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Tutorial overview: Suprasegmental adaptation in loanwords

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ABSTRACT

The current paper provides a survey of current studies on the adaptation of suprasegmentals, i.e., tone, pitch accent, and stress. Tone and pitch accent languages have a relatively free distribution of prominence and in principle could preserve the prominence of the input language without contradicting native restrictions. While many languages exhibit the faithful preservation of input prominence as expected, a number of tone and pitch accent languages, all of them East Asian languages, ignore the input language prominence partially, or even completely, and instead assign tones or pitch accents based on default assignment mechanisms. Stress languages, on the other hand, have stricter restrictions on the location of prominence and it is often impossible to faithfully preserve input language prominence in the original position. In a group of languages, the original stress position is ignored and stress is assigned based on the native metrical rules and the segmental composition of the input words, whereas others employ segmental deletion or vowel lengthening to bring the original stressed syllable into the appropriate position with respect to native metrical rules. It is suggested that the divergence in repair strategies may partly be due to the different combination of acoustic cues utilized to signal prominence in different languages, and it is also suggested that all else being equal, the faithful preservation of the input language prominence, by way of segmental alteration or by way of importation, is more likely to occur when the language contact is more direct and intimate than not.

1. Introduction

In the last couple of decades, loanword phonology has gained prominence as a productive research area of theoretical significance. Compared to segmental adaptation or phonotactic adaptation, suprasegmental adaptation is a relatively understudied field, but there has been a growing interest in the topic. The current paper provides a review of studies on the adaptation of the suprasegmental properties of tone, stress, and pitch accents. There are several key questions that arise in the adaptation of suprasegmentals, and these will be discussed below. Some of these are also relevant for the segmental domain, but others are more prominent in or unique to the suprasegmental domain.

First of all, as with segmental adaptation, when suprasegmental properties are adapted from one language to another, there is often more than one logically possible repair strategy available, and oftentimes choices are made even though there is no apparent motivation for that particular choice in the native phonology. For example, when the input language stress position violates the native language's stress rules, stress may shift to a position compatible with the native rule, but truncation or segmental lengthening is also possible to bring the current position of stress in line with the native rules. But

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then why does one language choose one option over the other? Such emergent patterns in loanwords pose a learnability puzzle (Broselow, 2009; Kang, in press).

Second, at what level is similarity between the lending language input and the borrowing language output calculated? Stress is a syntagmatic property—an abstract structural attribute of a syllable that does not have a simple phonetic correlate. Stress is signaled by a combination of pitch, intensity, duration, and spectral tilt (Laver, 1994; Chávez-Peón, 2008). Tone, on the other hand, is a paradigmatic property that has f_0 as a direct phonetic correlate.[1] Therefore, in the abstract phonological representation and in the surface phonetic representation, it is not immediately obvious whether or not stress and tone can be directly equated (Kenstowicz, 2004). Adaptation between languages employing the same type of system, stress or tone, is not necessarily straightforward. Stress languages can differ in the phonetic cues they employ in signaling stressed syllables, using a unique balance of intensity, duration, and pitch (Berinstein, 1979; Montero, 2007, among others). Also, in tone languages, the actual realization of tone in terms of the level of f_0 or the shape or steepness of the contour in a tonal contour is likely to differ from language to language (Maddieson, 1977; Yip, 2002). Moreover, in many East Asian languages, tone is not only contrastive in terms of pitch; phonation (e.g., creakiness, breathiness, etc.) is also intricately involved in the contrast (cf. Svantesson and House, 2006; Brunelle, 2009). Thus, it is not at all clear that a high tone in one language is directly equivalent to a high tone in another language phonetically.

Third, oftentimes input language prominence is completely ignored in the adaptation and prominence is assigned by a default mechanism. Such a situation may arise if, for whatever reason, equivalence is not established between the input language prominence and the native language prominence. However, sometimes, the adaptation shows partial sensitivity to the input language prominence (therefore, it cannot be the case that input prominence is not perceived or that no equivalence is made); nevertheless, the assignment of prominence in the borrowing resorts to a default mechanism (e.g., a high tone is placed on a syllable beginning with a voiceless consonant), ignoring the input language prominence to a large degree. Why is the input prominence ignored when there is no native restriction militating against its preservation? Where does the default mechanism come from?

These are some of the major questions that arise from the examination of cases of suprasegmental adaptation in the literature. With this background, we turn to the survey of languages employing suprasegmental adaptation. Here, I divide the languages into tone, pitch accent, and stress languages. These distinctions are not without their problems.[2] However, for the current purposes, we will stay away from these issues and will simply follow what is considered to be the common description of the languages, which is also usually how the languages are described in the sources from which I draw the data and discussion.

2. Tone languages

In tone languages, the position of pitch prominence (i.e., variants of a high tone) is relatively unrestricted; thus, native tonotactic constraints usually do not prevent the faithful preservation of input language prominence. However, as we will see, not all tone languages preserve the input language prominence.

We start with fairly straightforward cases of input prominence preservation in adaptations from a tone language to another tone language. Maddieson (1977) provides several such cases. Some representative examples of loanwords from Hausa (Afro-Asiatic) in Gwari (Niger-Congo) are provided in (1). In words consisting of only H tones or only L tones, the H and L of Hausa are mapped to the M and L of Gwari, respectively, as shown in (1a). In words containing both H and L tones in Hausa, tone mapping preserves the relative pitch height of the input H and L, as shown in (1b). See Maddieson (1977) for other cases of borrowing from one tone language to another, where the input language tonal contrast is largely preserved.

(1) Hausa loanwords in Gwari (Maddieson, 1977, based on Hyman and Magaji, 1970)

	Hausa	*Gwari*	
a.	*HH*	*MM*	
	$du^{H}bu^{H}$:	$du^{M}bu^{M}$	‘thousand’
	LLL	*LLL*	
	$a^{L}kwa^{L}$:ti^{L}	$a^{L}kwa^{L}ti^{L}$	‘box’
b.	*HL*	*HM, ML*	
	go^{H}:de^{L}	$gwo^{H}de^{M}$	‘give thanks’
	te^{H}:$bu^{L}r$	$te^{M}bu^{L}l$	‘table’
	LH	*LM, MH, LH*	
	$so^{L}so^{H}$:	$so^{L}so^{M}$	‘loofah, sponge’
	$ke^{L}ke^{H}$:	$kye^{M}kye^{H}$, $ce^{M}ce^{H}$	‘bicycle’
	$a^{L}mma^{H}$:	$a^{L}ma^{H}$	‘but’

[1] It has been proposed by some that tones are reinterpreted as the surface reification of an abstract underlying accent (cf. Goldsmith, 1987). From this perspective, stress and tones (which are actually accents under this view) can be equated at the abstract level of representation.

[2] See Hyman, 2006 for recent discussions on the classification of word-level prosody systems.

