (IPFV.3SG.NPST.MID)
- b. *ānaškezzi* [á:nsk:et̪si] / *ānšiškezzi* [á:nsisket̪si] ‘wipes’ (IPFV.3SG.NPST.ACT)  
*ārriškezzi* [á:r:risk:et̪si] ‘washes’ (IPFV.3SG.NPST.ACT)

Since Hittite imperfectives overwhelmingly show suffixal stress, the fixed root stress of the verbal forms in (204) makes them exceptional in their morphological category; nevertheless, when “renewed” by a subsequent generation of Hittite speakers, this exceptional stress pattern persists. The simplest explanation for this situation is that these speakers have acquired a grammar in which the features relevant to stress assignment are diachronically stable — in the case of (204), accented roots /á:ns/ ‘wipe’ and /á:r:/ ‘wash’ and the constraint ranking in (46) which — as discussed in section 4.3.4.1 above — instantiates Kiparsky and Halle’s (1977) BAP. This explanation in turn implies that the BAP was synchronically operative within the historical period of Hittite.

#### 4.3.7 Local summary: Lexical accent in Hittite & the BAP

Having established in §4.2 that Hittite has an LA system, the aim of §4.3 has been to determine the morphophonological principles that govern the distribution of word stress in this system, focusing first on verbal inflection. The primary data was examined in §§4.3.2–4.3.3, which provided empirical evidence for a synchronic prosodic contrast among radical verbs of both conjugational classes that extends across productive inflectional categories: fixed radical verbs retain stress on the verbal root in their plural non-past tense forms, imperfectives, and participles, while mobile radical verbs are stressed on the suffixal markers of these categories. This systematic contrast is summarized in (205) with representative examples — for the *mi*-conjugation,

<sup>81</sup>The phonological constraint driving epenthesis in /-Rs./ (*R* = sonorant) syllabic codas is a potentially inherited feature in Hittite given its affinities to the PIE ban on [-RF.] (*F* = fricative) that motivates SZEMERÉNYI’S LAW (Szemerényi 1970 [1989]; cf. Sandell and Byrd 2014). However, already in the earliest texts there are attested forms that point to both epenthesis and non-epenthesis in this phonological environment; the diachrony thus remains uncertain.

<sup>82</sup>A particularly clear example of an innovative form is *ānšiškizzi* in (204b), which shows epenthesis at the root-suffix boundary rather than the inherited rule of \*s-s-degeminatio (see, e.g., Mayrhofer 1986: 120–1, Byrd 2015: 23; Kloekhorst’s (2016: 238–40) alternative view is contradicted by the textual chronology of the imperfective stems of *anš-*, among other issues). It should be noted, however, that the argument advanced here does not depend on *which* treatment of these sequences is the oldest (or “original”) or even that one single treatment is the oldest (i.e., there may have been synchronic variation). Rather, just the existence of different treatments indicates that the imperfective stems are the output of multiple grammars of Hittite speakers; the fact that all of these grammars nevertheless produce identical surface stress patterns must be because they share the same synchronic principles of stress assignment.

mobile (205a) vs. fixed (205b), and for the *hi*-conjugation, mobile (205c) vs. fixed (205d).<sup>83</sup>

(205)	ROOT	3SG	3PL	PTCP	IPFV	GLOSS
		/-t̂si/, /-i/	/-ánt̂si/	/-ánt-/	/-sk:é-/	
a.	<i>ēd/ad-</i> /et/	<i>ēzzazi</i> [é:t̂s̄-t̂si]	<i>adanzi</i> [at-ánt̂si]	<i>adānt-</i> [at-á:nt-]	<i>azzikkē-*</i> [a-t̂sik:é:-]	‘eat’
b.	<i>wek-</i> /wék/	<i>wēkzi</i> [wé:k-t̂si]	<i>wekanzi</i> [wé:k-ánt̂si]	<i>wekant-</i> [wé:k-ant-]	<i>wekiške-</i> [wé:k-isk:e-]	‘demand’
c.	<i>nāḥ(h)-</i> /naχ:/	<i>nāḥi</i> [ná:χ-i]	<i>naḥanzi</i> [naχ:-ánt̂si]	<i>naḥānt-</i> [naχ:-á:nt-]	<i>(daskē-)</i> ([ta-sk:é:-])	‘fear’
d.	<i>ānš-</i> /áns/	<i>ānši</i> [á:ns-i]	<i>ānšanzi</i> [á:ns-ánt̂si]	<i>ānšant-</i> [á:ns-ant-]	<i>ānšike-</i> [á:n-sik:e-]	‘wipe’

§4.3.4 developed an optimality-theoretic analysis of these patterns, the crucial components of which are: (i) lexically unaccented singular non-past inflectional endings; (ii) lexically accented plural non-past inflectional endings, imperfective suffix, and participle suffix; and (iii) the BAP, whose morphophonological generalizations emerge from the ranking of phonological constraints in (46). The stress patterns in (205) fall out from the interaction of (i–iii) with the accentual properties of verbal roots, which are stored as part of their lexical entries: verbal roots that show mobile stress are unaccented (e.g. /et/, /naχ:/), fixed stress accented (/wék/, /áns/). The same phonological preference for leftmost word stress (i.e. PK-L) that plays an instrumental role in stress assignment for radical verbs in these inflectional categories also explains their accentual behavior in prefixation.

§4.3.5 extended the analysis from radical verbs (i.e. non-derived stems) to historically derived verbal stems, all of which appear to show fixed stem stress. This pattern can be explained in essentially the same way as those of fixed radical verbs, i.e. by the interaction of lexically accented stems and the BAP. Thus extended, the analysis attains comprehensive coverage of stress assignment in Hittite verbal inflection.

Finally, §4.3.6 was concerned with the division between synchronic and diachronic explanation. While there can be no doubt that stress patterns like (205) are fundamentally shaped by diachrony, I argue that historical considerations alone are insufficient to explain this data. The systematicity of these prosodic patterns strongly suggests that these forms are not just memorized, but produced by morphophonological principles that are acquired as part of the grammatical knowledge of native Hittite. Such grammatical knowledge is evident, in particular, when these principles are applied in concert with other innovations in the phonological grammar to generate novel forms that conform to the same prosodic generalizations.

So much for verbal inflection. The next section turns to word prosody in nominal and verbal

<sup>83</sup>The imperfective stem in (205a) is attested with plene writing of the suffix only in *azzikkī* ‘eat’ (2SG.IMPACT). The imperfective stem of the verb in (205c) happens to be attested with only non-plene forms (*naḥḥiške-*); the imperfective stem of the *hi*-verb /ta/ ‘take’ is supplied in its place.

derivation, seeking to reconcile the analysis developed above with the patterns of word stress attested in these domains, and thus to arrive at a general account of the synchronic principles of Hittite stress assignment.

## 4.4 Hittite derivational stress & head faithfulness

It was demonstrated in §4.3 that the BAP is synchronically operative in Hittite: within (at least) the domain of verbal inflection and related inflection-like categories, stress is consistently assigned to the leftmost accented morpheme, otherwise to the word's leftmost syllable. This section turns to derivational morphology, where there is evidence for exceptions to this morphophonological generalization, accented non-primary suffixes that attract stress away from an accented morpheme to their left. Rather than falsify this generalization, I argue that these suffixes provide crucial evidence that in Hittite, as in other LA systems (cf. §1.1.3.3), the accentual properties of morphological heads are privileged; accented derivational suffixes, which typically have head status, may therefore be assigned stress even when they occupy a phonologically dispreferred position.

§4.4.1 assesses the Hittite evidence for accented derivational suffixes and their accentual behavior in primary and non-primary derivation. I show that these suffixes — e.g. abstract noun-forming *-atar*, denominal verb-forming *-a(i)-* — consistently attract stress in preference to an accented stem to their left, and furthermore, suggest that this BAP-overriding feature — termed here accentual DOMINANCE — is a general property of accented derivational morphemes in Hittite. §4.4.2 then proposes a formal analysis of these word stress patterns, integrating them into the phonological model developed in §4.3.4 to account for stress assignment in verbal inflection. I show that incorporating HEAD FAITHFULNESS (Revithiadou 1999) into this model allows for a unified analysis of Hittite word stress patterns in inflection and derivation.

### 4.4.1 Stress patterns in derivation & accentual dominance

This section is concerned with the patterns of word stress observed in Hittite nominal and verbal derivation. §4.4.1.1 adduces evidence for accented derivational suffixes which — like accented inflectional suffixes (cf. §4.3.4.1) — attract stress away from the word's left edge when added to unaccented roots. §4.4.1.2 identifies clear cases of accentually dominant derivational suffixes. §4.4.1.3 discusses the problematic Hittite evidence for word stress in non-primary derivation, and argues that it is consistent with the hypothesis that all accented derivational suffixes are dominant.

#### 4.4.1.1 Accented derivational suffixes

The model of stress assignment developed in §4.3.4 to account for regular patterns of word stress within inflection is also sufficient to explain some of the stress patterns that arise in derivation. In particular, the BAP captures the stress-attracting properties of certain suffixes in primary derivation, which fall out straightforwardly from the assumption that these suffixes are lexically accented.


Such stress-attracting derivational morphemes include the noun-forming suffixes *-atar* and *-ul-*, which attach to both roots and derived stems. It was proposed in §4.2.2.4 that these suffixes were lexically accented, i.e. */-á:tar-/*, */-úl-/*. This hypothesis can now be confirmed. Since default stress in Hittite surfaces at the word's left edge (cf. §4.3.4.1), stress occurs word-internally only when it is attracted to a lexical accent. The stress-attracting properties of these suffixes is evident in (206), where they attach to unaccented verbal roots:

(206)	a.	<i>/ak:/</i>	'die'	⇒	<i>aggātar</i>	'death'	[ak:-á:tar]
		<i>/ek<sup>w</sup>/</i>	'drink'	⇒	<i>akuwātar</i>	'drinking'	[ak <sup>w</sup> -á:tar]
		<i>/ep:/</i>	'take'	⇒	<i>appātar</i>	'taking'	[ap:-á:tar]
		<i>/et/</i>	'eat'	⇒	<i>adātar</i>	'eating'	[at-á:tar]
		<i>/χas:/</i>	'beget'	⇒	<i>ħa(š)šātar</i>	'procreation'	[χas:-á:tar]
		<i>/k<sup>w</sup>en/</i>	'kill'	⇒	<i>kunātar</i>	'killing'	[k <sup>w</sup> (u)n-á:tar]
		<i>/au/</i>	'see'	⇒	<i>uwātar</i>	'seeing'	[u-wá:tar]
	b.	<i>/sχai/</i>	'bind'	⇒	<i>ishiūl</i>	'binding'	[isχi-yú:l]
		<i>/tāks/</i>	'make fit'	⇒	<i>takšūl</i>	'peace'	[taks-ú:l]

The accentual properties of the derivational bases in (206) have already been determined on independent grounds: because these verbal roots have corresponding radical verbs that exhibit stress mobility in inflection (§4.3.2.1), they must be unaccented (§4.3.7).<sup>84</sup> Underlyingly, then, all of the derived nominals in (206) contain a single accented morpheme, which is thus predictably assigned stress by the BAP; representative derivations for the forms in (206a) and (206b) are given in (207) and (208) respectively:<sup>85</sup>

(207) a. */ep: - átar - ∅/* → *appātar* [ap:á:tar] 'taking' (N.NOM/ACC.SG)

b.


<i>/ep: - átar - ∅/</i>	CULM	MAX-PROM	PK-L
a.  ap:á:tar			*
b. é:p:atar		*!	

<sup>84</sup>The root */tāks/* in (206b)— although not discussed in §4.3.2.1 above — must be unaccented, since it shows clear evidence for a mobile radical *mi*-verb paradigm in its oldest (OH/OS) attestations: 3SG.NPST.ACT *takkiš[zi]* [ták:i:stsi] : 3PL *takšanzi* [tak:sántsi] (cf. Oettinger 1979: 217–9, Kloekhorst 2008: 813–4). SSP-driven epenthesis in 3SG *takkišzi* is predictable (i.e., in a /TsT/ cluster), and likely did not originally occur elsewhere in the paradigm (cf. 1SG *taggaš[mi]* [ták:smi]), although later the epenthetic vowel appears to have been lexicalized and extended throughout (e.g. 3PL *takkišanzi*; NH/NS). On the *a*-vocalism of the root, see Melchert (1994: 140) and Kloekhorst (2008: 814) with references.

<sup>85</sup>Note, however, that a purely BAP-driven analysis would predict root stress when an accented derivational suffix combines with an accented root. Although I have been unable (so far) to identify any examples of such an interaction whose stress pattern can be determined, this prediction would surely be incorrect; I would expect, rather, that an accented derivational suffix like *-atar* would attract stress away from an accented root just as it does with the accented derived stems examined in §4.4.1.2 below. The modified analysis developed in §4.4.2 — which incorporates privileged faithfulness to the accentual properties of morphological heads — would generate suffixal stress in such a derivative.

(208) a. /tǎks - úl - ø/ → *takšūl* [taksú:l] ‘peace (treaty)’ (N.NOM/ACC.SG)

b.

/tǎks - úl - ø/	CULM	MAX-PROM	PK-L
a.  taksú:l			*
b. táksul		*!	

#### 4.4.1.2 Derivational suffixes in non-primary derivation

While the analysis developed in §4.3 can correctly generate attested word stress patterns in examples like (207–208), there are also cases in which the accentual behavior of derivational suffixes problematizes this analysis. Such cases occur, especially, in non-primary derivation — for instance, when the the same suffix *-atar* attaches to derived stems (rather than roots as in (206)) it still appears to attract stress consistently (i.e. [-á:tar]), as shown by frequent plene spellings of the suffix-initial vowel. Some relevant examples are given in (209):<sup>86</sup>

(209) a.	<i>āššu-</i> [á:s:u-]	‘good’	⇒	<i>aššuwātar</i> [a:s:w-á:tar]	‘goodness’
b.	<i>ḥatūga-</i> [χatú:ka-]	‘terrible’	⇒	<i>ḥatugātar</i> [χatu:k-á:tar]	‘terror’
c.	<i>(parā) ḥandānt-</i> [χantá:nt-]	‘providential; blessed’	⇒	<i>ḥandantātar</i> [χanda:nt-á:tar]	‘providence’
d.	<i>pišēn-</i> [pisé:n-]	‘man’	⇒	<i>pišnātar</i> [pishn-á:tar]	‘manhood’

What is significant about the examples in (209) is that, in each case, there is strong reason to believe that the derivational base for the *-atar* noun is itself a lexically accented stem, i.e. /á:s:u-/ ‘good’, /χatú:ka-/ ‘terrible’, /χandánt-/ ‘providential; blessed’, /pisén-/ ‘man’.<sup>87</sup> When the basic stems in (209b–d) occur as independent words (i.e. with the addition only of nominal inflectional endings), they bear stress on a word-internal syllable;<sup>88</sup> this non-default stress pattern

<sup>86</sup>The transcriptions in (209) indicate that the derived forms preserve the vowel length of their base, a feature which is in fact orthographically encoded in some attestations; see further §4.4.1.3 below — especially (213), where (209a) and (209c) are explicitly treated — as well as the more general discussion of “multiple plene spelling” in §3.2.

<sup>87</sup>In (209c), I assume that *ḥandant-* is an adjective, historically lexicalized from the participle of the verb *ḥandāi-* ‘arrange’ (for attested forms and semantic discussion, see Puhvel 1991: 96–107). This analysis is motivated by the selectional properties of *-atar* which, despite its high productivity, does not otherwise combine with participles; thus all attested bases terminating in *-ant-* are adjectives or nouns, e.g. *maninkuwantatar* ‘shortness’ (← *maninkuwant-* ‘short’), *mayandatar* ‘(young) adulthood’ (← *mayant-* ‘adult’). The accentual analysis, however, does not depend on this assumption.

<sup>88</sup>For peninitial stress in (209c), cf. *pišēnuš* [pisé:n-os] (ANIM.ACC.PL). However, oblique case forms of this noun are stressed on their inflectional case markers, e.g. *[p]išnāš* [pishn-á:s] (ANIM.GEN.SG). The shift of stress from stem

again argues for lexical accent associated with the stressed syllable.

The situation is somewhat more complicated for /á:s:u-/ in (209a). The motivation for positing this underlying representation will become clear in §5.3.3, where word stress in athematic nominals (like *āššu-*, a *u*-stem adjective) is treated in greater detail. The crucial point that emerges from this discussion is that Hittite inherited “weak” case (e.g. GEN.SG, DAT/LOC.SG) athematic inflectional endings from PIE that — like the plural non-past active verbal inflectional endings — were lexically accented (i.e. GEN.SG /-ás/, DAT/LOC.SG /-í/); however, these endings never attract stress when attached to *āššu-*, which in its weak case forms shows numerous plene spellings of its initial syllable and no plene spellings of its inflectional endings, both of which point to fixed leftmost stress.<sup>89</sup> The failure of these endings to attract stress is neatly explained if *āššu-* has a lexical accent on its stem-initial syllable (i.e. /á:s:u-/), which thus receives stress by the BAP. As a general principle, then, I assume that — just as in fixed radical verbs (cf. §4.3.2.2) — the presence or absence of intraparadigmatic stress mobility in well-attested athematic nominal formations as diagnostic of the presence or absence of a lexical accent on the nominal stem.<sup>90</sup>

In view of these accented underlying representations, the derivations in (209) are puzzling: why does /-átar-/ defy the pattern of accent resolution observed elsewhere in Hittite, attracting stress away from an accented stem to its left? In fact, this phenomenon is not specific to the suffix *-atar*, nor to the nominal bases given in (209). Precisely the same pattern is observed with the denominative verb-forming suffix *-a(i)-*;<sup>91</sup> several secure examples are provided in

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to (accented) inflectional ending is licensed by deletion of the accented stem vowel, thus an instance of what Kiparsky (2010: 146) refers to as “secondary mobility” (cf. n. 61; see further §5.3.3). Historically, the word reflects an ablauting *\*n*-stem *\*pes-én-/\*pes-n-´*; see Zucha (1988: 53–4) and Carruba (1993) (with discussion in Melchert 2013b: 178–9 n. 11 and Yates 2016b: 163).

<sup>89</sup>E.g., *āššuš* [á:s:u-s] (ANIM.NOM.SG), *āššawaš* [á:s:aw-aš] (GEN.SG), *āššawi* [á:s:aw-i] (DAT/LOC.SG), etc.; see *HW*<sup>2</sup> (I: 492–8) for attestations.

<sup>90</sup>Less certain is whether fixed initial stress in *thematic* nominals is indicative of a lexical accent on this syllable. The question depends on the status of the morphological divide between thematic and athematic inflection in Hittite, Anatolian, and ultimately in PIE. Two historical facts, at least, are clear: (i) all thematic nominals in PIE had fixed stem stress; (ii) the PIE athematic nominal inflectional endings were lexically accented (cf. Lundquist and Yates (to appear: §2.1.1, §3.1) with references). If it is the case that thematic endings were synchronically derived from athematic, then all thematic nouns must have had a lexical accent on their stressed syllable, since only then would the stem be assigned stress in preference to the accented inflectional endings by the BAP. However, if it is the case that thematic nouns were not synchronically derived from athematic but rather selected distinct thematic nominal inflectional endings, then it is possible that these thematic inflectional endings were simply unaccented; under this scenario, thematic nouns with fixed initial stress may be lexically unaccented and receive default stress by the BAP. Because it is unclear at present which of these possibilities is more likely for PIE or — more importantly — for Hittite, I do not take fixed initial stress in thematic nouns as evidence for an initial lexical accent in this chapter. As a consequence, attraction of stress to a derivational suffix in non-primary derivatives of these nouns does not necessarily imply accentual dominance (cf. §4.4.1.3 below); such examples are therefore excluded here as evidence for this phenomenon.

