

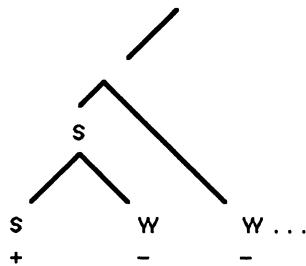
A Noncyclic Analysis of English Word Stress

Susana Sainz

1. Introduction

Most theories of stress have accounted for the basic stress patterns of English by a combination of stress and destressing rules. As Kiparsky (1979) points out, Liberman and Prince's (L&P) (1977) stress rules assign metrical structure in the following four main steps:

- (1) a. Assign [\pm stress]
- b. Assign "feet":



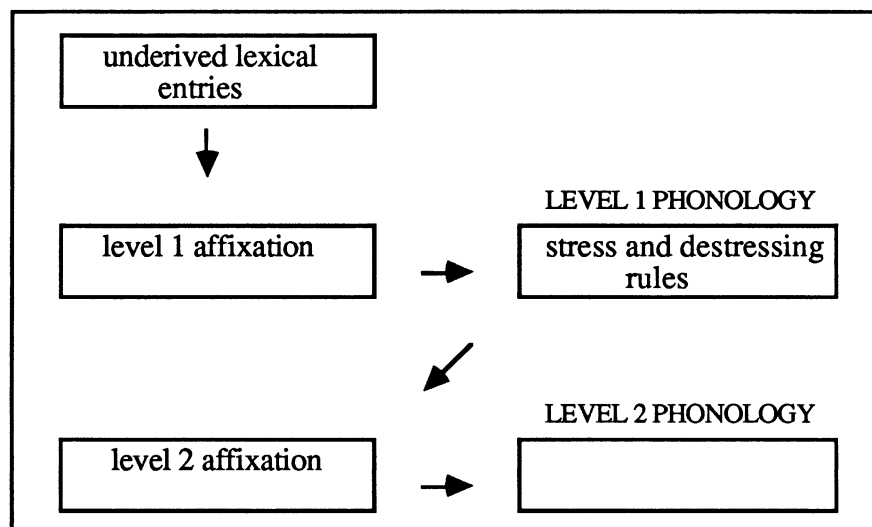
- c. Connect remaining nodes
- d. Label right branches *s* iff they are branching (at the relevant level)

They indicate that before applying these rules on a cycle, all prosodic structure in the domain of that cycle is erased ("Deforestation") and only the [\pm stress] markings are kept. Kiparsky notes that, because of the "deforestation" at the beginning of each cycle, the output of L&P's stress rules could equally be obtained by applying the rules on the last cycle, i.e., noncyclically. He proposes instead that not only the [\pm stress] markings but also all metrical structure assigned in previous cycles is kept as long as it is not deleted by the application of (1)b; thus he claims, in contrast to L&P, that rules (1a-d) crucially apply in a cyclic manner. Hayes (1981, 1982) and Selkirk (1984) come to the same conclusion as Kiparsky.

Turning now to morphological levels in English, two types of derivational affixes have been recognized: those that may affect stress placement (nonneutral or level 1, e.g., *in-*, *-ity*, *-ic*, *-ous*) and those that do not (neutral or level 2, e.g., *non-*, *-ness*, *-hood*, *-ly*). Furthermore, Siegel (1974) observed that neutral affixes appear outside but not inside nonneutral ones. This level 1/ level 2 distinction, together with the general claim that English word stress rules are cyclic, has led to a general proposal, worked out differently by different theories, that (i) level 1 morphology is the domain of (most) stress rules, i.e., level 1 affixes enter into the canonical patterns of English word stress while level 2 affixes do not, and (ii) stress rules interact with level 1 morphological rules, reapplying after each word-formation process. (The second part of this proposal is what we will be referring to throughout this article as the "cycle" or the "phonological cycle".)

In the present study,¹ however, we give some arguments in favour of a noncyclic application of English word stress rules within the framework of a level-ordered morphology. We deal exclusively with English derivational processes and argue (i) that level 1 morphology is the domain of word stress and destressing rules and (ii) that these rules apply in a noncyclic fashion, i.e., all level 1 affixation is done in one step before the stress and destressing rules apply. Within this approach the relevant part of the English lexicon could be organized as in (2).

(2) *Lexicon*



The diagram in (2) entails a clear divergence from the general proposal referred to above, as it denies the existence of the phonological cycle, i.e., it does not allow any interaction

between the morphology and the phonology at level (stratum or component) 1. In addition, (2) claims that level 1 phonological rules do not apply to bound roots, since underived lexical items must go through level 1 morphology before any phonological rules may apply. Finally, nothing in the structure we present in (2) prevents the existence of phonological rules that apply at both levels 1 and 2; in fact, our proposed analysis in section four includes some instances of such rules.

However, it is not the goal of this study to give an exhaustive account of English stress patterns, but to show that a noncyclic approach can capture the basic regularities of English stress. Hopefully, our conclusions will encourage a deeper investigation of the consequences of eliminating the cycle as a mode of application of word stress rules.

Sections two and three are a critical review of the literature on English word stress,² a review that serves to motivate both the formulation and the stratal domain assignment of the stress and destressing rules that play a role in the noncyclic analysis we offer in section four. Although stress is represented in our analysis in terms of Selkirk's (1984) grid theory, in section two we briefly compare a grid model (Selkirk's 1984) with a tree model (Hayes's 1981, 1982) and in section three we discuss both grid and tree models of English stress. We think (i) that these two approaches do not differ in aspects relevant to our noncyclic analysis and (ii) that, therefore, the conclusions reached in this study in terms of grid theory can be extended to tree analyses of English word stress.

Section two deals with questions relative to stress assignment. Selkirk's (1984) system of English word stress is revised and a crucial assumption is made concerning the underlying representation of vowel elements that always surface as schwa, namely, that they are schwas underlyingly. Furthermore, it is claimed that schwas cannot be stressed.

In section three some destressing rules are discussed in detail. Kiparsky's (1982) rules of Pre- and Poststress Destressing are collapsed as a level 1 rule of Medial Destressing. Initial Destressing--a separate rule from Medial Destressing--is assigned to the level 1 domain in order to deal with the different destressing properties of level 1 vs. level 2 prefixes, and this assignment is shown to require the noncyclic application of level 1 phonological rules. Finally, evidence is provided for the level 1 status of Sonorant Destressing.

In section four, the noncyclic approach suggested in section three in connection with the destressing behaviour of prefixes is shown to account for the basic stress patterns of English. Such an approach is proposed on the basis of (i) the rules and assumptions considered in sections two and three plus (ii) some additional rules introduced in the fourth

section. Finally, some standard arguments for the cyclic assignment of word stress are discussed and two arguments for the noncyclic assignment of word stress are presented.

2. Stress

This section is concerned with those rules and assumptions that are responsible for assigning stress to English words. To begin with, we claim that (i) never-alternating surface schwas are schwas in underlying representation and (ii) schwas are unstressable elements. Then, some of Selkirk's (1984) stress rules and her proposals about the notion of extrametricality are revised. Finally, Selkirk's (1984) and Hayes's (1982) stress rules are briefly compared. We think that this comparison may help the reader to follow the discussion of the following sections in which rules are formulated in terms of both approaches.