We also find cases where input language stress is preserved as a variant of a high tone in a tone language. In English loanwords in Cantonese, a stressed syllable is realized with a high tone, as shown in (2a). Similarly, English primary stress is reflected as a high tone in Yoruba (Niger-Congo) (Devonish, 2002; Kenstowicz, 2006), Shona (Niger-Congo) (Devonish, 2002; Leben, 1996; Kenstowicz, 2006), Hausa (Devonish, 2002; Leben, 1996; Kenstowicz, 2006), and Twi (Devonish, 2002, based on Carter, 1987), and a similar pattern is found in Portuguese loanwords in Kongo (Devonish, 2002, based on Carter, 1987), as shown in (2b–f). In these languages, English stress is realized with a rise in pitch toward the stressed syllable, followed by a subsequent fall in pitch, mimicking the H*L intonation that is often associated with English primary stressed syllables (Devonish, 2002; Kenstowicz, 2006).

(2) Input language stress is preserved as a variant of a high tone in a tone language

a. English to Cantonese (Silverman, 1992; Yip, 2006)

mótor → **mɔ^{H}**ta^{MH}

buffét → pow^{M}**fey^{H}**

b. English to Yoruba (Devonish, 2002; Kenstowicz, 2006)

líberty → **li^{H}**ba^{H}ti^{L}

tomáto → to^{M}**ma^{H}**to^{L}

guarantée → ga^{M}ran^{M}**ti^{H}**

c. English to Hausa (Leben, 1996; Kenstowicz, 2006)

cáptain → **kjaf^{H}**tin^{L}

recéipt → ra^{L}**sit^{HL}**

d. English to Shona (Devonish, 2002; Leben, 1996; Kenstowicz, 2006)

récipe → **re^{H}**si^{L}pi^{L}

philósophy → fi^{L}**ro^{H}**so^{L}fi^{L}

e. English to Twi (Devonish, 2002)

búcket → **bu^{H}**ki^{L}ti^{L}

cigarétte → si^{L}ga^{L}**rɛ:^{HL}**ti^{L}

f. Portuguese to Kongo (Devonish, 2002)

papél → pa^{L}**pe:^{HL}**le^{L} ‘paper’

rúa → **lu:^{LH}**la^{L} ‘street’

The next set of cases, Mandarin and Dholuo, are cases where the input language prominence is largely reflected as a variant of a high tone, and an additional default mechanism, which is motivated by the native phonology, also plays a role to a limited extent. In Mandarin, stressed syllables of the English input tend to be realized with variants of a high tone, e.g., tone 1 (H), tone 2 (LH), or tone 4 (HL), depending on their position in the word, although the mapping is not completely regular due to gaps in syllable types (Wu, 2006). For example, in monosyllabic words, a falling tone is assigned, as in (3a), presumably mimicking the (Rise) + Fall citation contour of English stressed syllables. In disyllabic words with initial stress, the most common patterns are a high tone (H) occurring when the English input is unaspirated obstruent-initial, but a rising tone (LH) is favoured when the input is sonorant-initial or aspirated obstruent-initial, as shown in (4b), reflecting the unmarked correlation between pitch and voicing familiar from tonogenesis (cf. Hombert et al., 1979; Svantesson and House, 2006), i.e., pitch tends to be higher following a voiceless consonant and lower following a voiced consonant.[3]

(3) Input language stress is preserved as a variant of a high tone in a tone language (Wu, 2006)

	English		*Mandarin Chinese*
a.	*bar*	→	**pa4^{HL}**
	cool	→	**k^{h}u4^{HL}**

[3] The effect of aspirated consonants on the tone of the following vowel varies from language to language.

b. *cúrry* → **ka1^{H}**li3^{L}
sóda → **su1^{H}**ta3^{L}
mángo → **mang2^{LH}**kuo3^{L}
tótem → **t^{h}u2^{LH}**t^{h}əng2^{LH}

In other words, tone assignment in English loanwords in Mandarin preserves English input stress as a variant of a high tone and furthermore makes additional distinctions based on the voicing of the initial consonant, which is allowed for by the richer tonal contrasts of the language. Then what is the source of this voicing-tone correlation? Wu (2006) demonstrates that the voicing-tone correlation is also found as a strong tendency in the native lexicon—a syllable of type CVN rarely occurs with a rising tone (Tone 2) if the initial consonant is an unaspirated stop and rarely with a high tone (Tone 1) if the initial consonant is a sonorant. Thus, the voicing-tone correlation that emerges in loanwords can be attributed to the skewed distribution of available syllable types in the native lexicon and does not necessarily pose a learnability puzzle.

English loanwords in Dholuo (Nilo-Saharan) retain input stress as a variant of a high tone but also common is the default Low tone assignment (Owino, 2003). Interestingly, the choice between default L and input stress preservation is determined based on the overall shape of the output word rather than the shape or segmental composition of the target syllables. In words with three syllables or more, English input stress tends to be maintained as a high tone variant, as shown in (4a), with the exception of three-syllable words with two epenthetic vowels, which take a L tone, as in *screw* → [si^{L}ku^{L}ru^{L}] and *box* → [bo^{L}ki^{L}si^{L}]. In disyllabic words, however, a high tone appears only if the word ends in a closed syllable, although the high tone may not fall on the closed (final) syllable necessarily, as shown in (4b). If the word ends in an open syllable, a default L is assigned to every syllable, as shown in (4c). In monosyllabic words (with a closed syllable), a default L tone is assigned, as shown in (4d).

(4) Tone assignment in English loanwords in Dholuo (Owino, 2003)

a. Longer words
báttery → **be^{H}**ti^{H}ri^{L}
locátion → lo^{L}**ke^{H}**sen^{L}
degrée → di^{L}gi^{L}**ri^{H}**

b. Disyllabic words with a final closed syllable (σCVC)
cábbage → **ka^{H}**bic^{L}
balloón → ba^{L}**lun^{HL}**
brúsh → bi^{L}**ras^{HL}**

c. Disyllabic words with a final open syllable (σCV)
rúbber → **ra^{L}**ba^{L}
coat → **ko^{L}**ti^{L}

d Monosyllabic words (CVC)
chief → **cif^{L}**
bus → **bas^{L}**

Similarly, in Swahili (Niger-Congo) loanwords in Dholuo, a H tone is assigned to the stressed syllable in Swahili, which is always the penultimate syllable of the word, as shown in (5a), with the exception of disyllabic words consisting of only open syllables and monosyllabic words, which are assigned default low tones, as shown in (5b).

(5) Swahili loanwords in Dholuo (Owino, 2003)

a. Longer words: stress → High tone

Swahili		*Dholuo*	
kanísa	→	ka^{L}**ni^{H}**sa^{L}	'church'
kufúli	→	ki^{L}**ful^{HL}**	'padlock' (with final vowel apocope)
kiberíti	→	ki^{L}bi^{L}**rit^{HL}**	'matchbox' (with final vowel apocope)

b. Default low

símu	→	**si^{L}**mo^{L}	'telephone'
núsu	→	**nus^{L}**	'half' (with final vowel apocope)

The default low tone in σCV or CVC words cannot be attributed to tonotactic restrictions in the native phonology in a straightforward way as Dholuo nouns of these shapes can take H tones, as the minimal pairs [ba^{L}la^{L}] 'partial baldness' and [ba^{L}la^{H}] 'salt lick' or [cak^{L}] 'milk' and [cak^{H}] 'a beginning' demonstrate. In verb stems, however, which can only take the form of σCV or (C)V(C), tonal contrasts are more limited and a L tone is the most common tone pattern (Tucker, 1994). So, it is possible that the L tone assignment in mono- or disyllabic words is a reflection of the unmarked tonal pattern in the native phonology (Owino, 2003).