<sup>91</sup>On the synchronic phonological interpretation of this suffix, see Melchert (1984: 74–5) (cf. Hoffner and Melchert 2008: 176 n. 12). Diachronically, it must be traced back to a disyllabic PA form with initial stress, most likely *\*-ó-ye/o-* per Oettinger (1979: 357–8) (for this view, see Kloekhorst (2008: 335; 2014a: 280–2) and now Melchert (2017a: *ad* §12.36) against the older derivation from *\*-éh<sub>2</sub>-ye/o-* proposed by Watkins (1975: 373) and maintained by Melchert (1984: 38–40; 1994: 130, 212–3; 1997: 133–4). It cannot be excluded that the suffix was still disyllabic



(210):<sup>92</sup>

(210)	a.	/χandánt-/	‘providential’	⇒	<i>handandā[nzi]</i>	[χanta:nt-á:-nt̃si]
	b.	/χap:és:(e)n-/	‘body part’	⇒	<i>happešnānzi</i>	[χap:es:n-á:-nt̃si]
	c.	/iwáru-/	‘dowry’	⇒	<i>iwārwāyer</i>	[iwa:rw-á:y-er]
	d.	/kankáti/	‘(sp. of plant)’	⇒	<i>gangadāizzi</i>	[kanka:t-á:y-t̃si]
	e.	/parséna-/	‘hip; cheek’	⇒	<i>paršnāizzi</i>	[parsn-á:y-t̃si]
	f.	/sáru-/	‘plunder’	⇒	<i>šarwāit</i>	[sa:rw-á:y-t]
	g.	/tākšúl-/	‘peace’	⇒	<i>takšulāit</i>	[taksu:l-á:y-t]

Once again, for each of the derivations in (210) there is clear evidence for lexical accent on the base stem. The derivation in (210a) involves the same base as in (210c) above. The bases in (210c–e) and (210g) are all attested in isolation with plene spellings that confirm non-initial stress (e.g. *iwāru*, *gangāti*, *paršēnus*, *takšūl*), and the last was explicitly shown in (208) above to contain the accented suffix /-úl-/. Similarly, when not subject to further derivation, the base stems in (210b) and (210f) form athematic nouns with fixed intraparadigmatic stress on the stem — for (210b), as indicated by consistent *e*-vocalism of the peninitial syllable (e.g. GEN.SG *happešnaš* [χap:és:nas]),<sup>93</sup> and for (210f), by plene spellings of the initial syllable, including in oblique case forms (e.g. DAT/LOC.SG *šāru* [sá:ruwi]), thus like /á:s:u/ in (209a) above. Denominative verb-forming *-a(i)-* thus patterns exactly like noun-forming *-atar*: it is an accented suffix (/ -á(y)-/), which attracts stress to itself in preference to the lexical accent of the stem to its left, thereby “overriding” the BAP.

It is very likely that other derivational suffixes show the same stress-attracting behavior, although unambiguous supporting evidence is much more limited (cf. §4.4.1.3). Likely candidates for membership in this set include the neuter noun-forming accented suffix /-úl-/ (treated in §4.2.2.4 and §4.4.1.1 above), the adjective- and “agent noun”-forming suffix *-ala-*, the denominal fientive/stative verb-forming suffix *-ešš-*, and the animate noun-forming suffix *-ai-*.

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[ -á: .e- ] or [ -á: .i- ] for (some) Old Hittite speakers (after inner-OH loss of intervocalic \*y); however, I wholly reject Kloekhorst’s (2014a: 387–9) recent proposal that the second syllable of this suffix was stressed (i.e. <sup>x</sup>[a: .é]). Among other issues, his attempt to derive the observed long vowel *ā* via “compensatory lengthening” upon loss of the intervocalic (!) glide is not remotely credible; there is no known type of compensatory lengthening — a process which results from the loss of moraic segments, typically either vocalic nuclei or weight-bearing coda consonants (e.g. Hayes 1989; Kiparsky 2011) — that would apply in this phonological environment. I am indebted to Kazu Yoshida for calling my attention to this point.

<sup>92</sup>Glosses for (210): (a) ‘show providence’ (3PL.NPST.ACT); (b) ‘(+ *arha*) dismember’ (3PL.NPST.ACT); (c) ‘bestow a dowry/inheritance’ (3PL.PST.ACT); (d) ‘treat with the *g*-plant’ (3SG.NPST.ACT); (e) ‘crouch’ (3SG.NPST.ACT); (f) ‘plunder’ (3SG.PST.ACT); (g) ‘make a peace treaty’ (3SG.PST.ACT). The meaning of (d) is discussed in detail by Puhvel (1997: 51–4) (cf. Miller 2004: 327, Melchert 2014b: 220 n. 2); on (e), see further Yates (2016b: 163) with references.

<sup>93</sup>The stem *hapeššar/n-* in (210b) contains the suffix *-eššar/-ešn-* (Hoffner and Melchert 2008: 58), which is clearly stress-attracting (thus likely /-és:ar-/), although plene spellings are quite rare (see Kloekhorst 2014a: 53–60 for a list of attested forms and discussion). It is possible that this noun itself is attested once with plene spelling of the suffix-initial syllable, i.e. <*ha-ap-pi-e-eššar*> (KBo 9.126 10–11 (OH/NS); see *HW*<sup>2</sup>, III: 221), but the restoration is uncertain (cf. Kloekhorst 2014a: 55–6 n. 156).

That the last four suffixes are also accented is supported by their stress-attracting behavior in examples like (211a–b), (211c–d), (211e–f), and (211g) respectively:<sup>94</sup>

- (211) a.  $\acute{e}$  *arzana-* ‘tavern’  $\Rightarrow$  *arzanālaš* [-á:l-as]  
 b.  $\acute{e}$  *karimna-* ‘temple’  $\Rightarrow$  *karimnālaš* [-á:l-as]  
 c. *mekk-* ‘many’  $\Rightarrow$  *makkēšši* [-é:s:-t̃si]  
 d. *nakkušša-* ‘scapegoat’  $\Rightarrow$  *nakkušēšdu* [-é:s:-t̃ru]  
 e. *wak-* ‘bite’  $\Rightarrow$  *wagāiš* [-á:y-s]  
 f. *link-* ‘swear’  $\Rightarrow$  *linkāus* [-á:(y)-os]

(211) confirms that these derivational suffixes are accented, but because the accentual properties of their bases are indeterminate,<sup>95</sup> it remains uncertain whether they attract stress from an accented stem in the same way as *-atar* and *-a(i)-*. However, the derivations in (212) strongly suggest that the three suffixes in (211), plus the less productive noun-forming suffix *-zil-*, all have this property as well.<sup>96</sup>

- (212) a. /ás:u-/ ‘good’  $\Rightarrow$  *aššūl* [a:s:ú:l]  
 b. /asúsa-/ ‘ring’  $\Rightarrow$  <sup>LÚ</sup> *ašušāleš* [asus-á:l-es]  
 c. /milit:-/ ‘honey’  $\Rightarrow$  *militēš[du]* [mi:liti:-é:s:-t̃ru]  
 d. /maniyáχ:/ ‘administer’  $\Rightarrow$  [*man*]iyahhāiš [ma:niyaχ:-á:y-s]  
 e. /sárnink-/ ‘compensate’  $\Rightarrow$  *šarnikzīl* [sarnik-t̃sí:l]

The derivation of (212a) is most secure, since it contains two known entities: the accented stem from (209a) and the accented suffix /-úl-/ from (206b).<sup>97</sup> In (212b), the base stem is at-

<sup>94</sup>Glosses for (211): (a) ‘(functionary associated with *a-*)’ (ANIM.NOM.SG); (b) ‘(functionary associated with *k-*)’ (ANIM.NOM.SG); (c) ‘becomes numerous’ (3S.NPST.ACT); (d) ‘let he/she/it become a scapegoat’ (3SG.IMPACT); (e) ‘biter; grain pest’ (ANIM.NOM.SG); (f) ‘oath’ (ANIM.ACC.PL); (g) ‘failure’ (N.NOM/ACC.SG). On the function and semantics of *-ala-*, *-ešš-* and *-ai-*, see Hoffner and Melchert (2008: 54–5, 177–8) with references (and on the first, cf. Melchert 2014a: 209–10). The stem of (211b) shows irregular variation, on which see Kloekhorst (2008: 451). Suffixal stress in (211c) — an instance of primary derivation — is indicated by both plene writing and reduction of the unstressed root /e/ vowel.

<sup>95</sup>An exception is *wak-* ‘bite’ in (211e), which was shown in (166) to form a mobile *hi*-verb and thus to be an unaccented root (see §4.3.4 above).

<sup>96</sup>Glosses for (212): (a) ‘favor’ (N.NOM/ACC.SG); (b) ‘(functionary associated with *a-*)’ (ANIM.NOM.PL); (c) ‘let he/she/it become sweet’ (3SG.NPST.IMPACT); (d) ‘administrative district’ (ANIM.NOM.SG); (e) ‘compensation’ (ANIM.NOM.SG). The suffix *-zil-* in (e) is clearly related to the somewhat more productive neuter noun-forming suffix *-il-*, which is stress-attracting, e.g. *hurki[l]* ‘failure’ (N.NOM/ACC.SG); on the historical development of these suffixes, see Rieken (2008).

<sup>97</sup>Melchert (2014a: 209) suggests that *aššul-* was historically reanalyzed as being derived from the verbal root *ašš-* ‘be good’, and further, that this reanalysis was the source of its productive use in deverbal derivation (e.g. *takšul-*  $\leftarrow$  *takš-* in (210g) above). If *aššul* is truly synchronically derived from *ašš-*, the suffix *-ul-* must nevertheless be accentually dominant, since the root *ašš-* — although poorly attested (more common is the derived stem *āššiye/a-*) — nevertheless shows evidence for a fixed radical verb paradigm, e.g. 3PL.NPST.MID *āššantari*. This

tested in isolation with plene writing of the peninitial syllable (*ašūša-* [asú:sa-]), which points to a lexical accent on this syllable. In (212c), the base forms an athematic noun with fixed stress on the stem, which similarly indicates an accented stem.<sup>98</sup> The verbal base of (212d) almost certainly bears a lexical accent on its stem, just like other factitives formed with the suffix *-ahh-*.<sup>99</sup> Finally, the verbal base of (212e) was analyzed in §4.3.5 as accented on the stem.

For each of the derivational suffixes in (212), then, there is positive evidence that the accented suffix attracts stress in preference to the accented stem and is thus subject to lengthening. With these examples added to the cases of *-atar-* and *-a(i)-*, the evidence for derivational morphemes “overriding” the BAP is sufficiently robust that that this principle must somehow be encoded in the synchronic grammar of Hittite speakers. One direct implication of this finding is that the analysis advanced in §4.3 must be refined to account for this new data, which is the primary goal of §4.4.2 below. In addition, this finding suggests a relationship between an affix’s morphological status (i.e. derivational vs. inflectional) and its behavior in stress assignment; this relationship — and its evidentiary basis — is explored in more detail in the next section.

#### 4.4.1.3 Derivation, dominance, and the evidence for word stress

The stress-attracting behavior of *-atar-*, *-a(i)-*, and in all likelihood also the suffixes in (212) in combination with accented stems is “exceptional” in the sense that it violates the BAP, which was established independently on the basis of the evidence treated in §4.3. However, the fact that such accentual behavior is common to all these suffixes suggests instead the possibility that the capacity to attract stress away from an accented stem — henceforth, accentual DOMINANCE — is a general property of accented derivational morphemes that distinguishes them from accented inflectional morphemes.<sup>100</sup> In §4.4.2, I contend that this hypothesis is essentially

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marginal root is thus likely accented /ás:/, as might be historically expected if it somehow derives from the formally and semantically similar nominal formation (so Kloekhorst 2008: 215–6).

<sup>98</sup>The stress pattern of the base stem in (212c) is somewhat uncertain. Fixed initial stress — hence lexical accent on the stem-initial syllable — is historically expected (cf. Gk. *méli* (GEN.SG *mélitos*) Goth. [míliθ] < PIE \**mélit-*), but fixed peninitial stress(/accent) is also possible in view of the initial syllable’s irregular *i*-vocalism (i.e. not the normal outcome of PIE \**é*) and the otherwise somewhat unexpected lack of plene writing in this syllable; see Melchert (1994: 140–1) for discussion and references. In view of the Greek and Germanic evidence (i.e. no Verner’s Law reflexes), the original mobile paradigm assumed by Kloekhorst (2008: 580–1) is unlikely.

<sup>99</sup>It is probable that the factitive suffix was dominant accented /-áχ:-/ and thus that all factitives were stressed on the derivational suffix, i.e. [-áχ:-] (see n. 101); yet it is clear, in any case, that all factitives had fixed stem stress — compare, e.g., *dasuwahwani* ‘we blind’ (FACT.1PL.NPST.ACT) with the unstressed allomorph of the first person plural ending (cf. §4.3.1 above) — just as expected on historical grounds.

<sup>100</sup>Kiparsky and Halle (1977) treat accentual dominance as an idiosyncratic property of morphemes ([±dominant]), a hypothesis which was developed in much subsequent generative research on LA systems (see Revithiadou 1999: 194–201 and Alderete (2001b: 231–9) for useful overviews; cf. §1.1.3.3). In their analysis, [+dominant] morphemes trigger cyclic erasure of the accentual specification of the stem to which they attach. If this morpheme is accented, its lexical accent predictably attracts stress; if not, other language-specific morphophonological principles function to assign stress — for instance, the “Oxytone Rule” in Vedic (Kiparsky 2010), or default “recessive” accent in Greek (e.g. Steriade 1988a). In this chapter, I employ the terms “dominance” and “dominant” not in this narrow sense, but simply as a descriptive label for the phenomenon whereby a morpheme attracts stress in preference to another accented morpheme to its left, thus “overriding” the phonological preference for left edge stress in Hittite.

correct — specifically, I argue (i) that the distinction between derivation and inflection in Hittite maps approximately onto the distinction between morphological head and non-head; and (ii) that accentual dominance is a property of morphological heads. Yet there is reason to wonder whether the strong empirical predictions of this hypothesis are borne out: if all accented derivational morphemes are dominant, why is the evidence for this property effectively limited to the cases discussed in §4.4.1.2 above? Why do non-primary derivatives formed with the suffixes in (212) show so little clear evidence for suffixal stress, and why don't other derivational suffixes show any at all?

The answer, in my view, is that the paucity of clear support for accentual dominance is due primarily to the nature of the orthographic evidence. Simply put, it is even more difficult to determine what surface stress patterns obtain in Hittite non-primary derivatives, which are the principal locus for interactions between accented stems and accented derivational suffixes, than in the radical and primary derivatives discussed in §4.3.2. One issue is that some derivational suffixes that are likely to be accented on historical grounds contain a vowel which does not lengthen when stressed (e.g. factitive *-ahh-*) or whose length cannot be reliably diagnosed by plene writing (e.g. fientive *-ešš-* when suffixed to *i-* and *u-*stems);<sup>101</sup> in such cases, it can be difficult or impossible to tell whether the suffix bears stress or whether it remains on the base. Yet even for suffixes that are subject to stressed vowel lengthening, the evidence for vowel length may be obscured by poverty of attestation; because non-primary derivatives tend to be relatively infrequent in comparison to primary derivatives and plene writing is optional, there is an increased chance that the stressed/long vowel of the suffix will fail to be reflected in the historical record. Moreover, both of these interrelated issues are further compounded by a third problem, viz., that non-primary derivatives tend to “inherit” features of their base, including vowel length (cf. n 10); a derived form may therefore contain multiple long vowels — the unstressed long vowel(s) of the base and the stressed long vowel of the derivational suffix — each of which is optionally spelled plene.

This effect is illustrated in (213) below, drawing examples from (209–210) above where their stress patterns were explicitly analyzed. Despite consistent suffixal stress, these forms contain two long vowels, which may thus be spelled plene — in some cases, within a single attestation, but more commonly, across attestations:

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<sup>101</sup>The Hittite factitive suffix *-ahh-* (*[-áχ:-]*) with short vowel is the regular outcome of PIE *\*-áh<sub>2</sub>-* (*← /-eh<sub>2</sub>-/*); on its historical development, see Melchert (1994: 157). Because this vowel is always short, the strongest arguments for its stress-attracting properties are historical: (i) the absence of any lenited reflexes (on PA lenition, see Eichner 1973, Adiego 2001), which might be expected if stress remained on the nominal stem in PIE/PA; (ii) more speculatively, it is possible that the imperative form *newāh* ‘renew!’ (with unexpected long vowel) in fact conceals Pre-Hitt. *\*new-ā* — i.e., the regular development of PIE *\*new-áh<sub>2</sub>* after the (pre-)Hittite loss of *\*h<sub>2</sub>* in auslaut — with subsequent recharacterization by the characteristic *[χ:]* of the factitive suffix. This scenario would be comparable to the well-known development of Ved. *ásayat* ‘lay’ from PIE *\*k<sub>2</sub>éy-o + t* (cf. Jasanoff 2003: 70 n. 138 with further examples); but see Kloekhorst (2014a: 95, 293–4) for an alternative hypothesis. The fientive suffix frequently attaches to *i-* and *u-*stem adjectives, an environment in which plene writing is non-contrastive and thus non-probative for vowel length (cf. n. 25 above).

- (213) a. *aššūl, āššul* [a:s:ú:l-] cf. (212a)  
 b. *aššuwātar, āššu(wa)nni,* [a:s:wá:t/n:-] cf. (209a)  
 c. *iwārwāyer* [iwa:rwá:(y)-] cf. (210c)  
 d. *ḥandantātar, ḥandāntatar* [χanda:ntá:t/n:-] cf. (209c)  
 e. *šaruwāit, šāruwawanzi* [sa:rwá:(y)-] cf. (210f)

The case of (213b) is instructive. The noun is attested more often with plene of the base (2x) than with plene of the suffix (1x). If the single form with plene had not been transmitted,<sup>102</sup> the occurrence of plene-spelled *-ātar* in the other structurally comparable forms in (209) would make it plausible to attribute the absence of suffixal plene in this noun to accident of attestation. Yet for less productive derivational suffixes, the presence of plene spelling in the base together with its absence in the non-primary derivative might be taken as evidence that the base retains stress in the derived form — wrongly, in the hypothetical case considered here,<sup>103</sup> but probably rightly in other cases, e.g. the adjectives derived with the suffix *-ili-* discussed in §4.2.2.4 above.

In sum, plene spellings of the base in non-primary derivatives are not a reliable diagnostic of word stress on the base. Rather, whether a non-primary derivatives bears stress on the base or the suffix can only be determined on the basis of the suffix’s phonological characteristics, which may provide positive (or less reliably, negative) evidence for suffixal stress. This situation is problematic, especially, for non-primary suffixes which do not lengthen under stress (for historically explicable phonological reasons), or which are weakly attested, since either of these factors may lead to the absence of such positive evidence (i.e. plene writing). As a consequence, outside of *-a(i)-* and *-atar* — which are both highly productive and contain vowels that lengthen under stress — clear evidence for suffixal stress in non-primary derivatives is rather scarce, even if this stress pattern is in fact relatively common in Hittite, as predicted by the hypothesis proposed above.

