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*Non-uniformity in English secondary stress: the role of ranked and lexically specific constraints**

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0 Introduction

The principles determining secondary stress placement in English display considerable NON-UNIFORMITY (Prince 1993) in their application. While in some contexts a syllable will be stressed if it is heavy, or if it is stressed in the stem of a derived form, in other environments syllable weight and stem stress do not entail secondary stress. To take a relatively straightforward case, the primary stress of the stems in (1a) is preserved as a secondary stress in the derived forms (cf. monomorphemic *Tàtamagóuchi* with initial stress), but stress preservation systematically fails in words like (1b). Here we have phonologically conditioned non-uniformity; stress preservation on light syllables is blocked in the environment of a following primary stress.

(1) a.	accrédit	accrèditátion	b.	phonétic	phònetícian
	imágine	imàginátion		cosmétic	còsmetícian
	oríginal	orìginálity		pathólogy	pàthológical
	medícinal	medìcinálity		telépathy	tèlepáthic
	divísible	divìsibílity		philátely	phìlatélic
	phenómenon	phenòmenólogy		diámeter	dìamétric

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English secondary stress also displays evidence of lexically conditioned non-uniformity; in some phonological environments, whether or not a principle applies depends on the lexical item at hand. As has often been observed (e.g. Liberman & Prince 1977: 299, Halle & Kenstowicz 1991: 460), Chomsky & Halle's (1968: 39) familiar generalisation that stress is preserved from stems like *condénse* in derived forms like *còndènsátion* (cf. *sèrendípity*) is disturbed by considerable lexical idiosyncrasy. Examples of stem stress preservation and non-preservation are given in (2a) and (2b) respectively; these words were selected to have initial heavy syllables and sonorant-final pretonic syllables, so as to control for phonological factors. The distribution of full and reduced vowels, taken here to correlate with stress,[1] is as given in Kenyon & Knott (1953), the usual source for American English stress data, supplemented by *Webster's* (1981), a more recent source that is generally consistent with Kenyon & Knott. Where there is variation between or within sources, I provide in parentheses the sources of the forms (i.e. K and/or W), followed by '+' for a full vowel in the relevant syllable, '−' for a reduced vowel, and '=' for both full and reduced variants. Thus (K+,W=) indicates that a form with a reduced vowel appears in Kenyon & Knott, and that *Webster's* gives both variants. Words missing from both dictionaries are used only when the pronunciation seems uncontroversial; these are noted with (J), indicating that I have relied on my own judgement. Note that even examples of stress preservation in (2a) are also often cited in the original sources with unstressed variants.

(2)	a.	advántage	àdvàntágeous$^{(K=,W=)}$	condémn	còndèmnátion$^{(K=,W=)}$
		àugmént	àugmèntátion$^{(K+,W=)}$	condénse	còndènsátion$^{(K+,W=)}$
		àuthéntic	àuthéntícity$^{(K=,W+)}$	impórt	ìmpòrtátion$^{(K+,W=)}$
	b.	infórm	ìnformátion	pìgmént	pìgmentátion$^{(K-,W=)}$
		trànspórt	trànsportátion	consérve	cònservátion
		trànsfórm	trànsformátion$^{(K-,W=)}$	convérse	cònversàtion
		sègmént	sègmentátion$^{(K-,W=)}$	confírm	cònfirmátion[2]
		consúlt	cònsultátion		

No extant account of English stress preservation has fully dealt with its

[1] I assume with Chomsky & Halle (1968) and subsequent research that a syllable with a reduced vowel or a syllabic consonantal nucleus is unstressed, and one with a full vowel is stressed, *modulo* the effects of word-finality (cf. Fudge 1984, Burzo 1994 and the Appendix below). I will not discuss finer distinctions between levels of stress than secondary, primary and the complete lack of stress, because stem stress does not seem to determine whether a syllable has tertiary or secondary stress (see Halle & Vergnaud 1987: 245 and Kager 1989; cf. Kiparsky 1979).

[2] The last three words (*conservation*, *conversation*, *confirmation*) are cited by Halle & Kenstowicz (1991: 460) as examples of non-preservation of stem stress. As there is no quality distinction between the full and reduced versions of these rhotacised vowels (or syllabic [r]), it is in fact impossible to know if the stress is preserved or not, at least in most dialects of American English (see Liberman & Prince 1977: 284, 299). However, John McCarthy (personal communication) notes that in Eastern Massachusetts English, where rhotacised vowels are generally restricted to stressed

non-uniformity, that is, explained why stress is consistently preserved in one context (1a), never preserved in another (1b) and variably preserved in yet another (2).

As Prince (1993) and many others have shown, phonologically conditioned non-uniformity is an expected consequence of the ranked and minimally violable constraints of Optimality Theory, and is thus captured more straightforwardly than in theories that do not allow for constraint violability (see especially McCarthy & Prince 1993a, 1994a, Prince & Smolensky 1993 and McCarthy 2000). In Optimality Theory, a constraint is violated in a particular environment because its satisfaction would conflict with the requirements of a higher-ranked constraint. If in another context the higher-ranked constraint makes no conflicting demands, the lower-ranked one is obeyed. In frameworks that do not allow for violability, non-uniformity is handled in a variety of ways, but accounting for it usually requires a loss of generality in the formulation of constraints or rules.[3]

Given the ease with which Optimality Theory generally deals with non-uniform constraint application, it is perhaps not too surprising that constraint ranking would help to provide insight into the complexities of the English secondary stress system.[4] §1 of this paper employs ranked constraints to account for the regular patterns of pretonic stress, in which syllable weight non-uniformly determines the distribution of secondary stress. The analysis of stem stress preservation and monomorphemic exceptions in §2 incorporates prosodic faithfulness constraints into the hierarchy established in §1. The result is an account that relies largely on independently motivated constraints and rankings to explain the non-uniform distribution of stem-based stress and of underlyingly specified exceptional stress.

Lexically conditioned non-uniformity requires elaboration of the basic theory of Prince & Smolensky (1993), which provides no means of relativising the activity of a constraint to a particular set of lexical items. To handle the lexical idiosyncrasy of stem stress preservation, I propose in §2.4 that prosodic faithfulness constraints can be multiply instantiated in the constraint hierarchy: in a general version and in a lexically indexed version. This allows stress preservation to optionally overcome some, but not all, constraints. The resulting analysis captures the non-uniformity of stress preservation outlined above. This approach to lexical non-uni-

syllables, words of this type vary as to whether the rhotic of the stem is preserved or not. Assuming that rhotic preservation correlates with stress preservation, this provides a window on the stress patterns of these words, at least in one dialect. McCarthy, a native speaker, judges all three of these words to have schwa, and *usurpation* to have the rhotacised vowel (though *conversation* and *confirmation* have an optional rhotacised vowel when used as direct nominalisations; see §2.4.1).

[3] Compare, for example, the extrametricality rule in Hayes' (1995) analysis of Kelkaar's Hindi with the NON-FINALITY constraint in Prince & Smolensky's (1993) account.

[4] See Hammond (1999) for another approach to English stress in Optimality Theory.

formity is further justified in §2.5 by providing evidence of lexically indexed ranking of a structural constraint. Outstanding problems for further research appear in the Appendix.

1 An optimality account of regular pretonic stress placement

1.1 Primary stress

The account of pretonic stress placement to be proposed here takes as its starting point McCarthy & Prince's (1993b) brief discussion of English stress. They invoke the following gradiently violable constraint to place main stress near the edge of the word:

(3) ALIGN-HEAD (Align (PrWd-R, Head(PrWd)-R))
Align the right edge of the Prosodic Word with the right edge of the head of the Prosodic Word.

McCarthy & Prince (1993b) discuss only the interaction between ALIGN-HEAD and ALIGN-LEFT (ALIGN-L; see §1.2 below), and abstract from quantity-sensitivity. Though a full account of primary stress placement is beyond the scope of this paper (see e.g. note 5), I will show how the alignment-based approach can yield a novel, typologically supported, account of this aspect of the system.

Following Prince & Smolensky (1993), I take headship to be transitive, so that 'head of the Prosodic Word' is fulfilled not only by the foot that bears main stress, but also by the syllable that is the head of that foot. An undominated ALIGN-HEAD constraint would force the head of the Prosodic Word to be the rightmost syllable, resulting in final main stress. That English nouns are not stressed on the final syllable is partially accounted for by the domination of ALIGN-HEAD by NON-FINALITY (NON-FIN), formulated as 'the head of the Prosodic Word must not be final' (Prince & Smolensky 1993: 52: cf. Hung 1994, Buckley 1998 – see also Hayes 1982, Selkirk 1984 and Kager 1989 on extrametricality in English stress). The minimal violation of gradient ALIGN-HEAD, which satisfies NON-FIN, is to have main stress on the penultimate syllable. The ranking NON-FIN ≫ ALIGN-HEAD places main stress on the correct syllable of *horízon*, and other words with heavy penultimate syllables (e.g. *aróma*, *uténsil*, *appéndix*, *placénta*):

(4) NON-FIN ≫ ALIGN-HEAD

horizon	NON-FIN	ALIGN-HEAD
☞ a. ho[rí]zon		*
b. [hóri]zon		**!
c. [hòri][zón]	*!	

The tableau follows the usual conventions (Prince & Smolensky 1993). Foot boundaries are indicated by square brackets, and headship by accent marks. Violations of ALIGN-HEAD are counted in terms of the number of syllables that separate the main stress from the right edge. A candidate that fully satisfies ALIGN-HEAD with final stress (4c) is ruled out by its violation of the higher-ranked NON-FIN. The unmotivated violation of ALIGN-HEAD in (4b) rules out antepenultimate stress.

The antepenultimate stress of words like *Canada* that have light penults (e.g. *América*, *cínema*, *ársenal*) can be attributed to constraints demanding that feet be minimally bimoraic (i.e. FOOTBINARITY, or FTBIN; Prince & Smolensky 1993), and left-headed (i.e. TROCH: 'feet are trochaic'). If these constraints, along with NON-FIN, outrank ALIGN-HEAD, antepenultimate stress is optimal for such words (on the ranking between NON-FIN and FTBIN, see note 16):

(5) FTBIN, TROCH, NON-FIN ≫ ALIGN-HEAD

Canada	FTBIN	TROCH	NON-FIN	ALIGN-HEAD
☞ a. [Cána]da				**
b. Ca[náda]			*!	*
c. Ca[ná]da	*!			*
d. [Caná]da		*!		*

This account differs from prior analyses of English stress in that weight-sensitivity is attributed to the interaction of FTBIN and ALIGN-HEAD, rather than to a principle of quantity-sensitivity *per se*. The standard analysis of English is that main stress is subject to a quantity-sensitivity parameter or rule, and that the parameter is turned off for secondary stress placement, though syllable weight is again a factor in the subsequent application of destressing (Liberman & Prince 1977, Hayes 1982, Halle & Vergnaud 1987). In Halle & Vergnaud's (1987: 228) analysis of English, for instance, secondary stress assignment differs from primary stress assignment in lacking a weight-to-stress rule (the Accent Rule). The motivation for secondary stress assignment without quantity-sensitivity is that heavy syllables often surface as stressless in the pretonic string of syllables (see §1.2 below).