2.1. The "Neutral" Vowel in English

A number of conditions have been proposed in the literature regarding the abstractness of underlying representations: the Alternation Condition (Kiparsky 1973), the Revised Alternation Condition (Kiparsky 1973), the Strict Cycle Condition (Mascaró 1976). All these conditions limit the abstractness of underlying representations to cases motivated by phonological alternations. Along the lines of these proposals, we are going to postulate underlying schwas for those V-elements in English that always surface as schwa. Moreover, we assume the following characterization of schwa:

- (3) a. The "neutral" vowel schwa is a vowel element with no feature specification.
 b. Assuming multi-tiered phonological representations, as proposed in autosegmental theory, we represent this featureless V-element or "empty V" (V_e) as occupying a V (skeleton) slot unassociated with any segmental tier(s). This is illustrated below with the word *Panama* [pænəmə]:

"skeleton"(CV-tier) ..	C	V	C	V	C	V
segmental tier(s)	p	$\begin{bmatrix} - \text{high} \\ + \text{low} \\ - \text{back} \end{bmatrix}$	n		m	$\begin{bmatrix} - \text{high} \\ + \text{low} \\ + \text{back} \end{bmatrix}$

- c. "Empty Vs" cannot be stressed.

Therefore, under our analysis, never-alternating surface schwas are assumed to be "empty Vs" underlyingly.³

Let us consider now vowel alternations such as the ones in *democrat-democracy* [déməkræt]-[dəmákrəsɪ]. It is a well-known fact that "lax vowels reduce to a central, high, or mid unrounded 'neutral' vowel in English when they are sufficiently weakly stressed. . . . We have been representing this neutral vowel as [ə]." (Chomsky and Halle 1968, p.110 henceforth referred to as SPE). In the light of the above assumptions, we interpret SPE's statement as referring to the reduction to schwa, i.e., the loss of features, of those vowels with a feature specification in underlying form that either never get stressed, or else get destressed, as shown below.⁴

- (4) democrat [déməkræt] -- democracy [dəmákrəsɪ]
 president [prézədənt] -- presidential [prézədénʃəl]
 alternate [ólɹənèt] -- alternative [ólɹənetɪv]

Consequently, a preliminary formulation of the rule of Vowel Reduction can be as follows:⁵

- (5) *Vowel Reduction*

$$\begin{array}{c} V \\ [-\text{stress}] \end{array} \rightarrow V_e$$

The operation of Vowel Reduction--a rule of feature deletion ordered, as we will see later, after the stress and destressing rules--is illustrated in (6).⁶

- (6)
$$/d \begin{bmatrix} - \text{high} \\ - \text{low} \\ - \text{back} \end{bmatrix} m \begin{bmatrix} - \text{high} \\ + \text{low} \\ + \text{back} \end{bmatrix} k r \begin{bmatrix} - \text{high} \\ + \text{low} \\ - \text{back} \end{bmatrix} t/ \dots\dots \text{Underlying Repres.}$$
- $$[d \acute{e} m a k r \grave{e} t] \dots\dots\dots \text{After stress and destressing rules}$$
- $$[d \begin{bmatrix} - \text{high} \\ - \text{low} \\ - \text{back} \end{bmatrix} m \begin{bmatrix} \quad \quad \quad \end{bmatrix} k r \begin{bmatrix} - \text{high} \\ + \text{low} \\ - \text{back} \end{bmatrix} t] \dots\dots \text{After Vowel Reduction}$$
- $$[d \acute{e} m \grave{a} k r \grave{e} t] \dots\dots\dots \text{Surface Repres.}$$

In this connection, it is interesting to note Hayes's (1982) venturesome account of the fact that, unlike *Ticonderoga*, *abracadabra* does not have two possible stress patterns.

The phonetic variation resulting from left- and right-branching word trees is far greater in words like *abracadabra* than in words like *Ticonderoga*: destressing and vowel reduction are involved, rather than just subtle differences of pitch and timing. Because of this, one of the variants^[7] is likely to achieve exclusive listing in the lexicon--for a speaker who hears only the *àbracadábra* variant, the underlying vowel quality of the second syllable is not available, owing to the lack of phonological alternations. (Hayes 1982, p.261).

Hayes uses the same kind of argument to explain the shift of stress pattern displayed by words such as *cátamaràn*, that he gives under (91a).

(7)	<i>càtamarán</i>	→	<i>cátama(ràn)_{em}</i>	(= Hayes's (91a))
	<i>hùllabalóo</i>	→	<i>húllaba(lòo)_{em}</i>	
	<i>Áltamahá</i>	→	<i>Áltama(hà)_{em}</i>	
	<i>Mànitowóc</i>	→	<i>Mánito(wòc)_{em}</i>	

At least the examples under (91a) would appear to require brute force lexical listing. . . . For example, all the words under (91a) are marked with final main stress in Kenyon and Knott (1944). The more recent shifted stressings have regularized the word tree labeling, while retaining the old foot structure. Quite plausibly, *the reduction to schwa of their second vowels has inhibited the regularization of their feet* [emphasis ours] (Hayes 1982, p.364).

By our assumptions, *abracadabra* and *catamaran* are simply listed in the lexicon with a featureless V-element in the second syllable, which predicts that they will not be stressed. This accounts for the single stress pattern of *abracadabra* and for both stress patterns of *catamaran*, which only differ in whether the last syllable is or is not marked extrametrical. The new stress pattern of *catamaran* involves a regularization, because most English nouns have their last syllable extrametrical. We will see in section 2.2 that, under our analysis, the derivation of these two words is straightforward.

Hammond (1984) adopts Hayes's stress system and proposes a constrained theory of metrical transformations. As part of his analysis, he posits two reduction rules. One of them, Late Reduction, which reduces vowels in light syllables, is fed by destressing and a rule of vowel shortening, and has many exceptions. Interestingly, the other, Early Reduction, precedes destressing, seems to be exceptionless and reduces all vowels (in open or closed syllables) that are not stressed. Notice that, under Hammond's analysis, all nonstressed vowels are reduced, whereas under ours, underlyingly "reduced" vowels are not stressed. In other words, these two analyses make the same predictions regarding

syllables that are not stressed by the regular application of Hayes's stress rules. However, our analysis goes one step further, since we are claiming that both Hayes's and Selkirk's stress rules are "blocked" whenever their application would assign stress to a syllable with an underlyingly featureless vowel. We have already referred to two words whose derivation shows such a blocking effect, namely, *abracadabra* and *catamaran*. The derivation of *abracadabra* is given in the next section and that of *catamaran* as well as some other illustrative examples in section four.

2.2. Selkirk's Stress System

Selkirk's proposals concerning *extrametricality* will be revised in section 2.3. For now, let us just note that, according to her, extrametricality is a property of lexical items, in their lexical entries. The extrametricality conditions she proposes are as follows:

- (8) a. A final consonant may be marked extrametrical.
- b. A final syllable may be marked extrametrical.
- c. The final syllable of any suffixed noun, verb or adjective is necessarily marked extrametrical.

It will be seen that consonant extrametricality is relevant only to the Heavy Syllable Basic Beat Rule, and syllable extrametricality to Beat Addition on the second metrical level and the Main Stress Rule.

The stress rules we adopt from Selkirk are given in (9) in the order they apply.

(9) First metrical level

- a. *Demibeat alignment* (DBA): align each syllable with a single grid position on the first metrical.