To summarize, Mandarin and Dholuo are cases where the input language prominence is largely reflected as a variant of a high tone, with an additional default mechanism, motivated by the native phonology, also playing a role in a limited context.

On the other hand, there are many cases where the input language tone, stress or pitch accent position is partially, or completely, ignored in adaptation to a tone language and tone is assigned by a default mechanism, even in contexts where native tonotactic constraints do not prevent the preservation of the input prominence as a high tone variant. In other words, loanwords conform to *stricter* structural requirements than the native phonology, such that the foreign input is transformed to an unmarked form, even when there is a seemingly more faithful licit form available in the language. Kenstowicz (2005) refers to such cases as a ***retreat to the unmarked***. Three general types of default tone assignment patterns are attested: non-discriminate assignment of a default tone, tone assignment sensitive to syllable weight and tone assignment sensitive to the laryngeal feature of the consonant in the onset or the coda of the syllable.

Vietnamese distinguishes six different tones in sonorant-final syllables and two tones in obstruent-final syllables. In French and English loanwords, however, the most common pattern is a high (or non-low) level tone (*ngang*) in a sonorant-final syllable and a high rising tone (*sac2*) in a stop-final syllable (Barker, 1969; Avery, 1983; Pham, 2003).

In the case of Vietnamese, there is some independent evidence from the native phonology that *ngang* is the unmarked tone of sonorant-final syllables and *sac2* is the unmarked tone of obstruent-final syllables based on the distributional pattern of tones in reduplication and cliticization as well as the overall frequency of occurrence in the lexicon (Avery, 1983; Pham, 2003). Another example of default tonal assignment comes from Proto-Tai. According to Gandour (1979), borrowings from Indic, Khmer and Indonesian, which are all non-tonal, to Proto-Tai are all assigned the Proto-Tai tonal category A—"normal level tone".

We also find a default tone strategy in French loans in White Hmong; but unlike Vietnamese, the choice of tones in loanwords seems unmotivated by markedness evidence from the native phonology. White Hmong distinguishes between seven different tones (L, M, H, LH, HL, creaky, and breathy). In French loanwords in White Hmong, the final stress of French is completely ignored and a Low tone is assigned to all syllables, as in (6) (Golston and Yang, 2001). This is despite the fact that there is no clear evidence from the native phonology to suggest that L is the default tone of the language.

(6) French loanwords in White Hmong (Golston and Yang, 2001)

French		*White Hmong*	
no.á	→	nɔ^{L}he^{L}, *nɔ^{L}he^{H}	'Noah'
ʒe.ʁi.kó	→	je^{L}li^{L}kɔ^{L}, *je^{L}li^{L}kɔ^{H}	'Jericho'

The total lack of sensitivity to French final stress and the uniform assignment of a level low tone may be attributed to the fact that, in French, stress is consistently final and non-contrastive and hence not salient enough perceptually and/or is underspecified in the word-level phonological representation. In contrast to French, in English, the position of stress is more varied and stress also has a marginally contrastive function. However, we still find cases where the position of English stress is largely ignored in adaptation to a tone language.

In English loanwords in White Hmong, a wider array of tones are utilized (L, LH, HL and creaky) compared to the French loanwords discussed above. However, the position of stress in the input only has a marginal effect[4] and, for the most part, tone assignment is determined by the internal structure of the input language syllables (Golston and Yang, 2001). In general, an open syllable or a syllable with a nasal coda is assigned a low tone (L), as shown in (7a), a syllable with a tense vowel or a vowel plus/ɹ/sequence in the input is assigned a falling tone (HL), as shown in (7b), and a closed syllable with a voiceless consonant coda is assigned a rising tone (LH), as shown in (7c).

[4] Word-final unstressed syllables are often realized with a creaky tone, as in [stu.pɪd] → [si^{L}tu^{LH}**pe^{creaky}**], but word-final stressed syllables are not. A stressed light open syllable may be realized with a rising tone if the following syllable begins with a voiceless consonant (e.g., [stu.pɪd] → [si^{L}**tu^{LH}**pe^{creaky}]), but this option is not attested for unstressed syllables.

(7) Input language (English) stress is mostly ignored in White Hmong

a.	V, VN	→	L	
	ə.mɛ́.ɹɪ.kə	→	**ʔa^{L}me^{L}li^{L}ka^{L}**	'America'
	pé.lɛ̀s	→	**p^{h}e^{L}**le^{LH}	'Payless'
	ké.màɹt	→	**k^{h}e^{L}**ma^{HL}	'K-mart'
	fon	→	**fɔŋ^{L}**	'phone'
b.	VV, Vɹ	→	HL	
	kek	→	**k^{h}e^{HL}**	'cake'
	paɹk	→	**p$^{h\ HL}$**	'park'
	ké.màɹt	→	k^{h}e^{L}**ma^{HL}**	'K-mart'
c.	VC$_{voiceless}$	→	LH	
	kə.sɛ́t	→	ka^{L}**se^{LH}**	'cassette'
	pé.lɛ̀s	→	p^{h}e^{L}**le^{LH}**	'Payless'
	ɔ́.fɪs	→	ʔɔ^{L}**fi^{LH}**	'office'

As Golston and Yang (2001) note, it is puzzling why loanwords utilize only a subset of the available native tonal inventory and the absence of H, M, or breathy tones is not explicable based on markedness or distributional patterns of the native phonology. Also, vowel length and consonant voicing in the English input affects tone assignment even though the consonant itself is deleted in the output, as shown in the examples in (7b–c). In other words, vowel length and the consonant disappear, but leave their trace in tone assignment. This shows that, unlike the voicing-tone correlation in English loanwords in Mandarin, the correlation between syllable structure and tone observed in English loanwords in White Hmong cannot be attributed to tonotactic preferences in the native lexicon.

Similarly, in English loanwords in Thai, input stress only marginally affects tone assignment[5] and the effect of the segmental composition of the input is much more dominant. The general pattern is that a "live" syllable is assigned a M tone and a "dead" syllable is assigned a H tone (Gandour, 1979; Kenstowicz and Suchato, 2006),[6] despite the fact that there is no clear "evidence internal to Thai tonology that suggests such a connection." (Kenstowicz and Suchato, 2006:942). In fact, in native words, a H tone is unattested in a dead syllable with a long vowel. Some examples are provided in (8).

(8) English loanwords in Thai

a. Live syllables

bill	→	bi^{M}n
fair	→	fɛ:^{M}

b. Dead syllables

big	→	bi:^{H}k
block	→	blɔ^{H}k

Also, similar to White Hmong, the coda consonant in the English input can affect tone assignment even when the consonant itself does not survive in the output due to restrictions on syllable structure. For example, when English words end in a sonorant–obstruent cluster and the final obstruent is deleted, an unexpected H tone appears on a live syllable in the output if there was an underlying *voiceless* obstruent, as in *champ**p*** → [c^{h}ɛ:^{H}m], but not when the deleted segment was voiced, as in *blon**d*** → [blɔ^{M}n]. In other words, the tone assignment pattern is not due to preferences for particular output configurations but rather due to particular properties of the English input.