In view of these orthographic limitations, I provisionally assume that any positive evidence for suffixal stress in non-primary derivation is likely to be significant, and if the accentual properties of the stem can be determined, may further point to accentual dominance. I therefore take an isolated but relatively secure example like (212c) above as evidence that the fientive suffix *-ešš-* was accentually dominant, and on this basis, further assume that this derivational suffix attracted stress in forms like (214), although this stress pattern is strictly speaking unverifiable:

<sup>102</sup>In fact, the hapax form *aššuwātar* (KBo 32.13 ii 34; MH/MS) is not registered by *HW*<sup>2</sup> (I: 540–1) or by Puhvel (1991: 202); it is, however, noted by Kloekhorst (2014a: 360 n. 1404).

<sup>103</sup>A real example potentially relevant here is the “agent noun” derivative of *šērḫa-* ‘(cultic object)’, which is *šērḫala-* ‘(cultic functionary associated with š-)’. The non-primary derivative is attested just a handful of times, once with plene of the base, never with plene of the suffix (see *CHD*, Š: 437–8). At first glance, such a distribution points to stress on the base; however, if the evidence for *-ala-* as stress-attracting cited in (212b) is correct (i.e., plene-spelled *-āla-* in *ašušāla-* not a scribal error), then *šērḫala-* is in fact [se:rχá:la-] with a stressed long vowel in the suffix which by chance was not recorded with plene spelling. Such an omission would hardly be surprising, given the optionality of plene writing and the low number of occurrences of the derived form.

- (214) a. /aráwa-/ ‘free’ ⇒ *arāweššer* [ara:w-é:s:-er]  
 b. /idálu-/ ‘evil’ ⇒ *idālawešta* [ita:l(a)w-é:s:-t(:a)]  
 c. /tépu-/ ‘small’ ⇒ *tēpawešta* [te:p(a)w-é:s:-t(:a)]

Yet a still broader take-away from the orthographic issues discussed above is that the lack of unambiguous evidence for accentual dominance in many derivational suffixes does not seriously problematize the hypothesis that accented derivational suffixes are dominant, and thus consistently attract stress in non-primary derivation. I adopt this hypothesis in the §4.4.2, where I develop an analysis that accounts for attested patterns of word stress in both derivation and inflection.

#### 4.4.2 Stress assignment in Hittite derivation

This section develops a general optimality-theoretic analysis of Hittite stress assignment, expanding the scope of the analysis advanced in §4.3 so that it not only predicts attested patterns of word stress in verbal inflection, where stress assignment is governed by the BAP, but also in nominal and verbal derivation, where the predictions of the BAP are under certain conditions violated. Specifically, the earlier analysis must be refined to account for the behavior of accentually dominant morphemes, which attract stress away from an accented stem to their left (cf. §4.4.1).

This task is taken up in the remainder of this section, which is structured as follows. In §4.4.2.1, I argue that Hittite stress is sensitive to morphological headedness, and in turn, that accentual dominance derives from an affix’s status as a morphological head. According to this hypothesis, the dominant affixes identified in §4.4.1 have head status because, as prototypical derivational morphemes, they determine the basic morphosyntactic properties of the word as a whole; as such, higher-ranked faithfulness constraints protect their lexical accent, which is thus realized in preference to the lexical accent of a non-head to their left. §4.4.2.2 formally implements this analysis, introducing to the existing constraint ranking an undominated faithfulness constraint that refers directly to a word’s morphological structure and privileges the accentual properties of its head. I then apply this updated constraint ranking to Hittite non-primary derivatives containing accentually dominant suffixes, and demonstrate it correctly predicts the observed data, including the stress patterns of complex derivatives with multiple dominant suffixes.

##### 4.4.2.1 Derivation & morphological headedness in Hittite

§4.4.1.3 adduced evidence for morphemes that are accentually dominant, accented suffixes that attract stress away from the accented stems to which they attach against the general phonological preference in Hittite for left edge stress. The existence of these seemingly exceptional suffixes naturally gives rise to certain questions about the nature of accentual dominance and how it should be analyzed. One possibility — suggested by Kiparsky and Halle (1977) — is that dominance is an idiosyncratic feature (i.e. [ $\pm$ dominant]), which must be learned as part of each

affix's lexical entry. However, the examination of the stress patterns associated with various affixes undertaken in §4.3 and §4.4.1 has shown that the distribution of this feature is much more predictable than would be expected under this hypothesis; rather than being associated with an arbitrary set of affixes, dominance seems to be a property only of morphemes that are standardly viewed as derivational and — in view of the discussion in §4.4.1.3 — plausibly assumed to be a property of *all* accented derivational morphemes.

To account for this distribution, I propose that stress assignment in Hittite is sensitive to morphological headedness, preferentially aligning a word's morphological head — generally a derivational affix, when one is present — with its prosodic head, the syllable which bears primary stress. Hittite effects this preference through HEAD FAITHFULNESS (HEADFAITH) constraints, which privilege the phonological properties of morphological heads in accordance with the meta-constraint ranking in (50) (repeated from §1.1.3.3; cf. Revithiadou 1999: 20–31):

(50) HEADFAITH >> FAITH

Under this view, dominance effects arise when a lexically accented morpheme is the word's morphological head, and as such, its accentual features are preferentially realized over those of other (i.e. non-head) morphemes. In other words, accentual dominance is a type of head dominance (cf. Zwicky 1985: 2), and accented derivational affixes are dominant because they tend to be morphological heads.

The concept of “morphological head” — and the role it plays in stress assignment in LA systems cross-linguistically — was treated in detail in §1.1.3.3. Essentially, a word's morphological head is the morpheme that determines certain fundamental morphosyntactic properties of the word as a whole, such as its part of speech (A, N, V, etc.) and (relatedly) its subcategorization frame.<sup>104</sup> By this definition, derivational morphemes — which, in contrast to inflectional morphemes, prototypically change the syntactic category of the stem to which they are affixed — generally have head status; the only major exception to this generalization is when a word contains multiple derivational morphemes, in which case it is the one with highest scope (in suffixation, the last to attach) that determines the morphosyntactic properties of the word and is thus its morphological head. Accordingly, I assume that the ability to change a word's syntactic class is a necessary condition for morphological head status in Hittite. Virtually all of the Hittite affixes traditionally classified as derivational have this capacity, including the accentually dominant morphemes identified in §4.4.1 above;<sup>105</sup> the class-changing capacity of these affixes —

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<sup>104</sup> Whether roots have head status in underived words is uncertain and may vary cross-linguistically. For Hittite, I assume that the accentual properties of roots are not privileged in the same way as those of affixal morphological heads (similarly, see Sandell (2015: 176, 184–90) on Vedic Sanskrit). I leave open here whether this is because roots in Hittite are non-heads, or because the relevant faithfulness constraints are indexed to affixal heads (the latter as in Sandell's analysis).

<sup>105</sup> Of the suffixes treated by Hoffner and Melchert (2008: 53–62, 175–9) under “word formation,” only *-ške-* and the other imperfective suffixes are never class-changing. The inflection-like morphosyntactic properties of these suffixes were discussed in §4.3.3.1, where I argued that they have grammatical status on par with the verbal inflectional endings; this status in turn explains why, with respect to stress assignment, *-ške-* patterns with inflection rather than derivation. See also Yates (2015a: 169–74) for arguments that the verbal infix *-ni(n)-* is not synchronically productive in Hittite.

five noun-forming suffixes (*-atar*, *-ala-*, *-ul-*, *-ai-*, *-il-*) and two verb-forming suffixes (*-a(i)-*, *-ešš-*) — are exemplified in (215):<sup>106</sup>

(215)	a.	<i>idalu-</i>	‘evil’	⇒	<i>idālwatar</i>	‘wickedness’	A ⇒ N
		<i>lahḫiya-</i>	‘travel’	⇒	<i>lahḫiyatar</i>	‘expedition’	V ⇒ N
	b.	<i>lišši-</i>	‘liver’	⇒	<i>liššiyala-</i>	‘portentious’	N ⇒ A
		<i>genzu-</i>	‘lap’	⇒	<i>genzuwala-</i>	‘merciful’	N ⇒ A
	c.	<i>aššu-</i>	‘good’	⇒	<i>aššul-</i>	‘favor’	A ⇒ N
		<i>immiyela-</i>	‘mix’	⇒	<i>immiul-</i>	‘food mixture’	V ⇒ N
	d.	<i>ištarnink-</i>	‘make sick’	⇒	<i>ištarninkai-</i>	‘illness’	V ⇒ N
		<i>maniyahḫ-</i>	‘administer’	⇒	<i>maniyahḫai-</i>	‘administration’	V ⇒ N
	e.	<i>tayela-</i>	‘steal’	⇒	<i>tayazzil-</i>	‘theft’	V ⇒ N
		<i>šarnink-</i>	‘compensate’	⇒	<i>šarnikzil-</i>	‘compensation’	V ⇒ N
	f.	<sup>GIŠ</sup> <i>tarma-</i>	‘peg’	⇒	<i>tarma(i)-</i>	‘nail down; affix’	N ⇒ V
		<i>purutt-</i>	‘mud’	⇒	<i>purutta(i)-</i>	‘cover w/ mud’	N ⇒ V
	g.	<i>dampu-</i>	‘blunt’	⇒	<i>tampuešš-</i>	‘be(come) blunt’	N ⇒ V
		<i>sakkar/n-</i>	‘shit’	⇒	<i>šaknešš-</i>	‘be(come) impure’	N ⇒ V

Yet while class-changing capacity may be a property of all Hittite derivational morphemes, it is nevertheless not a sufficient condition for morphological headedness, since the participle suffix *-ant-* has this capacity, but phonologically behaves as a non-head (i.e. accented, but non-dominant). Hittite participles were examined more closely in §4.3.3.1, where it was argued that participial *-ant-* has certain morphosyntactic properties prototypical of inflectional morphemes, such as high productivity and predictable semantics. This situation is in fact typologically common: participles cross-linguistically straddle the line between inflection and derivation, having certain characteristics of each of these word-formation processes. Given its inflection-like properties in Hittite, it is hardly surprising that participial *-ant-* would be treated morphologically as a non-head and, as a result, pattern prosodically with (e.g.) the verbal inflectional endings (cf. §4.3.4.4), whose lexical accent is not privileged by head faithfulness.

In general, then, the distinction between a potential morphological head and non-head in Hittite is equivalent to the distinction between derivation and inflection, with the standard caveat that the boundary between these word-formation processes cannot always be clearly defined (cf. n. §41). With the single (principled) exception of the participle suffix, I therefore assume that if a morpheme has the capacity to change a word’s syntactic class, it is derivational and thus eligible for head status. This analysis predicts that these morphemes will be subject to head faithfulness, and thus if accented, exhibit accentual dominance effects in stress assignment. The next section shows that these predictions are borne out in Hittite non-primary

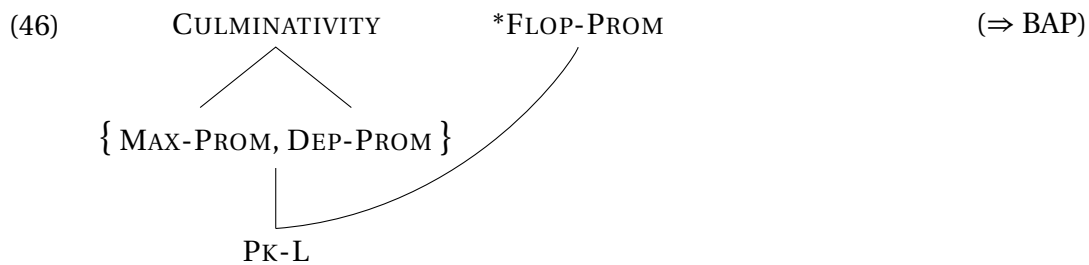
<sup>106</sup>Note also in (215) — especially (215b) — that the meaning of the derivative is not always wholly predictable from its base; such semantic unpredictability is another prototypical feature of derivational rather than inflectional processes.



derivation.

#### 4.4.2.2 Head faithfulness & word stress in derivation

The aim of the analysis advanced in this section is to capture the systemic principles of Hittite synchronic stress assignment. To this end, it must generalize across Hittite morphology, correctly predicting attested patterns of word stress in both inflection and derivation. A natural starting point for developing such a general analysis is the ranking of phonological constraints proposed in §4.3.4.1 to account for the data observed in verbal inflection, where stress assignment is consistent with the morphophonological generalizations specified by the BAP. This ranking is repeated in (46) below:

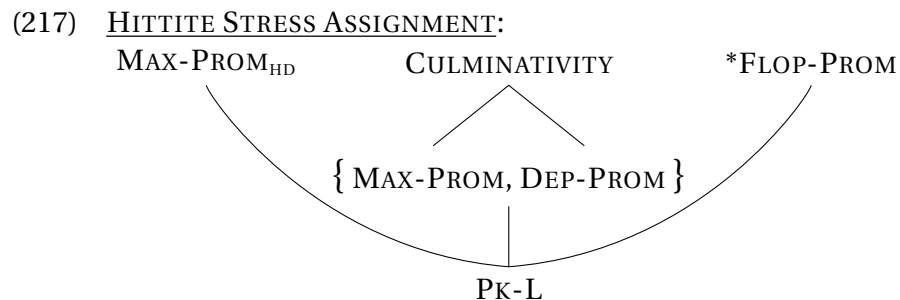


This ranking must be revised in view of the new data adduced in §4.4.1.2, which identified a set of derivational morphemes that are accentually dominant, and thus systematically fail to conform to these same generalizations.

To account for this data, I propose to introduce an additional faithfulness constraint that makes direct reference to morphological structure, privileging the accentual properties of a word's morphological head (cf. §1.1.3.3). The proposed constraint — taken from Revithiadou's (1999) HEADFAITH constraint family (cf. (49a) above) — is given in (216):

(216) MAX-PROM<sub>HD</sub>: "A prominence in the input sponsored by a morphological head must have a correspondent in the output."

In order to generate the BAP non-compliant stress patterns observed in connection with dominant morphemes, the positionally-indexed constraint in (216) must strictly dominate its general analogue MAX-PROM. Specifically, I propose that Hittite has the constraint ranking in (217), with MAX-PROM<sub>HD</sub> situated at the top of the grammar:




When ranked as in (217), MAX-PROM<sub>HD</sub> requires that the lexical accent of a morphological head be faithfully realized in preference to a non-head, even when the non-head is nearer to the left edge of the word and thus more harmonic with respect to PK-L. Dominance effects are thus predicted to arise whenever a word's morphological head is accented: its lexical accent is preferred to any lexical accent(s) associated the word's other constituent morphemes due to undominated MAX-PROM<sub>HD</sub>.

The predictions of this analysis can be observed clearly in words that contain a single derivational morpheme, which thus functions as the word's morphological head. When this morpheme is accented — as is the case (e.g.) for /-átar-/ and /-á(i)-/<sup>107</sup> — it is accentually dominant, consistently receiving stress when suffixed to a lexically accented stem (cf. §4.4.1.2); the derivations in (218–219) show that this stress pattern is correctly generated by the proposed constraint ranking:<sup>108</sup>


(218) a. /χatú:ka - átar - ø/ → *ħatugātar* [χatuká:tar] ‘terror’ (N.NOM/ACC.SG)

b.

/χatú:ka - átar - ø/	CULM	MAX-PROM <sub>HD</sub>	MAX-PROM	PK-L
a. χatú:ká:tar	*!			***
b. χatú:katar		*!	*	*
c.  χatuká:tar			*	**
d. χá:tukatar		*!	**	

(219) a. /sá:ru - ái - t/ → *šaruwāit* [sarwá:yt] ‘plundered’ (3SG.PST.ACT)

b.

/sá:ru - ái - t/	CULM	MAX-PROM <sub>HD</sub>	MAX-PROM	PK-L
a. sá:rwá:yt	*!			*
b. sá:rwayt		*!	*	
c.  sarwá:yt			*	*

The tableaux in (218) and (219b) show identical violation profiles. In each case, the derivational suffix — *-atar* and *-a(i)-* respectively — is manifestly the word's morphological head, as it changes the syntactic category of the base stem ( $A \Rightarrow N$ ;  $N \Rightarrow V$ ). In both tableaux, the faithful candidate (a) is ruled out by top-ranked CULMINATIVITY. That leaves candidates (b) and (c),

<sup>107</sup>The suffix /-á(i)-/ in (219b) exhibits synchronically irregular allomorphy (at least in early Hittite), surfacing in some paradigmatic forms as [-á:e-], [-á:i-], or [á:y] (cf. n. 91), and in others as [-á:-]. I leave open here the question of how this allomorphy is best analyzed synchronically.


<sup>108</sup>The analysis proposed in this section is concerned only with stress assignment; it therefore does not explicitly account for the base-derivative vowel length transfer effect regularly observed in non-primary derivatives (cf. §4.4.1.3). In the derivations in (218–220), the accented vowel of the stem is given as long in the input, but this should not be taken as a claim that the long vowel is part of stem's lexical entry; I provisionally assume, rather, that this vowel's surface length is due to the cyclic application of stressed vowel lengthening (cf. n. 111) or to output-output constraints on base-derivative identity (see §3.2 for details). Developing an analysis that systematically unifies stress assignment and vowel length in Hittite is a topic for future research.

where one lexical accent is deleted in violation of MAX-PROM.<sup>109</sup> The lexical accent of the stem — a non-head — is preserved in (c), which would be more harmonic than (b) under the unmodified BAP analysis, since stress surfaces closer to the left edge of the word and thus better satisfies PK-L. However, this candidate incurs a fatal violation of undominated MAX-PROM<sub>HD</sub>, since it fails to realize the lexical accent of the word's morphological head. Thus candidate (b), which is faithful to the lexical accent of the head morpheme at the expense of a non-head's accent, emerges as the winner.

The revised analysis thus handles dominance effects in the simple case, i.e. when a word contains just one derivational morpheme. A more serious test for the analysis, however, is whether it makes correct predictions in complex formations containing multiple accented derivational morphemes — for instance, *takšulāizzi* ‘makes peace’, which contains both the noun-forming suffix /-úl-/ and denominal verb-forming /-á(i)-/. Either of these morphemes may be accentually dominant when occurring independent of the other; the grammar was already shown to predict this effect for /-a(i)-/ in (219), and similarly does for /-úl-/ , as evident in (220):

(220) a. /á:s:u - úl - ø/ → *aššul* [a:s:ú:l] ‘favor’ (N.NOM/ACC.SG)


b.

/á:s:u - úl - ø/	CULM	MAX-PROM <sub>HD</sub>	MAX-PROM	PK-L
a. á:s:ú:l	*!			*
b. á:s:ul		*!	*	
c.  a:s:ú:l			*	*

Yet when a word contains both of these suffixes, only one can be the morphological head. In the case of *takšulāizzi*, the head must be verb-forming /-a(i)-/. This suffix scopes over the preceding morphemes, determining the syntactic category of the word as a whole (V).<sup>110</sup> As such, the lexical accent of /-a(i)-/ should be privileged; the derivation in (221) confirms that the constraint ranking in (217) correctly assigns stress to this suffix:

(221) a. /tǎks - úl - ái - tsi/ → *takšulāizzi* [taksu:lá:ytsi]

b.

/tǎks - úl - ái - tsi/	CULM	MAX-PROM <sub>HD</sub>	MAX-PROM	PK-L
a. taksú:lá:ytsi	*!			***
b. taksú:laytsi		*!	*	*
c.  taksu:lá:ytsi			*	**
d. táksu:laytsi		*!	**	

As in the preceding tableaux, the competition is essentially between candidates (b) and (c). This competition is resolved by MAX-PROM<sub>HD</sub>, which is violated only by (c) since it is /-á(i)-/ — not /-úl-/ — that is the word's morphological head. Crucial to this analysis is that MAX-PROM<sub>HD</sub> is

<sup>109</sup>Candidate (d) in (218) is eliminated even independent of MAX-PROM<sub>HD</sub> by its double violation of MAX-PROM.