The account based on FTBIN and ALIGN-HEAD seems to better converge with the typological facts. The pattern of having a single quantity-sensitive foot for main stress, along with iterated quantity-insensitive feet, is fairly common amongst trochaic languages (relatively clear examples are Spanish (Harris 1983, Halle & Vergnaud 1987, Hayes 1995) and Inga (Levinsohn 1976, Hayes 1995)).[5] What unites these cases is that the single quantity-sensitive foot is found at the right edge of the word (abstracting

[5] The facts of English primary stress retraction do introduce some complications (see

from extrametricality and exceptionality). Trochaic languages that have primary stress on the leftmost foot do not apparently display quantity-sensitivity that is specific to primary stress. In fact, the opposite scenario is sometimes observed. In Finnish (Kiparsky 1991, Kager 1992, Elenbaas 1999), for example, secondary press placement avoids left-headed light–heavy (LH) feet, while the main stress foot is strictly initial and bisyllabic, even at the cost of creating an LH foot. Here only secondary stress is sensitive to syllable weight. As far as I know, this main-stress specific quantity-*in*sensitivity has never been attested of trochaic languages with rightmost primary stress. While these correlations escape other approaches to main-stress specific weight effects, which simply endow the main stress foot with quantity-sensitivity in one way or another (e.g. Halle & Vergnaud 1987, Dresher & van der Hulst 1998, Hayes 1995), in what follows I show that they fall out directly from the present analysis of English main-stress quantity-sensitivity.

I will first deal with the absence of main-stress specific quantity-sensitivity in trochaic languages with primary stress at the left edge of the word. In such languages, ALIGN-HEAD(L), rather than ALIGN-HEAD(R), is the constraint determining main-stress placement. Crucially, FTBIN and TROCH cannot force a violation of ALIGN-HEAD(L), since they do not conflict with it. To illustrate this, the tableau in (6) shows how candidate prosodifications are evaluated for the hypothetical input *danaca*.

(6) *Left-oriented main stress*

danaca	FTBIN	TROCH	ALIGN-HEAD(L)
☞ a. [dána]ca			
b. [daná]ca		*	*
c. da[náca]			*

Obviously, no matter how these constraints are ranked, stress will not shift from the left edge of the word, either by forming an iambic foot (6b) or by

especially Kager 1989, as well as Burzio 1994, for thorough discussion and references). When there is final stress, the main stress usually occurs on the next foot to the left. This is presumably an effect of NON-FIN. With no elaboration, the present account would predict that main stress should land on the next legitimate foot, either a heavy syllable (e.g. *staláctìte*) or pair of lights (e.g. *acétylène*). However, main stress often ends up further to the left, skipping a heavy syllable (e.g. *désignàte*) or a pair of light syllables (e.g. *cátamaràn*). One way to capture these cases of 'strong' and 'long' retraction might be to use a constraint demanding the alignment of the right edge of the Prosodic Word with a foot head (rather than the head of the Prosodic Word) to place the rightmost stress, and position the ALIGN-HEAD constraint much lower in the hierarchy, so that it cannot affect the placement of the other feet in the word. This would mean that the typological generalisation would have to be stated in terms of how a non-iterated foot can differ from iterated feet in quantity-sensitivity, rather than how the main stress foot differs from secondary stress feet.

skipping the first syllable (6c), since FtBin and Troch can be fully satisfied with stress right at the left edge (6a). Thus, main-stress specific quantity-sensitivity cannot be driven by the interaction of these constraints. This contrasts with English and similar cases in which stress placement skips a light edgemost syllable to form a larger foot, because the dominance of FtBin and Troch forces the violation of Align-Head(R) (see (5)).

To see why main-stress quantity-insensitivity is only attested at the left edge, consider how Align-Head(R) and Align-Head(L) treat a light–heavy sequence of syllables. Above, we noted that Align-Head(R) prefers L(H) to (LH), when the foot is trochaic (see tableau (4)). Align-Head(L), on the other hand, is better satisfied by (LH), and can thus override the general dispreference for LH feet seen in trochaic languages. In Finnish and similar languages (see Kager 1992 for others), LH sequences in non-initial positions are stressed on the heavy syllable, rather than on the light one, though stress is otherwise trochaic. If an LH sequence is initial in the word, however, the main stress falls on the light syllable. This can be explained by the dominance of Align-Head over the constraint disfavouring such feet (for evidence of the reverse ranking, see Malayalam (Mohanan 1986, Idsardi 1992, Hayes 1995) and Wolof (Ka 1988, Idsardi 1992)). In this way, at the left edge, but not the right, we get main-stress specific quantity-insensitivity.

1.2 Secondary stress

McCarthy & Prince (1993b) point to examples such as the following to motivate a ranking of Align-Head above Align-L ('align all feet with the left edge of the prosodic word'):

(7) banána, América, terrífic, cerámic, Fellíni(J), lagóon, gorílla, Jamáica, crevásse

These words would satisfy Align-L if they had initial main stress, but this would lead to an unmotivated violation of Align-Head, so long as the latter is dominant (note that many of these words are exceptions to Non-Fin; see Pater 1994 for an analysis in Optimality Theory). Align-L is satisfied only when this can be done at no expense to Align-Head, as in the following examples:

(8) Tàtamagóuchi(J), Kàlamazóo, Wìnnepesáukee, Wàpakonéta, Lòllapalóoza(J)

In a sense, McCarthy & Prince's (1993b) constraint-based account of English, which ranks Align-Head above Align-L, can be seen as recasting the derivational analysis of Halle & Kenstowicz (1991), which assigns main stress from the right and secondary stress from the left (cf. Hayes 1982, Halle & Vergnaud 1987).

Besides ALIGN-HEAD, violations of ALIGN-L are also commanded by PARSE-σ (Prince & Smolensky 1993). McCarthy & Prince (1993b) show that iterative stress placement requires the dominance of PARSE-σ, and as examples like *Àpalàchicóla* show, English does have iterative secondary stress (cf. Kager 1994, Crowhurst & Hewitt 1995, Green & Kenstowicz 1995 and Elenbaas & Kager 1999 on Alignment and the typology of iterative stress placement). ALIGN-L is fully satisfied only if there is a single foot at the left edge, but PARSE-σ, which demands that all syllables belong to feet, requires medial footing. The effect of the dominance of PARSE-σ is illustrated in (9), which shows only violations that are not shared by both candidates (shared violations are those of PARSE-σ due to the unparsed final syllable, and of ALIGN-L due to the position of main stress):

(9) PARSE-σ ≫ ALIGN-L

Apalachicola	PARSE-σ	ALIGN-L
☞ a. [Àpa][làchi][có]la		**
b. [Àpa]lachi[có]la	**!	

The place of PARSE-σ in our existing hierarchy can be fully determined by a consideration of the fact that main-stress placement does not shift to the left to achieve more exhaustive parsing (e.g. *ho*[*rí*]*zon* rather than [*hóri*]*zon*). This indicates a ranking of ALIGN-HEAD above PARSE-σ, resulting in the following partial hierarchy for English stress:

(10) FTBIN, TROCH, NON-FIN ≫ ALIGN-HEAD ≫ PARSE-σ ≫ ALIGN-L

The dominance of ALIGN-HEAD over PARSE-σ and of FTBIN over ALIGN-HEAD indicates that, by transitivity, FTBIN dominates PARSE-σ. The empirical consequence of this ranking is the ill-formedness of parses like *[*bà*][*nána*] or *[*Tàta*][*mà*][*góu*]*chi*, which satisfy PARSE-σ by forming a monomoraic foot in contravention of the higher-ranked FTBIN. If, however, sufficient segmental material is available to support a bimoraic foot, then both constraints can be satisfied. Examples of bimoraic feet in pretonic position are provided in (11).

(11) a. bàndána, Nàntúcket, pòntóon, càntéen, cèntúrion, càntánkerous, bàctéria, Òctóber, èxtrínsic, cògnítion, prìvátion, vòcátion, cìtátion, èjéction, gràdátion$^{(K+,W=)}$
b. Hàlicàrnássus, ròdomòntáde$^{(K+,W-)}$, pìthecànthrópus, àpothègmátic, ànimàdvérsion

c. àrgumèntátion$^{(K+,W=)}$, sèdimèntátion$^{(K=,W=)}$, èlephàntíasis$^{(K=,W=)}$, sàcramèntárian$^{(K+,W=)}$, ìnstrumèntátion$^{(K+,W=)}$.

The words in (11a) differ from the *banana* words in (7) in the presence of both a heavy syllable and a full vowel in initial position. Similarly, the words in (11b) and (11c) differ from the *Tatamagouchi* set in (8) in their possession of a stressed heavy syllable in medial pretonic position. Particularly interesting are the words based on roots without stress on the final syllable in (10c), which argue against an analysis of these forms in which the stress is stored underlyingly, and point to the productivity of this pattern of secondary stress assignment (Kager 1989: 123). The words in (11c) do have variants with a reduced vowel; these are dealt with in §2.5.

In (12), tableaux for *banana*, *bandana*, *Tatamagouchi* and *Halicarnassus* are combined to show the effects of pretonic syllable weight.

(12) FtBin ≫ Parse-σ

		FtBin	Parse-σ
a.	*banana*		
	☞ i. ba[nána]		∗
	ii. [bà][nána]	∗!	
b.	*bandana*		
	i. ban[dána]		∗!
	☞ ii. [bàn][dána]		
c.	*Tatamagouchi*		
	☞ i. [Tàta]ma[góu]chi		∗
	ii. [Tàta][mà][góu]chi	∗!	
d.	*Halicarnassus*		
	i. [Hàli]car[nássus]		∗!
	☞ ii. [Hàli][càr][nássus]		

When the input supplies a light syllable, it surfaces as stressless in pretonic position, due to the dominance of FtBin, which sets a bimoraic minimum (12a, c). To rule out the parsing of an entire ternary pretonic string into a single foot, which I do not consider here, I assume an undominated constraint against trisyllabic feet, possibly also derivable from FtBin (see Prince & Smolensky 1993; cf. Burzio 1994, and see further the Appendix on ternary strings). Also omitted from the tableau is a constraint against vowel lengthening, which would also outrank Parse-σ, so that the vowel is not made long to satisfy both Parse-σ and FtBin (though cf. note 9). When the input syllable that surfaces in pretonic position contains a long vowel or final consonant, FtBin and Parse-σ are satisfied by the creation of a monosyllabic bimoraic foot (12b, d).