English loanwords in Lhasa Tibetan present a case where the English input stress is completely ignored in tone assignment (Hsieh and Kenstowicz, 2006, 2008). In Tibetan, H and L tones, or registers, are contrastive only in the initial syllable and non-initial syllables are realized with a default H tone. The exact phonetic realization of the initial L and H tones differs depending on the composition of the rhyme. In English borrowings, the stress position of the English input is ignored and tone is assigned based on the voicing of the word-initial consonant of the English input; a H tone appears on the first syllable if the English word begins with a voiceless consonant or a vowel, as in (9a), and a L tone appears if the English word begins with a voiced consonant (obstruent or sonorant), as in (9b).

[5] For example, in disyllabic words with a final "live" syllable, the majority pattern is a M tone if the final syllable is stressed and a falling tone if unstressed, as in *domáin* → [do:^{M}me:^{M}n] and *árrow* → [ɛ:^{M}ro:^{HL}].

[6] Traditional Thai grammar distinguishes between "live" and "dead" syllables. "Live" syllables end in a sonorant or a vowel and "dead" syllables end in an obstruent.

(9) Input language stress (English) is ignored in Tibetan, a tone language (Hsieh and Kenstowicz, 2006, 2008)

a. Voiceless consonant- or vowel-initial word

políce → **pu^{H}**li^{H}si^{H}

áspirin → **ʔ^{H}**si^{H}pi^{H}lin^{H}

b. Voiced consonant-initial word

bóttle → **po^{L}**to^{H}ra^{H}

mótor → **mo^{L}**t a^{H}

Hsieh and Kenstowicz (2006, 2008) examine the possibility that the consonant-tone correlation is a reflection of native statistical generalizations. However, the asymmetry is not striking enough to support a categorical effect attested in loanwords. For example, the L tone is slightly more common for sonorant-initial words (L: 56%, H: 44%) overall, but the preference for L does not hold true for many individual sonorant consonants. Moreover, the voicing contrast of the English obstruents affects tone assignment, but the voicing contrast itself is neutralized in the adapted form, as in [**p**u^{H}li^{H}si^{H}] 'police' vs. [**p**o^{L}to^{H}ra^{H}] 'bottle'. This type of opaque correlation between the input consonant and the output tone assignment should now be quite familiar. In other words, adapters seem to be performing on-line tonogenesis, which essentially exaggerates consonant-induced pitch perturbations and turns them into phonological contrasts, while neutralizing the laryngeal contrast on the consonants themselves (cf. Hombert et al., 1979).

It turns out that Tibetan adapters are not only "stress-deaf", but surprisingly also "tone-deaf" in their adaptation of Mandarin tones. Here again, no effort is made to match the general pitch level of the Mandarin input tone—Tibetan tone assignment is based on the voicing of the initial consonant. Some examples are provided in (10).

(10) Adaptation of Mandarin tone to Tibetan (Hsieh and Kenstowicz, 2006, 2008)

a. Voiceless (obstruent)-initial words: High tone

Mandarin		*Tibetan*	
ʂu^{H}tɕi^{F}	→	**ʂu^{H}**tɕi^{H}	'secretary (of a CCP committee)'
taŋ^{L}ʯan^{R}	→	**taŋ^{H}**$\tilde{\text{ø}}^{H}$	'CCP member'

b. Sonorant-initial words: Low tone

ja^{H}tsl̩^{L}	→	**ja^{L}**tse^{H}	'duck'
wa^{L}sl̩^{H}	→	**wa^{L}**si^{H}	'gas'

Hsieh and Kenstowicz (2006, 2008) propose that equivalence cannot be drawn between the Mandarin and Tibetan tones because their acoustic realizations differ greatly; Tibetan tonal contrasts utilize a far smaller pitch range (ca. 20 Hz), compared to that of Mandarin (ca. 100 Hz) (based on Chuang, 1972; Kjellin, 1977). To account for the adaptation pattern in English and Mandarin, they propose a series of "enhancement constraints" which provide the intended mapping between the voicing of the input consonants and tones in the output: voiced → L tone, voiceless → H tone, which are presumably innately available or derivable from the general phonetic experiences of the speakers in the sense of Steriade (2008[2001])'s *P-map*.

Finally, there are a couple of examples of adaptations in borrowings from Japanese, a pitch accent language, to the tone languages Thai and Taiwanese. In both cases, the input pitch accent is completely ignored and tone assignment is based on the position and segmental composition of the syllables. In Japanese loanwords in Thai, default tone assignment is generally similar to that of the English loanwords discussed above; a live syllable is adapted with a M tone, and among the dead syllables, /ʔ/-final syllables tend to get a L tone, while /p t k/-final syllables tend to get a H tone (Osatananda, 1996).

In Japanese loanwords in Taiwanese (Southern Min), another tone language, tone is also assigned based on the segmental composition of the syllables and no attempt is made to mimic the position of the pitch accent in the Japanese input, despite the fact that Taiwanese has an inventory of seven tones (Hsieh, 2006; Tu and Davis, 2009). Here, tone assignment is sensitive to the structure of the rhyme, roughly assigning a contour tone (H͡L or M͡H, depending on the position) to a syllable with a heavy nucleus or a sonorant coda, and a level tone (H or M, depending on the position) to a syllable with a light nucleus or a syllable with an obstruent coda, as shown in (11). The examples in (11) illustrate that the position of the pitch accent in Tokyo Japanese is irrelevant in tone assignment.

(11) Tone assignment in Japanese loanwords in Taiwanese (Hsieh, 2006)

a. Light syllable or syllable with an obstruent coda

Japanese		*Taiwanese*	
susí	→	su^{H}ɕi^{H}ʔ$^{\underline{M}}$	'sushi'
míso	→	mi^{H}so^{H}ʔ$^{\underline{M}}$	'miso'

b. Syllable with a long vowel or a sonorant coda

kanpai (unaccented)	→	$k^{h}am^{\widehat{MH}}pai^{\underline{HL}}$	'to toast'
zyankén	→	$tɕaɲ^{\widehat{MH}}k^{h}en^{\underline{HL}}$	'scissor-paper-rock'

Similar to Tibetan, the Taiwanese pattern is also puzzling in that there is no evidence that the emergent pattern is the "default" pattern of Taiwanese, although the restriction of a contour tone to a rhyme with a long vowel or sonorant coda is a cross-linguistically common pattern (Zhang, 2004). Moreover, one of the tones that surfaces in the loanwords (i.e., $\widehat{MH}$) does not even exist in the native inventory. Hsieh (2006) proposes that tone assignment is motivated by the preservation of contrast—the preservation of types of rhymes. It is not clear, however, why the preservation of rhyme structure trumps direct tone preservation.