Second metrical level

- a. *Heavy syllable basic beat rule* (HBR): align a heavy syllable with a basic beat.⁸
- b. *Initial basic beat rule* (IBR): align an initial syllable with a basic beat.
- c. *Beat addition* (BA): add a basic beat (parameters: right-to-left, left-dominant).

$$\begin{array}{ccccccc} & & & & & & x \\ x & x & \rightarrow & x & x \end{array}$$

To illustrate how these rules apply we offer a couple of derivations.

(13)		Mississippi	Adiron(dack) _{em}
	DBA	x x x x	x x x x
	HBR	x x x x	x x x x x x
	IBR	x x x x x	x x x x x x x
	BA	x x x x x x	x x x x x x x
	MSR	x x x x x x x	x x x x x x x x

Thus far, we have presented that part of Selkirk's theory--with slight modifications--that we will be adopting in our noncyclic approach to word stress in section four. Let us consider now the effect that postulating unstressable V-elements in underlying representation has on the application of the stress rules.

(14)		Hacken(sack) _{em}	abracadabra	Monongahe(la) _{em}
	DBA	x x x	x x x x x	x x x x x
	HBR, IBR	x x x	x x x x x	x x x x x
	BA	x x	x x	x x
	MSR	x x x x x x	x x x x x x x x	x x x x x x x x

The derivations in (14) show that the only rule that applies to underlyingly featureless V-elements is Demibeat Alignment, which is in accordance with Selkirk's claim that "all syllables of an utterance enter into the overall rhythmic organization of the sentence" (Selkirk 1984, p.90).¹¹

2.3. Extrametricality

This section revises some of Selkirk's assumptions regarding extrametricality and argues for the assignment of this property to the adjectival suffixes *-atory* and *-ative*. This

revision will be important to our discussion of Kiparsky's destressing rules in section three.

Selkirk adopts the notion of extrametricality proposed by Hayes to describe constituents which are ignored by the stress rules. The assignment of this property is constrained by the Peripherality Condition to the edges of stress domains. However, her view of extrametricality differs from Hayes's. She proposes that "just two sorts of constituents may be extrametrical--*syllables* and *segments*--thereby rejecting the possibility of assigning the property of extrametricality to morphological¹⁸ constituents or to prosodic constituents higher in the prosodic hierarchy than the syllable." (Selkirk 1984, p.87)¹². Furthermore, she claims that extrametricality can be assigned to just one segment or syllable (Selkirk 1984, p.88).

However, this proposal makes impossible the derivation of the correct stress patterns of English words in *-ative* and *-atory*. To show what the problem is, we give the derivation of a word in *-ative* without departing from Selkirk's system. We assume that this is a level 1 suffix since, first, it may shift the stress of its bases (*argument* → *argumentative*); second, it may create the environment for TSS (*excl[éy]m* → *excl[é]mative*); and, third, it may attach to bound stems (*nomin+ative*).

(15)	[[conserv] at i(v) _{em}]	<i>Cycle 1</i>
	x x	DBA
	x x	HBR
	x	MSR
	conservati(v) _{em}	<i>Cycle 2</i>
	x x x x	DBA
	x x x	HBR
	x x	MSR, (TPPC)
	x	
	conservati(v) _{em}	
	x x x x	BM
	x x x	
	x x	
	x	
	conservativ	<i>Postcycle</i>
	x x x x	Monosyllabic Destressing
	x x	
	x x	
	x	

The derivation in (15) gives an incorrect result, namely, that *-at-* receives main stress. The right stress pattern of *conservative* cannot be derived because of Selkirk's assumptions

about extrametricality. The crucial point is that *-ative* and *-atory* should be ignored by those stress rules that, as Selkirk points out, " 'care' whether a final . . . syllable is within a particular cyclic domain." (Selkirk 1984, p.88). In other words, these two suffixes behave as if they were extrametrical.

Clements (1986) proposes the following analysis in this connection. On the one hand, he points out that forms such as *conserve*, *conservative*, *conservation* and *conservatory* justify a division of *-atory* into *at+ory* and *-ative* into *at+ive*. (Note incidentally that the vowel alternations exhibited by *-at-* in these forms justify the postulation of an underlyingly long vowel for this suffix.) On the other hand, he indicates that the addition of *-at* alone to stems does not always create existing words (**conserve*), which suggests that '*at+ive*' and '*at+ory*' are compound suffixes which are added to bases in one step. This is confirmed by the fact that the stress pattern of words like *conserv-ative* is always the same as that of words like *alternat-ive*. Given these facts, Clements defines an *Extrametrical Chain* as "a sequence of one or more extrametrical constituents of the same category occurring in the same cyclic domain." Then, he formulates the Peripherality Condition as in (16):

(16) *Peripherality Condition*

A constituent may be marked with the feature [+extrametrical] only if it is a member of an Extrametrical Chain which is peripheral in its domain.

The analyses of *-atory* and *-ative* reviewed in this section show that Selkirk's claim that just one syllable or segment may be extrametrical cannot be maintained. Instead, it must be assumed, first, that these two compound suffixes are extrametrical and, second, that they attach to bases in the same cycle.

2.4. Hayes's and Selkirk's Stress Theories

In this section we briefly compare Hayes's (1981, 1982) and Selkirk's (1984) stress assignment procedures.

(17) presents a diagram showing a rough equivalence between Selkirk's and Hayes's stress rules.

(17)		<i>SELKIRK</i>		<i>HAYES</i>
	<i>1st Metrical Level</i>	.....	DBA	
	<i>2nd Metrical Level</i>	.....	a)HBR, BA (right. ... end of words)	Long Vowel <i>Foot Level</i> Stressing, English Stress Rule
			b)HBR, IBR, BA	Strong Retraction
	<i>3rd Metrical Level</i>	.....	MSR	Word Tree <i>Above Foot Level</i> Construction ¹³
			BM	Rhythm Rule

As far as the construction of metrical structure at the second metrical/foot level is concerned, these two approaches differ in one main respect. Selkirk's HBR will stress all heavy syllables, whereas heavy syllables will be stressed under Hayes's analysis only in the following cases (the rules are ordered as given): first, Long Vowel Stressing (LVS) will stress any final syllable containing a long vowel; next, the English Stress Rule (ESR) will stress a nonextrametrical heavy ultimate, or, otherwise, a penultimate; finally, Strong Retraction will stress every other (light or heavy) syllable--or "the syllable" if there is only one--counting leftwards from the syllable stressed by the ESR.¹⁴

2.5. Conclusions

This section has introduced the stress rules and related assumptions that are part of the noncyclic analysis we propose in section four. It has been shown that Selkirk's stress system must be modified at least so as to include the following proposals:

- (18)
- a. For those vowel elements that always surface as schwa, a schwa must be postulated in underlying representation.
 - b. Schwas cannot be stressed.
 - c. The compound suffixes *-atory* and *-ative* are extrametrical and must be added to bases in one step.

3. Destressing

Our description of English stress patterns makes use of Selkirk's (1984) grid theory and combines the application of rules that assign grid positions (stress rules) with rules that eliminate grid positions (destressing rules). Stress rules were introduced in section two and destressing rules are presented in this section. Our discussion of Kiparsky's (1979, 1982), Hayes's (1981, 1982) and Selkirk's destressing rules will serve as the basis for proposing the following level 1 rules in English: Medial Destressing, Initial Destressing and Sonorant Destressing.