Not all medial pretonic syllables are stressed when they contain sufficient input segmental material to form a bimoraic foot. A sonorant-final syllable will regularly surface as stressless when it is preceded by a single syllable (Liberman & Prince 1977, Hayes 1982, Kager 1989):

(13) sèrendípity, sìmultáneous, tàrantélla, Pènnsylvánia, Mòzambíque, gòrgonzóla

Halle & Vergnaud (1987: 240) observe that long vowels also usually retain their length and are stressed in initial position (14a), but often surface as stressless and reduced medially:

(14) a. prìvátion, vòcátion, cìtátion, èjéction, gràdátion$^{(K+,W=)}$
 b. dèprivátion, ìnvocátion, èxcitátion$^{(W=,K+)}$, rèvelátion, dègradátion

Again, the variation that exists in the stressing of these words, and others like them, is addressed in §2.

As it stands, the constraint hierarchy does not distinguish between prosodifications that place the first two syllables in separate feet, or in a single left-headed foot, although the latter is the desired outcome. To elaborate the hierarchy accordingly, I will posit a constraint that disfavours stress on the pretonic syllable, derived from the 'Stress Well' environment of Halle & Vergnaud (1987: 238), which they use to target stressed syllables adjacent to the main stress for destressing and shortening (see also Liberman & Prince 1977 and intervening work on English stress for similar notions). I assume the formulation in (15), adopting a name suggested by Plag (1999) as a replacement for StressWell (cf. Pater 1995).

(15) *Clash-Head
 No stressed syllable may be adjacent to the head syllable of the Prosodic Word.

This constraint may be regarded as a slightly more specific instantiation of the general prohibition against adjacent stresses, or stress clash (Prince 1983, Hammond 1984). The evidence from within English for this specific formulation is that adjacent secondary stresses are well tolerated. Words like *Tìcònderóga* show no tendency toward becoming clashless; examples parallel to **Tìconderóga* are unattested (Liberman & Prince 1977; see also the Appendix below). It is not easy to marshal cross-linguistic evidence for this constraint, as its effects are often indistinguishable from simple *Clash. However, Hayes (1995: 157) notes that Maithili has specifically pretonic shortening, which could be reduced to the combined effects of *Clash-Head and Weight-to-Stress, as pretonic shortening would result in the satisfaction of both of these constraints.

By ranking Parse-σ above *Clash-Head, we can preserve our previous result of generating stress on single pretonic syllables. The satisfaction of

*Clash-Head by words like *Sàn Francísco*, and its violation due to Parse-σ in words like *Fràncíscan*, are illustrated in the conjoined tableaux in (16).

(16) Parse-$\sigma \gg$ *Clash-Head

		Parse-σ	*Clash-Head
a.	*San Francisco*		
	☞ i. [Sàn Fran][cís]co		
	ii. [Sàn][Fràn][cís]co		*!
b.	*Franciscan*		
	i. Fran[cís]can	*!	
	☞ ii. [Fràn][cís]can		*

The foot created in (16a.i) might be thought to violate Weight-to-Stress, the Optimality Theoretic successor to the quantity-sensitivity parameter, which requires that heavy syllables be placed in head position of a foot (Prince & Smolensky 1993). However, as the sonorant is syllabic, the medial syllable is in fact light, and therefore incurs no Weight-to-Stress violation. Similarly, as underlying long vowels in this position surface as reduced, they also satisfy Weight-to-Stress.

To assess the ranking of Weight-to-Stress relative to *Clash-Head, we require data from medial syllables ending in obstruents, which cannot be incorporated into the nucleus in English. Here we run into the notorious 'Arab Rule', which states that an obstruent-final syllable is stressless if and only if it is preceded by a light syllable (e.g. *Àlexánder* vs. *Tìmbùctóo*; see Fidelholtz 1967, Ross 1972 and especially Kager 1989 on secondary stress). These data can be captured by placing Weight-to-Stress between Parse-σ and *Clash-Head, whose relative ranking has just been shown to be independently motivated. A word like *Tìmbùctóo* with a pretonic stressed syllable motivates the ranking of Weight-to-Stress over *Clash-Head. The *Àlexánder* pattern can be dealt with by Parse-$\sigma \gg$ Weight-to-Stress; since the initial monomoraic syllable cannot be parsed alone, it must be paired with the following syllable into a binary foot (see Mester 1994, Cabré & Kenstowicz 1995 and Prince & Smolensky 1993 on Latin for closely related Parse-σ effects in other languages). This result is illustrated in tableau (17):

(17) Parse-$\sigma \gg$ Weight-to-Stress $\gg$ *Clash-Head

		Parse-σ	Weight-to-Stress	*Clash-Head
a.	*Alexander*			
	☞ i. [Àlex][án]der		*	
	ii. A[lèx][án]der	*!		*
b.	*Timbuctoo*			
	i. [Tìm][bùc][tóo]			*
	☞ ii. [Tìmbuc][tóo]		*!	

For *Alexander*, it would be possible to avoid violating both PARSE-σ and WEIGHT-TO-STRESS either by forming an initial iambic foot or by parsing both of the first two syllables into feet. However, these alternatives would violate TROCH and FTBIN respectively, both of which dominate PARSE-σ in the hierarchy.

To complete this analysis of the Arab Rule, we need to include constraints on the relative permissibility of obstruent and sonorant consonant nuclei. Cross-linguistically, sonorant consonants make better nuclei than do obstruents, and for ease of exposition, I will express this with a pair of constraints, and a universally fixed ranking between them (cf. Prince & Smolensky 1993: §8). If *SONNUC is violated by a nuclear sonorant consonant, and *OBSNUC by a nuclear obstruent, then the fixed ranking *OBSNUC ≫ *SONNUC creates a universal dispreference for obstruent nuclei relative to sonorants.

In English, *OBSNUC must be undominated by any conflicting constraints, so that obstruent nuclei are ruled out across the board. In particular, it must dominate WEIGHT-TO-STRESS, so that obstruents will resist integration into the nucleus in stressless syllables. Consonantal nuclei are indicated by omission of the vowel:

(18) *OBSNUC ≫ WEIGHT-TO-STRESS

Alexander	*OBSNUC	WEIGHT-TO-STRESS
a. [Àlx][án]der	*!	
☞ b. A[lèx][án]der		*

The constraint against sonorant nuclei must be ranked beneath not only WEIGHT-TO-STRESS, but also *CLASH-HEAD, so that *CLASH-HEAD can continue to force stressless medial sonorant-final syllables:

(19) *CLASH-HEAD ≫ *SONNUC

gorgonzola	*CLASH-HEAD	*SONNUC
☞ a. [gòrgn][zóla]		*
b. [gòr][gòn][zó]la	*!	

While low-ranked, *SONNUC is not freely violated. Words like *Monòngahéla* and *Valènciénnes* resist left alignment; here the presence of secondary stress on the second, rather than the first, syllable is correlated with the presence of the coda sonorant consonant on the second syllable (cf. *Tàtamagóuchi*). This requires *SONNUC to dominate ALIGN-L:

(20) *SONNUC ≫ ALIGN-L

Monongahela	*SONNUC	ALIGN-L
a. [Mònn]ga[héla]	*!	
☞ b. Mo[nònga][héla]		*

1.3 Conclusions on regular pretonic stress

As this concludes the analysis of regular pretonic stress, it is worth highlighting some aspects of it. The hierarchy argued for thus far is as follows:

(21) FtBin, Troch, Non-Fin
|
Align-Head
|
Parse-σ　　　*ObsNuc
|
Weight-to-Stress
|
*Clash-Head
|
*SonNuc
|
Align-L

We have seen converging evidence for a number of the rankings included here. In the analysis of primary stress, FtBin was shown to dominate Align-Head, forcing stress off a light penult (*[Cána]da* > *Ca[ná]da*), and Align-Head was required to dominate Parse-σ, so that main-stress placement would not be shifted to achieve more exhaustive parsing (*ho[rí]zon* > *[hóri]zon*). The resulting implicational dominance of Parse-σ by FtBin is confirmed by the absence of pretonic light syllable stress (*ba[nána]* > *[bà][nána]*). Similarly, in the analysis of the Arab Rule, Parse-σ needed to be ranked above Weight-to-Stress (*[Àlex][án]der* > *A[lèx][án]der*), and Weight-to-Stress above *Clash-Head (*[Tim][bùc][tóo]* > *[Tìmbuc][tóo]*); the implied ranking of Parse-σ above *Clash-Head is further justified by the presence of pretonic heavy syllable stress (*[bàn][dána]* > *ban[dána]*). This sort of convergence points to the overall coherence of the system, as well as illustrating the variety of effects that simple constraints can have, once they are interpreted as minimally violable.

Returning to the theme laid out in the introduction, let us consider how the non-uniformity of syllable-weight effects on secondary stress has been dealt with in terms of constraint ranking and minimal violation (see Alber 1997 for discussion of non-uniform weight effects cross-linguistically). The Arab Rule is a particularly complex case of non-uniformity; whether a syllable receives stress is determined by the quality of the syllable-final consonant (sonorant *vs*. obstruent) and by the weight of the preceding syllable. The difficulty this generalisation poses is attested to by the fact that in pre-Optimality Theoretic analyses, it has either been left unaccounted for (see Prince 1985: 486 for an explicit discussion of the inability of then current theories to cope with it), or simply stipulated (amongst metrical theorists, see Hayes 1982: 256 and Kager 1989). Using ranked constraints, we have managed to reduce the influence of the final consonant to universal constraints on syllabic well-formedness (*ObsNuc and *SonNuc) and the contribution of the preceding syllable to the activity of Parse-σ, all interacting with Weight-to-Stress.

In this treatment of the asymmetry between sonorant-final and obstruent-final syllables, it appears to be crucial that syllabification and stress assignment be evaluated in parallel, rather than established and evaluated in sequence. Whether a syllable in a pretonic sequence is unstressed depends in part upon whether the syllable-final consonant can be parsed as a nucleus. Whether a sonorant is parsed as a nucleus in turn depends upon whether it is unstressed. This sort of interdependence between the well-formedness of stress and syllable structure is awkward to express in a theory in which syllabification derivationally precedes stress placement (on parallelism see especially McCarthy 1993, Prince & Smolensky 1993, Cohn & McCarthy 1994 and McCarthy & Prince 1995).