To summarize the discussion so far, some tone languages use a variant of a high tone to reflect prominence in the input language. Such a pattern is found when the input is from a tone language, as well as when the input is from a stress language, both in African tone languages,[7] as well as in Asian tone languages, e.g., Cantonese and Mandarin. On the other hand, there are languages where the input prominence, stress, tone, or pitch accent, is partially or largely ignored and default assignment prevails.

These latter cases are puzzling in at least two ways. First, why is the input language prominence ignored? Second, where does the "default" come from? The default mechanism is motivated by the native phonology in some cases, but not in others? It is notable that all cases of "retreat to the unmarked" are found in Asian tone languages (Vietnamese, White Hmong, Thai, Lhasa Tibetan, and Taiwanese). Many Southeast Asian Languages are currently undergoing tonogenesis or have done so fairly recently. Also, even synchronically, tonal contrast in many of these languages interacts closely with phonation contrasts and the tonal inventory is often restricted based on the segmental composition of the syllables. Therefore, the tonal contrast has more complex perceptual cues (cf. Kjellin, 1977; Pham, 2003; Svantesson and House, 2006; Brunelle, 2009), which is distinct from African tone languages, where tones have a more straightforward correlation with f_0 phonetically. So, in this sense, tones in Asian languages are more closely tied to "segmental" contrasts, compared to African tone languages, and the output high tone associated with stressed syllable in the English input is not necessarily equated with a high tone in the native language.

3. Pitch accent languages

The two pitch accent languages for which suprasegmental adaptation has been systematically investigated are Korean (North Kyungsang, South Kyungsang, and Yanbian (Chinese) dialects) and Japanese (Tokyo, Nagasaki, Kagoshima dialects). With the exception of the adaptation of Mandarin tones in Yanbian Korean (spoken in Yanbian, an autonomous region of China), pitch accent is assigned largely based on the segmental composition of the input words and exhibits "a retreat to the unmarked" (cf. Kenstowicz, 2005).

Shinohara (2000, 2004) shows that in French loanwords in Japanese, pitch accent is assigned by the Latin stress rule, i.e., the accent falls on the head of a bimoraic trochee at the right edge of a word with final syllable extrametricality: ́μμ<σ>#, as in (12a). English loanwords, on the other hand, preserve the stress of the input word as a lexical accent to a large extent (Shinohara, 2000, 2004), as in (12b), but default accent placement, similar to the pattern found in French loanwords, is also possible, as in (12c) (McCawley, 1968; Kubozono, 2006).

(12) Accentual adaptation in Japanese

a. French loanwords in Japanese

French		*Japanese*	
tʀavɛsti	→	torabésuti	'travesty'
alɛʀt	→	aréruto	'alert'

b. English loanwords in Japanese

French		*Japanese*
techníque	→	tekuní:ku
pícnic	→	píkunikku

c.

Eúrope	→	jo:róppa
Chrístmas	→	kurisúmasu

Again, what makes these cases particularly interesting is that the default status of these emergent patterns is not necessarily evident in the native phonology. Shinohara (2004) suggests the possibility that loanword accentuation reflects

[7] We do not know of any cases where the input language pitch accent is preserved as a variant of high tone. This may be due to properties specific to pitch accent languages or simply due to the low number of relevant cases.

UG preferences, but Kubozono (2006) argues that the default pattern is indeed present in the native data as a strong statistical tendency, even though the pattern is less noticeable in native words than in the loanwords due to the relative scarcity of accented native words and those with long or epenthetic vowels.

Pitch accent assignment in English loanwords in Northern Kyungsang Korean is examined in detail by Kenstowicz and Sohn (2001). In Northern Kyungsang Korean, there are two types of pitch accents. Words with a "doubled" accent have a high tone over the first two syllables and words with a "single" accent have a high tone over just a single syllable. For "single" accent native words, the position of the accent is largely unpredictable. For example, three-syllable words can have an accent on any of the three syllables, as in *kámani* 'rice bag', *kurúma* 'cart', or *satarí* 'ladder'. So, in principle, there are no native restrictions on pitch accent placement that would prevent the faithful preservation of the position of stress in the English input as a pitch accent. However, in the actual adaptation, pitch accent is assigned largely based on the segmental composition of the word. If the initial syllable of a word is heavy, a "doubled" accent is assigned, particularly when the initial syllable contains a long vowel, as in (13a). Otherwise, the general pattern is to have a "single" accent on the head of a bimoraic trochee at the right edge of a word, as in (13b).

(13) Accentual adaptation in English loanwords in Northern Kyungsang Korean

a. Initial syllable with a long vowel: double accent

utópia	→	jú:t^{h}óp^{h}ia
Vénus	→	pí:nʌ́sɨ

b. Otherwise: single accent

cábinet	→	k^{h}epinét
América	→	ameríkʰa

Similarly, in South Kyungsang Korean, accent assignment in the native vocabulary is largely unpredictable (e.g., /kúɾ́ɨm/ 'cloud', /kíɾɨm/ 'oil', /kəɾ́ɨm/ 'fertilizer'). However, in English loanwords, pitch accent is assigned mainly based on the segmental composition of the words (Jun, 2006; Kubozono, 2007; Lee, 2009). Heavy syllables tend to attract a pitch peak (i.e., a high tone), as in (14a). In addition, the penultimate syllable gets a default accent, as in (14b).

(14) Accentual adaptation in English loanwords in Southern Kyungsang Korean

a. Heavy syllable: H

lemon	→	remón	Light-Heavy: LH
taxi	→	tǽksi	Heavy-Light: HL
méntion	→	ménsjən	Heavy-Heavy: HH

b. Default: penult H

gas	→	k'ásɨ	Light-Light: HL
domino	→	tomíno	Light-Light-Light: LHL

As in Japanese, some aspects of loanword accent assignment in the Korean dialects are directly attributable to native patterns. For example, in Northern Kyungsang Korean, native words with initial long vowels are assigned a double accent without exception and the same holds true for loanwords. However, other patterns that emerge in loanwords have only tenuous connections to native tendencies, if at all. For this reason, Kenstowicz and Sohn (2001) discuss the possibility that the emergent loanword patterns could be attributable to UG preferences.

Another puzzle that arises is why the input stress is ignored in pitch accent assignment in the languages even in the absence of native restrictions preventing the faithful preservation of the input stress position. Kubozono (2006) argues that the contrastive function of pitch accent location is fairly marginal in Japanese phonology and that it is the presence vs. absence of accent that is functionally more important. Thus, faced with foreign input, Japanese adapters pay close attention to contrastive aspects of the signal from the perspective of the native phonology i.e., presence of an accent, which is signaled by an abrupt drop in pitch, rather than to the location of the pitch drop, which is contrastively less important in Tokyo and Kagoshima Japanese.[8]

Thus far, we have discussed the adaptation of stress in pitch accent languages. We find the adaptation of pitch accent into another pitch accent language in Japanese loanwords in North Kyungsang Korean and Yanbian Korean (Ito, in preparation) and here, too, pitch accent assignment ignores the input pitch accent position and default assignment applies.