<sup>110</sup>If /-úl-/ were instead the morphological head, the word would be a noun, as in (220).

positionally indexed, penalizing the deletion of a lexical accent associated with a word's head morpheme, a status which is structurally dependent; the fact that a derivational suffix like /-úł-/ has head status in other derived forms — including (220) and, under a cyclic view, its immediate base [taksú:ul] 'favor' — therefore does not enter into the computation of stress for *takšulāizzi* as a whole. Significantly, an alternative analysis, which treats accentual dominance as an idiosyncratic lexical property of morphemes, cannot generate this pattern while maintaining strictly parallel constraint evaluation (in accordance with classical Optimality Theory). Under such an analysis, candidates (b) and (c) in (221) would be equivalent with respect to a (MAX-PROM-like, but higher ranked) constraint that penalizes deletion of lexical accents associated with [+dominant] morphemes, which in turn would incorrectly leave (c) as the winner because it better satisfies PK-L. However, by incorporating head faithfulness into the analysis, it is possible to account for the word stress pattern of (221) and other Hittite complex derivatives while maintaining strict parallelism.<sup>111</sup>

Finally, the constraint ranking in (217) encounters no issues with unaccented derivational morphemes. The identification of such affixes is problematized by the factors discussed in §4.4.1.3 — in particular, vowel length “inheritance” effects and the optionality of plene writing. However, some likely candidates were noted in §4.2.2.4 — for instance, the adjective-forming suffix *-ili-*, which is found in (e.g.) *karūili-* [karú:wili] ‘former; previous’ (← *karū* [karú:] ‘formerly’).<sup>112</sup> It appears that this derivational base never attracts stress, even though it often has head status, as in *karūili-*. Provided that *-ili-* is unaccented (i.e. /-ili-/), this situation is predicted by the analysis, as illustrated in (222):

(222) a. /karú: - ili - ø/ → *karūili* [karú:wili] ‘former’ (N.NOM/ACC.SG)

b.

/karú: - ili - ø/	CULM	MAX-PROM <sub>HD</sub>	MAX-PROM	PK-L
a.  karú:wili				*
b. karu:wí:li			*!	**
c. ká:ru:wili			*!	

In (222), /-ili-/ must be the word's morphological head, given that it changes the syntactic category of its base *karū* ‘formerly’ (i.e. ADV ⇒ A). Yet since the word's head is unaccented, MAX-PROM<sub>HD</sub> does no work,<sup>113</sup> stress assignment thus proceeds in accordance with the BAP. The winning candidate (a) faithfully realizes the single lexical accent in the input, thus being preferred

<sup>111</sup>It should be noted, however, that the head-faith based approach is not incompatible with a cyclic(/stratal) analysis (cf. n. 108), should that ultimately prove to yield the best systemic account of Hittite quantitative (and to a lesser extent, qualitative) vowel alternations. If the constraint ranking in (217) applied on each cycle, it would also account for the observed data — in the relevant case, generating the mapping /táksú:l - ái - tsi/ → [taksú:l:layt̪si] in exactly the same way as in (218–221).

<sup>112</sup>On this suffix, see Hoffner and Melchert (2008: 58). It appears that the initial [i] vowel is sporadically subject to syncope (e.g. *karūli*), which provides further evidence for the absence of stress (at least on this syllable; cf. n. 18).

<sup>113</sup>A possible testing ground for comparing a cyclic analysis of accentual dominance (à la Kiparsky and Halle 1977) with the non-cyclic account advocated here would be a case in which an accented stem combines with an accented derivational suffix followed by an unaccented derivational suffix. The latter would predict stress on

to candidate (c), which perfectly satisfies PK-L but is ruled out by its violation of higher-ranked MAX-PROM. There is no motivation to stress the word's head, as in candidate (c), which is less harmonic than (a) with respect to both PK-L and MAX-PROM.<sup>114</sup>

The take-away from the derivations in (218–222): augmented with head faithfulness, the constraint ranking posited on the basis of the inflectional data can also explain the distribution of word stress in nominal and verbal derivation. Specifically, the revised ranking accounts for accentual dominance effects: lexically accented derivational morphemes are generally the word's morphological head, and as such, top-ranked MAX-PROM<sub>HD</sub> requires that their lexical accent be faithfully realized even in preference to an accented morpheme to their left. It also correctly account for cases in which a word contains multiple derivational morpheme: the morpheme affix with the highest scope — the last to attach — attracts stress, because this morpheme is the word's head and is thus privileged by MAX-PROM<sub>HD</sub>. Crucially, these results are achieved without introducing problems elsewhere in the system: the addition of MAX-PROM<sub>HD</sub> to the model does not incorrectly predict that unaccented derivational morphemes will receive stress, nor does it affect stress assignment in radical verbs, which thus proceed in accordance with the BAP.

## 4.5 Conclusions & discussion

The primary aim of this chapter was to advance a new synchronic analysis of Hittite stress assignment. Toward this end, it was established first in §4.2 that Hittite has a LA system in which word stress is free, unbounded, culminative, and obligatory — viz., that every Hittite word has one and only one primary stress, which may fall on any syllable within the word. The grammatical principles that govern the surface distribution of primary stress were then investigated in the next two sections (§§4.3–4.4), the former focusing on stress patterns found within the inflectional paradigms of individual words, and the latter on stress patterns that obtain across derivationally related words.

One major empirical finding of this chapter is that there is a clear divergence between inflectional and derivational morphemes in their capacity to attract word stress. Accented inflectional morphemes attract stress away from phonologically preferred position at the word's left edge, but if more than one accented inflectional suffix is present, it is the one that best satisfies this phonological preference that receives stress, i.e. the leftmost. The resulting pattern is consistent with Kiparsky and Halle's (1977) BAP, whose operation in Vedic Sanskrit was discussed

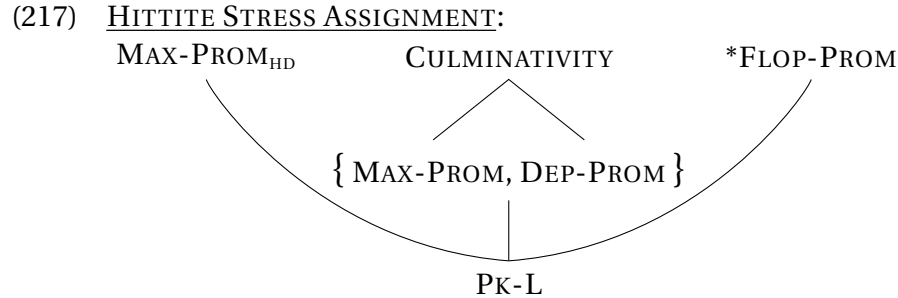
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the accented syllable of the stem (by PK-L), since neither of the word's lexical accents are protected by MAX-PROM<sub>HD</sub>. The cyclic analysis, however, would predict stress either on the word-initial syllable (if dominance involves erasure; cf. n. 100), or else on the accented derivational suffix (if it does not involve erasure). At present, unfortunately, I know of no examples where these differing predictions can be clearly evaluated.

<sup>114</sup>As noted in §4.2.2.4, I tentatively take the existence of apparently stress-neutral derivational suffixes like *-ili-* as evidence that Hittite preferentially realizes lexically accented heads rather than simply requiring that heads be stressed (i.e. HEADFAITH rather than HEADSTRESS in the sense of Revithiadou 1999; cf. §1.1.2.2, §1.1.3.3). While this finding may have implications for the reconstruction PIE's LA system (cf. §5.3.4), it nevertheless should be viewed as provisional, given the limited evidence for suffixes of this kind in Hittite (especially in primary derivation) and the well-known difficulties of interpreting the orthographic evidence for word stress (cf. §4.4.1.3).

in §1.1.3.2, and which was then shown in Chapter 2 to govern stress assignment in Cupeño.

In contrast, derivational morphemes may attract stress away from other accented morphemes against the phonological preference for left edge stress, thus violating the BAP. This “dominant” property of accented derivational morphemes was attributed to their status as morphological heads, whose lexical accents are positionally privileged (by HEADFAITH) in Hittite just as (e.g.) in Modern Greek, Russian, and Salish (Revithiadou 1999). I then developed an optimality-theoretic model of Hittite stress assignment that accounts for these prosodic generalizations, which fall out from the constraint ranking in (217):



With this foundation in place, I turn to diachrony in Chapter 5, where I argue, first, that Hittite and the Anatolian languages provide crucial support for reconstructing the PIE lexical accent system. Specifically, I contend that both the BAP and morphological headedness played a role in PIE stress assignment, just as it does in Hittite. I also argue that certain Anatolian word-prosodic innovations are best understood in view of an inherited system with these properties, and assess the implications of such changes for the historical development of LA systems cross-linguistically.

## CHAPTER 5

### Lexical Accent in Anatolian and Proto-Indo-European

#### 5.1 Introduction

Chapter 4 presented a new synchronic analysis of attested Hittite stress patterns, deriving these patterns from interactions between ranked phonological constraints and the accentual properties of morphemes. This chapter now turns to comparative reconstruction. §5.2 examines the (limited) evidence for stress assignment in other Anatolian languages and its implications for the reconstruction of PA stress assignment. §5.3 proceeds in turn to assess the implications of the Anatolian evidence for the reconstruction of the PIE system. §5.4 presents some general conclusions and directions for future research.

#### 5.2 Reconstructing PA stress assignment

The non-Hittite Anatolian languages offer relatively limited secure evidence for word stress. For the purposes of comparative reconstruction, the most important sources of prosodic information are Palaic and cuneiform Luwian, where plene writing serves as an orthographic diagnostic for word stress.<sup>1</sup> It is generally assumed that — just as in Hittite — plene writing is (optionally) used to indicate vowel length, which correlates with word stress due to (historical) processes lengthening stressed inherited short vowels and shortening of unstressed long vowels.<sup>2</sup> While their poverty of attestation makes it infeasible to attempt a synchronic analysis of Palaic or Luwian stress comparable to that of Hittite stress in Chapter 4, there is nevertheless sufficient evidence to suggest that they share with Hittite the same fundamental principles of

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<sup>1</sup>The label “cuneiform Luwian” here refers simply to the Luwian that is recorded in cuneiform script which — as discussed in §1.3.1 — reflects two distinct dialects, Kizzuwatna Luwian and Empire Luwian. The Luwian that is attested in hieroglyphic script forms a much more substantial corpus, but unfortunately this script provides virtually no evidence for the position of word stress.

<sup>2</sup> See Melchert (1994: 205–6, 215–19, 247, 261–6) on these stress-conditioned quantitative processes. The exact relationship between plene writing, vowel length, and word stress in these languages has not been systematically assessed in the way that was for Hittite in §§3.1–3.2, and there is reason to suspect that there may be differences between them. For instance, there is evidence to suggest that — in contrast to what was argued for Hittite in §3.2 (see especially (137) and subsequent discussion) — the monophthongization of inherited diphthongs produced new unstressed long vowels in Luwian. This hypothesis would explain examples such as Luw. *tappašī* ‘in heaven’ ([tá:p:as-i:]) and — with double plene — *dātti* [tá:t:-i:] ‘to the father’ where the long vowel of the Luwian dative-locative singular ending would derive from the PIE dative ending *\*-ei* in an unstressed position (for initial stress in ‘heaven’, cf. Hitt. *nēpisi* [né:pis-i] << PIE *\*néb<sup>h</sup>-s-i*; see Yates 2014a, Oettinger 2016). Nevertheless, it is reasonable (with due caution) to use the presence or absence of plene writing of inherited short vowels as evidence for word stress.

stress assignment, which can therefore be reconstructed for PA.

This evidence is treated in the next two sections. §5.2.1 focuses on verbal inflection in Palaic, then §5.2.2 turns to non-primary derivation in Luwian; I contend that these provide evidence respectively for the BAP and HEAD FAITHFULNESS as features of PA stress assignment.

### 5.2.1 Inflectional stress in Palaic & PA

Given the meager size of the corpus, the amount of evidence for word stress in Palaic is unsurprisingly small.<sup>3</sup> However, the evidence that is available indicates that Palaic — like Hittite — had stress-alternating inflectional paradigms. In particular, a Hittite-like mobile stress pattern is observed in at least one radical *mi*-verb in Palaic, *muš-* ‘become satiated’; the attested non-past active forms are given in (223):<sup>4</sup>

(223)	2SG	<i>mūši</i>	[mú:si]	‘you become satiated’
	3PL	<i>mušānti</i>	[mus-á:nti]	‘become satiated’

The alternation in (223) between stress on the root in singular forms and stress on inflectional endings in plural forms — the dominant pattern in Hittite radical *mi*-verbs (see §4.3.2 above) — is confirmed by plene writing. This alternation is in fact more easily detected in Palaic than in Hittite, since only in Palaic is the initial (historically short) vowel of the 3PL.NPST.ACT ending long when stressed ([-á:nti]; cf. Hitt. [-ántsi]) and thus spelled plene.

Further evidence for the mobile stress pattern directly attested in (223) comes from comparison of Palaic radical verbs with their Hittite cognates. For each of the Palaic verbs in (224), the corresponding Hittite verb is a radical *mi*-verb with a robustly attested mobile stress paradigm (see §4.3.2.1 above); significantly, the attested Palaic forms show exactly the same stress pattern as in Hittite, including attraction of stress to the 3PL.NPST.ACT inflectional ending in (224b–c):

(224)		PALAIIC		cf.	HITTITE	
	a.	<i>āšdu</i>	[á:s-t:u]	‘let him be’ (3SG.IMP.ACT)	<i>ēšdu</i>	[é:s-t:u]
	b.	<i>aḫuwānti</i>	[aχ <sup>w</sup> -á:nti]	‘drink’ (3PL.NPST.ACT)	<i>akuanzi</i>	[ak <sup>w</sup> -ántsi]
	c.	<i>atānti</i>	[at-á:nti]	‘eat’ (3PL.NPST.ACT)	<i>adanzi</i>	[at-ántsi]

Palaic and Hittite thus attest identical stress patterns in cognate morphological categories and in the individual lexical items. The simplest explanation for this agreement is that they are generated by grammars with the same properties: the cognate roots and affixes have the same accentual properties in each language, and the position of word stress is determined by the interaction of these morphemes with the same ranking of phonological constraints. The

<sup>3</sup>The extant Palaic texts are gathered in Carruba 1970, which also includes a grammatical description and dictionary.

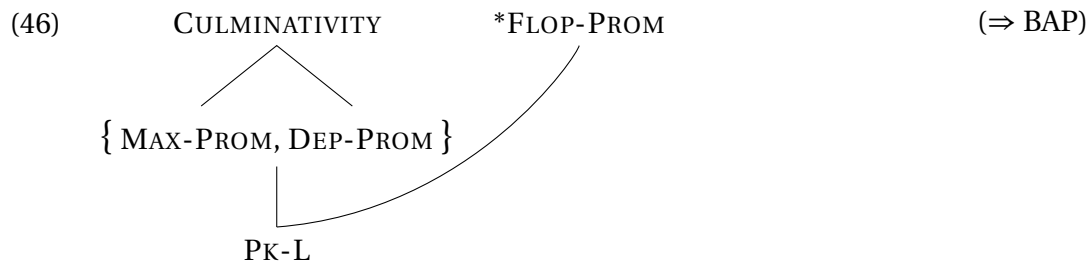
<sup>4</sup>On the morphological analysis as 2SG.NPST.ACT and interpretation of *mūši*, see Yakubovich (2006).



relevant morphemes are listed in (225);<sup>5</sup> the necessary constraint ranking — the one which drives Kiparsky and Halle’s (1977) BAP in Hittite verbal inflection (cf. §4.3.4) — is repeated in (46):

(225)

	PALAIIC	HITTITE	
a.	/aχ <sup>w</sup> /	/ek <sup>w</sup> /	‘drink’
	/as/	/es/	‘be’
	/at/	/et/	‘eat’
	/mus/	—	‘become satiated’
b.	/-ánti/	/-ántsi/	(2SG.NPST.ACT)
	/-si/	/-si/	(2SG.NPST.ACT)
	/-t:u/	/-t:u/	(3SG.IMP.ACT)



Provided with the inputs in (225), the constraint ranking in (46) correctly generates the mobile stress pattern observed in (223) above; these forms are derived in (226–227) below:

(226) a. /mus - si/ → *mūši* [mú:si] ‘you become satiated’ (2SG.NPST.ACT)

b.

	/mus - si/	CULM	MAX-PROM	DEP-PROM	PK-L
a.	musi	*!			
b.	☞ mú:si			*	
c.	musí:			*	*!

(227) a. /mus - ánti/ → *mušánti* [mus-á:nti] ‘become satiated’ (3PL.NPST.ACT)

<sup>5</sup>Pal. *muš-* lacks a cognate in Hittite, but in lacking accentual specification, conforms to the regular pattern in Hittite and — as argued explicitly in §5.3.2.3 below — in PIE.

b.

/mus - ánti/	CULM	MAX-PROM	PK-L
a.  musánti			*
b. musanti	*!	*	
c. mú:santi		*!	

This agreement between Hittite and Palaic has clear implications for the reconstruction of stress assignment in their proximate common ancestor, PA. Phonologically, it supports the reconstruction of the BAP constraint ranking in (46) for PA. Morphologically, it supports reconstructing PA roots and affixes with the same accentual properties as those attested in its daughter languages, i.e. (228):<sup>6</sup>

(228)

	PALAIIC	HITTITE		PA	
a.	/aχ <sup>w</sup> /	/ek <sup>w</sup> /	<	*/h <sub>1</sub> eg <sup>w</sup> /	‘drink’
	/as/	/es/	<	*/h <sub>1</sub> es/	‘be’
	/at/	/et/	<	*/h <sub>1</sub> ed/	‘eat’
	/mus/	—	<	*/m(e)us/	‘become satiated’
b.	/-ánti/	/-ántsi/	<	*/-ánti/	(2SG.NPST.ACT)
	/-si/	/-si/	<	*/-si/	(2SG.NPST.ACT)
	/-t:u/	/-t:u/	<	*/-tu/	(3SG.IMP.ACT)

A direct consequence of reconstructing the morphemes in (228) and the BAP constraint ranking in (46) for PA is that alternating stress is predicted when the roots in (228a) combine with the affixes in (228b). These predictions are spelled out explicitly in (229–230) for the PA root \*/ed/ ‘eat’:<sup>7</sup>

(229) a. PA \*/h<sub>1</sub>ed - si/ → \*[h<sub>1</sub>ét-si] ‘you eat’ (2SG.NPST.ACT) > Hitt. *ēzzi* [é:t̄si]

b.

/h <sub>1</sub> ed - si/	CULM	MAX-PROM	DEP-PROM	PK-L
a. *h <sub>1</sub> etsi	*!			
b.  *h <sub>1</sub> étsi			*	
c. *h <sub>1</sub> etsí			*	*!

(230) a. PA \*/h<sub>1</sub>ed - ánti/ → \*[h<sub>1</sub>əd-ánti] ‘eat’ (3PL.NPST.ACT) > Hitt. *adanzi* [at-ántsi]  
Pal. *atānti* [at-ánti]

<sup>6</sup>It is uncertain whether the 3PL.NPST.ACT suffix was already \*/-ánti/ in PA — having undergone the conditioned change discussed in Chapter 1 n. 27 — or was still \*/-énti/ as in PIE (see (247) in §5.3.2.2 below).

<sup>7</sup>In (230), I assume that unstressed root /e/ was reduced to [ə] following the proposal in Yates 2014c, which also provides a critical overview of alternative views.

b.