A more widespread source of non-uniformity comes from the different behaviours of heavy syllables in initial and medial position. In initial position, (potentially) heavy syllables are regularly stressed (e.g. *Sỳlvánia*, *vòcátion*, *Fràncíscan*); in peninitial pretonic position, they are usually unstressed (e.g. *Pènnsylvánia*, *ìnvocátion*, *Sàn Francísco*). Here this positional difference is derived from the ranking Parse-$\sigma \gg$ *Clash-Head. *Clash-Head demands pretonic stresslessness, but is overruled when it would lead to non-exhaustive parsing. This analysis thus does not simply stipulate the difference between initial and medial position in the formulation of rules or constraints (cf. rules of medial shortening and destressing found in almost any rule-based analysis of English), but instead derives it from constraint interaction.

The constraint that limits the effects of *Clash-Head is not itself a mere stipulation, but is independently motivated both cross-linguistically and in the grammar of English: Parse-σ plays a role in iterative stress as well as in the Arab Rule. Note too that even this constraint with wide-ranging effects is itself violated when exhaustive parsing would require construction of a monomoraic foot, and a consequent violation of FtBin (e.g. *banána*). A major issue in metrical theory prior to the advent of Optimality Theory was whether metrical parsing was universally exhaustive or not (compare Hayes 1982 and Halle & Vergnaud 1987 to Kager 1989 and Idsardi 1992). By adopting the middle ground that minimal violation affords us, we can straightforwardly account for the conditions under which exhaustivity is actively enforced, and those under which it has no effect (cf. Mester 1994).

2 Special secondary stress

The generalisations about secondary stress outlined and accounted for in the previous section are upset by two sets of words: lexical exceptions and derived words that retain stress from their stems. In this section, I argue for a treatment of these special cases in terms of prosodic faithfulness and lexically specific ranking. In this domain, minimal constraint violation is again crucial for a principled account of non-uniformity.

2.1 Lexical exceptionality and stem stress preservation as prosodic faithfulness

The pretonic stress in the classic example *còndènsátion* conflicts with the tendency for a pretonic syllable to be unstressed and reduced in this environment (see § 1.2). Since Chomsky & Halle (1968), the pretonic stress in *condensation* has generally been assumed to be due to the stress on the corresponding syllable of *condénse* (cf. *cóntemplàte* → *còntemplátion*). In Chomsky & Halle's analysis, primary stress is assigned to *condense* on the first cycle, and preserved as a secondary stress when *-ation* is added on a subsequent cycle. Some additional examples of stem-based exceptions like *condensation*, which preserve stress on a sonorant-final syllable, are provided in (22a). Examples involving long vowels appear in (22b) and fricative-final syllables in (22c) (see (37) for examples of obstruent-final syllables).

(22)	a.	advántage	àdvàntágeous$^{(K=,W=)}$	b.	commúnal	còmmùnálity
		àugmént	àugmèntátion$^{(K+,W=)}$		cònglóbàte	cònglòbátion
		àuthéntic	àuthèntícity$^{(K=,W=)}$		crèáte	crèàtívity
		condémn	còndèmnátion$^{(K=,W=)}$		denóte	dènòtátion
		condénse	còndènsátion$^{(K+,W=)}$		èxcíte	èxcìtátion$^{(K+,W=)}$
		impórt	ìmpòrtátion$^{(K+,W=)}$		èxclúsive	èxclùsívity
	c.	contést	còntèstátion		exhúme	èxhùmátion
		detést	dètèstátion		immóbile	ìmmòbílity
		doméstic	dòmèstícity			
		elástic	èlàstícity			
		incrúst	ìncrùstátion			
		infést	ìnfèstátion			
		molést	mòlèstátion$^{(K+,W=)}$			
		protést	pròtèstátion$^{(K+,W=)}$			

As pointed out by Halle & Kenstowicz (1991: 460), parallel lexical exceptions also occur:

(23) ìncàrnátion, òstèntátion, chímpànzée

Since there are no independent stems of the form *incárn*, *ostént* or *chimpán*, the pretonic stress in these words cannot be due to cyclicity (though cf. Fidelholtz 1967: 7). Halle & Kenstowicz (1991) draw attention to these cases in proposing a radically novel treatment of *condensation*-like words: that they too are simply lexical exceptions, subject to a lexically conditioned weight-to-stress rule.

However, using a lexically conditioned weight-to-stress rule for apparent cases of stress preservation, and denying that the stress pattern of the stem plays any role, leads to a missed generalisation.[6] As Liberman & Prince (1977: 299) note, while a sonorant-final syllable can be productively destressed in this environment (e.g. *infórm* → *ìnformátion*), there are no instances of such a syllable becoming stressed in a derived word. That is, there are no words like *cóntemplàte* that become *còntèmplátion*, with a stressed pretonic syllable[7] (compare *árgument* → *àrgumèntátion*, discussed in §1.2 and further in §2.5 below). Thus, while the presence of stress on the corresponding stem syllable does not ensure stress in this position, a lack of stress on the stem syllable does guarantee stresslessness. This generalisation shows that, *contra* Halle & Kenstowicz (1991), Chomsky & Halle (1968) were in fact correct in assuming that the stress patterns of *condénse* and *cóntemplàte* influence the stressing of *còndènsátion* and *còntemplátion*.

To capture the **còntèmplátion* gap, as well as other aspects of the distribution of lexical and stem stress preservation, I will now advance an account that relies on a prosodic faithfulness constraint that applies between lexical and surface forms, and one that applies between morphologically related items (on prosodic faithfulness see amongst others Kenstowicz 1995, Itô *et al*. 1996, Benua 1997, Alber 1998, Alderete 2000, McCarthy 2000, Kager 2000). First of all, I assume that the lexical form of a word like *incantation* or *chimpanzee* includes stress on the pretonic syllable. In order for this stress to be preserved in the output, there must be a faithfulness constraint that outranks *Clash-Head, since *Clash-Head usually forces such syllables to be stressless (see the tableau in (19) above). I will assume the relatively informal statement in (24) (see McCarthy 2000 on differences between possible Correspondence Theory formulations):

(24) Ident-Stress
If α is stressed, then $f(\alpha)$ must be stressed.

In this constraint, f is the correspondence relation between input (lexical) and output (surface) strings of segments (see McCarthy & Prince 1995, McCarthy 2000 for formal details). The ranking Ident-Stress $\gg$ *Clash-

[6] Burzio (1994: 88) points out that Halle & Kenstowicz's lexically specific weight-to-stress rule also overgenerates stressless heavy syllables in monomorphemic words, predicting that some words like *monòngahéla* should appear with an initial stress, since the heavy syllable could optionally be ignored by the stress rules, resulting in a parsing similar to *Tàtamagóuchi*.

[7] Some words of this type (most famously *compensation*; see Chomsky & Halle 1968: 39) do have variant pronunciations in Kenyon & Knott (1953) and *Webster's* (1981), with an unreduced medial vowel. However, this occurs only when the stem also has a variant pronunciation with the same full vowel (e.g. *compensate* also has an optional full vowel in the medial syllable according to these sources). As far as I know, there are no counterexamples to the claim that full vowels never appear in this position in derived words when they are not conditioned by a full vowel in the stem.

HEAD leads to the preservation of underlying stress, even at the cost of a *CLASH-HEAD violation:

(25) ID-STRESS ≫ *CLASH-HEAD

chimpànzee	ID-STRESS	*CLASH-HEAD
a. [chìmpan][zée]	*!	
☞ b. [chìm][pàn][zée]		*

With the added assumption that a correspondence relationship also exists between a stem and its derivative, then an unstressed pretonic syllable in **còndensátion* would also violate the version of IDENT-STRESS that applies between morphologically related forms.

This analysis makes no claim about how the stem/derivative correspondence relationship is set up; only that one exists. There are a number of possible implementations, and nothing in the data under consideration here seems to bear on the choice between them. The frameworks that are the most fully developed formally and most congruent with this paper's adoption of a correspondence approach to faithfulness are those of Benua (1997) and McCarthy (1999). Benua (1997) proposes a recursive constraint hierarchy that replicates a lower-ranked version of itself for each layer of affixation. However, the 'base priority' (i.e. stems affect derivatives, but not the reverse) for which the recursive hierarchy is proposed could also be accounted for in the following implementation of Sympathy Theory (McCarthy 1999). Stems are chosen as sympathetic 'flowered' candidates on the basis of their satisfaction of an Anchoring constraint demanding that a segment at the edge of an Input 'base' lie at the edge of the Output word (prosodic or otherwise; see McCarthy & Prince 1995). Stem stress preservation is then faithfulness of the optimal form to this flowered candidate. Since a derived form is by definition not a 'base' or 'stem', and could not better satisfy Anchoring than the stem itself, no flowered candidate that could upset base priority would be produced. It might be necessary, though, for a non-base candidate to be chosen under compulsion (Steriade 1998), which would require either elaboration of this proposal or adoption of an alternative one. Some alternatives include lexical networks of relations between morphologically related words (see Derwing 1990, Burzio 1994, 1996, Bybee 1996) or paradigm uniformity (see Flemming 1995, Kenstowicz 1996, Steriade 2000).

In the tableau in (26), stem stress is included in the input as a graphically simple way of illustrating stem stress preservation, with no intended theoretical implication:

(26) ID-STRESS ≫ *CLASH-HEAD: stem stress preservation

còndénsation	ID-STRESS	*CLASH-HEAD
a. [cònden][sá]tion	*!	
☞ b. [còn][dèn][sá]tion		*

IDENT-STRESS can be taken to be a single constraint, or the abbreviation for a pair of separate Input–Output and Output–Output versions of IDENT-STRESS that occupy the same place in the hierarchy (though see note 10). Because stress on these pretonic syllables is driven by faithfulness to prosodic structure either in the lexicon or in the stem of a derived word, stress will not emerge in this position when it is absent underlyingly, or in the stem. This is consistent with Liberman & Prince's (1977) observation that *còntèmplátion*-like words do not exist.

In the hierarchy for regular stress, the ranking of *CLASH-HEAD was fixed above ALIGN-L by the need to place *SONNUC intermediate between them; sonorant nuclei are formed to avoid violations of *CLASH-HEAD (e.g. *gòrgonzóla*; tableau (19)), but not ALIGN-L (e.g. *monòngahéla*; tableau (20)). Having established a ranking of IDENT-STRESS above *CLASH-HEAD, transitivity entails that IDENT-STRESS also dominates ALIGN-L. This ranking captures the fact that stress preservation overrides the 'initial dactyl' effect (Liberman & Prince 1977: 300). In (27a) we find monomorphemic words that show the regular left-alignment pattern, in (27b) instances of derived words that preserve the stress of their stems and in (27c) some lexical exceptions.

(27) a. Tàtamagóuchi[J], Kàlamazóo, Wìnnepesáukee, Wàpakonéta, Lòllapalóoza[J]
b. accrèditátion, imàginátion, orìginálity, medìcinálity, divìsibílity, phenòmenólogy
c. apòtheósis, Apòllináris, Epàminóndas, Schehèrezáde

That stress preservation is at work in (27b) can be clearly seen in the contrast between *àcademícian*, as derived from *àcadémic*, and *acàdemícian*, from *acádemy* (Fidelholtz 1967, Kager 1989: 170).