Finally, an example of the adaptation of tone in a pitch accent language is found in Mandarin loanwords in Yanbian Korean. In Yanbian Korean, pitch accent falls on either of the last two syllables for the majority of native and Sino-Korean

[8] Matsuura (2008) examines pitch accent placement in loanwords in Nagasaki Japanese, where it is argued that the pitch accent adaptation is sensitive to the position of pitch drop in Tokyo Japanese.

words. In Mandarin loanwords, the pitch accent also falls on one of the two last syllables—the penultimate or the final—depending on the tone of the final two syllables in the Mandarin input. Ito and Kenstowicz (2009) demonstrate that pitch accent assignment mirrors the pattern of f_0 movement during the transition between the last two syllables of the Mandarin input—if f_0 rises during the transition, pitch accent falls on the final syllable (LH); if f_0 falls during the transition, the pitch accent falls on the penultimate syllable (HL). As Ito and Kenstowicz point out, the Yanbian Korean pattern is somewhat surprising, given that in most other Asian tone or pitch accent systems input prominence is largely ignored and default tone/accent assignment prevails.

4. Stress languages

Now we will consider cases where a stress language borrows words from another stress language.[9] Unlike tone or pitch accent languages, stress languages have more restricted possibilities in terms of where prominence can occur. When the input stress position violates the metrical constraints of the native language, the illicit structure can be repaired by shifting stress to an acceptable position, while keeping the segmental material intact. Alternatively, the stressed syllable of the input can be placed in the proper position with respect to native metrical restrictions by segmental truncation or augmentation. We will discuss these two types of adaptation in turn.

First, a number of languages exhibit the stress shift option. A list of languages employing the stress shift option is provided in (15). It is notable that the stress shift option is found in languages with stress on initial (15a), final (15b) or (ante) penultimate syllables (15c). The input language is English where unspecified.

(15) Stress shift

a. Native pattern: stress on initial syllable

i. Finnish (Uralic, Karttunen and Moore, 1974; Karvonen, 2005; Fenyvesi and Zsigri, 2006; Arto Anttila, p.c.)

Swedish	*musík*	→	músi:kki	'music'
Russian	*pirók*	→	pí:rakka	'pie'
	vacátion	→	vǻke:si	'vacation'

ii. Hungarian (Uralic, Fenyvesi and Zsigri, 2006)

convérter	→	*kónverter*

iii. Icelandic (Indo-European, Clausing, 1986)

the mosqúitos	→	*mú:skiturdnar*

iv. Tohono O'odham (Uto-Aztecan, Fitzgerald, 1999)

Spanish	*machína*	→	má:gina	'car'
	becérro	→	wísiɪo	'calf'

b. Native pattern: stress on the final syllable

i. Jahai (Afro-Asiatic/Mon-Khmer, Burenhult, 2001)

Malay	*bílang*	→	bilɛ́ŋ	'to count'

ii. French (Indo-European, Peperkamp and Dupoux, 2003)

wálkman	→	wɔkmán

iii. Pochutec (Uto-Aztec, Bartholomew, 1980)

Spanish	*cabállo*	→	kayú	'horse'
	médio	→	milyú	'half'

iv. Tatltepec Chatino (Oto-Manguean, Bartholomew, 1980)

Spanish	*cabállo*	→	kwayú	'horse'
	música	→	muská	'music'

c. Others

i. Selayarese (Austronesian, Broselow, 2000)

Native pattern: stress on penultimate, but on antepenultimate if final vowel is epenthetic

Bahasa Indonesian	*səbáb*	→	sábaʔ	'cause'
	bərás	→	bérasa	'rice'

[9] Takahashi (2006) examines the adaptation of Japanese pitch accent in Palauan, a stress language. Palauan shows a combination of sensitivity to input pitch accent and an emergent default strategy. All other languages discussed in this section are cases of stress-to-stress adaptation.

ii. Egyptian Arabic (Afro-Asiatic/Semitic, Hafez, 1996)

Native pattern: final stress if final syllable is superheavy; otherwise, penultimate syllable is stressed

dóctor	→	doktó:r
kétchup	→	katsább
cútout	→	katá:wet

For example, Hungarian has regular initial stress and English words with non-initial stress are adapted with a stress shift to the initial syllable and English *convérter* is realized as *kónverter* in Hungarian (Fenyvesi and Zsigri, 2006). Here again, we are faced with the learnability puzzle: how do Hungarian adapters decide to employ stress shift rather than segmental deletion, as in *converter* → **vérter*?

It turns out, while the homeland varieties of Hungarian and Finnish mainly employ stress shift, American varieties of Finnish and Hungarian also show truncation of segments, albeit in restricted contexts, as in *garáge* → Am. Finnish [krá:tsi], *apártment* → Am. Finnish [pármentti] and *excúse me* → Am. Hungarian [kjúzmi] (Karttunen and Moore, 1974; Fenyvesi and Zsigri, 2006) Also, there are other languages that employ segmental deletion to maintain the input stress in the original position and at the same time comply with native restrictions on the stress position. These are listed in (16). Interestingly, all three are Latin American languages in contact with Spanish and in all three languages, stress falls on the final closed syllable.

(16) Truncation

a. Huave, Basilect (Language Isolate, Davidson and Noyer, 1997; Broselow, 2009)

Native pattern: stress on the final closed syllable; for the few words ending in an open syllable, stress is on the penultimate syllable.

Spanish	*garabáto*	→	garabát	'hook'
	ígado	→	ík	'liver'

b. K'ichee' (Mayan, Isaacs and Wolter, 2003 cited in Broselow, 2009)

Native pattern: stress on the final closed syllable

Spanish	*atáke*	→	atá:k	'attack'
	gánas	→	gá:n	'desire'

c. San Lucas Quiaviní Zapotec (Oto-Manguean, Chávez-Peón, 2007)

Native pattern: stress on the final heavy syllable

Truncation is limited to the final vowel in an open syllable

Spanish	*júgo*	→	xu:g	'juice'
but	*báscula*	→	bá'skwa'll	'scale'

For example, in Spanish loanwords in the basilect of Huave, the position of input Spanish stress is preserved at the expense of segmental material. In the native vocabulary of Huave, most content words and suffixes end in a closed syllable and stress falls on that final closed syllable. Thus, when Spanish words have non-final stress, post-tonic material is truncated so that stress falls on a word-final closed syllable, as in Sp. *garabáto* → [garabát] 'hook' and Sp. *ígado* → [ík] 'liver'. A very similar pattern is found in Spanish loanwords in K'ichee' (Isaacs and Wolter, 2003, cited in Broselow, 2009) and in San Lucas Quiaviní Zapotec (Chávez-Peón, 2007). Both of these languages have a restriction that the final syllable be closed and stressed and Spanish loanwords with non-final stress are adapted with the truncation of post-tonic segments.

Fijian and Hawaiian, on the other hand, employ vowel lengthening to preserve the input stress position and to comply with native metrical restrictions.