	/h <sub>1</sub> ed - ánti/	CULM	MAX-PROM	PK-L
a.	𐎧𐎠𐎡𐎠 *h <sub>1</sub> ədánti			*
b.	*h <sub>1</sub> edanti	*!	*	
c.	*h <sub>1</sub> édnti		*!	

As shown in (229a) and (230a), the PA surface forms selected as winners in the tableaux in (229b) and (230b) develop straightforwardly into the forms attested in the daughter languages.

Palaic and Hittite thus provide convergent evidence for the reconstruction of the BAP as a feature of PA stress assignment. A further question, however, is whether there is also inner-Anatolian comparative support for accentual dominance effects — i.e. morphemes that “override” the phonologically preferred stress pattern — of the kind observed in Hittite (§4.4). This question is addressed in §5.2.2.

### 5.2.2 HEADFAITH in Luwian & PA

While Luwian — unlike Hittite and Palaic — does not show exhibit evidence for the BAP within verbal inflection,<sup>8</sup> a significant aspect in which Luwian agrees with Hittite is in having affixes that consistently attract word stress. As in Palaic, the Luwian corpus is fairly small, which limits the extent of the evidence for this phenomenon;<sup>9</sup> nevertheless, there are at least two Luwian affixes that clearly have this stress-attracting property: neuter abstract-noun forming *-a<sub>hi</sub>(t)-* and denominal verb-forming *-a(i)-*. Some productively derived forms containing these suffixes are given in (231) and (232) respectively:<sup>10</sup>

<sup>8</sup>The lack of evidence in Luwian for mobile stress in verbal inflection is somewhat surprising. Given that Luw. /a/ appears to lengthen under stress in both open and closed syllables (Melchert 1994: 247), one might expect to find at least a few examples of plene writing in the relatively robustly attested 3PL.NPST/IMPACT of radical verbs — e.g. *ašandu* ‘let them be’ (10x), *adandu* ‘let them eat’ (1x), *iyandu* ‘let them go’ (8x), *piyandu* ‘let them give’ (1x). However, plene writing of the 3PL ending is not attested except in CV roots, where the initial vowel of the ending coalesces with the final vowel of the root, e.g. *lāndu* ‘let them take’, *šāndu* ‘let them release’. This absence could indicate that mobile stress in verbal paradigms was replaced by fixed root stress. Possible support for this scenario comes from the fact that verbs which have generalized their “weak” (i.e. unstressed) stem allomorph in Luwian such as *tūwa-* ‘place’ also appear to have initial stress in plural forms that historically bore stressed on their inflectional endings, e.g. *dūwandu* [tú:wandu] ‘let them place’ (cf. Melchert 1994: 279).

<sup>9</sup>Luwian texts in cuneiform script are collected in Melchert 2001 (cf. Otten 1953; Starke 1985). Melchert’s (1993) lexicon provides full entries for all of the forms cited below.

<sup>10</sup>Glosses for (231): (a) ‘forcefulness’ (N.NOM/ACC.SG); (b) ‘femininity’ (N.NOM/ACC.SG); (c) ‘liveliness’ (N.ABL/INSTR.SG/PL); (d) ‘life’ (N.NOM/ACC.SG); (e) ‘status of a scapegoat’ (N.DAT/LOC.SG); (f) ‘favor’ (N.ABL/INSTR.SG/PL); (g) ‘manhood; virility’ (N.NOM/ACC.SG). Glosses for (232): (a) ‘display forcefulness’ (2SG.IMPACT); (b) ‘made an anointing (?)’; (c) ‘furnished a scapegoat’ (3PL.PST.ACT). Examples (231a–b), (231d), and (231g–h) show deletion of the word-final stop, which is regular in Luwian (Melchert 1994: 278). On the Luwian clitic particle =ša in (231b) and its historical development see Jasanoff (2010) with references to earlier scholarship. For the derivation of (231c), see Melchert (1983: 17) (contra Starke 1990: 163). See n. 2 above for discussion the final unstressed long vowel in (231e).

- (231) a. *annarumm(i)-* ‘forceful’ ⇒ *ānnarumāḫi* [-á:χi]  
 b. *ašrul(i)-* ‘female’ ⇒ *ašrulāḫi=ša* [-á:χi]  
 c. *ḫuitumar/n-* ‘life’ ⇒ *ḫuitumnāḫitati* [-á:χit-ati]  
 d. *ḫuitwāl(i)-* ‘living’ ⇒ *ḫūitwalāḫi=ša* [-á:χi]  
 e. *nakkušša/i-* ‘scapegoat’ ⇒ *nakkuššāḫitī* [-á:χit-i:]  
 f. *waššar* ‘favor’ ⇒ *waššarāḫitati* [-á:χit-ati]  
 g. *zita/i-* ‘man’ ⇒ *zidāḫi=ša* [-á:χi]
- (232) a. *annarumm(i)-* ‘forceful’ ⇒ *annarumāi* [-á:y]  
 b. *ikkuwar/n-* ‘anointing’ ⇒ *īkkunāunta* [-á:-wnta]  
 c. *nakkušša/i-* ‘scapegoat’ ⇒ *nakkuššāunta* [-á:-wnta]

Two points support the suffixal stress pattern assumed in (231–232). First, the (initial) vowel of the suffix is in every case long, since it is spelled plene. These long vowels can be explained straightforwardly by lengthening under stress, for which there is clear historical evidence in Luwian (Melchert 1994: 261–5).<sup>11</sup> This analysis is recommended, moreover, by the “double plene” spelling observed in the derived form in (231a) and (232b); the fact that these word contains two surface long vowels — one in the base and one in the suffix — is naturally explained by the same base-derivative length transfer effect that is regularly observed in Hittite derivation when word stress shifts from the base to the derivational suffix (see §3.2 and §4.4.1.3 above).<sup>12</sup>

Having established that the words in (231–232) have suffixal stress, the case for analyzing *-aḫi(t)-* and *-a(i)-* as stress-attracting is straightforward. Stress surfaces on these suffixes irrespective of their position within the word — for instance, the initial stressed/long vowel of the suffix *-aḫi(t)-* may be in the second, third, or fourth syllable from the word’s left edge, as in (231g), (231b), and (231a) respectively, or in the second, third, or fourth syllable from its right edge, as in (231g), (231e), and (231f). This type of distribution suggests that these suffixes are inherently stress-attracting, i.e. accented /-áχit-/ and /-a(i)-/, and more generally, that word stress in Luwian is — as in Hittite (§4.2.2) — free, unbounded, morphology-dependent and accent-conditioned.

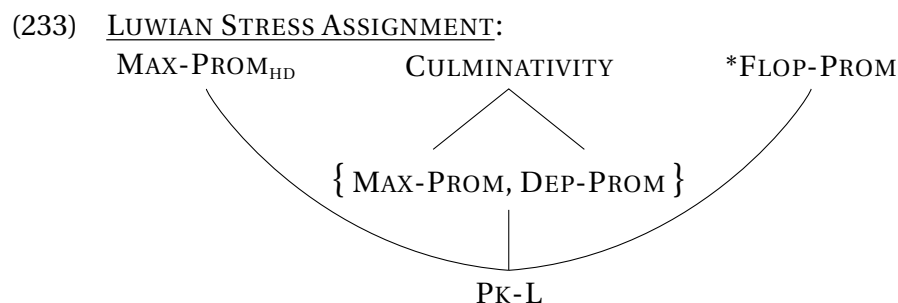
Finally, there is some evidence to suggest that *-aḫi(t)-* and *-a(i)-* are not just accented but also dominant. First, on comparative grounds, it is likely significant that only words containing dominant derivational suffixes in Hittite show multiple plene spellings of the kind seen in

<sup>11</sup>Since Luwian seems to allow unstressed surface long vowels under conditions in which they are not permitted in Hittite (cf. n. 2), it is somewhat more difficult for Luwian than for Hittite to exclude an alternative analysis whereby these suffixes contain underlying long vowels that do not attract stress. Still, economy recommends explaining the similar Hittite and Luwian facts in the same way.

<sup>12</sup>The nominal bases of (231a) and (232b) are not attested with plene writing, but since they are not well attested (4x, 1x respectively), its absence need not be significant. With respect to (231a), moreover, plene writing does occur in the noun *ānnar(i)-* ‘forcefulness; virility’, which is the derivational base of the adjective *annarumm(i)-* (cf. Melchert 1993: 14–15); the lack of plene writing in the adjective is thus still more likely to be accidental (i.e. *ānnarumm(i)-\**).

(231a) and (232b) (cf. §4.4.1.3). Yet there is also further concrete evidence for *-aḫi(t)-*. Unlike most of the bases in (231–232), whose accentual properties cannot be determined, the adjective *ḫuitwāl(i)-* ‘living’ in (231d) probably bears a lexical accent. This adjective shows plene spelling of the peninitial syllable, e.g. *ḫuitwālīš* ‘living.ANIM.NOM.SG’, which likely indicates that this vowel is long/stressed, i.e. [χ<sup>w</sup>itwá:l-is].<sup>13</sup> If it is assumed that Luwian — just as Hittite and Palaic — maintains the BAP from PA, this non-initial stress pattern must be due to a lexical accent, i.e. /χ<sup>w</sup>itwá:l(i)/. A further consequence of this assumption is that the suffix *-aḫit-* must be dominant, since in the derived form in (231d) it attracts stress in preference to the lexical accent on the stem to its left, thus “overriding” the BAP.


Under this analysis, accented derivational suffixes in Luwian are dominant, which is directly parallel to what was observed in Hittite. The accentual behavior of these suffixes is thus similarly amenable to analysis in terms of HEADFAITH (Revithiadou 1999; cf. §1.1.3.3). Specifically, this behavior emerges if Luwian shares with Hittite the constraint ranking in (233) (cf. (217) above) in which MAX-PROM<sub>HD</sub> is top-ranked:



MAX-PROM<sub>HD</sub>, which requires faithfulness to the lexical accent of the word’s morphological head, has the effect of privileging the accent of class-changing derivational suffixes like *-aḫi(t)-* and *-a(i)-* over those of other morphemes, since *-aḫi(t)-* and *-a(i)-* have head status in examples like (231–232). This effect is illustrated in (234), where the crucial example from (231d) above is explicitly derived:<sup>14</sup>

(234) a. /χ<sup>w</sup>itwá:l(i) - áχi - ø/ → *ḫūitwalāḫi=ša* [χ<sup>w</sup>itwá:lá:χi=sa] ‘life’ (N.NOM/ACC.SG)

b.

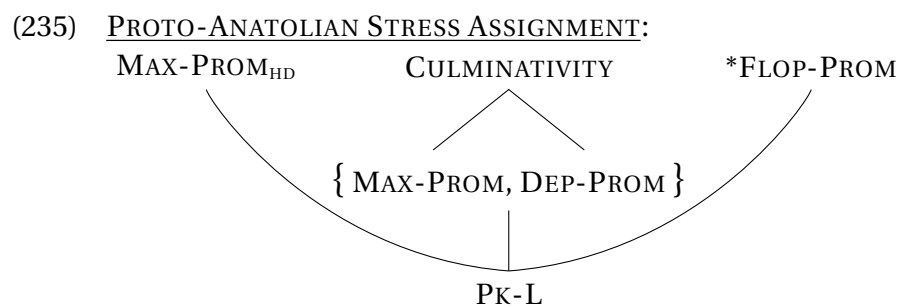
/χ <sup>w</sup> itwá:l(i) - áχi - ø/	CULM	MAX-PROM <sub>HD</sub>	MAX-PROM	PK-L
a. χ <sup>w</sup> itwá:lá:χi	*!			***
b. χ <sup>w</sup> itwá:laxi		*!	*	*
c.  χ <sup>w</sup> itwá:lá:χi			*	**
d. χ <sup>w</sup> ítwá:laxi		*!	**	

<sup>13</sup>This long(/stressed) vowel is also (likely) attested in the related adjective *ḫuitwāli(ya)-* ‘of a living person’, e.g. [*ḫu*]itwālīš (ANIM.NOM.SG), *ḫūitwāliyan* (N.NOM/ACC.SG).

<sup>14</sup>For simplicity, the accented vowel of the base stem in (234) is given as long in the input; as in Hittite, however, I assume that this long vowel is in fact derived by cyclic vowel lengthening or by output-output faithfulness constraints (cf. Ch. 4 n. 108).

In the tableau in (234b), undominated CULMINATIVITY forces deletion of a lexical accent, as in candidates (b) and (c). Of these, (b) better satisfies the general preference for left edge stress than (c) but is excluded by its violation of MAX-PROM<sub>HD</sub>, thus leaving (c) to emerge as the winner.

Because there is no independent evidence in Luwian for the BAP, the analysis in (234b) is necessarily uncertain. However, the general tendency for productive derivational suffixes in Luwian to attract stress suggests that morphological headedness plays a role in Luwian stress assignment, and the example in (234b) is at least compatible with the constraint ranking that was established for Hittite in Chapter 4. The simplest explanation for these facts is that both Luwian and Hittite have the constraint ranking in (233), and that this commonality is due to inheritance from PA. I therefore propose that PA stress assignment was determined by the constraint ranking in (235):



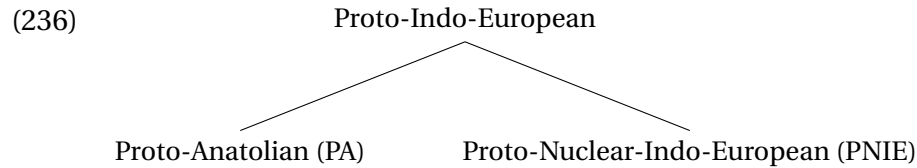
It bears repeating that (235) is just the BAP constraint ranking augmented with top-ranked MAX-PROM<sub>HD</sub>. The BAP component has strong empirical support from both Palaic and Hittite (§5.2.1), while MAX-PROM<sub>HD</sub> — in all likelihood reconstructible on the basis of Hittite alone — is likely also necessary to account for the Luwian evidence.

### 5.3 Reconstructing PIE stress assignment

Having reconstructed (235) for PA, I turn now to the deeper prehistory of its word-prosodic system. This section is concerned with the synchronic operation of the PIE word-prosodic system, the reconstruction of which is directly informed by the Anatolian evidence for stress assignment. In this respect, §5.3.1 contends that the BAP is reconstructible for PIE on the basis of systemic convergence between Anatolian and the NIE languages. Comparative morphological reconstruction under the BAP constraint ranking is discussed in §5.3.2, which focuses on the PIE category ancestral to Anatolian radical *mi*-verbs and shows that its stress patterns can be derived from the interaction of the accentual properties of reconstructed morphemes and the BAP. §5.3.3 turns to the nominal system, arguing that all nominal intraparadigmatic stress mobility in Hittite and PIE is consistent with the predictions of the BAP. Finally, §5.3.4 treats accentual dominance and the role of morphological headedness in the PIE stress system, where the reconstruction is problematized by divergences between Anatolian and the NIE languages.

### 5.3.1 PIE stress assignment & the BAP

As with other aspects of PIE grammar, reconstruction of the PIE stress system depends on comparison of the NIE and Anatolian languages, whose common ancestors — PNIE and PA respectively — stand in a sisterhood relationship as the immediate daughters of PIE; this relationship is represented in (236):<sup>15</sup>



When agreement cannot be established between PNIE and PA with respect to a linguistic feature, the reconstruction of this feature for PIE is necessarily called into question, since its presence or absence may reflect an innovation along either branch.<sup>16</sup> Yet when (non-trivial) agreement can be established between PNIE and PA, by far the most likely hypothesis is that this shared feature is due to common inheritance from PIE.

One such shared feature is the BAP. In §4.3, I demonstrated that this principle was operative in Hittite stress assignment, and in §5.2.1, identified evidence in Palaic that supports its reconstruction for PA. Similarly, Kiparsky and Halle (1977) reconstruct the BAP for PNIE, having shown that it is synchronically operative in Vedic Sanskrit,<sup>17</sup> and pointed to evidence in Ancient Greek and Balto-Slavic that is indicative of its prehistoric operation (cf. Kiparsky 1982d, 1984, 2010).<sup>18</sup> The convergence between PA and PNIE strongly argues that the BAP — or equivalently, the constraint ranking in (46) — was also operative in PIE itself:

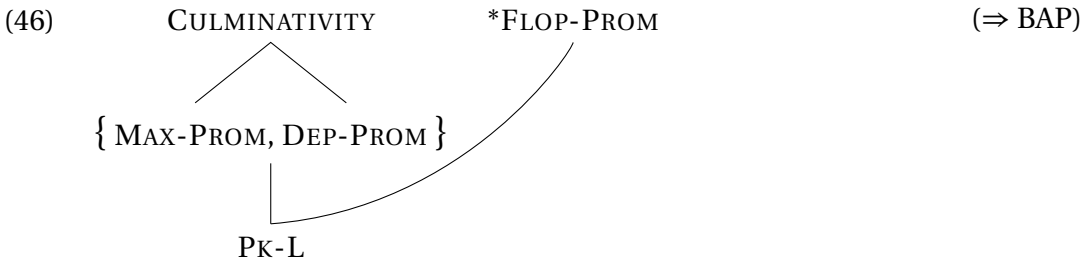
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<sup>15</sup>See §1.3.1 above for fuller discussion of the relationship between Anatolian and the NIE languages (and specifically, (56) for a fuller family tree).

<sup>16</sup>Well-known features in which the Anatolian languages diverge from PNIE include, in the nominal system, grammatical number (singular/plural vs. singular/dual/plural) and gender (animate/inimate vs. masculine/feminine/neuter). In the verbal system, moreover, Anatolian lacks many fundamental PNIE verbal formations, including the \*s-aorist, the optative, and (perhaps above all) the perfect; see Lundquist and Yates (to appear: §2.1, §4) for an overview of these morphological categories and an assessment of their PIE status.

<sup>17</sup>Some evidence for the BAP in Vedic nominal inflection was discussed already in §1.1.3.2; see §5.3.2.1 for additional evidence from the verbal system.

<sup>18</sup>The evidence for the BAP in Ancient Greek and Balto-Slavic is less clear than in Vedic due to various stress-related innovations — for instance, the development of the “Law of Limitation” in Greek (see Probert 2012), which restricts the position of the word stress to the final three syllables of the word, or in Slavic, the incorporation of clitics into the stress domain (see, e.g., Olander 2009: 156–7 with references). However, it is very likely that Greek “recessive accentuation” — demonstrably the default stress pattern in the language (Probert 2006: 128–44) — continues the PIE leftmost default in modified form, i.e. leftmost within the stress domain; this point is supported by Lundquist’s (2016, 2017: 61–110) recent demonstration that Vedic *bahuvrīhi*-compounds, which are assigned stress by the BAP, stand in correspondence with “recessively accented” Greek compounds. Similarly, the Slavic rule whereby initial proclitics are stressed in words containing no inherently accented morphemes (ŠAXMATOV’S LAW) may reflect the BAP applying over a phonological domain above the word level (see Kiparsky to appear with references).



The BAP is, of course, just one aspect of the PIE stress system. On the one hand, it does not constitute even the whole of this system’s phonological component. As will become clear in §5.3.4 below, the NIE languages parallel Hittite in showing accentual dominance effects in derivation, which are thus likely reconstructible for PIE; just as in Hittite (cf. §4.4), accounting for these dominance effects requires revising the constraint ranking in (46), the predictions of which are thus limited to words in which accentual dominance is irrelevant. On the other hand, there is the morphological component of the PIE stress system — i.e. the reconstructible roots and affixes and their lexically specified accentual properties, which when input to the PIE constraint ranking yield PIE surface word stress patterns. The latter aspect of this system is addressed in the next section.