In his article "Lexical Morphology and Phonology", Kiparsky (1982) refers to two rules of medial destressing whose ordering with respect to the cyclic rule of Trisyllabic Shortening (TSS) he gives as crucial: Prestress Destressing precedes TSS and therefore it must be cyclic itself, and Poststress Destressing follows TSS. A fundamental assumption for Kiparsky's argument is that cyclic rules and postcyclic rules form two disjoint blocks and that rules from one block cannot be interspersed with rules from the other block (Kiparsky 1982, Rubach 1984a, 1984b, Booij and Rubach 1987).

Hayes (1981, 1982) discusses two destressing rules: Prestress Destressing and Poststress Destressing, the former being subject to different segmental conditions depending on whether the rule applies in medial or initial position, and the latter applying only medially. Contrary to Hayes, Kiparsky (1979, 1982) claims that Initial (Prestress) Destressing is a separate rule from medial Prestress Destressing, since the former is word-level (postcyclic, or level 2) whereas the latter is cyclic (level 1).

Finally, Selkirk (1984) reformulates the rules of Initial Destressing, Medial Destressing and the *Arab* Rule as one postcyclic rule: Monosyllabic Destressing. Unlike Kiparsky, she assumes a morphologized version of TSS, which makes the ordering of destressing rules with respect to TSS irrelevant for making predictions about their (cyclic/noncyclic) status.

In this section we show the morphologized version of TSS to be untenable and adopt Kiparsky's phonological formulation of this rule instead. This allows us to assume, with Kiparsky, that predictions can be made regarding the status of phonological rules by fixing their order of application with respect to other rules whose status has already been established. However, the predictions we will be making here do not refer to the cyclic vs. postcyclic status of phonological rules, but to their level 1 vs. level 2 status. With regard to destressing rules, Kiparsky's rules of medial Pre- and Poststress Destressing are collapsed as a level 1 rule of Medial Destressing. In addition, it is argued that the different

destressing behaviour of level 1 vs. level 2 prefixes as well as the data supporting Kiparsky's word-level (level 2) version of Initial Destressing can both be explained in terms of a level 1 rule of Initial Destressing within a noncyclic approach to English word stress. Finally, Selkirk's assumptions about destressing are considered. Her reformulation of Initial and Medial Destressing as a single postcyclic rule is rejected on the basis of the discussion of Kiparsky's and Hayes's rules, and her rule of Sonorant Destressing is revised.

3.1. Trisyllabic Shortening

In this section we present an argument, due to Kiparsky (1982), in favour of a phonological version of TSS. Adopting such a version of this rule allows predicting the level 1 status of all preceding rules, once the level 1 membership of TSS has been established.¹⁵

Selkirk (1984) views TSS as a rule of allomorphy triggered by the following suffixes: *-ic, -ance, -ize, -ation, -atory, -ative, -ity, -ent, -al, -ify, -ive, -ism*. However, by denying the phonological character of this rule she fails to account for contrasts such as those between (19)a and b, (20)a and b, and (21)a and b.

- | | | |
|------|------------------------|-----------------|
| (19) | a. TSS does not apply: | b. TSS applies: |
| | grādation | gr[æ]dual |
| | rēlation | r[ε]llative |
| | prīvation | pr[ɪ]vative |
| (20) | a. TSS does not apply: | b. TSS applies: |
| | fōcal | cr[ɪ]lminal |
| | lōcal | n[æ]tural |
| | cōastal | gr[æ]dual |
| | trībal | n[æ]tional |
| (21) | a. TSS does not apply: | b. TSS applies: |
| | invāsive | rep[ε]titive |
| | explōsive | comp[α]sitive |
| | decīsive | imp[ε]ditive |
| | divīsive | supp[α]sitive |

As pointed out by Kiparsky (1982), these contrasts can be explained if we state TSS as phonologically conditioned, i.e., as a rule that shortens a vowel when followed by at least two syllables the first of which is unstressed. In (19)a the stress on the second syllable blocks the shortening of the preceding long vowel; in (20)a and (21)a the long vowel in the first and second syllable respectively is not shortened because the condition that it must be followed by at least two syllables is not met.

We believe Kiparsky's argument to be convincing, and we adopt his formulation of TSS.

3.2. Kiparsky's and Hayes's Rules of Medial Destressing

This section introduces Kiparsky's and Hayes's destressing rules.

3.2.1. Kiparsky's Rules

Kiparsky (1982, p.35-42) proposes the following rules and crucial orderings:

- (22) a. *Word stress assignment*. (Hayes 1981, 1982).¹⁶
- b. *Prestress Destressing*. This rule "eliminates metrically weak stresses medially in open syllables if another stress follows".
- c. *Trisyllabic Shortening* (TSS). A rule that "shortens a vowel if followed by at least two more syllables of which the first is unstressed:

$$V \rightarrow [-\text{long}] / __ C_\circ V_i C_\circ V_j$$
 , where V_i is not metrically strong".
- d. *y-Syllabification*.

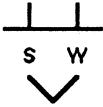
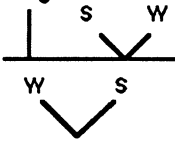
$$y \rightarrow i / \text{word-finally}$$
- e. *Poststress Destressing*. "This rule destresses metrically weak open syllables between a stressed and an unstressed syllable."

Rules a through e are crucially ordered.

Let us look now at the evidence he gives for the proposed rules and orderings.

First, the assignment of word stress has to precede TSS to account for the failure of the long vowels in (23) to shorten.¹⁷ An illustrative derivation is given in (24).

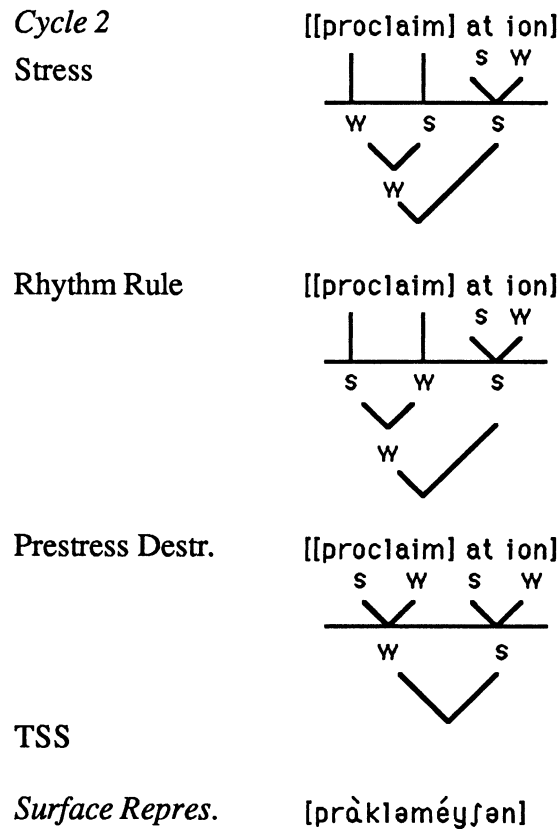
(23)	mīgrátion	fīnality
	flōtátion	vītality
	gŷrátion	glōbality
	cītátion	tōnality
	quōtátion	tītánic

(24)		
	<i>Cycle 1</i>	[[migrate] ion]
	Stress	
	<i>Cycle 2</i>	[[migrate] ion]
	Stress	
	TSS	inapplicable
	<i>Surface Repres.</i>	[mâýgréýfən]

Second, as shown in (26), Prestress Destressing has to be ordered before the cyclic rule of TSS to account for the shortening of the long vowels in the first syllable of the words in (25); since Prestress Destressing precedes a cyclic rule, it must be cyclic itself.¹⁸

(25)	pr[à]clamátion
	r[è]storátion
	r[è]citátion

(26)		
	<i>Cycle 1</i>	[[proclaim] at ion]
	Stress	



On the other hand, the contrast between (27)a and (27)b shows that Prestress Destressing applies only in open syllables:¹⁹

- | | | |
|------|----------------|-----------------|
| (27) | a. èxplanátion | b. còndénsátion |
| | còmbinátion | ìndèntátion |
| | ìnvitátion | ìnfèstátion |
| | phònètícian | sýntàctícian |

Third, TSS needs to be ordered before y-Syllabification to account for its failure to shorten the long vowels in (28):

- (28) vácancy
sécrecy
pótency

These vowels are not eligible for undergoing TSS because the condition that they must be followed by at least two syllables is not met before the syllabification of -y.