To further fix the place of IDENT-STRESS in the hierarchy, we must determine the extent to which it can overcome other constraints with which it conflicts. It turns out that the upper bounds of stress preservation are determined by two constraints whose rank above *CLASH-HEAD is independently motivated in §1: FTBIN and ALIGN-HEAD.

2.2 Unfaithfulness I: FTBIN

In the vast majority of situations in which IDENT-STRESS conflicts with FTBIN, FTBIN triumphs. This can be seen both in the complete absence of lexical stress, and in the consistent failure of stem stress to be preserved, in certain environments. In particular, a light syllable is never stressed when it is the final number of bisyllabic or trisyllabic pretonic string. Lexical stress never turns up on the underlined syllable of words like *Mòn<u>te</u>béllo* or *Tàta<u>ma</u>góuchi* (Selkirk 1984), and in derived words these syllables are always destressed (Kager 1989). Examples of destressing corresponding to the **Mòntèbéllo* and **Tàtamàgóuchi* gaps are provided in (28a) and (b), respectively.

(28)	a.	phonétic	phònetícian	telépathy	tèlepáthic
		còsmétic	còsmetícian	mechánic	mèchanístic
		pathólogy	pàthológical	philátely	phìlatélic
		specífic	spècifícity	dìámeter	dìamétric
	b.	àcadémic	àcademícian	mìlitáry	mìlitarístic
		màthemátic	màthematícian	Ìndiána	Ìndianápolis
		hèmatólogy	hèmatológic		

As we saw in §1.2, the same absence of stress usually occurs in pretonic light syllables in word-initial position, such as in *banána*. Here too, we have productive destressing:

(29)	grámmar	grammárian	cívil	civílian
	órigin	oríginal	májesty	majéstic
	médicine	medícinal	próphecy	prophétic
	nóvel	novélla	míracle	miráculous

Word-initially, though, we find some well-known lexical exceptions (e.g. *ràccóon*), as well as some usually unrecognised instances of stem stress preservation (e.g. *fàscístic*). I refer the reader to the Appendix for a discussion of the somewhat complex challenges these 'exceptional exceptions' present.

In §1.2, the lack of pretonic stress on words like *banána* and *Tàtamagóuchi* was attributed to the ranking of FtBin above Parse-σ. The parallel blocking of lexical and stem-based stress preservation described here can likewise be ascribed to the high ranking of FtBin, so long as it dominates Ident-Stress. With Ident-Stress intervening between FtBin and *Clash-Head, pretonic stress preservation is possible for words like *condensation* and *chimpanzee*, but impossible for words like *phonetician* and *Montebello*, or *mathematician* and *Tatamagouchi*, as well as *majestic* and *banana*. The following tableau compares *condensation* and *phonetician*; the other word-types would be treated just like *phonetician*:

(30) FtBin ≫ Id-Stress ≫ *Clash-Head

		FtBin	Id-Stress	*Clash-Head
a.	*còndénsation*			
☞	i. [cònden][sá]tion		*!	
	ii. [còn][dén][sá]tion			*
b.	*phònétician*			
	i. [phòne][tícian]		*	
☞	ii. [phò][nè][tícian]	*!		*

With this ranking of constraints, stress preservation is possible only if it incurs no violation of FtBin (compare (30a.ii) and (30b.ii)).

This analysis also applies to the distinction between possible exceptional monomorphemic words like *chìmpànzée* and impossible ones like **Mòntèbéllo*, given that any misplaced lexical stress will be filtered out by the dominance of FtBin over Ident-Stress. A useful comparison can be made to the discussion of such cases in Kager (1989: 140). Kager also posits lexical stress on the pretonic syllable of *chìmpànzée*. This lexical stress blocks the rule of 'Closed Syllable Adjunction', which would ordinarily form a foot by adjoining the medial syllable with a preceding one. However, to express the absence of words like **Mòntèbéllo*, Kager is forced to invoke a bald restriction against lexical stress on light syllables, presumably because there is no reason why lexical stress should block 'Closed Syllable Adjunction', but not 'Open Syllable Adjunction'. When preservation of underlying stress is formalised as an Optimality Theoretic constraint, however, the extent to which lexical stress can override the usual stress phonotactics of the language can be expressed without positing constraints on the lexicon that duplicate the effects of similar constraints on surface forms (cf. Kenstowicz & Kisseberth 1977).

2.3 Unfaithfulness II: Align-Head

The approach taken to ruling out stress preservation when it conflicts with FtBin carries over to an account of why instances of stress preservation discussed here are instances of weak preservation. Weak preservation is not complete faithfulness – the segment bearing stress in the stem is the head of the Prosodic Word, and its correspondent is but the head of a foot. A separate, but obviously related, observation is that preservation of the stem stress does not interfere with main stress placement – stress is preserved not at all, instead of forcing the displacement of main stress.[8] Similarly, lexical stress does not force main-stress placement to the left,[9] though see Chomsky & Halle (1968), Hayes (1981), Selkirk (1984), Halle & Vergnaud (1987), Kager (1989), Jensen (1993), Burzio (1994) and Pater (1994) for accounts of the rightward displacement of main stress under pressure from the lexicon.

I will start with the second observation. An example of how stress preservation might interfere with main-stress placement can be found in the cases we have just looked at. If FtBin $\gg$ Ident-Stress disallows

[8] Since this paper was first written (see Pater 1995), Benua (1997) has provided an account of the strong preservation of main stress in Level 2 suffixation (e.g. *bóttomlessness*) that shares many of the same basic assumptions as the present analysis of Level 1 weak preservation. Her claim is that Level 2 suffixes are indexed for a higher-ranked version of an Ident-Stress constraint than are Level 1 suffixes (cf. Derwing 1990, Burzio 1996; see also Urbanczyk 1996 on morpheme-specific faithfulness). The ranking of the Level 2 Ident-Stress constraint above Align-Head keeps main stress constant across words that are formed by Level 2 affixation.

[9] This statement must of course be qualified by a recognition of the fact that main stress does shift leftward when there is exceptional final stress (see note 4 above). I leave out discussion of these cases in order to focus on pretonic secondary stress.

**gràmmárian*, then what rules out **grámmarian*? This would satisfy both FtBin and Ident-Stress. The problem with **grámmarian*, of course, is that main stress is too far to the left. Assuming that *-ian* and other stress-placing suffixes are incorporated into the Prosodic Word, a ranking of Align-Head ≫ Ident-Stress will ensure that main-stress placement is unresponsive to the demands of stress preservation:

(31) Align-Head ≫ Id-Stress

grámmarian	Align-Head	Id-Stress
☞ a. gram[mári]an	**	*
b. [grámma]rian	***!	

As discussed in §1.1, the dominance of Align-Head by FtBin, Troch and Non-Fin entails that the minimal number of Align-Head violations is the two incurred by the optimal candidate. The third violation rules out **grámmarian*, due to the ranking of Align-Head over Ident-Stress. Similar results obtain if one posits preantepenultimate lexical stress.

The same ranking can account for the subordination of the preserved stress to the primary stress. Let us assume that Ident-Stress is a gradient constraint: it is satisfied if the correspondent of the head of the prosodic Word is itself the head of the Prosodic Word (i.e. strong preservation), one violation is caused if the head of the Prosodic Word is in correspondence with only the head of a foot (weak preservation), while two violations result if the head of the Prosodic Word is in correspondence with a non-head (non-preservation). In terms of a grid-based representation of prominence (Prince 1983, Selkirk 1984, Halle & Vergnaud 1987), such gradience would be a natural interpretation of an Ident-Stress constraint: strong preservation preserves the two grid marks of primary stress, weak preservation preserves one and non-preservation preserves none (assuming the two levels of stress we are dealing with here). An attempt to better satisfy Ident-Stress by making the preserved stress the head of the Prosodic Word will automatically increase the number of violations of the higher-ranked Align-Head:

(32) Align-Head ≫ Id-Stress

imágination	Align-Head	Id-Stress
☞ a. i[màgi][ná]tion	*	*
b. i[mági][nà]tion	***!	

Here Align-Head must be violated at least once, due to the dominance of Non-Fin. If the stem stress is preserved as a primary stress, as in (32b), additional – and fatal – Align-Head violations are incurred by having two more syllables between the main stress and the right edge. I have omitted a candidate with two main stresses: this would likely be ruled out by an independent constraint against joint headship.

To explain the upper limits of lexical and stem stress preservation, we have ranked IDENT-STRESS beneath FTBIN and ALIGN-HEAD. Along with the ranking of IDENT-STRESS above *CLASH-HEAD and ALIGN-L that is needed for the attested instances of stress preservation, the following hierarchy results (this focuses on the constraints relevant to stress preservation, and omits the weight-related constraints; see §3 for the complete set):

(33) FTBIN ≫ ALIGN-HEAD ≫ IDENT-STRESS ≫ *CLASH-HEAD ≫ ALIGN-L

2.4 Unfaithfulness III: lexically specific ranking

Not all of the non-uniformity of stress preservation is phonologically conditioned. Alongside the words like *còndènsátion* that preserve the stress of their stems, there is a set of words that are identical in the relevant phonological characteristics, yet fail to preserve the stress of their stems. Some examples are repeated in (34):

(34) ìnformátion, trànsportátion, trànsformátion$^{(K-,W=)}$, cònsultátion, pìgmentátion$^{(K-,W=)}$, cònservátion, cònversátion, cònfirmátion, sègmentátion$^{(K-,W=)}$

Note too that many of the words cited in (20) as examples of stress preservation could equally be included in this list, since they have variant pronunciations that do not preserve stress (see below on sources of this variation).

Here I will present an analysis of this lexical idiosyncrasy in terms of a lexically specific constraint, and point out its advantages over earlier treatments. The basic idea is that constraints can be multiply instantiated in a constraint hierarchy: in a general and a lexically specific version. The regular pattern in English appears to be that of stresslessness in this environment. In monomorphemic words, there are more instances of the stressless than the stressed cases (Kager 1989), and as derived lexical items become more established, they tend to lose their stress, which I take to be regularisation to the general pattern (compare for example *èxhòrtátion*$^{(K=,W=)}$ to *ìnformátion*). Therefore, I assume that words like *condensation* and *chimpanzee* are subject to the lexically specific version of IDENT-STRESS. I will designate this set of words as 'S_1', and the lexically specific constraint as IDENT-STRESS-S_1. IDENT-STRESS-S_1 replaces IDENT-STRESS above, which as we have seen, ranks above *CLASH-HEAD and beneath FTBIN and ALIGN-HEAD.