### 5.3.2 Reconstructing the PIE accentual lexicon

This section is concerned with how the accentual properties of PIE roots and affixes can be reconstructed in tandem with the BAP. I illustrate here with a simple case, PIE *\*m*-conjugation root presents, the category ancestral to Hittite radical *mi*-verbs. §5.3.2.1 treats the historical reflexes of this category in Vedic Sanskrit, showing how the regular alternating stress pattern — and marginal fixed stress pattern — associated with these Vedic verbs can be derived via the interaction of the BAP and the accentual properties of their constituent roots and affixes. §5.3.2.2 demonstrates that the lexically specified accentual properties of PIE roots and affixes can be reconstructed on the basis of comparison between Vedic and Hittite, and that when these morphemes are input to the BAP constraint ranking in (46), the PIE grammar outputs surface forms that develop directly into the forms attested in the IE languages. Finally, §5.3.2.3 explores a broader question that arises from morphological reconstruction in §5.3.2.2 — viz., whether PIE had accented verbal roots.

#### 5.3.2.1 Vedic Sanskrit “Class II” presents & the BAP

PIE *\*m*-conjugation root presents are continued in both Hittite and Vedic Sanskrit — in the former, as radical *mi*-verbs, and in the latter, as “Class II presents” (in terms of the Sanskrit grammarians). These PIE verbs lack an overt derivational suffix; rather, the verbal root is directly followed by inflectional endings (i.e. R + E) that mark person, number, and tense and that have reflexes in Hittite and Vedic reflexes which are in most cases transparently cognate. Besides structural identity, there are also word equations that hold across these languages, examples of



which are given in (237):<sup>19</sup>

(237)	VEDIC	HITTITE			PIE	
	<i>ád-mi</i> <sup>+</sup>	<i>ētmi</i>	[é:t-mi]	<	* <i>h<sub>1</sub>éd-mi</i>	‘I eat’
	<i>ás-ti</i>	<i>ēšzi</i>	[é:s-t̂si]	<	* <i>h<sub>1</sub>és-ti</i>	‘is’
	<i>hán-ti</i>	<i>kuēnzi</i>	[k <sup>w</sup> é:n-t̂si]	<	* <i>g<sup>wh</sup>én-ti</i>	‘smashes; kills’
	<i>sás-ti</i>	<i>šēšzi</i>	[sé:s-t̂si]	<	* <i>sés-ti</i>	‘sleeps’

Descriptively, the predominant stress pattern in the present active paradigm of Vedic Class II presents is the same as in the non-past active paradigm of Hittite radical *mi*-verbs (see §4.3.2.1): stress regularly surfaces on the verbal root in singular forms and on inflectional endings in plural forms. Attested forms for the Vedic verbs in (237) plus *e/i-* ‘go’ (< PIE \**h<sub>1</sub>ey-*) and *vaś/uś-* ‘wish; want’ (< PIE \**wek-*) are provided in (238):<sup>20</sup>

(238)		‘eat’	‘be’	‘go’	‘want’	‘sleep’	‘strike’
		√ <i>ad-</i>	√ <i>as/s-</i>	√ <i>e/i-</i>	√ <i>vaś/uś-</i>	√ <i>sas-</i>	√ <i>han/ghn-</i>
SINGULAR	1ST	<i>ád-mi</i> <sup>+</sup>	<i>ás-mi</i>	<i>é-mi</i> <sup>+</sup>	–	–	–
	2ND	<i>át-si</i>	<i>ási</i>	<i>é-ši</i> <sup>+</sup>	–	–	<i>hán-si</i>
	3RD	<i>át-ti</i>	<i>ás-ti</i>	<i>é-ti</i>	<i>vás-ti</i>	<i>sás-ti</i>	<i>hán-ti</i>
PLURAL	1ST	–	<i>s-más(i)</i>	<i>i-mási</i>	<i>uś-mási</i>	–	–
	2ND	–	<i>s-thá(s)</i>	–	–	–	<i>ha-thá(s)</i>
	3RD	<i>ad-ánti</i> <sup>+</sup>	<i>s-ánti</i>	<i>y-ánti</i>	<i>uś-ánti</i> <sup>+</sup>	<i>sas-ánti</i> *	<i>ghn-ánti</i>

The Vedic stress alternations depicted in (238) submit to essentially the same analysis in Hittite

<sup>19</sup>Unless otherwise indicated, all Vedic forms are attested in the *Rigveda* (RV) with the position of stress marked; the symbol “+” marks forms that occur only in post-RVic texts. The reconstructions in (237) are standardly accepted; see, e.g., *LIV*<sup>2</sup>.

<sup>20</sup>Three points about Vedic phonology and orthography should be noted: (i) in this dissertation, I present all Vedic forms in their standard transliteration, including in underlying forms; (ii) Ved. *v* and *u* are allophones, differing only in syllabicity; (iii) Ved. *e* and *o* are the surface reflexes of the diphthongs /ai/ and /au/, which are realized as *i* and *u* when /a/ is deleted. In (238), then, the root alternation observed in ‘go’ between stressed *é-* and unstressed *i-* is thus entirely parallel to the alternation in ‘be’ between *ás-* and *s-*. Ved. *sas-ánti*\* ‘sleep’ is unattested as such, but its stress pattern (and root vocalism; see (245) below) is securely inferred from the corresponding third plural imperative form *sas-ántu* ‘let them sleep’ (RV I.29.4a, VII.55.5c); as in Anatolian (see Ch. 4 n. 29 for Hittite), the singular and plural third person imperative endings in Vedic have the same accentual properties as the indicative present(/non-past) endings (thus, e.g., *s-ántu* ‘let them be’ is attested (RV IV.10.8b) beside *s-ánti* ‘are’ in (238).

(cf. §4.3.4.1). The components of this analysis are thus: (i) the BAP; (ii) an underlying contrast between unaccented singular endings and accented plural endings; and (iii) unaccented verbal roots. The endings are listed with their accentual properties in (239) and the verbal roots in (240):

(239)

	SINGULAR	PLURAL
1ST	/-mi/	/-más(i)/
2ND	/-si/	/-thá(s)/
3RD	/-ti/	/-ánti/

(240)

ROOT	GLOSS	ROOT	GLOSS
/ad/	‘eat’	/vaś/	‘wish; want’
/as/	‘be’	/sas/	‘sleep’
/ai/	‘go’	/ghan/	‘smash; kill’

Provided with the inputs in (239–240), the BAP constraint ranking in (46) correctly predicts the surface stress patterns in (238). The derivations in (241–242) explicitly illustrate these predictions for the singular and plural forms of the verb /sas/ ‘sleep’:

(241) a. Ved. /sas - ti/ → Ved. *sás-ti* ‘sleeps’ (3SG.PRS.IND.ACT)

b.

/sas - ti/	CULM	MAX-PROM	DEP-PROM	PK-L
a. <i>sasti</i>	*!			
b. <i>sásti</i>			*	
c. <i>sastí</i>			*	*!

(242) a. Ved. /sas - ánti/ → Ved. *sas-ánti* ‘sleep’ (3PL.PRS.IND.ACT)

b.

/sas - ánti/	CULM	MAX-PROM	PK-L
a. <i>sas-anti</i>	*!	*	
b. <i>sas-ánti</i>			*
c. <i>sás-ati</i>		*!	

The derivations in (241–242) are familiar from the analysis of Hittite and Palaic mobile radical verbs developed in §4.3.4.2 and §5.2.1 above. (241b) shows the emergence of default leftmost stress in the absence of accented morphemes; the faithful candidate (a) is excluded by CULMINATIVITY, leaving candidate (c) to be selected as the winner because it best satisfies PK-L.

Meanwhile, (242b) shows that underlying lexical accents are preferentially realized; despite incurring a violation of PK-L, the faithful candidate (a) is preferred to candidate (c) because the latter violates higher-ranked MAX-PROM.<sup>21</sup>

Among Vedic Class II presents, however, there is a synchronic prosodic split: beside mobile verbs like (238), there is at least one verb with fixed root stress, *takṣ-* ‘fashion’.<sup>22</sup> This stress pattern is can be observed in (243):<sup>23</sup>

- (243) 3SG *tāṣ-ti\** ‘fashions’ (3SG.PRS.IND.ACT)  
 3PL *tákṣ-ati* ‘fashion’ (3PL.PRS.IND.ACT)

Just as in Hittite (cf. §4.3.4.3 above), the fixed root stress pattern in (243) falls out directly from the BAP if the root in question is lexically accented, i.e. /tákṣ/.<sup>24</sup> The 3PL form in (243) — which contrasts by its root stress with the majority of Vedic Class II presents — is derived in (244) below:

- (244) a. Ved. /tákṣ - ánti/ → Ved. *tákṣ-ati* ‘fashion’ (3PL.PRS.IND.ACT)  
 b.

/tákṣ - ánti/	CULM	MAX-PROM	PK-L
a. <i>tákṣ-ánti</i>	*!		*
b. <i>tákṣ-ati</i>		*	
c. <i>takṣ-ánti</i>		*	*!

In (244b), satisfying CULMINATIVITY requires deletion of a lexical accent; PK-L then determines the winner, selecting candidate (b) with initial stress.

The stress (non-)alternations observed in Vedic Class II presents thus emerge from the interaction of the BAP with the lexically specified accentual properties of these verbs’ constituent

<sup>21</sup>Note that some of the Vedic verbal roots in (240) exhibit deletion of the root vowel in the 3rd plural, e.g. /ghan - ánti/ → *ghn-ánti* ‘smash; kill’ (<sup>x</sup>*han-ánti*). Deletion in this case has the effect of improving the harmony of the winning candidate, since it allows both MAX-PROM and PK-L to be satisfied simultaneously; however, it is clear that PK-L does not itself drive pretonic vowel deletion in Vedic, since there are other cases of deletion — e.g. /bhar - tí-s/ → *bhr-tí-s* ‘bearing’ (F.NOM.SG) (<sup>x</sup>*bhar-tí-s*) — in which pretonic deletion occurs even when the result does not better satisfy PK-L.

<sup>22</sup>The root *dāś-* ‘worship’ must also have originally formed a Class II present with fixed root stress; 3SG *dāṣ-ti* ‘worships’ testifies to its original Class II membership, while the root stress of the participle *dās-at-as* ‘worshipping’ (PTCP.M.NOM.PL) is a feature of roots that exhibit fixed stress paradigms — compare, for instance, fixed Ved. *tákṣ-at-i* ‘fashioning’ (PTCP-F.NOM.SG) vs. mobile *sas-at-ím* ‘sleeping’ (PTCP-F.ACC.SG).

<sup>23</sup>The 3SG form *tāṣ-ti* in (243) is not attested with stress marked, but since 3SG.PRS.IND.ACT forms are never stressed on the ending, it must have been stressed on the root. The 3PL form exhibits an ending *-ati*, which is a reduced allomorph of the 3PL.PRS.IND.ACT ending found in immediately post-tonic position. Historically, this reduced allomorph arose via syncope of /e/ and vocalization of the syllabic nasal, i.e. \*/-énti/ → \*[-ṛti] > Ved. *-ati*; see Kiparsky’s (to appear) discussion of “post-ictic syncope.”

<sup>24</sup>Kiparsky (to appear) assumes that the root also contains an underlying long vowel, i.e. /tákṣ/, which shortens before the accented 3PL ending. Alternatively, the long vowel in 3SG *tāṣ-ti* may derive synchronically from compensatory lengthening; see Sandell (2014) for discussion.

roots and affixes. With this basic analysis of the Vedic data in place, it is possible to turn to comparative reconstruction in §5.3.1.

### 5.3.2.2 PIE root presents & the BAP

The descendants of PIE *\*m*-conjugation root presents have now been analyzed in both Hittite and Vedic Sanskrit. It has long been established that cognate verbs belonging to the relevant categories — Hittite radical *mi*-verbs and Sanskrit Class II presents — show identical alternating surface stress patterns, which is thus standardly reconstructed for the proto-language, e.g. (245):<sup>25</sup>

(245)	VEDIC	HITTITE		PIE
	<i>sás-ti</i>	<i>šēšzi</i> [sé:s-t̂si]	<	*[sés-ti] ‘sleeps’ (3SG.PRS.IND.ACT)
	<i>sas-ánti*</i>	<i>ššaŋzi</i> [sas-ánt̂si]	<	*[səs-énti] ‘sleep’ (3PL.PRS.IND.ACT)


However, when the analysis of Vedic Class II presents laid out in §5.3.2.1 immediately above is compared to the analysis of Hittite radical *mi*-verbs previously developed in §4.3.4, it becomes clear that the surface identity in (245) is the result of convergence at a deeper level — i.e., in the accentual properties of cognate morphemes and the morphophonological principles by which stress is determined. Specifically, both languages have the BAP constraint ranking, which interacts with morphemes with the same accentual properties in each language, i.e. (246):

(246)	VEDIC	HITTITE	
	/sas/	/ses/	‘sleep’
	/-ti/	/-t̂si/	(3SG.PRS/NPST.ACT)
	/-ánti/	/-ánt̂si/	(3SG.PRS/NPST.ACT)


As a consequence, the corresponding Hittite and Vedic forms in (245) are generated in exactly the same way. The Hittite and Vedic tableaux for the 3SG form are repeated in (179b) and (241b) respectively:

<sup>25</sup>In (245), the PIE form is traditionally cited as *\*s<sub>e</sub>s-énti* with the subscripted vowel in the root representing “schwa secundum” (see Mayrhofer 1986: 175–7). The exact nature of “schwa secundum” in PIE is controversial. Comparison with (e.g.) PIE *\*h<sub>1</sub>s-énti* ‘are’ (> Ved. *s-ánti*) suggests that deletion of *\*/e/* is preferred in this morphological environment but was blocked for phonotactic reasons; the reduced vowel *\*[ə]* (> Hitt. *a*, Skt. *a*) assumed here is thus plausible (cf. Byrd 2015: 9).

(179b)


/ses - t̄si/	CULM	MAX-PROM	DEP-PROM	PK-L
a. ses-t̄si	*!			
b.  sé:s-t̄si			*	
c. sas-t̄sí:			*	*!

(241b)


/sas - ti/	CULM	MAX-PROM	DEP-PROM	PK-L
a. sas-ti	*!			
b.  sás-ti			*	
c. sas-tí			*	*!

The tableaux for the 3PL forms are also identical — compare Hittite (180b) with Vedic (242b):

(180b)

/ses - ántsi/	CULM	MAX-PROM	PK-L
a. ses-ántsi	*!	*	
b.  sas-ántsi			*
c. sé:s-ántsi		*!	

(242b)

/sas - ánti/	CULM	MAX-PROM	PK-L
a. sas-anti	*!	*	
b.  sas-ánti			*
c. sás-ati		*!	

The simplest explanation for the exact agreement observed in the tableaux above is that Hittite and Vedic faithfully preserve the relevant aspects of the PIE stress system. Morphologically, one inherited feature is therefore an underlying accentual contrast between unaccented singular verbal inflectional endings and accented plural endings, i.e.(247):<sup>26</sup>

(247)

	SINGULAR			PLURAL		
	VEDIC	HITTITE	PIE	VEDIC	HITTITE	PIE
1ST	/-mi/	/-mi/	*-/mi/	/-más(i)/	/-wéni/	*-/mé(-)/
2ND	/-si/	/-si/	*-/si/	/-thá/	/-tréni/	*-/té(-)/
3RD	/-ti/	/-t̄si/	*-/ti/	/-ánti/	/-ántsi/	*-/énti/

<sup>26</sup>On the segmental reconstruction of the PIE endings in (247), see Lundquist and Yates (to appear: §4.2.5); a following dash (-) indicates the possibility of an additional segmental material, the reconstruction of which is problematized by disagreement across the ancient IE languages.


In addition, Hittite and Vedic inherited the unaccented verbal roots in (248):

(248)	VEDIC	HITTITE	PIE	
	/ad/	/et/	*/h <sub>1</sub> ed/	‘eat’
	/as/	/es/	*/h <sub>1</sub> es/	‘be’
	/ghan/	/k <sup>w</sup> en/	*/g <sup>wh</sup> en/	‘smash; kill’
	/sas/	/ses/	*/ses/	‘sleep’

And finally, Hittite and Vedic inherited from PIE the BAP constraint ranking. Provided with the inputs in (247–248), this constraint ranking properly generates PIE *m*-conjugation root presents with the mobile stress pattern observed in Hittite and Vedic. (249–250) illustrate the predictions of this analysis for the third person singular and plural present indicative forms of PIE \*/ses/ ‘sleep’:


(249) a. \*/ses - ti/ → \*[sés-ti] ‘sleeps’ (3SG.PRS.IND.ACT) > Hitt. *šēšzi* [sé:s-t̂si]  
 Ved. *sás-ti*

b.

/ses - ti/	CULM	MAX-PROM	DEP-PROM	PK-L
a. ses-ti	*!			
b.  sés-ti			*	
c. səs-tí			*	*!

(250) a. \*/ses - énti/ → \*[səsénti] ‘sleep’ (3PL.PRS.IND.ACT) > Hitt. *šāšanzi* [sas-ánt̂si]  
 Ved. *sas-ánti*

b.

/ses - énti/	CULM	MAX-PROM	PK-L
a. ses-enti	*!	*	
b.  səs-énti			*
c. sés-nti		*!	

The derivations in (249–250) mirror what was observed already in Hittite and Vedic, which is of course expected given that these languages maintain the PIE system intact. Note too, that at a purely surface level, their output forms develop via regular sound change into the attested Hittite and Vedic forms, as shown in (249a) and (250a). That standard IE handbooks reconstruct PIE surface forms of exactly this kind (*LIV*<sup>2</sup>, 536–7) is a positive result and a useful check on the synchronically-oriented method employed here, whose novel features are that it not just describes but predicts this pattern, and derives from it general properties of the morphology and phonology of PIE. Two of these general properties are further explored in §5.3.2.3 and §5.3.3 below.

### 5.3.2.3 On the accentedness of PIE verbal roots

In §5.3.2.2, it was demonstrated that, once the BAP constraint ranking is reconstructed for PIE, it is also possible to reconstruct the properties of a number of verbal roots. Specifically, it was shown that cognate roots in Vedic Sanskrit which form a mobile root present in former and a radical *mi*-verb in the latter were themselves lexically unaccented in PIE; the roots whose accentual properties are securely reconstructible on this basis are repeated below in (248):

(248)	VEDIC	HITTITE	PIE	
	/ad/	/et/	*/h <sub>1</sub> ed/	‘eat’
	/as/	/es/	*/h <sub>1</sub> es/	‘be’
	/ghan/	/k <sup>w</sup> en/	*/g <sup>wh</sup> en/	‘smash; kill’
	/sas/	/ses/	*/ses/	‘sleep’

More generally, under this approach, evidence for a mobile *\*m*-conjugation root present in the daughter languages also constitutes *prima facie* evidence that the root in question was unaccented in PIE. Direct evidence for mobility is generally limited to Hittite and Vedic, and in the absence of counter-evidence, an unaccented PIE root is plausibly reconstructed on the basis of a mobile radical *mi*-verb in the former or a mobile root present in the latter. Thus, for instance, on the basis of the Vedic mobile root present for the verb ‘go’ in (238), which alternates (e.g.) 1SG *é-mi* vs. 1PL *i-mási*, this root is reconstructible as \*/ei/ ‘go’. In this case, moreover, the reconstruction is bolstered by ablaut alternations in Ancient Greek (cf. *eî-mi* vs. *í-men*), which clearly indicate erstwhile mobile stress (< PIE *\*h<sub>1</sub>éy-mi* vs. *\*h<sub>1</sub>i-mé*).<sup>27</sup> Yet even without comparative support, the Hittite mobile radical *mi*-verb *epp-lapp* ‘take’ (cf. §4.3.2.1 above)—which alternates (e.g.) 1SG *ēpmi* ([é:pɪ-mi]) vs. 1PL *[a]ppuweni* ([ap:-wé:ni]) — is probably sufficient grounds to reconstruct an unaccented root PIE \*/h<sub>1</sub>ep/.