(17) Lengthening

a. Fijian (Austronesian, Kenstowicz, 2007; Broselow, 2009)

Native pattern: Iterative right-to-left moraic trochee

guitár	→	[ŋgitá:]
cábin	→	[kè:bíni], *[kebíni]
cólony	→	[kò:lóni], *[kolóni]

b. Hawaiian (Austronesian, Elbert and Pukui, 1979; Schüz, 1994; Jones, 2009)

Native pattern: Iterative right-to-left moraic trochee

rábbit	→	[là:páki], *[lapáki]

Some exceptions: *Álex* → [əlíkə], *Hérbert* → [həpáki]

Both languages have moraic trochees built from right to left. Thus, in words such as *cábin* → [kè:bíni], without vowel lengthening, the initial syllable would be unstressed *[kebíni], but vowel lengthening allows the input stress to be preserved. It is not the case that all stressed vowels are lengthened; rather, vowels are lengthened only in contexts where stress would otherwise not fall on that syllable. For example, in *tobácco* → [tavákо], the regular stress rule assigns stress on the penultimate syllable anyway; thus, the stressed vowel does not lengthen. In other words, it is not the case that the preservation of stress in the original position is an epiphenomenon of stressed syllables being adapted as long vowels, which in turn attract stress. Rather, the vowel lengthening applies only when necessary for keeping stress in the original position.

To summarize, we see that languages make different choices when native metrical constraints force a choice between preserving suprasegmental information and segmental information. Some languages preserve all segmental information of the input language at the expense of not preserving input language stress, while others preserve the input language stress at the expense of deleting segmental material or altering segmental duration. Here, we are faced with a learnability puzzle (Broselow, 2009; Kang, in press): given these options that are available to satisfy the native metrical restrictions, how do adapters converge on a particular choice?

One possibility is to resort to the contrastive status of the relevant structure in the native language—i.e., a contrastive aspect of the native phonology is preferentially preserved over non-contrastive aspects of the native phonology (cf. Dresher, 2009). For example, in Finnish, the segmental distinction of C vs. Ø is contrastive, but the position of stress is not contrastive and completely predictable. Therefore, when presented with a choice between segmental deletion vs. stress shift, strategies which preserve contrastive characteristics are preferred over those that preserve predictable and redundant characteristics. However, this explanation cannot be extended to other groups of languages. In Huave, for example, despite the fact that the position of stress is predictable in the native phonology, the input stress position is preserved over segmental material.

Another possibility is that the different adaptation patterns follow from the way foreign stress is perceived. Dupoux and Peperkamp (2002), Peperkamp and Dupoux (2002) and Peperkamp (2004) propose that when the stress pattern is "surface-observable"—i.e., stress consistently falls on a predictable position from the edge of the utterance, as in Hungarian, French, and Fijian, learners do not encode the position of stress in their pre-lexical representations during the early stages of acquisition. As a result, they lose the ability to perceive stress contrasts, resulting in "stress-deafness".[10] Indeed, perception experiments support the view that speakers of languages where stress is surface-observable (i.e., Arabic, Finnish, French, Hungarian, and Turkish) exhibit poor performance in perceiving stress contrasts in foreign stimuli, whereas speakers of languages such as Spanish and Polish, where stress position is unpredictable, or predictable, but not surface-observable, respectively, perform much better (Dupoux et al., 1997; Peperkamp and Dupoux, 2002; Altmann, 2006).

Under the view that the bulk of loan adaptation takes place during perception (Peperkamp, 2005; Peperkamp et al., 2008; Boersma and Hamann, 2009), it is expected that when the host language has surface-observable stress, the input position of stress is erased during perception and the apparent stress shift is a case of straightforward stress assignment over the segmental material, devoid of input stress. In other words, perception-based stress adaptation would predict that languages employing stress shift are "surface-observable" stress languages, whereas ones showing preservation of the input stress are likely not. The languages, however, do not fall into the predicted two categories. In fact, all languages employing the three strategies in (15)–(17)—stress shift, truncation, and vowel lengthening—fit the criterion of "surface-observability", except for Selayarese, where final vowel epenthesis obscures an otherwise regular penultimate stress pattern.

Similarly, Broselow (2009) proposes that stress adaptation takes place during perception. Broselow argues that in Fijian, what is perceived from the input is not the position of stress per se, but rather vowel length on a stressed syllable, which in turn attracts stress in the production grammar. For example, *cabin* is perceived with a long vowel on the initial syllable (/ke:bini/), and regular stress assignment outputs [kè:bíni].[11] As for the truncation repair strategy attested in Huave and K'ichee', Broselow (2009) proposes that because the correlation between stress and word boundaries is strongly reliable in these languages, during perception, the acoustic properties of stress are perceived as cues for word boundaries. However, this account runs into problems with many of the languages employing the stress shift option, where, apparently, the robust correlation between the position of stress and word boundaries does not result in truncation.

In fact, any theory of stress adaptation that predicts a rigid correlation between native stress patterns and a repair strategy for stress adaptation runs into problems in languages where both options are variably attested. We mentioned above the variation between homeland vs. American varieties of Finnish and Hungarian (Karttunen and Moore, 1974; Fenyvesi and Zsigri, 2006); the homeland varieties mainly employ stress shift, whereas the American varieties show segmental deletion, albeit in limited contexts.

A very similar issue arises in tone languages as well. Although tone languages tend to have relatively few restrictions on the occurrence of tones, there are cases where tonotactics make it impossible to preserve the input prominence without altering segmental properties. In Mandarin (Wu, 2006), as mentioned above, the general pattern that stressed monosyllabic words are adapted with a falling tone is violated in *valve* → [fa$^{2(LH)}$] and *card* → [k^{h}a$^{3(L)}$] due to gaps in the Chinese syllabary (i.e., *[fa$^{4(HL)}$] and *[k^{h}a$^{4(HL)}$]). Interestingly, the tonotactic restriction is satisfied by changing the tone, rather than changing the vowel or the

[10] It is not the case that all languages with predictable stress have surface-observable stress in the sense of Peperkamp and Dupoux (2002). For example, in Polish stress falls on the penultimate syllable, but there are many monosyllabic words, and as a result, in terms of distance from the edge of an utterance, stress does not always fall on a designated position and stress is not "surface-observable".

[11] Peperkamp (2004) suggests a similar analysis for Watjarri, which has surface-observable stress, but unexpectedly allows exceptional stress on loans. Rice's (2006) analysis of stress assignment in Norwegian loanwords is similar in spirit.

consonant (e.g., *card* → *[k^hə$^{4(HL)}$]). Wu (2006), citing Culter and Chen (1997), conjectures that the Mandarin pattern may be due to the general relative prominence of segmental features over tonal features. Cantonese (Yip, 2002, 2006), on the other hand, faced with similar tonotactic restrictions, preserves tones at the expense of altering the segmental quality. Cantonese does not allow a high tone on syllables containing a long vowel and an obstruent coda (*V:O^H). When a stressed syllable with an obstruent coda contains a vowel that does not have a short counterpart in Cantonese, the vowel quality changes to allow for a high tone. For example, the most faithful approximation of *Jack*, *[tsɛ:k^H], violates the *V:O^H constraint, thus the word is borrowed with a change in vowel quality (i.e., [tsɪk^H]) rather than with a tonal change. Yip (2002), citing Surendran and Niyogi (2004), conjectures, contrary to Wu (2006), that tones in tone languages may carry a higher functional load than vowel quality.