For the general version of IDENT-STRESS, we know that it must be subordinated to *CLASH-HEAD so that stress will be lost in the *information* cases. However, by keeping it above ALIGN-L, we guarantee that words like *imagination* will strictly obey IDENT-STRESS, accounting for the lack of lexically based variation in words of this type (an empirical observation due to Burzio 1994; see further §2.4.1).

To show the effects this ranking has on these various sets of words, an example of each is placed in the collapsed tableaux in (35):

(35) Id-Stress-S_1 ≫ *Clash-Head ≫ Id-Stress ≫ Align-L

		Id-Stress-S_1	*Clash-Head	Id-Stress	Align-L
a.	*condénsation*				
	i. [cònden][sá]tion	*!		*	
	☞ ii. [còn][dèn][sá]tion		*		
b.	*ìnfórmation*				
	☞ i. [ìnfor][má]tion			*	
	ii. [ìn][fòr][má]tion		*!		
c.	*imágination*				
	☞ i. i[màgi][ná]tion				*
	ii. [ìma]gi[ná]tion	(*!)		*!	

As *condensation* is subject to Ident-Stress-S_1, its ranking above *Clash-Head renders the stress-preserving (35a.ii) optimal, even with the attendant *Clash-Head violation. When Ident-Stress-S_1 does not apply, as in *information*, the ranking *Clash-Head ≫ Ident-Stress creates a preference for pretonic stresslessness over stress preservation, leading to the grammaticality of (35b.i). Finally, no matter whether a word like *imagination* is targeted by the lexically specific version of Ident-Stress or not, stress preservation (35c.i) is always more highly valued than left-alignment (35c.ii), because of the dominance of Ident-Stress over Align-L.

We have yet to consider the ranking between Parse-σ and Ident-Stress-S_1. There is a group of words that preserve stem stress on a pretonic syllable, and leave the preceding initial syllable unstressed. Here are two of the more robust examples (Kager 1989: 171):[10]

(36) apártment apàrtméntal
seléctive seléctívity

In these examples, faithfulness to stem stress causes a violation of Parse-σ, as well as of the lower-ranked *Clash-Head. Like stress preservation that violates only *Clash-Head, this sort of preservation is very in-

[10] There are no instances of similar Parse-σ violations in underived words, which may suggest that the version of Ident-Stress that ranks above Parse-σ is specific to Output–Output correspondence. Other differences between lexical and stem stress preservation include the absence of underived words that stress a peninitial pretonic syllable that ends in a fricative or contains a full vowel (cf. (22b, c)). However, it would also seem reasonable to regard these as accidental gaps in the distribution of lexical stress, given the tendency toward regularising loss of medial stress. A full account of words like those in (36) would have to deal with the complications induced by the instances of apparent monomoraic feet (e.g. *àcòustícian*, and medially stressed variants of words in (37a); see also the Appendix) and vowel lengthening (e.g. *dòmèstícity*) that seem to occur as alternatives to Parse-σ violations (see Kager 1989: 171 for further examples).

consistent; the examples in (37a) have variants in which the medial syllable is unstressed (though compare the more consistently stressed medial syllables in (37b), in light of the 'Arab Rule' discussed in §1.2 above).

(37) a. àdaptátion$^{(K=,W=)}$ àffectátion$^{(K=,W+)}$
b. rèlàxátion$^{(K+,W+)}$ èxpèctátion$^{(K+,W+)}$

This further example of lexically idiosyncratic stress preservation can be captured by placing IDENT-STRESS-S_1 above PARSE-σ:

(38) ID-STRESS-$S_1 \gg$ PARSE-σ

apártmental	ID-STRESS-S_1	PARSE-σ
a. [àpart][mén]tal	*!	
☞ b. a[pàrt][mén]tal		*

The resulting hierarchy is as in (39).

(39) FTBIN, TROCH, NON-FIN $\gg$ ALIGN-HEAD $\gg$ IDENT-STRESS-S_1 $\gg$ PARSE-σ $\gg$ *CLASH-HEAD $\gg$ IDENT-STRESS $\gg$ ALIGN-L
where S_1 = {*condensation*, *apartmental*, *chimpanzee*, …}

A lexical item's membership in S_1 could either be formalised in set theoretic terms (see Itô & Mester 1995a) or with lexical diacritics (cf. ±Latinate in Chomsky & Halle 1968). The content of the set of words that is subject to the lexically specific IDENT-STRESS certainly varies from speaker to speaker. It also seems that there is speaker-internal variation for the stressings of some of these words (e.g. several speakers I have consulted find both *còndensátion* and *còndènsátion* acceptable for 'the act of condensing'). To capture this, it may be that a third IDENT-STRESS constraint is needed, whose ranking is not fixed with respect to *CLASH-HEAD (see e.g. Kiparsky 1993, Reynolds 1994, Anttila 1997, Itô & Mester 1997, Boersma & Hayes 1999). This would allow for three sets of words: consistently stressed, consistently stressless and variably stressed.

2.4.1 *Other approaches*. In proposing the cyclic analysis of the *condensation* cases, Chomsky & Halle recognise the existence of apparent exceptions, such as *information* (1968: 112), as well as the alternate pronunciation of *condensation* with a reduced medial vowel (1968: 39, 116). They point out an interesting correlation between the morphosyntactic behaviour of the words and the stress patterns. They claim that when *condensation* is a transparently nominalised verb ('the act of condensing') it preserves the verb stress and full vowel, while as a relatively freestanding noun (e.g. 'drops of water on the window pane') it has a reduced medial vowel. Similarly, *information* cannot be given a directly nominalised reading (*'his information of my friend about the lecture' *vs*. 'his relaxation of the conditions'), and never preserves the stress of the related verb. Their analysis of this set of facts is that only the nominalised forms receive verbal stress on the initial cycle. The independent noun forms lack the relevant internal morphological structure, so their stems never receive verbal stress, and there is no stress to be inherited cyclically (see also Kiparsky 1998).

While it is not clear whether Chomsky & Halle (1968) meant to imply that all of the exceptionality in this domain could be reduced to morphosyntactic factors, one might wonder whether it can. The answer is that it cannot. The word *indentation*, for example, is most commonly given a reading as the product, rather than the process, of indenting, yet only the pronunciation with a full vowel is attested in Kenyon & Knott (1953) and *Webster's* (1981). Conversely, *transportation* is often used as a nominalisation (e.g. 'the transportation of the convicts took five hours'), but these sources agree that it has a reduced vowel. In the present analysis, the establishment of words as relatively independent, and common, lexical items leads to their regularisation (i.e. their loss of membership in the set of words targeted by the higher-ranked IDENT-STRESS constraint); on these grounds we would expect a correlation with the nominalisation facts, but would also expect other factors, such as frequency, to play a role.[11]

Within a rule-based approach, another possibility is to allow the rule that transfers the stress of stems to their derivatives to be subject to lexical conditioning. In *SPE*, there is no such rule, since stem stress is automatically inherited by the derived form as a consequence of cyclic rule application. However, within the framework of Halle & Vergnaud (1987), in which structure is erased between cycles, such a rule of Stress Copy is necessary, and Halle & Vergnaud (1987) and Halle & Kenstowicz (1991: 492) do state that its application is lexically governed.

Lexically based application of a rule like Stress Copy, however, should result in the existence of exceptions to stress preservation in all environments. As Burzio (1994) points out, the resulting prediction is that there should be as many exceptions to the *imágine–imàginátion* pattern of preservation as there are to the *condénse–còndènsátion* one. As we have seen though, there seem to be no exceptions to the former pattern, but plenty to the latter. This phonologically restricted exceptionality also has consequences for any attempt to deal with the *information* class of words in terms of morphological reanalysis. In present terms, one might be tempted to say that *condensation* and *information* differ in that only the former lies in correspondence with its stem, while the latter is an independent word. However, if correspondence can be turned off for *information*, then it should also be possible for words like *imagination* to lose their connection to their stems and, like monomorphemic *Tatamagouchi*, to be stressed on the initial syllable.

Burzio (1994: 185) takes the difference in the consistency of stress preservation in these two environments to indicate that there are two fundamentally different processes at work: stress preservation for *im-*

[11] To make this account more directly sensitive to morphology, it would appear straightforward to index a ranking of a IDENT-STRESS to the nominalising morpheme (see Benua 1997 on morpheme-specific faithfulness).

agination, and vowel-quality preservation for *condensation*. This is in conformity with his basic theoretical premise that a foot made up of a single heavy syllable is ill-formed (see Kager 1989: 129 for an earlier similar approach to English stress). To maintain the ban against monosyllabic feet, Burzio requires additional machinery such as null vowels before apparent instances of such feet (e.g. [∅ban][dana]), as well as vowel reduction that is more context-sensitive than usually assumed. However, while these assumptions may seem rather idiosyncratic within metrical theory as a whole, they are relatively natural in the context of Burzio's particular framework. More problematic is the fact that the account is incomplete, since Burzio does not offer an analysis of vowel-quality preservation, and hence provides no reason why vowel-quality preservation should be variable and stress preservation consistent.

Lexically specific constraints are here advanced as an alternative to the constraint domains, or co-grammars, proposed in Itô & Mester (1995a, b) and discussed in Pater (1994), Katayama (1995) and Inkelas *et al*. (1997). In the constraint-domains approach, lexical exceptions are dealt with by creating a separate constraint hierarchy for each lexical stratum (e.g. Latinate in English, Yamato in Japanese). The two approaches would seem to cover a similar range of data, but the obvious advantage of lexically specific constraints is that they avoid the massive duplication of constraints required by constraint domains. There are likely more subtle advantages too, such as there being no need to decide which co-grammar to send a word through when it contains morphemes that belong to more than one domain, since there is but one grammar (cf. Inkelas *et al*. 1997: 405).

While it is important to recognise that issues about the power of lexically specific constraints remain to be addressed (see e.g. Katayama 1995, Inkelas *et al*. 1996, 1997, Fukazawa *et al*. 1998, Itô & Mester 1999), they do appear to be necessary for an adequate account of the English data.[12] In the next section, we turn to another set of exceptions to the generalisations of §1, which provide further evidence of lexically specific ranking. In these cases, however, prosodic faithfulness is not at issue; here we see the effects of a lexically specific ranking of a structural constraint, *CLASH-HEAD. Itô & Mester (1999) have recently proposed that only faithfulness constraints can be instantiated in lexically specific form (see also Itô & Mester 1995b, Fukazawa 1998), which is intended to restrict the range of possible lexically specific phonological phenomena. Since most phonological phenomena likely result from, and can be blocked by, rankings between structural and faithfulness constraints, the empirical consequences of this restriction are very subtle, and potential counterexamples are hard to come by. Structural constraints that do directly conflict with one another are typically prosodic constraints of the Align-

[12] René Kager (personal communication) points out that an allomorphic analysis is also conceivable for these data, as it is for many of the cases that have been argued to require lexically sensitive ranking. I leave the elaboration of such an analysis, and its comparison with the present one, for future research.

ment family, and these do induce lexically specific behaviour (see e.g. Pater 1994, Katayama 1995, Inkelas *et al*. 1996). However, in Correspondence Theory (McCarthy & Prince 1995), anchoring constraints, which cover much, if not all, of the scope of alignment constraints, are formally faithfulness constraints, so these cases are likely reanalysable in Itô & Mester's (1999) terms. The case of lexically specific *CLASH-HEAD is thus of considerable interest, insofar as the data do not seem reducible to faithfulness.