Fourth, the rule of Poststress Destressing has to follow all the other rules. The words in (29)b show that Poststress Destressing has to be ordered after y-Syllabification, so that the syllable following the one bearing main stress is in medial position by the time Poststress Destressing applies:

- | | | |
|------|------------------------------------------|-----------------------------------|
| (29) | a. tránsitòry
prómissòry
plánetàry | b. advísory
cúrsory
plénary |
|------|------------------------------------------|-----------------------------------|

This restriction is required to prevent the destressing and subsequent reduction of final long vowels (állỳ, áltò).

The words in (30) show that this destressing rule has to be ordered after TSS:

- (30) mígratòry
víbratòry
rótatòry
phónatòry

Kiparsky's arguments for this last ordering will be given in section 3.3.1.1.

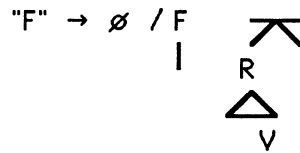
3.2.2. Hayes's Rules

Prestress and Poststress Destressing are stated by Hayes (1982) as follows:

- (31) a. *Prestress Destressing*

$${}^{\text{w}}\text{F} \rightarrow \emptyset / \text{---} \text{F}$$

(Delete a nonbranching foot structure when it precedes a foot and is metrically weak.)

b. *Poststress Destressing*

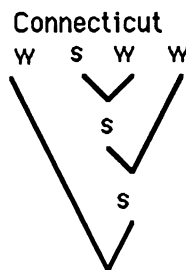
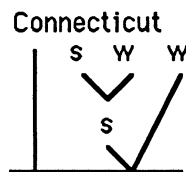
(Delete a binary foot whose first syllable is open and which is immediately preceded by a nonbranching foot.)

Hayes points out that the formulation of Prestress Destressing can be simplified by replacing the weak-foot condition with a universal condition on destressing rules: "No foot in strong metrical position may be deleted." (Hayes 1982, p.257).

3.2.2.1. *Prestress Destressing*

This rule removes a nonbranching foot from a tree when it is weak and followed by another foot. Hayes argues that this rule has two functions: to remove initial secondary stresses and certain stresses that arise in cyclic derivations. He illustrates this double function with the derivations below:²⁰

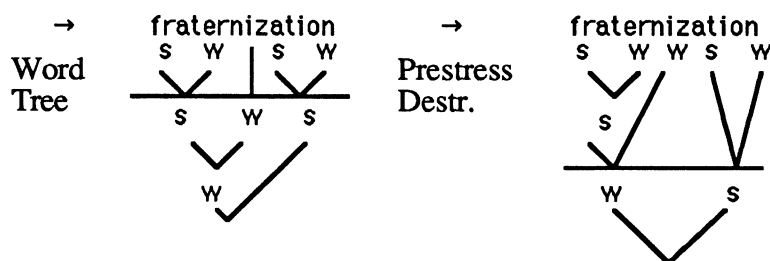
(32) a.



Noun Extrametricality
English Stress Rule, SSA
Strong Retraction
Word Tree Construction

Prestress Destressing
SSA

b.



According to Hayes this rule is constrained by some segmental conditions, namely, that "only light syllables destress in initial position (with a special exemption for Latinate prefixes), and only open syllables in medial position." (Hayes 1982, p.253). This accounts for the contrasts between (33)a vs. b, and (34)a vs. b:

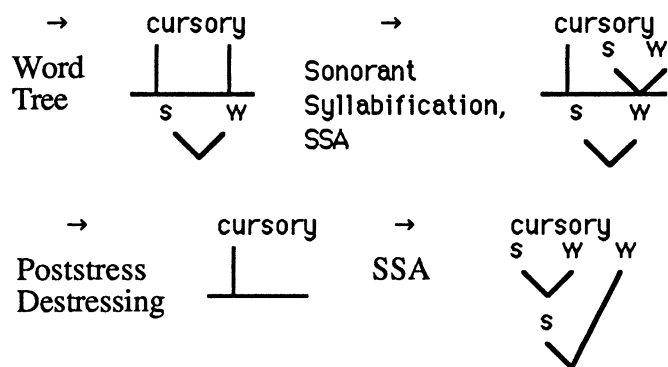
- | | | |
|------|------------------------------------------------|-----------------------------------------------|
| (33) | a. Initial light syllable
banána | b. Initial heavy syllable
bândána |
| (34) | a. Medial open syllable
[[ecònomize] átion] | b. Medial closed syllable
[[òriênt] átion] |

3.2.2.2. Poststress Destressing

This rule removes a branching foot when it follows a nonbranching foot and its first syllable is open. Poststress Destressing is needed to account for two classes of data: suffixes like *-ory*, *-ary*, and *-ative*, and nonfinal ternary feet.

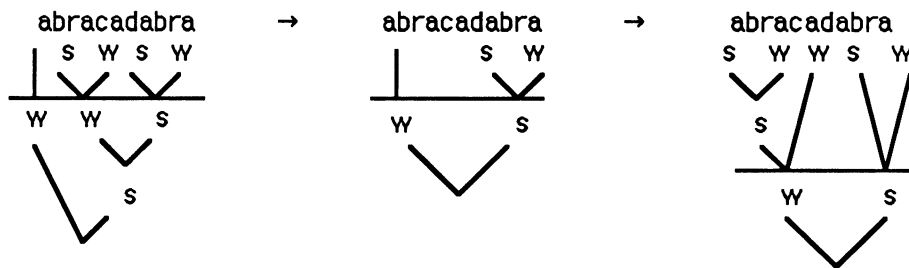
(35) exemplifies the application of Poststress Destressing to a word in *-ory*: ²¹

(35)

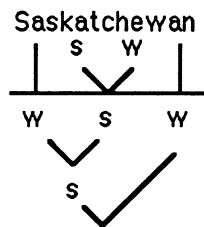


(36) shows the application of Poststress Destressing to account for the nonfinal ternary feet in (37): the rule destresses the medial foot of the words in (37)a; it is blocked in (37)b because the foot to be deleted is in a strong metrical position, which shows that Poststress Destressing must follow word stress assignment; finally, it is inapplicable in (37)c because the first syllable of the foot to be removed is heavy.

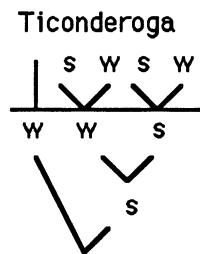
(36) a.



b.



c.