The existence of accented roots — and their associated fixed stress inflectional paradigms — in Hittite and Vedic raise the question of whether accented roots should also be reconstructed for PIE. The minority status of this type in each language suggests, at the very least, that accented roots in PIE were rare. Perhaps the strongest candidates for accented PIE roots are Hitt. /wék/ ‘demand’ and Ved. /táks/ ‘fashion’, which are synchronically accented in these languages, forming a fixed radical *mi*-verb and a fixed “Class II” present respectively. Significantly, these verbal forms are analyzed by *LIV*<sup>2</sup> as belonging historically to “Narten presents,” a type of PIE *\*m*-conjugation root present characterized by lengthened grade of the root in singular active forms and fixed root accent.<sup>28</sup> If the special phonological behavior of this type is

<sup>27</sup> In Ancient Greek, default stress (i.e. “recessive accentuation”; cf. §1.1.2.2) was generalized in (virtually) all finite verb forms. There is also evidence in other IE languages that indirectly supports a mobile root present for *\*h<sub>1</sub>ey-* ‘go’; see *LIV*<sup>2</sup> (232–3).

<sup>28</sup> Contra Kloekhorst (2008: 996–7), Hitt. *wek-* ‘demand’ cannot be derived from an ordinary PIE mobile root present. The invariant root-final singleton velar stop *-k-* ([k]) — in particular, in imperfectives containing the suffix *-ške-* (cf. Melchert 2014c: 255 n. 8) — must be explained by lenition (see Ch. 3 n. 51), which can only

due to the fact that they are formed from “Narten roots” (Schindler 1994; Jasanoff 2012; Villanueva Svensson 2012, *i.a.*), it may be the case that lexical accent was one property of these exceptional roots.

However, an alternative possibility — consistent with the arguments of Kümmel (1998) and Melchert (2014c) that “Narten presents” were a derived category in PIE — is that fixed root stress in “Narten presents” was due to the presence of an additional derivational morpheme (albeit one with no segmental content; see, e.g., Bye and Svenonius 2012), which introduced a lexical accent onto the root. This analysis would align “Narten presents” with thematic presents, *\*s*-aorists, and other verbal categories that show fixed stress, most of which contain an overt derivational morpheme that is plausibly analyzed as the source of the lexical accent. Furthermore, this analysis avoids a serious objection — viz., that there is direct counter-evidence to reconstructing the PIE congenitor of Hitt. /wek/ as an accented root in PIE. This evidence comes from Vedic, where the reflex of PIE *\*wek̂* is the unaccented root /vaś/ ‘wish; want’; this root forms a mobile root present (see (238) above), which thus alternates (e.g.) 3SG *vás-ti* vs. 1PL *uś-mási*. As noted above, having a mobile root present in Vedic is strong evidence that a verbal root was unaccented in PIE — in this case, that the PIE root was *\*/wek̂/*.

I therefore propose that the synchronic accentedness of Hitt. /wék/ ‘demand’ and Ved. /táks/ ‘fashion’ is due to a reanalysis of what were originally derived “Narten presents:” within the individual languages, the accent associated with this category was reanalyzed as a lexical feature of these verbal roots. This reanalysis was likely facilitated by two factors. The first is the loss of Narten derivation as a productive morphological process. This loss is potentially dateable to proto-language itself; the poverty of reconstructible examples suggest that “Narten presents” were already a marginal type in PIE. The other factor was the loss in each language of the root-based verbal formation that coexisted in PIE beside the derived “Narten present;” once the “Narten present” no longer coexisted with formally related (but functionally contrastive) verb forms, it was free to be reinterpreted as a root.

This proposal is supported, moreover, by the fact that Hittite has accented roots that more transparently result from reanalysis of derived formations. For instance, although some of the formal details are disputed, there is general agreement that Hitt. /páy/ ‘go’ (cf. §4.3.2.2) reflects a historical univertation of the unaccented PIE root *\*/h<sub>1</sub>ey/* ‘go’ (discussed above) and a particle that ultimately yields the accented Hittite prefix /pé/ (on which see §4.3.4.5).<sup>29</sup> The diachronic source of the verb’s synchronic accentedness is thus the accent originally associated with the ancestor of this prefix, which has been reanalyzed as a property of the root in Hittite.

Another likely candidate is Hitt. /sip:ánt-/ ‘libate’. Modifying a proposal of Forssman (1994), Melchert (2016a) contends that this Hittite verb ultimately reflects a PIE reduplicated *\*h<sub>2</sub>e*-conjugation aorist stem *\*/se-spónd-/* (thus Jasanoff to appear b);<sup>30</sup> like other *\*h<sub>2</sub>e*-conjugation

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be conditioned by the prehistoric *\*é̄* that is characteristic of the strong stem of a “Narten present” — i.e., Hitt. *wékzi* < PIE *\*wék̂-ti* (≠ *\*wék̂-ti*). The lenited stop in the Hittite plural paradigmatic forms also requires *\*é̄*, which suggests that the singular stem was analogically generalized already in PA.

<sup>29</sup>On the origin of this verb, see Kloekhorst (2008: 616–8) with references; for the phonological details, cf. Melchert (2015a: n. 7).

<sup>30</sup>On the phonological motivation for the deletion of the root-initial *\*s* in this reduplicated form see now Zukoff (2017a: §3.8.8, §5.8), who points to close analogues for the process in Sanskrit and Germanic. In my view, neither



aorists, the verb would have originally had \*ó-root vocalism in most paradigmatic cells (Jasanoff 2013; cf. Melchert 2015c).<sup>31</sup> I suggest that /sip:ánt/ is a relic of this stage: when stress mobility — synchronically, the dominant pattern in Hittite radical *hi*-verbs (cf. §4.3.2.1) — was analogically introduced into this category (cf. Melchert 2013a), this verb failed to undergo the change, likely because it was formally opaque (i.e., no longer transparently reduplicated and the only disyllabic stem in its category); it was thus reanalyzed as a root /sip:ánt/ by Hittite speakers, who preserved its (now irregular) inherited fixed root stress pattern by positing a lexical accent on this (peninitial) syllable.

A similar scenario may be explain the accentedness of /krá/ép/ ‘devour’ and /srá/ép/ ‘sip’. As discussed in §4.3.2.2, these verbs belong historically to a morphological category — \**h<sub>2</sub>e*-conjugation root presents with \*ó/é-root ablaut — that originally had fixed root stress. Most verbs in this verb eventually became mobile, but these verbs — for formal reasons discussed in detail by Melchert (2013a: 147–9) — did not undergo this change.<sup>32</sup> At this stage, the fixed root stress pattern that was previously a property of the category as a whole was reassigned to these verbs in the form of a lexical accent.

The Hittite examples above thus show a clear trajectory: an inherited unaccented root that received stress on the surface due to the presence of some other morpheme(s) with which it cooccurred in word-formation; when the relevant word-formation process was lost — or in the case of Hitt. /páy/ ‘go’, the two morphemes irrevocably fused — the surface stress pattern was reinterpreted as a property of the root rather than the word-formation process. Having established this trajectory, I return at last to the question raised above: did PIE have accented (verbal) roots? While it is of course impossible to prove the non-existence of a type, the data considered here suggest that, at least in the verbal system, accented roots were not a feature of PIE.<sup>33</sup> Rather, the stress patterns associated with various verbal categories — both derived (e.g. thematic presents, \**s*-aorists) and non-derived (e.g. *mi*- and *hi*-conjugation root aorists) were in PIE purely a function of the inflectional and derivational morphemes by which are they instantiated. If this proposal is correct, the next step would be to attempt to determine the accentual properties of these affixes which, when combined, would correctly yield attested patterns of word stress in the daughter languages, and in turn, in PIE. I leave this line of inquiry to future research.<sup>34</sup>

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the formal objections to Melchert’s (2016a) derivation raised by Yakubovich (2016) nor the alternative proposal of Yakubovich and Kassian (2002) are compelling.

<sup>31</sup>In this detail, I depart from Melchert (2016a), who reconstructs plural forms with stressed inflectional endings.

<sup>32</sup>For other accented *hi*-verb roots in Hittite, it is unclear whether their accentedness is because of the general tendency observed in the course of the Hittite period to generalize stressed stem allomorphs (observed, especially, in *a/e*-ablauting *mi*-verbs; see Ch. 4 n. 6) or because they — like ‘libate’, ‘devour’ and ‘sip’ — were “left behind” when stress mobility was analogically introduced into other verbs in their category. Further research may shed light on the issue.

<sup>33</sup>Per §5.3.3, however, I assume that accented nominal roots — such as \*/g<sup>u</sup>ó/éw/ ‘cow’ in (252) below, and perhaps others belonging to the “basic stock” of PIE (see Lundquist and Yates to appear: §2.4.2–3), e.g. \*/h<sub>2</sub>óéwi/ ‘sheep’ (> CLuw. *hāwī-*, Ved. NOM.SG *ávis*, GEN.SG *ávy-aṣ*) — are reconstructible for PIE itself.

<sup>34</sup>One hypothesis that I would register here is that (at least) the past tense singular endings of the PIE \**h<sub>2</sub>e*-conjugation were originally preaccenting. This proposal would explain two facts: (i) the PIE perfect has root stress in singular forms (e.g. Ved. *ja-gám-a* ‘I went’ < PIE \*g<sup>u</sup>e-g<sup>u</sup>óm-*h<sub>2</sub>e*), a non-default (i.e. not leftmost) pat-

### 5.3.3 PIE nominal inflectional & the BAP

Reconstructing the BAP ranking for PIE makes strong, empirically testable predictions about possible synchronic stress patterns in PIE inflectional paradigms, not only in the verbal system that provided the basis for its reconstruction, but also in the nominal system. The prediction made by this reconstruction is that within PIE nominal and verbal inflectional paradigms all stress patterns can be derived from the interaction of the BAP and the accentual properties of the stem and inflectional endings — in short, that all synchronic inflectional mobility in PIE was BAP-compliant. In this section, I argue that this prediction is borne out, both within Anatolian and at the directly reconstructible stage of PIE.

The evidence for word stress in the nominal system has not been a focus of this dissertation, principally because direct evidence for synchronic mobility in Anatolian nominal paradigms is fairly limited: alternating stress is attested in relatively few lexical items, most of which belong to the most archaic stratum of the lexicon, and these often present an internally conflicting picture — i.e., there is evidence for more than one stress pattern for a single word form. For instance, attested beside Hittite ANIM.ACC.PL *pātu[š]* ‘feet’ ([pá:t-os]) are two genitive plural forms, one with plene spelling of the final syllable (*padān*) and one with plene spelling of the initial syllable (*pātan*); meanwhile, N.NOM/ACC.SG *ēšhar* ‘blood’ ([é:sχar]) has at least three attested genitive singular forms — *išhanāš*, *ēšhanas*, and *išhānaš* — each with plene writing of a different syllable. In these cases, an original stress-alternating pattern can be recovered on the basis of textual chronology and comparative reconstruction: *padān* ([pat-á:n]) and *išhanāš* ([isχ-n-á:s]) are attested in OS scripts, while the other forms are attested only in post-OH; moreover, the former has exact cognates in Ved. *pad-ám* and Gk. *pod-ôn*, and the latter in Ved. *as-n-ás*.<sup>35</sup> Yet the situation is not always so clear, and if one approaches the data with aprioristic assumptions about what stress (or still more dangerously, ablaut) patterns existed in the proto-language, it is often possible to find attested forms that validate these assumptions.

The poverty of evidence for word stress in Hittite nominal inflection — and the non-uniform character of what is attested — thus make it a poor starting point for a synchronic analysis of Hittite stress assignment. However, now that the BAP has been established for Hittite on the basis of the more robust evidence for word stress in the verbal system, the attested nominal forms serve as a natural testing ground for its predictions. A full analysis of Hittite nominal stress patterns is far beyond the scope of this dissertation; I thus restrict the discussion here to athematic nominals whose inflectional stress pattern can clearly be determined on the basis of synchronic diagnostics (i.e., plene writing, vowel reduction), and focus, in particular, on lexical items generally held to preserve PIE stress patterns.

Nominal intraparadigmatic stress alternations can be identified for several individual lexical items in Hittite that meet these criteria (including ‘foot’ above), as well as more generally in

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tern, which thus indicates the presence of a lexical accent; (ii) that stress originally remained fixed on the root in plural forms (rather than shifting onto inflectional endings), a pattern which — as discussed immediately above — is preserved in traces in the Hittite *hi*-conjugation.

<sup>35</sup>I assume the late hapax NS form *išhānaš* is either a scribal error or — per Rieken (1999: 303) — analogical; in any case, it does not imply that a real [a] vowel was normally present in the paradigm nor does it provide evidence for regular stress on this syllable at an earlier linguistic stage (*pace* Kloekhorst 2008: 259–60).

primary “heteroclitite” *r/n*-stems (the category to which ‘blood’ above belongs).<sup>36</sup> Some secure examples are given in (147); descriptively, all show a rightward shift of stress from the nominal stem in the “strong” cases (NOM.SG, ACC.SG, NOM.PL, ACC.PL) to the inflectional endings in the other (“weak”) cases:

(251)	STRONG		WEAK
a.	<i>ēšhar</i> [é:sχ-ar]		<i>išhanāš</i> [isχ-n-á:s]
	‘blood’ (N.NOM/ACC.SG)		‘of blood’ (N.GEN.SG)
b.	<i>pātu[š]</i> pá:t-os]		<i>padān</i> [pat-á:n]
	‘feet’ (ANIM.ACC.PL)		‘of the feet’ (ANIM.GEN.PL)
c.	<i>tēkan</i> [té:kan]		<i>taknāš</i> [takn-á:s]
	‘earth’ (N.NOM/ACC.SG)		‘of the earth’ (N.GEN.SG)
d.	<i>āiš</i> [á:ys]		<i>iššī</i> [is:-í:]
	‘mouth’ (N.NOM/ACC.SG)		‘in the mouth’ (N.LOC.SG)
e.	<i>pišēnuš</i> [pisé:n-os]		<i>[p]išnāš</i> [pisn-á:s]
	‘men’ (ANIM.ACC.PL)		‘of the man’ (ANIM.GEN.SG)

The distribution of word stress in (251) strongly suggests that in Hittite the weak case endings were distinguished from the strong case endings by their capacity to attract stress. This situation exactly parallels what is found in the cognate endings in Vedic Sanskrit, which were discussed in §1.1.3.2. In Vedic nominal inflection — just as in verbal inflection (cf. §5.3.2.2) — intraparadigmatic mobility was driven by the accented weak case endings, which could attract stress away from its phonologically preferred position at the word’s left edge. In accordance with the BAP, stress was attracted to the ending whenever the nominal stem was unaccented, but if the nominal stem was accented, stress remained fixed on the root. Accentual minimal pairs illustrating this distribution are given in (28–29) below (repeated from §1.1.3.2):

- (28) a. /√gáv - am/ → *gáv-am* ‘cow’ (M.ACC.SG)  
 b. /√gáv - á/ → *gáv-ā* ‘with the cow’ (M.INSTR.SG)
- (29) a. /√pad - am/ → *pád-am* ‘foot’ (M.ACC.SG)  
 b. /√pad - á/ → *pad-ā* ‘with the foot’ (M.INSTR.SG)

Modulo regular change, nominal forms like (28–29) are standardly reconstructed for PIE. The

<sup>36</sup>The characteristic feature of Hittite “heteroclitite” *r/n*-stems (of which there are several subtypes with different stem-forming suffixes) is stem suppletion: they have one stem, terminating in [r], in the strong cases, and another stem, terminating in [n] in the weak cases. The inflectional patterns of Hittite *r/n*-stems are treated in detail by Rieken (1999: 261–418); see Hoffner and Melchert (2008: 124–131) for an overview.

most economical explanation for this identity is that the relevant roots and endings were also (un)accented in PIE;<sup>37</sup> the forms corresponding to those (28–29) were thus derived in PIE as in (252–253) by regular application of the BAP:<sup>38</sup>

- (252) a.  $*/\sqrt{g^w\acute{o}w - es}/ \rightarrow *g^w\acute{o}w-es$  ‘cows’ (ANIM.NOM.PL)  
 b.  $*/\sqrt{g^w\acute{e}w - \acute{e}h_1}/ \rightarrow *g^w\acute{e}w-eh_1$  ‘with the cow’ (ANIM.INSTR.SG)
- (253) a.  $*/\sqrt{pod - es}/ \rightarrow p\acute{o}d-es$  ‘foot’ (ANIM.NOM.PL)  
 b.  $*/\sqrt{ped - \acute{e}h_1}/ \rightarrow ped-\acute{e}h_1$  ‘with the foot’ (ANIM.INSTR.SG)

For present purposes, the major take-away from these examples is that PIE had unaccented athematic nominal strong case endings and accented weak case endings. It is thus highly plausible that inflectional endings with these contrasting properties were inherited into Hittite. By this hypothesis, Hittite had nominal inflectional endings with the lexical entries in (254):

(254) HITTITE CASE ENDINGS

STRONG/UNACCENTED		WEAK/ACCENTED	
/-s/	(ANIM.NOM.SG)	/-ás/	(ABL/GEN.SG)
/-an/	(ANIM.ACC.SG)	/-í/	(LOC.SG)
/-es/	(ANIM.NOM.PL)	/-án/	(GEN.PL)
/-os/	(ANIM.ACC.PL)	/-ás/	(DAT/LOC.PL)
/-Ø/	(N.NOM/ACC.SG)		

To derive the data in (251a–d) above, only one further assumption is necessary — viz., that these nouns have lexically unaccented stems, i.e. (255):

(255) HITTITE STEMS

{/esχ-ar/, /esχ-(a)n/}	‘blood’
/pat/	‘foot’
/tekan/	‘earth’
/ais:/	‘mouth’

Provided with the inputs in (254–255), the attested Hittite stress alternations in (251a–d) fall out

<sup>37</sup>See Lundquist and Yates (to appear: §3.1) for further discussion (cf. Kiparsky to appear).


<sup>38</sup>In (252a) and (253), I illustrate with the prosodically equivalent NOM.PL rather than ACC.SG case forms because of certain issues (related to STANG’S LAW; see Mayrhofer 1986: 163–4) in the segmental reconstruction of the ACC.SG. form of ‘cow’.

straightforwardly from the application of the BAP:<sup>39</sup>

- (256)
- |    |               |   |                |             |                |                |
|----|---------------|---|----------------|-------------|----------------|----------------|
| a. | /esχ-ar-∅/    | → | <i>ēšhar</i>   | [é:sχ-ar]   | ‘blood’        | (N.NOM/ACC.SG) |
|    | /esχ-(a)n-ás/ | → | <i>išhanāš</i> | [isχ-n-á:s] | ‘of blood’     | (N.GEN.SG)     |
| b. | /pat-os/      | → | <i>pātu[š]</i> | [pá:t-os]   | ‘feet’         | (ANIM.ACC.PL)  |
|    | /pat-án/      | → | <i>padān</i>   | [pat-á:n]   | ‘of the feet’  | (ANIM.GEN.PL)  |
| c. | /tekan-∅/     | → | <i>tēkan</i>   | [té:kan]    | ‘earth’        | (N.NOM/ACC.SG) |
|    | /tekan-ás/    | → | <i>taknāš</i>  | [takn-á:s]  | ‘of the earth’ | (N.GEN.SG)     |
| d. | /ais:-∅/      | → | <i>āiš</i>     | [á:ys]      | ‘mouth’        | (N.NOM/ACC.SG) |
|    | /ais:-í/      | → | <i>iššī</i>    | [is:-í:]    | ‘in the mouth’ | (N.LOC.SG)     |

The stress pattern in (251e) — i.e., *pišēnuš* ‘men’ ([pisé:n-os]) vs. *[p]išnāš* ([pɪsn-á:s]) — calls for further comment. This form — which exhibits the stress pattern traditionally described as “hysterokinetic” — may at first glance appear incompatible with the BAP. The strong case-forms show non-initial stress, which must indicate the presence of a lexical accent on the stressed peninitial syllable. The formal derivation of *pišēnuš* in (257) below illustrates this point:

(257)

/pisén - os/	CULM	MAX-PROM	PK-L
a.  pisé:n-os			*
b. pí:sen-os		*!	