2.5 Lexically specific *CLASH-HEAD

As discussed in §1.2, odd-parity pretonic strings contrast with bisyllabic ones in that the final pretonic syllable of those strings is usually stressed if it is heavy, as in *bàndána*, *Hàlicàrnássus* and *àrgumèntátion*. This was explained by the ranking PARSE-$\sigma \gg$ *CLASH-HEAD, which creates a preference for parsing the lone syllable into a foot over the stresslessness that *CLASH-HEAD demands of a syllable adjacent to the main stress. This section examines the rather large set of exceptions to this pattern of heavy-syllable stress.

The best-known exceptions to the usual pattern of initial pretonic heavy-syllable stress are words that were historically formed with Latinate prefixes (see e.g. Chomsky & Halle 1968: 121, Liberman & Prince 1977: 284 and Halle & Vergnaud 1987: 239). The prefixes often surface as stressless when pretonic, whether they end in a sonorant (40a), an obstruent (40b) or have a long vowel in other (often related) words (40c).

(40) a. condémn, condénse, embárrass, embráce, engáge, engráve, enjóy
b. absólve, admíre, advántage, extréme, extínguish, obsérve, obstrúct$^{(K-,W=)}$
c. precócious, presént, prolóng, recúrrent, refórm, reláx

It is not the case, though, that these prefixes always reduce in the pretonic environment. Besides the fact that more semantically transparent cases of prefixation, especially with the very productive prefixes /pre-/, /re-/, /pro-/ and /de-/, do not involve reduction (e.g. *recover* 'cover again' *vs*. *recover* 'get back', *rebutter* 'butter again' *vs*. *rebutter* 'one who rebuts', *preconscious vs*. *precocious* – the consistent long vowels are likely due to a restriction that 'true' prefixes in English must be bimoraic; see McCarthy & Prince 1994b), there is a great deal of variation in whether words with opaque Latinate prefixation have stressed or stressless initial pretonic syllables. In general, more common words have stressless initials, while more learned words have stressed initials (Fidelholtz 1975). To give a sense of the sort of variation that occurs, the lists in (41) provide examples of words with historical Latinate prefixes that are transcribed by Kenyon & Knott (1953) as stressless, stressed or with both stressed and stressless variants.[13] I have indicated in brackets instances in which *Webster's* (1981)

[13] In the examples of pretonic stresslessness, [ɛ] and [iy] often reduce to something like [ɪ], rather than schwa. Like most studies of English stress, the present one does not attempt to account for these facts.

disagrees with Kenyon & Knott. Here + means that *Webster's* transcribes the initial syllable of the word as stressed, − stressless, = both stressed and stressless:

(41) a. *Stressless*
admire, admonitory, advance, advantage, adversity (+), advise, combust, companion, compassion, compose, compress, compulsion, companion, concur, concern, condemn, conduct, confection, confer, conflate, conflict (VB), congressional, convenient, convention, embarrass, embody, embrace, endeavour, endow, engage, enjoin, enjoy, enlarge, enlighten, entice, entire, exact, example, exceed, except, excrete, excursion, excuse, executive, exhume, expose, express, extend, extinguish, extravagance, extraneous (+), extreme, object (VB), obsequious (=), observe, obsess (=), obstetric (=), obstruct (=), obtain, obtrude, obtuse, obvert, proceed (=), produce (=), profess (=), profound (=), project (VB), prolong, promote, propel, propose, protect

b. *Stressless or stressed*
abdominal (+), abduct (+), abhor (−), absolve, absorb (−), abstemious (+), abstract (VB), abstruse, absurd (−), abnormal (+), accelerate, accentuate, accept, accessible, accessory, acknowledge, adhere, administer (−), admit (−), admixture (+), admonish (+), adverse (+), adverbial, concelebrate, concoct, concordance, eccentric, emphatic, exhale (+), obscene, obscure, obverse, pronomial (+)

c. *Stressed*
abscissa, abscond, admeasure, adsorb, advection, agnomen, concrete (VB), concretion (=), conglobate (=), empiric (−), emporium (=), enteric (=), excreta, excursus, exogamy, expropriate, exsect, extrinsic, extrorse, obtest, obtund, progenitor (=), proliferate (−), proscenium, prosector, protract (=), protrude

Since the more common words tend to be reduced, for this set of words it would seem that pretonic stresslessness is productive. This is confirmed by the existence of a number of derived words in which pretonic stresslessness occurs on syllables that are stressed in the stems:[14]

(42)	áccèss	accéssible$^{(K=,W=)}$	cóngress	congréssional$^{(K-,W+)}$	
	ádverb	advérbial$^{(K=,W+)}$	émphasis	emphátic$^{(K-,W+)}$	
	cóncòrd	concórdance$^{(K=,W=)}$	éxecùte	exécutive	exécutor

[14] Liberman & Prince (1977: 285) note what might be another two cases of this type: 'in the words *concave*, *convex*, the prefix retains stress; curiously, in the derivatives *concavity*, *convexity* it seems easily destressable'. However, in Kenyon & Knott (1953), the stems and the derivatives are equally given with both stressed and stressless initial syllables, while in *Webster's* (1981), both *concave* and *concavity* have only stressed initials. Here, as well as for the rest of the special cases discussed in §2, careful study of the judgements and pronunciations of native speakers would be extremely informative.

The presence of full stressed vowels in the stems precludes an analysis of the pretonic stresslessness of these words in terms of faithfulness to any prosodic or segmental feature. To capture this pattern, we can posit a lexically specific version of *Clash-Head ('no stress/main stress adjacency'), which I will refer to as *Clash-Head-S_2, that dominates Parse-σ. For a typical speaker, the set 'S_2' would include most of the words in (41a), some of the words in (41b), but few of those in (41c). The result of this lexically specific ranking is illustrated in (43):

(43) *Clash-Head-$S_2 \gg$ Parse-σ

advantage	*Clash-Head-S_2	Parse-σ
a. [àd][ván]tage	*!	*
☞ b. ad[ván]tage		**

For words that are subject to *Clash-Head-S_2, pretonic stresslessness is preferred, even though this results in an extra Parse-σ violation (the other is due to Non-Fin). For words that are not targeted by *Clash-Head-S_2, the extra Parse-σ violation makes pretonic stresslessness ungrammatical, since as shown in §1.2, Parse-σ dominates the general *Clash-Head constraint. And parallel to Stress-Ident-S_1, it may be that for some words, a speaker would have a ranking of *Clash-Head that is identical to that of Parse-σ, producing free variation.

The effects of this ranking can also be seen outside of the domain of words based on Latinate prefixes. All of the words in (44) appear in either Kenyon & Knott (1953) or *Webster's* (1981) with at least a variant with a stressless initial:

(44) ambássador$^{(K=,W=)}$, Atlánta$^{(K=,W=)}$, Atlántic$^{(K-,W=)}$, Kentúcky$^{(K=,W-)}$, Manháttan$^{(K+,W=)}$, Septémber$^{(K=,W=)}$, sincére$^{(K=,W=)}$

Outside of Latinate prefixation too, initial heavy syllable stresslessness appears to be productively generated. Most of these cases involve long vowels (45a), but there is at least one instance each of a sonorant-final and an obstruent-final syllable becoming destressed in a derived word (45b). Again, variation runs rampant.

(45)	a.	Pláto	platónic$^{(K=,W=)}$	démon	demónic$^{(K+,W-)}$
		phóne	phonétic$^{(K=,W-)}$	régal	regálity$^{(K+,W-)}$
		vácàte	vacátion$^{(K=,W=)}$	fátal	fatálity$^{(K=,W=)}$
		schéma	schemátic$^{(K+,W-)}$	phótogràph	photógraphy$^{(K=,W-)}$
		légal	legálity		
	b.	sénse	sensátion$^{(K+,W=)}$	spéctacle	spectácular$^{(K+,W=)}$

So far, we have looked only at initial syllables. However, the ranking *Clash-Head-$S_2 \gg$ Parse-σ generalises to medial environments as well. Recall that in the present account, the dominance of Parse-σ over

*CLASH-HEAD also generates stress on the pretonic syllable of words like *Halicarnassus*. The productivity of stress in this environment was demonstrated by words like *argumentation*, in which a stressless syllable in the stem becomes stressed. There are, however, monomorphemic words that lack stress on such syllables:

(46) Kìlimanjáro, Nèbuchadnézzar, èlecampáne$^{(K-,W+)}$

We also find instances of productive destressing here. Liberman & Prince (1977: 298) note that *sèntimentálity* optionally occurs, though *sèntiméntal* bears a stress on the corresponding syllable. To this example we can add those in (47a) and (47b).

(47)	a.	ìnstruméntal	ìnstrumentálity$^{(K+,W=)}$
		rècomménd	rècommendátion$^{(K+,W=)}$
		óriènt	òrientátion$^{(K+,W=)}$
		rèpresént	rèpresentátion$^{(K+,W=)}$
	b.	rétrogràde	rètrogradátion$^{(W=)}$
		cíviliÌse	cìvilisátion$^{(K=,W-)}$
		stándardìse	stàndardisátion$^{(K=,W-)}$
		párasìte	pàrasitólogy$^{(W=)}$

This too results from *CLASH-HEAD-$S_2 \gg$ PARSE-σ:

(48) *CLASH-HEAD-$S_2 \gg$ PARSE-σ

Kilimanjaro	*CLASH-HEAD-S_2	PARSE-σ
a. [Kìli][màn][járo]	*!	*
☞ b. [Kìli]man[járo]		**

The productivity of this set of exceptional cases contrasts with those discussed in the previous section. In this environment, derivation results in both stressless pretonic stem syllables becoming stressed, and stressed ones become stressless (e.g. *árgument*, *àrgumèntátion*; *rècomménd*, *rècommendátion*). However, in the *condensation* environment, only productive destressing is attested (e.g. *trànspórt*, *trànsportátion*; *còmpensáte*, **còmpènsátion*). This falls out from the treatment of the present cases in terms of the lexical ranking of a structural constraint, and the *condensation* cases in terms of a lexically ranked faithfulness constraint.