(37) a. àbracadábra
Lùxipalílla
Kìlimanjáro
pàraphernálla

b. Sàskátchewàn
Èscúminàc
Mamáronèck
Òktíbbèhà

c. Tìcònderóga
Monòngahélla
cúcùmber
càrbùncle

3.3. Medial (Pre/Poststress) Destressing

In this section Kiparsky's and Hayes's rules of medial destressing are discussed. Some arguments are given for the level 1 status of Poststress Destressing and for the elimination of the segmental conditions on Medial (Pre/Poststress) Destressing. Kiparsky's claim that Medial Prestress Destressing precedes TSS is confirmed--which establishes the level 1 membership of Medial Prestress Destressing--and a single level 1 rule of Medial (Pre/Poststress) Destressing without segmental conditions is proposed.

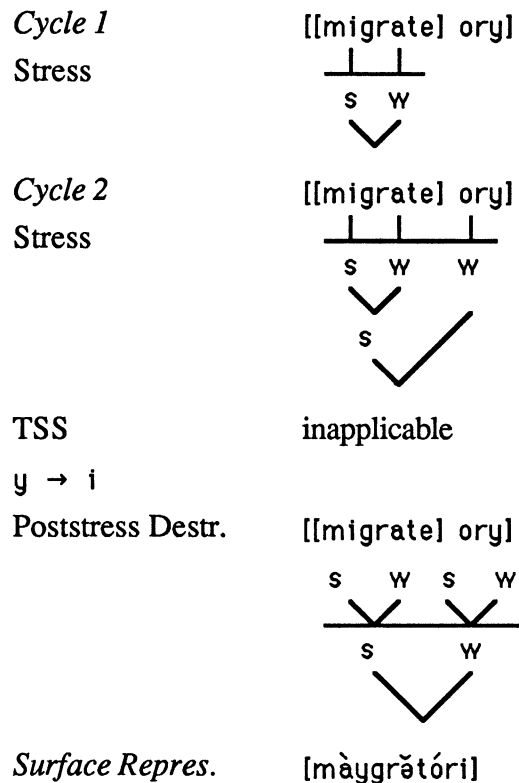
3.3.1. Medial Destressing Is a Level 1 Rule

Our discussion of Kiparsky's and Hayes's medial destressing rules in this section serves as the basis for proposing a single level 1 rule of Medial (Pre/Poststress) Destressing

3.3.1.1. Problems with Kiparsky's Analysis

Kiparsky argues that TSS precedes y-Syllabification, which in turn is ordered before Poststress Destressing; so, by transitivity, TSS must precede Poststress Destressing. This ordering, he claims, predicts that Poststress Destressing will never feed TSS, a prediction that, according to him, is borne out by words such as *migratory*, *vibratory*, *rotatory* and *phonatory*--from (30) above--where TSS is blocked by the stress on *-at-* inherited from the first cycle. To illustrate this, he gives the following derivation:

(38)



There are several problems to point out in connection with Kiparsky's analysis in (38). First of all, we have already indicated that the extrametrical suffixes *-atory* and *-ative* must be added to bases in one step. Second, the destressing of *-at-* in these words should not be done by means of Poststress Destressing but by Prestress Destressing instead, since (i) Prestress Destressing is ordered first in Kiparsky's analysis and is applicable and (ii) Poststress Destressing is not defined anyway, because the syllable following *-at-* is not unstressed. Recall that Kiparsky requires Poststress Destressing to apply in the context of a following unstressed syllable, although he does not give any crucial evidence for this condition.

Let us examine now some more examples requiring an analysis similar to that of *migratory*.

(39)	Prestress Destressing:		Poststress Destressing:
	dōnate – d[ow/ɑ]natory		prīvate – pr[ɪ]vative
	crēmate – cr[iy/ɛ]matory		dōnate – d[ow/ɑ]native
(40)	Word Stress	dó (nà-tòry) _{em}	prí (và-tive) _{em}
	Pre-stress Destr.	dó (na-tòry) _{em}	
	Post-stress Destr.		prí (va-tive) _{em}
	TSS	d[ów/á] (na-tòry) _{em}	pr[ɪ́] (va-tive) _{em}

The examples in (39) are similar to Kiparsky's. Their derivation proceeds as in (40) and shows that both Kiparsky's Pre- and Poststress Destressing feed TSS, a rule that applies obligatorily in *privative*, and only optionally in *crematory*, *donatory* and *donative*.

Additional support for the claim that Poststress Destressing precedes TSS comes from the words in (42). (As previously pointed out, within Kiparsky's framework, the destressing of *-at-* in words in *-atory* must be done by Prestress Destressing; therefore, the words in (41) just confirm Kiparsky's claim that Prestress Destressing precedes TSS.)

(41)	Prestress Destressing:
	sāne – s[ǣ]natòry
	defāme – def[ǣ]matòry
	inflāme – infl[ǣ]mmatòry
	explāin – expl[ǣ]natòry
	invōke – inv[á]catòry

(42) Poststress Destressing:

derīve – der[í]vative
 exclāim – excl[ǣ]mative
 provōke – prov[á]cative

The data presented in (39), (41) and (42) argue for a feeding order between both Pre- and Poststress Destressing and TSS. Thus, contrary to Kiparsky, we must conclude that not only Medial Prestress Destressing but also Medial Poststress Destressing precede the level 1 rule of TSS and, therefore, that both rules must be level 1. Within this proposal, the roots of *migratory*, *vibratory*, *rotatory* and *phonatory* are assumed to be exceptions to TSS (cf. $v[áy]brǣtive$, not $*v[í]brǣtive$).

Now that the level 1 status of these two rules has been established, we can collapse them as a single level 1 rule of Medial Destressing. We state this rule as in (43) and propose the crucial orderings in (44). (Recall that evidence to order y-Syllabification before Medial Destressing comes from forms such as *advísōry*.)

(43) *Medial Destressing*

		x	x					x
x	x	x		→		x	x	x
σ	σ	σ				σ	σ	σ

(mirror image)

Conditions: a. only open syllables destress
 b. the given case (prestress) applies before the m.i. case
 (poststress) if both are applicable

(44) { y-Syllabification
 Medial Destressing
 TSS

The b-condition on Medial Destressing--a condition that we state only for clarity since it follows from the usual interpretation of mirror image rules --accounts for the destressing of *-at-* in words such as *dedicatory*, *sanatory*, *explanatory*, etc., as shown in (45). Recall that the compound suffixes *-atory* and *-ative* are added to bases in one step.

- (45) dedi(ca-tory)_{em} *First Cycle*
 x x x x x Stress Rules
 x x x
 x
 dedi(ca-tory)_{em}
 x x x x x Medial Destressing
 x x
 x

Given the crucial orderings in (26) and the rule of Medial Destressing in (43), the derivation of the words in (39), (41) and (42) is now straightforward.

- (46) sane derive *First Cycle*
 x x x Stress Rules
 x x x
 x x
 sa(na-tory)_{em} deri(va-tive)_{em} *Second Cycle*
 x x x x x x x DBA, HBR
 x x x x x x
 x x
 sa(na-tory)_{em} deri(va-tive)_{em}
 x x x x x x x x y-Syllabification, DBA
 x x x x Medial Destressing
 x x TSS

(The rule of Initial Destressing completes the derivation of *derivative*.)