In the tableau in (257), the faithful candidate (a) is the winner because the alternative candidate (b), which better satisfies PK-L, does so by violating higher-ranked MAX-PROM. However, if the input had instead been an underlyingly accented stem, MAX-PROM would have been irrelevant, and candidate (b) with default leftmost stress would have been chosen as the winner.

If the stem is accented, however, it would seem that, in the weak cases, the lexical accent of the stem loses to the accent of the inflectional ending to its right, which would ordinarily contradict the predictions of the BAP. The derivation in (258) may serve to clarify the situation:

- (258) a. /pisén - ás/ → *[p]išnāš* [pɪsn-á:s] ‘of the man’ (ANIM.GEN.SG)

<sup>39</sup>The underlying form of the weak stem of (255a) and other primary *r/n*-stems in its class is uncertain. In particular, the derivational suffix could be analyzed as containing no vowel (/n/), an unaccented vowel (/an/), or even an accented vowel (/án/), since such a vowel — if it has any reality — would be deleted on the surface, as in (258) below. If the stressed suffixal [á:] vowels found, especially, in the dative-locative case of some *r/n*-stems in this class (e.g. *uddāni*) is correctly attributed to the influence of an “endingless locative” form (cf. Rieken 1999: 300), it would speak in favor of some kind of an underlying vowel in this position. However, the issue calls for further research.

b.

	/pisén - ás/	CULM	MAX-PROM	PK-L
a.	☞ pisé:n-as		*	*
b.	☞ pɪsn-á:s		*	*
c.	pisen-á:s		*	**!
d.	pí:sen-as		**!	

The partial tableau in (258b) shows what occurs when the accented stem /pisén/ ‘man’ and the accented ending /-ás/ (GEN.SG) are input into the BAP constraint ranking. Two outputs are possible under this ranking: candidate (b), the attested form [pɪsn-á:s]; or unattested candidate (a) <sup>x</sup>[pisé:n-as], which has stress fixed on the accented peninitial syllable of the stem. Both of these candidates equally satisfy MAX-PROM, deleting just one accent, and PK-L, since stress falls one syllable away from the word’s left edge. What this tableau shows, then, is that some further principle of the grammar prefers the attested form with syncope to the unattested form without it. While a full analysis of the conditions on deletion — i.e., on quantitative ablaut, in IE terms — is obviously beyond this study, there is clear evidence for deletion and reduction of pretonic vowels elsewhere in Hittite (see especially §3.3), and the constraint responsible, even if low ranking, will suffice to ensure that the attested form [pɪsn-á:s] in (b) is preferred to the otherwise equivalent unattested form <sup>x</sup>[pisé:n-as].<sup>40</sup>

More important, however, is that the “skipping” candidate in (c) is ruled out. This candidate, in which both accented vowels surface and the rightmost is stressed, is impossible under the BAP constraint ranking, which allows mobility from a medial accented vowel onto a (non-dominant; cf. §5.3.4 below) accented morpheme to its right only under the condition that the vowel is deleted, a pattern that Kiparsky (2010: 146) refers to as “secondary mobility.” I am aware of no compelling evidence Hittite or the other Anatolian languages for this type of “skipping” pattern in nominal inflectional paradigms, and thus conclude that Anatolian supports Kiparsky’s (to appear: 44) hypothesis that “the hysterokinetic type of mobility does not exist except as an epiphenomenon of zero grade ablaut.”

The idea that rightward intraparadigmatic stress mobility from a non-initial accented vowel is contingent on its deletion is an important one, with interesting implications for another pattern of Hittite nominal intraparadigmatic mobility that requires further discussion. This is the alternating stress pattern observed in the Hittite word for ‘fire’, which has attested forms like (259):

(259)

<i>pahhur</i>	[páχ: <sup>w</sup> or]	(N.NOM/ACC.SG)	:	<i>pahhwenas̃</i>	[paχ: <sup>w</sup> é:n-as]	(GEN.SG)
				<i>pahhweni</i>	[paχ: <sup>w</sup> é:n-i]	(DAT/LOC.SG)

<sup>40</sup> However, if deletion failed to apply — for instance, in a particular lexeme in which it was phonotactically blocked, either in PIE itself or as an innovation in one of the daughter languages that preserves the BAP — one would expect cases in which a form like candidate (a) in (258b) does surface. A comparable situation is actually attested in the paradigm of Ved. /pitár/ ‘father’; per Kiparsky (2010: 145–6), when ablaut applies in the weak case forms before consonant-initial endings, it leaves behind a syllabic nucleus –r̥– that is a licit accentual host and thus receives stress in accordance with the BAP, e.g. LOC.PL Ved. *pit̥ṣu* ‘among the fathers’ ← /pitár - sú/.

This lexical item is generally held to provide important evidence for “proterokinetic” mobility, i.e. intraparadigmatic stress mobility between a nominal root in the strong cases and a following derivational suffix in the weak cases (see further below); under this view, the Hittite forms in (259) would preserve essentially intact a reconstructed paradigm with N.NOM/ACC.SG *\*péh<sub>2</sub>-w<sub>r</sub>* and a stem *\*p(e)h<sub>2</sub>-wén-* in the weak cases, thus showing the shift of stress from root to derivational suffix characteristic of this hypothesized class.<sup>41</sup> There can be no doubt that Hittite synchronically shows this alternating stress pattern;<sup>42</sup> however, before considering its possible historical implications, it may be useful to consider how this pattern can be analyzed in purely Hittite terms.

The NOM/ACC.SG form shows initial stress, which in principle could reflect an accent in this position, or it could be due to default stress. Yet if the root were accented, it would receive stress in its weak case-forms via the BAP (i.e. leftmost wins), which it does not; stress surfaces instead on the derivational suffix. These two facts can therefore be understood only if (i) the nominal root is unaccented (/pǎχ:/) (ii) the strong case allomorph of the derivational suffix is unaccented (/ -wor- / < PIE *\*-/w<sub>r</sub>/*); and the weak case allomorph of the suffix is accented (/ -wén- /); this analysis is outlined informally in (260):<sup>43</sup>

- (260) a. /pǎχ: - wor - ø/ → *pahhur* [páχ:<sup>w</sup>or] ‘fire’ (N.NOM/ACC.SG)  
 b. /pǎχ: - wén - í/ → *pahhweni* [paχ:<sup>w</sup>é:n-i] ‘in the fire’ (DAT/LOC.SG)

The first interesting point to note about (260) is that — unlike in the “hysterokinetic” weak case form in (258) above — there is no “secondary mobility” in (260b); the suffixal /e/-vowel fails to delete, and thus does not cede stress to the accented inflectional ending to its right, which would yield unattested Hitt. *<sup>x</sup>pahhuni* (<sup>x</sup>[paχ:<sup>w</sup>oní:]) or the like. This situation is, in fact, predicted under the BAP, as can be seen clearly in the tableau in (261):<sup>44</sup>

<sup>41</sup>Thus Kuiper (1942: 18), Schindler (1975: 9–10), Rieken (1999: 331–3), Fortson (2010: 120), Meier-Brügger (2010: 344–5), Beekes and de Vaan (2011: 206), *i.a.*

<sup>42</sup>Contra Keydana (2013), if the root were stressed in the noun’s weak case forms, ‘fire’ would have patterned with *mēhur* ‘time’ (GEN.SG *mēhunas*) and *šēhur* ‘urine’ (GEN.SG *šēhunas*), with post-tonic syncope of the suffixal /e/-vowel; analogical restoration of this suffixal vowel is unlikely, since it is in fact subject to reduction when, in post-OH, root stress is generalized in this paradigm (NH gen.sg. *pahhunas* [páχ:<sup>w</sup>onas]).

<sup>43</sup>In (260), I treat the fusion of [χ:] with the following [w] (yielding [χ:<sup>w</sup>]) as a synchronic process. This is not crucial to the analysis; it is possible — perhaps even likely, in view of similar stress alternation in ‘water’ (N.NOM/ACC.SG *wātar* [wá:t-ar] vs. LOC.SG *witēni* [wit-é:n-i]) — that the root has been reanalyzed as /paχ:<sup>w</sup>/ in Hittite and the derivational suffix as /-Vr- / ~ /-é:n- / . Note that I follow Schindler (1975: 4–5) in the assumption that ‘water’ originally had an “acrostatic” inflectional paradigm (viz., fixed root stress and *\*o/e*-root ablaut), but was analogically influenced by ‘fire’ in the prehistory of Hittite (*pace* Kloekhorst to appear).

<sup>44</sup>In candidate (c) in (261), [o] is conditioned syllabic reflex of /w/ adjacent to a uvular fricative; elsewhere, it vocalizes as [u], as in PIE. In (d), post-tonic syncope would be expected; cf. Hitt. *mēhuni* ‘at the time (of)’ ([mé:χ<sup>w</sup>oni] ← /méχ-wén-í/).

(261)

	/pǎχ: - wén - í/	CULM	MAX-PROM	PK-L
a.	paχ: <sup>w</sup> én-í:	*!		***
b.	paχ: <sup>w</sup> én-i		*	*
c.	paχ: <sup>w</sup> on-í:		*	**!
d.	páχ: <sup>w</sup> on-i		**!	

Candidate (c) — the unattested form <sup>x</sup>*pahhuni* (<sup>x</sup>[paχ:<sup>w</sup>on-í:]) — is manifestly worse under the BAP constraint ranking than attested (b), incurring an additional violation of PK-L. The explanation for this result is straightforward: if underlying /e/ were to delete in the weak stem, the suffix-initial glide /w/ would vocalize, resulting in a syllabic nucleus that is the source of this additional violation. There is therefore no phonological motivation for a shift in stress to the inflectional ending, nor for the vowel deletion that this shift would condition.<sup>45</sup>

The other interesting point about the analysis laid out in (260–261) above is that it crucially depends on the fact that Hittite *r/n*-stems are heteroclites: the derivational suffix has two allomorphs (/–wor–/, /–wén–/) whose prosodic properties — like their segmental properties — cannot be derived from one another by regular phonological processes. If the suffix instead had a single underlying representation — either (i) unaccented like the strong case allomorph /–wor–/ or (ii) accented like the weak case allomorph /–wén–/ — the observed “proterokinetic” stress alternation between root and derivational suffix would not have obtained; rather, under (i) the noun would show alternating stress between root and inflectional endings in the strong and weak cases, while under (ii), stress would simply remain fixed on the derivational suffix.

In this context, a broader implication of reconstructing the BAP for PIE emerges. Under this constraint ranking, the intraparadigmatic stress alternation between root and derivational suffix characteristic of “proterokinetic” nominals, one of the four templatic classes posited under the widely accepted “Erlangen model” of IE nominal morphophonology, is predicted to be impossible, except in the special case of heteroclite stems. This prediction in fact converges with the findings of most recent scholarship on IE word prosody — in particular, of Keydana (2013), Kümmel (2014), and Lundquist (2015), who have demonstrated that much of the evidence from the daughter languages cited in support of the class’s reconstruction should in fact be explained otherwise.<sup>46</sup> Accordingly, I take the fact that the BAP rules out this stress pattern in other nominal stem classes at the directly reconstructible stage of PIE as a strength of the analysis.<sup>47</sup> More broadly, then, I contend that the Hittite and the Anatolian languages provide no

<sup>45</sup>The winning candidate (b) in fact suggests a potentially important difference between Hittite and Vedic Sanskrit with respect to how ablaut applies. Under a Vedic-like grammar, one might expect a Hittite form <sup>x</sup>[paχ:<sup>w</sup>ón-i] with the attested suffixal stress pattern but also with deletion of /e/ before the underlyingly accented inflectional ending, exactly as in Ved. *pit̥su* ‘among the father’ discussed in n. 40 above. Assessing the implications of this apparent divergence between Hittite and Vedic is a task for future research.

<sup>46</sup>For instance, Lundquist (2015) has now convincingly refuted the idea that Vedic *ti*-stem nouns showed “proterokinetic” mobility at any shallow prehistoric stage.

<sup>47</sup>More broadly, then, while Hittite does attest descriptively “proterokinetic” paradigms and thus supports the reconstruction of these surface forms for PIE, it does not support reconstructing a “proterokinetic” class in the sense (e.g.) of a phonological template imposed by a marked suffix (as suggested by Fellner and Grestenberger



compelling evidence for synchronic inflectional mobility that is non-BAP compliant, and in the absence of strong evidence for this synchronic pattern elsewhere, conclude that such mobility is correctly ruled out by the BAP in PIE.

### 5.3.4 PIE stress assignment & morphological headedness

The analysis of Hittite stress assignment developed in Chapter §4 brought to light an important property that distinguishes it from Cupeño. While both languages demonstrably have the same general preference for left-edge stress and the high-ranking faithfulness constraints on prosodic structure that underlie the BAP, only Hittite has accented morphemes that “override” the BAP, attracting stress against the general “leftmost wins” pattern observed elsewhere in the system. In §4.4.1, it was observed that these dominance effects are uniquely associated with prototypical derivational suffixes, and moreover, that all accented derivational suffixes likely have this property. This distribution suggests that accentual dominance derives from a general property of the grammar that is characteristic of derivational suffixes. Accordingly, I argued that the accentual dominance is best understood as a consequence of morphological headedness — specifically, that the lexical accents of derivational morphemes are privileged due to their status as morphological heads, which are protected in Hittite by positionally-indexed faithfulness constraints that outrank their general counterparts. In §5.2.2, moreover, I identified evidence suggesting that the accentual properties of heads were similarly privileged in Luwian, and on this basis, I argued that PA also had a grammar in which accentual dominance was a function of morphological headedness.

As pointed out already in §1.1.3.3, accentual dominance is a well-known phenomenon in the LA systems elsewhere in the IE family, including Ancient Greek, Vedic Sanskrit, and Balto-Slavic. On this basis, it is clear that accentual dominance was a feature of the LA system of PNIE; that this phenomenon is also found in Hittite is thus unsurprising, and simply confirms that it is also reconstructible for PIE itself. However, beyond the fact that accentual dominance was PIE feature, there is little that can be said with any real certainty. The problem is twofold. On the one hand, the Hittite suffixes that exhibit dominance effects — e.g. abstract noun-forming *-atar-*, denominative verb-forming *-ai-*, fientive *-ešš-*, factitive *-ahḫ-* — lack diagnostic comparanda in the other IE languages. While Hittite suffixes like *-atar-* and *-ai-* are synchronically monomorphemic, they are historically complex (see Ch. 4 nn. 16, 91), and while built out of inherited material, there is nothing that they can be directly compared to Greek, Vedic, or Balto-Slavic, where comparison might shed light on the PIE situation. Hittite *-ešš-* and *-ahḫ-* do have exact or near correspondents in Greek (*-ē-*, *-ā-*),<sup>48</sup> but like most Greek finite verbs (cf. n. 27), members of the cognate class are uninformative about the position of word stress in PIE.

On the other hand, there is the issue of apparent mismatches between the languages. While it has been argued that in Greek — like Hittite — all derivational suffixes are dominant and thus consistently attract stress if accented (Steriade 1988a: 279–81; cf. Sandell 2015: 190–2),

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2016).

<sup>48</sup>Hittite *-ahḫ-* also has a correspondent in Latin *-ā-* — e.g., Lat. *re-nov-ā-re* ‘make new; restore’, which is an exact match for Hitt. *newahḫ-* ‘id.’. As is generally the case, however, Latin does not provide any prosodic information relevant to the PIE situation.



- (264) a. /gáv - mánt - am/ → *gó-mant-am* ‘possessing cows’ (M.ACC.SG)  
 b. /bála - vánt - s/ → *bála-vān* ‘strong’ (M.NOM.SG)  
 /man - ‘as - vánt - s/ → *mán-as-vān* ‘thoughtful’ (M.NOM.SG)

In (264), the accent of the derivational suffixes /-mánt-/ and /-vánt-/ is not privileged in the same as the accent of /-ín-/ or /-yá-/ in (47) above; instead, stress assignment proceeds in accordance with the BAP, and the leftmost lexically accented syllable receives word stress.

This non-trivial divergence between Vedic and the LA systems of Hittite and Greek raises a difficult question about what should be reconstructed for PIE beyond the simple existence of accentual dominance effects. The agreement between Hittite and Greek with respect to HEAD-FAITH suggests that it is Vedic which has innovated, but given that the Vedic system is arguably more complex in having a distinction between dominant and non-dominant derivational morphemes, it is also plausible that the other two languages have simplified the inherited system in exactly the same way. In my view, there are at present too many unknowns to seriously address this question; what is needed, rather, is more rigorous synchronic work on stress assignment in the ancient IE language branches that preserve (aspects of) the inherited system intact, i.e. Indo-Iranian, Greek, Anatolian, and Balto-Slavic.

## 5.4 Conclusions & discussion

The primary aim of this chapter was to evaluate the implications of the synchronic analysis of Hittite developed in Chapter §4 for the reconstruction of stress assignment in PIE. As a first step toward this end, the inner-Anatolian evidence for word stress was examined in §5.2. The limited available evidence in Palaic and Luwian was shown to be consistent with the morphophonological principles of stress assignment that were securely established for Hittite — i.e., the BAP and highly-ranked prosodic HEADFAITH constraints — and on this basis, I argued that these principles are reconstructible for their proximate common ancestor, PA.

In §5.3, the Anatolian evidence was in turn brought to bear on the reconstruction of the PIE word-prosodic system. The reconstruction of this system is directly informed by its immediate daughters — on the one hand, PA, and on the other, the ancestor of the rest of the IE languages, PNIE. That the BAP is reconstructible for the PNIE stage was proposed already by Kiparsky and Halle (1977), who reconstructed this principle on the basis of evidence from Greek, Balto-Slavic, and above all Vedic Sanskrit, where they demonstrated it was synchronically operative (cf. Kiparsky 1973, 1982d, *et seq.*). In view of the convergence between PA and PNIE in this respect, §5.3.1 argued that the BAP is reconstructible for PIE. However, it is also clear that PIE had accentually dominant morphemes, which thus attracted stress against the general left edge preference specified by the BAP. §5.3.4 discussed how these dominance effects are best analyzed at the PIE level. Since they submit to analysis in terms of head faithfulness in both Greek and Anatolian, I raised the possibility that PIE also had an LA system in which the prosodic properties of morphological heads were privileged by faithfulness constraints; this reconstruction is highly uncertain, however, and calls for further research.

The major features of the proposal advanced here thus relate to the reconstruction of the



ist in these systems? What properties make them (un)stable over time? Yet investigating these questions in the history and prehistory of these languages requires knowing the basic properties of the system that they inherited from the proto-language. The reconstruction advanced in this chapter is one step toward this end.

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