3 Final hierarchy and conclusions

The following diagram incorporates the rankings for IDENT-STRESS and the lexically specific IDENT-STRESS-S_1 and *CLASH-HEAD-S_2 that were established in §2 into the hierarchy proposed for regular stress in §1.[15]

[15] With the urging and help of Bruce Hayes, I have verified that these rankings are

Strikingly, the distribution of exceptional and stem-based stress requires Ident-Stress to interact with a high-ranking FtBin and Align-Head, low-ranking Align-L and intermediate *Clash-Head and Parse-σ, all of which are consistent with the analysis of regular stress.

(49)

FtBin, Troch, Non-Fin

Align-Head

*Clash-Head-S_2 Id-Stress-S_1

Parse-σ *ObsNuc

Weight-to-Stress

*Clash-Head

*SonNuc Id-Stress

Align-L

where S_1 = {*condensation*, *apartmental*, *chimpanzee*, … },
S_2 = {*admire*, *companion*, *Atlanta*, *Kilimanjaro*, *representation*, … }

This paper has used ranked constraints to deal with two types of non-uniformity in English secondary stress. In §1.2 an account of the non-uniform effects of syllable weight on stress was given that was shown to reduce the complex distribution of stressed heavy syllables to the interaction of a set of simple, cross-linguistically well-motivated constraints. In §§2.1–2.3, the generalisations about where stress could and could not be preserved from underlying and stem sources were shown to be derivable by placing a prosodic faithfulness constraint, Ident-Stress, into the hierarchy established in §1 (see also Plag 1999 for an approach to morphologically governed stress that interleaves morphologically specific constraints into this same hierarchy for English stress). This allowed a straightforward formulation of the notion that stress preservation can overcome some but not all of the constraints governing regular stress assignment, which seems inexpressible without the formal vocabulary of minimal constraint violation.

To deal with the lexical conditioning of stem stress preservation, §2.4 introduced the formalism of lexically specific constraint ranking, and applied it to the Ident-Stress constraint. This was contrasted with other approaches to exceptions to stress preservation, such as morphological reanalysis and lexically conditioned rule application, and was shown to

learned by the implementation of Tesar & Smolensky's (2000) constraint-demotion algorithm in Hayes' OTSoft program.

improve on them by being able to delineate the phonological environments in which exceptions are found. Again, this depended on constraint ranking: words are not allowed the freedom of completely escaping the effects of a constraint by having stress preservation turned off (which is essentially what is done with lexically conditioned rules or morphological reanalysis), but instead are allowed only the more limited liberty of being subject to a slightly different ranking of the constraint.

This paper does not pretend to offer a complete account of English stress: it presents only a cursory treatment of primary stress that abstracts from such complexities as exceptional and morphologically governed stress and stress-retraction patterns, and even in secondary stress, there are some unresolved issues (see the Appendix). However, it does seem that within the domains dealt with here, minimal constraint violation allows considerable progress toward the often conflicting goals of reducing complex data to basic principles, and of avoiding overgeneration.

Appendix: Residual issues

In the analysis presented here, I have adopted standard representational assumptions so as to highlight the role of minimal violation in accounting for non-uniformity. This Appendix, however, highlights two problems for the analysis, which would appear to be best addressed by changes in representational premises. The consequences of these changes would likely be far-reaching, so I leave these as issues for further research.

The ranking of FtBin over Ident-Stress is used to account for the general absence of lexical and stem stress preservation on monomoraic syllables. There is, however, a set of counterexamples to this analysis. Examples of lexical stress on pretonic light syllables appear in (50a) and stem-based stress in (50b):

(50) a. ràccóon, bàbóon, èffáce, vàmóose, sùttée, sèttée, èfféte, bàssóon$^{(\mathrm{K}+,\mathrm{W}=)}$, càfféine, Èsséne, èrráta, Còlléen, fèllátio, ìllúsion, Hìppócrates

b.

fáscist	fàscístic$^{(\mathrm{K}-,\mathrm{W}+)}$	Ítaly	Ìtálian
léprosy	lèprótic	rábbi	ràbbínical
ánarchy	ànárchic	éthic	èthícian
gémma	gèmmátion	Héllène	Hèllénic$^{(\mathrm{K}+,\mathrm{W}=)}$
hérald	hèráldic	lípid	lìpídic
módern	mòdérnity	clínic	clìnícian
Áaron	Àarónic	mámmal	màmmálian
ácid	àcídic$^{(\mathrm{K}+,\mathrm{W}=)}$	métric	mètrícian$^{(\mathrm{K}=)}$

The fact that many of the words in (50) have alternate pronunciations with unstressed initial syllables is not unlike the situation for words like *condensation* discussed in the text. The present pattern is also similar to the *con-*

densation/chimpanzee one in that monomorphemic words with stress in this position are outnumbered by ones without, and that derived words productively destress, but do not stress, these syllables.

One might account for this pattern by positing a lexically specific IDENT-STRESS constraint that outranks FTBIN, with the restriction to initial position stated in the formulation of this faithfulness constraint (cf. Steriade 1993, Flemming 1994 and Beckman 1995, 1998). If, however, initial monomoraic syllables can exceptionally be parsed, then there is no reason why a monomoraic syllable that itself makes up a word should not be exceptionally parsed, as it is of course initial. This would be counter to the absoluteness of the bimoraic minimum on words (e.g. */bæ/, */tɛ/ and */pɪ/), which McCarthy & Prince (1986) ascribe to FTBIN. Note that one could not simply reinterpret word minimality as a restriction on the size of the head of a Prosodic Word, as exceptional monomoraic primary stresses also occur (e.g. *Sémìte* and *éssày*).[16]

The tension between the existence of these exceptional monomoraic feet and the absoluteness of the bimoraic word minimum is a generally unresolved problem. One way of avoiding it, besides simply stipulating the bimoraic word maximum, is to deny that these initial syllables are parsed into feet, and treat them instead as accented but unfooted, or as unfooted and unaccented, but unreduced (cf. Kager 1989: 142, Burzio 1994).[17] To make this consistent with the rest of the text account, we would need to introduce a violable constraint that demands that an accented syllable be the head of a foot, or that a full vowel be stressed, so that in the usual cases discussed in the text, full vowels, accent and headship are correlated. Initial accent preservation would then be generated by ranking positional stress or vowel-quality faithfulness above the head/accent correlation constraint (*ràc*[*cóon*]), but below FTBIN (*[*ràc*][*cóon*]). The latter ranking would enable these facts to be brought in line with McCarthy & Prince's analysis of word minimality, which requires FTBIN to dominate positional faithfulness.

The second problem is that for words containing a pretonic ternary string beginning with a single heavy syllable, like *Lùxipalílla*, the parsing *[*Lùx*][*ìpa*][*lílla*] is predicted, since it respects all of PARSE-σ, FTBIN and *CLASH-HEAD. As Bill Idsardi has pointed out, a similar issue arises with respect to forms like *àrgumèntátion*. In §1.2 it is argued that PARSE-σ prefers the pretonic syllable to be parsed as a foot. While this correctly accounts for cases in which the pretonic syllable is preceded by a pair of lights (e.g. [*Hàli*][*càr*][*nássus*], [*sèdi*][*mèn*][*tá*]*tion*), the presence of an initial heavy does allow for the parsing

[16] One way of generating these exceptional monomoraic main stresses is to have a lexically specific version of NON-FIN that outranks FTBIN. Like the lexically specific *CLASH-HEAD, this constraint would apply primarily, but not exclusively, to words containing bound affixes – in this case the suffixes *-ite*, *-oid*, and *-ode* (e.g. *Semite*, *cathode*, *lithoid* – see Liberman & Prince 1977: 305). This would not interfere with a FTBIN-based analysis of word minimality, since when the input is monosyllabic, NON-FIN is rendered inactive by the dominance of LEX $\approx$ PR, that is, by the requirement that lexical words be prosodified (Prince & Smolensky 1993). An interesting related observation is that words of this shape (i.e. a light followed by a heavy syllable) are regularly end-stressed (Oehrle 1971, Liberman & Prince 1977: 299). This suggests that the regular pattern is for FTBIN to dominate NON-FIN, and that these constraints are actively competing.

[17] Another approach would be to deny that the word minimum is foot-based. See Garrett (1999) for cross-linguistic arguments to this effect.

[*àr*][*gumn*][*tá*]*tion*, which would violate only the very low-ranked *SonNuc. In both cases, what appears to be needed is an added pressure to parse the first two rather than the second two syllables of the pretonic string into a foot.

An important, and often neglected fact about pretonic dactyls is that the onset of the final syllable is aspirated and (in the case of [t]) unflapped (Withgott 1982: 146, Gussenhoven 1986: 133, Jensen 1993: 106). This contrasts with consonants that are onsets to a word-final syllable, even though the immediate environment is identical; in both cases, the consonants are flanked by reduced vowels (compare *Mèdi<u>t</u>erránean*, *Máni<u>t</u>owòc* and *Nàvra<u>t</u>ilóva* with *cápi<u>t</u>al* and *autóma<u>t</u>a*). In this respect, these consonants are behaving as if they are foot-initial (*po<u>t</u>áto*) or Prosodic Word-initial (*<u>t</u>omáto*). Thus, while violating either Parse-σ, as in [*Lùxi*]*pa*[*lílla*], or maximal FtBin ([*Lùxipa*][*lílla*]) would yield the correct distribution of stress, neither parsing is consistent with the consonantal allophony.

The simplest way to make these syllables foot-initial would be to posit an iambic foot. However, if iambicity is permitted here, then it is difficult to see how one would give an account of the usual pattern of antepenultimate noun stress. Furthermore, this would make the main stress non-initial in its foot, counter to the evidence from aspiration. Thus, it seems necessary either to set up another level of foot structure, as in the 'superfoot' of early metrical phonology, so that these syllables are incorporated as foot-initial (Prince 1980), or to posit recursive Prosodic Word structure (see McCarthy & Prince 1993a and Kager 1994 on recursive morphological stems), so that they are PrWd-initial. Whatever the proper analysis of these initial dactyls turns out to be, there are two related facts that also must be accounted for. First, weight-related constraints and stem stress preservation both consistently override the stresslessness of the second syllable in this type of sequence (e.g. *Tì<u>còn</u>deróga* and *ì<u>còn</u>oclástic*). Second, flapping is preserved from the stem in this environment (e.g. *càpi<u>t</u>alístic vs. mìli<u>t</u>arístic*; Withgott 1982). As flapping is allophonic in English, this last fact may provide motivation for an Output–Output correspondence account of morphological relatedness (see Benua 1995, 1997 and McCarthy 1996), though it could also be that the flapping is derivable from prosodic differences between the words, which may or may not ultimately require Output–Output correspondence to explain (cf. Cohn & McCarthy 1994).[18]

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[18] See now Kiparsky (1998) and Steriade (2000), who have taken each of these positions. The issue remains unresolved, absent a comprehensive prosodic analysis.

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