Note that the final -y in *sanatory* is assigned a demibeat right after it has been syllabified. Crucial support for this move comes from words like *cúrsōry* (whose derivation is given in (50) below), where the incorporation of the just syllabified -y into the grid is required for the rule of Medial Destressing to apply. In such examples the (poststress) destressing of the long vowel in -ory confirms Selkirk's claim that "all syllables of an utterance enter into the overall rhythmic organization of the sentence" (Selkirk 1984, p.90). We already assumed this claim in section two to justify the assignment of a demibeat to syllables with underlyingly featureless V slots.

It needs to be observed that this proposal fails to explain why derived words formed with the suffixes -y, -ory and -ary do not undergo TSS.

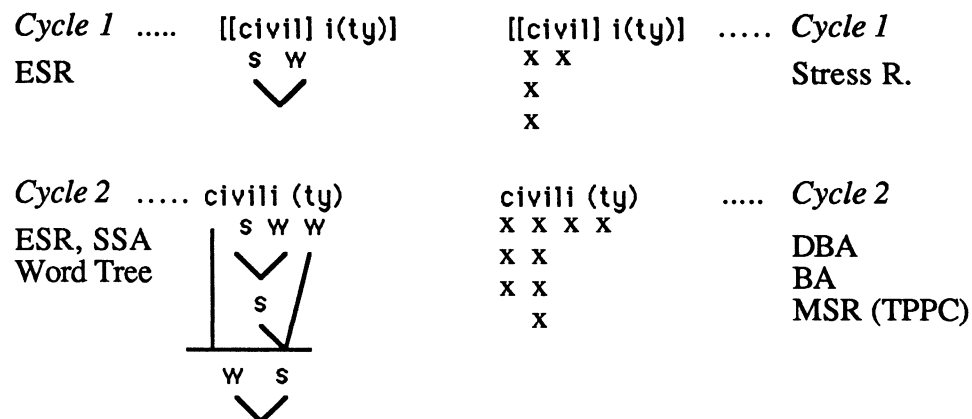
- (47) vācancy rōsary revīsory
 pōtency ōvary advīsory
 dēcency prīmary

These words can be accounted for if we postulate two final -y 's in level 1 suffixes--one underlyingly /y/ as in (47), and the other /i/ as in (48)--and mark only the nonsyllabic -y as an exception to TSS.

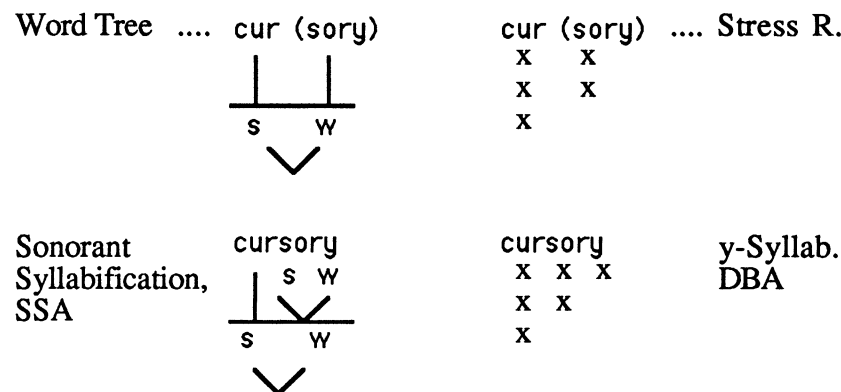
- | | | |
|------|-----------|-------------|
| (48) | s[ə]nity | div[ɪ]nity |
| | v[ə]nity | ser[é]nity |
| | op[ə]city | verb[á]sity |

The assumption that the words in (47) have a final /y/ whereas those in (48) have a final /i/ is independently motivated by their respective stress patterns. As shown below, words ending in -ity behave as if their final -y were a vowel with respect to the assignment of extrametricality in underlying representation, while words ending in -y, -ory and -ary behave as if their final -y were a consonant.

(49)



(50)



(Initial²² and Medial Destressing complete the derivations in (49) and (50) respectively as far as the grid is concerned.)

A more detailed examination of this account is in order.

3.3.1.2. Hayes's Analysis

Unlike Kiparsky's, Hayes's Prestress Destressing applies in both initial and medial position although under different segmental conditions. In the previous section Kiparsky's claim that Medial Prestress Destressing precedes TSS--which determines the level 1 status of this destressing rule--has been confirmed. The application of Prestress Destressing in initial position will be considered in section 3.4.

If we examine now Hayes's and Kiparsky's formulation of Poststress Destressing, we will see that they account for the same data. First, the requirement that the foot to be deleted be branching in Hayes's formulation is equivalent to Kiparsky's condition that the syllable to be destressed be followed by an unstressed syllable. Second, Hayes's requirement that the foot to be deleted be preceded by a nonbranching foot is equivalent to Kiparsky's condition that the syllable to be destressed be preceded by a stressed syllable. Finally, the segmental conditions on the target syllable are the same: it must be open. Therefore, the arguments given in the previous section to show the level 1 status of Kiparsky's Poststress Destressing, can be extended to Hayes's Poststress Destressing.

3.3.2. Segmental Conditions on Medial Destressing

In their formulation of Medial Pre- and Poststress Destressing both Kiparsky (1982) and Hayes (1982) make reference to a segmental condition on the application of these rules, namely, that only open syllables may destress. However it is not clear to us that medial destressing in open vs. closed syllables is the rule. Consequently, we now consider Kiparsky's and Hayes's evidence for the open-syllable condition. We examine first the case of Medial Prestress Destressing, and then turn to Medial Poststress Destressing.

In (51) we give three lists of words in which Medial Prestress Destressing is potentially applicable to a closed syllable: the syllables in (51)a show no destressing, those in (51)b obligatory destressing and reduction of the vowel, and, finally, those in (51)c optional destressing and reduction of the vowel if destressing applies.²³

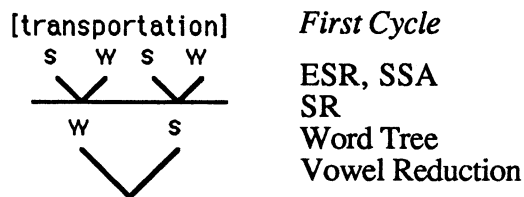
(51) a. No destressing:	b. Obligatory destressing:	c. Optional destressing:
annexation	affirmation	adaptation
conductivity	confirmation	advantageous
conformation	conservation	affectation
decantation	consultation	authenticity
demarcation	conversation	adventitious
deportation	designation	collectivity
destructivity	externality	commendation
detestation	exultation	condemnation
domesticity	imperfection	condensation
elasticity	infertility	confrontation
electricity	information	deformation
elongation	internality	dispensation
exaltation	lamentation	emendation
expectation	molestation	exhortation
exportation	observation	fermentation
impartation	perturbation	fomentation
immortality	preservation	fragmentation
importation	reformation	inaccessible
inactivity	reportorial	incongruity
incrustation	reservation	ostentation
inculcation	transformation	productivity
inculpation	transportation	protestation
incurvation	usurpation	sentimentality
indentation		
indignation		
inductility		
inductivity		
infestation		
informality		
malformation		
prolongation		
recantation		
relaxation		
retardation		
retentivity		
retractation		
subornation		
syntactician		
transcendental		

In other words, (51) shows that at least as many closed syllables can destress by this rule as those that cannot. Hence, there is no open-syllable condition on Medial Prestress Destressing.