Another possibility is that the difference between Mandarin and Cantonese comes from the fact that Cantonese has had a more direct and intensive contact with English than Mandarin and there is a higher level of bilingualism in Cantonese–English contact than Mandarin–English contact situations. This is also compatible with the fact that in Cantonese, along with forms like *Jack*, *[tsɪk^H], where violation of *V:O^H is repaired with a vowel quality change, there are many forms where similar words are borrowed without modification in violation of the native restriction against *V:O^H, as in [ts^{h}ɛ:k^H] 'check' or [k^hɔ:^{H}pɛ:k^H] 'call back' (Bauer and Benedict, 1997; Yip, 2002).[12] Such importation of foreign structure is more likely with more intense bilingualism (Paradis and Lacharité, 1997, 2008, 2009).

The adaptation-as-perception view also runs into problems with respect to cases of non-adaptation and cases where loanwords induce restructuring of the native phonology. Here, we will discuss a few examples of the latter type. These are cases where the native metrical pattern is underdetermined by the native data due to the limited range of word shapes that are available and the introduction of foreign words with novel shapes (i.e., longer words, words with long vowels, etc.) bring about a reanalysis of the native system. Fikkert et al. (2006) state that "[w]hen the native stress rules are indecisive, loanwords can trigger a change." They argue that such a mechanism is responsible for the development of the modern English Latinate stress system. In Old and Middle English, stress is assigned to the initial syllable, and earlier Latin and French borrowings show stress shift to the initial syllable in conformity with the native pattern, as in *ácademy* and *cómparable*. However, by Early Modern English, a series of phonological rules shortened the length of native words, and Old English words with more than one foot were often reduced to a single foot in Middle English. This created room for an alternative analysis of the "initial stress" as a trochaic foot at the right edge of the word with final extrametricality, rather than at the left edge, the latter of which is the original stress pattern. Crucially, this reanalysis was triggered by the abundance of foreign loans with non-initial stress. For the majority of native words, this reanalysis did not change surface stress, as in *wáter* and *hópefulness*, but the change had a visible effect on longer loanwords, as in *sevérity*, *apéritif*, and *pejórative* and many early quadrasyllabic loanwords, such as *callígraphy*, *hostílity*, *philósophy*, etc., shifted their stress from root-initial to antepenultimate (Dresher and Lahiri, 2005; Svensson, 2007).

A similar situation is found in Norwegian. Similar to Old English, native Norwegian stems are restricted in length and shape (i.e., monosyllabic: cv́cc or cv́:c and disyllabic: cv́:.cv or cv́c.cv) and stress always falls on the initial syllable (Kristoffersen, 2000; Rice, 2006). This stress pattern is not only compatible with a trochee at the left edge, but also with a moraic trochee built at the right edge with optional final mora extrametricality. As a result, in loanwords in Norwegian, the option of preservation of input stress by vowel lengthening (discussed in Rice, 2006), as in *orkidé* → [orkidé:], *América* → [amé:rika], *[amerika], coexists with stress shift to the initial syllable (Kristoffersen, 2000; Hilton, 2007), as in *machíne* → [máʃʃɪn] ∼ [mɑʃí:n]. Hilton (2007) demonstrates that the variation is conditioned by social factors, as well as the frequency of use of particular words—initial shift is more likely in rural dialects, by people of a lower social class, and for higher frequency words.

A similar analysis can be applied to stress assignment in Spanish loans in Tohono O'odham. According to Fitzgerald (1999), in Tohono O'odham, primary stress falls on the initial syllable and vowel length is contrastive only for the initial (stressed) syllable in native words. The majority of Spanish loanwords show stress shift to the initial syllable, as shown in (15a-iv) above, repeated in (18a). However, there is a sizable number of Spanish loanwords that retain the original (non-initial) stress with vowel lengthening, as shown in (18b). The consistent initial stress of native Tohono O'odham is compatible with either quantity-insensitive trochee at the left edge or with quantity-sensitive trochee.

(18) Spanish loanwords in Tohono O'odham (Uto-Aztecan, Fitzgerald, 1999)

	Spanish		*Tohono O'odham*	
a.	*machína*	→	mà:gina	'car'
	becérro	→	wísiɬo	'calf'
b.	*jamón*	→	hamó:n	'ham'
	María	→	maɬí:ja	'Maria'

What these cases of variation and historical shift in stress adaptation suggest is that the choice of adaptation strategy is not rigidly tied to a particular language type and can vary even within the same language, depending on the sociolinguistic context: in particular, in situations where contact with the input language is relatively more direct, as in the urban dialects of Norwegian or American varieties of Finnish and Hungarian, input stress is more likely to be preserved. This hypothesis is in

[12] I would like to thank Michael Kenstowicz for drawing my attention to this observation.

fact compatible with the core insight of the perception-based theory of adaptation once it is recognized that the sociolinguistic context under which borrowing takes place can be varied—the closer the contact and the higher the level and rate of bilingualism, the more likely the adapters are to perceive stress contrasts of the input language correctly, in turn leading to the stronger possibility of the preservation of input stress.

5. Conclusion

To summarize the overall results of this survey, tone languages and pitch accent languages have a relatively free distribution of prominence, and in principle, can preserve the prominence of the input language (stress or pitch accent) without contradicting native tonotactic restrictions. While many languages show faithful preservation of input prominence as expected, there are a number of languages that ignore the input language prominence partially, or even completely, and assign tone or pitch accents based on a default mechanism. It was noted that all examples of the latter type of adaptation come from East Asian languages and it was suggested that the perceptual cues in the East Asian tone languages may be more complex than pitch alone and that this complexity impedes the direct equation of input prominence, stress or tone, with the native tonal categories. The default mechanism that emerges in the adaptation is motivated by the native phonology in certain cases, but often the connection to the native phonology is tenuous at best, leading many to resort to innate universals.

Also playing a role is the degree of bilingualism in the contact; i.e., all else being equal, the closer the contact between the two languages, the greater the possibility of the preservation of input suprasegmental prominence as in the contact between Mandarin and the Yanbian dialect of Korean spoken in China, the contact between English and Cantonese in Hong Kong, and the contact between English and various African tone languages which also have local varieties of English widely in use.

Stress languages, on the other hand, have stricter restrictions on the location of prominence and it is often not possible to faithfully preserve the input language prominence in the original position. A group of languages employ the stress shift option, i.e., the original stress position is ignored and stress is assigned based on native metrical rules and the segmental composition of the input words. On the other hand, another group of languages employ segmental deletion or vowel lengthening to bring the original stressed syllable to the appropriate position with respect to the native metrical rules. We considered a few possible hypotheses regarding how to account for the different choices each language makes. It was demonstrated that any hypothesis that makes a strict prediction based on the structural characteristics of the native language phonology is too rigid, given the intra-language variation in adaptation—both synchronic and diachronic. As in tone languages, it was suggested that while structural characteristics are relevant, all else being equal, the faithful preservation of the input language stress position, by way of segmental alteration or by way of importation, is more likely when the language contact is more direct and intimate.

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