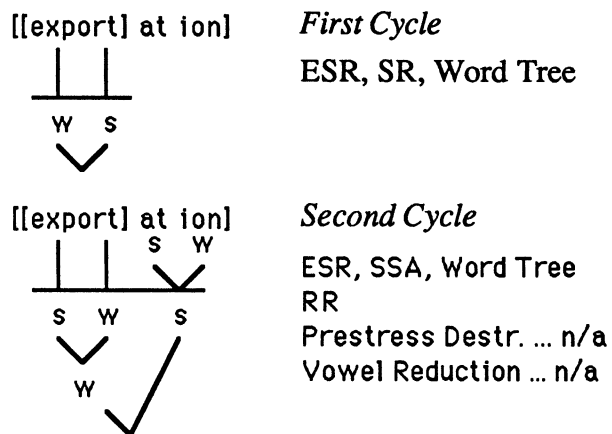
To explain the (obligatory/optional) prestress destressing of closed syllables such as the ones in (51)b/(51)c, Halle and Vergnaud (1987) follow SPE and postulate that forms with unstressed and reduced vowels are derived from a representation with flat structure

(e.g., [trans+port+at+ion]), whereas those with stressed and unreduced ones are derived from a representation with internal constituent structure (e.g., [[ex+port] +at+ion]). Representative derivations--within Hayes's framework--of these two cases are given in (52)a and b. Notice that the Vowel Reduction Rule, as assumed by Hayes, reduces anything that is weak within a foot, e.g., the second syllable of *trànsportátion*. In *èxpòrtátion*, however, Hayes's Prestress Destressing is not applicable because of the open-syllable condition and, as a result, Vowel Reduction cannot apply.

(52) a.



b.



Turning now to Medial Poststress Destressing, Kiparsky does not give any crucial examples to justify the condition that only open syllables destress in poststress position. Hayes gives the contrast between the *abracadabra* and the *Monongahela* cases as evidence in favour of the segmental condition on Poststress Destressing. However, we have already seen that this contrast can be handled in a different way that requires no destressing at all: as the first syllable of *Monongahela* and the second of *abracadabra* always surface with a schwa, we postulate a V-element with no feature specification in both cases, which prevents these two syllables from ever being stressed.

(53)	abracadabra	Monongahe(1a) _{em}	
	x x x x x	x x x x x	DBA, HBR, IBR
	x x	x x	BA
	x	x	MSR

To conclude, since (i) there is no evidence for the open-syllable condition on Medial Poststress Destressing and (ii) the number of exceptions to the open-syllable condition on Prestress Destressing is bigger than the number of regular cases (if the data in (51) is representative), we see no reason not to drop this condition and simply assume that the words in (51)a are exceptions to the rule of Medial (Pre/Poststress) Destressing. This allows a restatement of Medial Destressing-(43), eliminating condition (a):

(54) *Medial Destressing* (MD)

	x	x				x
x	x	x	→	x	x	x
σ	σ	σ		σ	σ	σ
(mirror image)						

Notice that Medial Destressing has numerous exceptions with open syllables too.

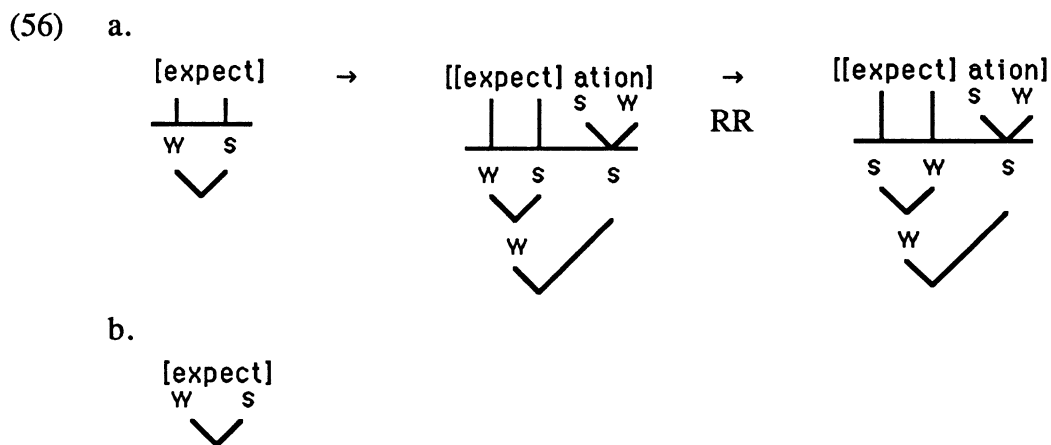
(55)	avocation	immorality	influential
	denotation	impassivity	inhumane
	detonation	incitation	intonation
	exponential	incoherence	illegality
	immobility	indocility	

3.4. Initial Destressing

Following Kiparsky, we claim in this section that Initial Destressing is a separate rule from Medial (Prestress) Destressing. Then, we consider the different destressing properties of level 1 and level 2 prefixes, and show that they can be accounted for if Initial Destressing is assigned to the level 1 domain within a noncyclic approach to word stress.

3.4.1. Kiparsky's Word-Level Rule of Initial Destressing

Unlike Kiparsky's, Hayes's Prestress Destressing applies in both initial and medial position although on different segmental conditions. It has already been argued that Medial Prestress Destressing is a level 1 rule since it feeds the level 1 rule of TSS (*proclamation* [pràklǎméyʃən]). Let us look now at an argument given by Kiparsky (1979) for the word-level (postcyclic, or level 2 in later frameworks) status of Initial (Prestress) Destressing.



Kiparsky notes that the Rhythm Rule (RR) retracts stress onto the initial syllable of *expectation* even though it is unstressed and reduced in *expect*. This shows that Initial Destressing is a word-level rule: if it were cyclic, it would destress the prefix in the first cycle, thus bleeding the RR in the second cycle, which would give the incorrect result **expèctátion*. On the other hand, Initial Destressing must precede phrasal applications of the RR, as illustrated in (57).

- (57) a. exáct → exàct chángé
 b. benígn → benìgn túmor
 c. thîrtéen → thîrtêen mén

Initial Destressing applies in *exact* and *benign* bleeding the (phrasal) RR. However, no destressing is possible in *thirteen* to prevent the phrasal application of the RR.

L&P (1977) give some examples similar to Kiparsky's (*intense líght, exàct ánsver*) where prefix (prestress) destressing bleeds phrasal applications of the RR. So, contrary to Hayes, we must conclude that Initial Destressing and Medial (Prestress) Destressing are two different rules. This seems to be a desirable result, since (i) Medial Destressing cannot be defined in two-syllable words, whereas Initial Destressing may be (e.g., *expect*); and (ii) we have shown that Medial Destressing has no segmental conditions, while Initial Destressing does: it only applies to light syllables and prefixes.²⁴ The need for the first condition on Initial Destressing, which we state as in (58), is illustrated by the words in (59).

(58) *Initial Destressing* (ID)

$$\begin{array}{ccccc}
 & & x & & x \\
 & x & x & & x \\
 & x & x & \rightarrow & x & x \\
 \# & \sigma & \sigma & & \# & \sigma & \sigma
 \end{array}$$

Condition: the syllable to be destressed must be light or a prefix

(59) Initial light syllable:

atómic
esséntial
demócracy
oríginal
monárchic
análogous

Initial heavy syllable:

bândána
fínáality
âmbíguous
rôbúst
mâgníficence
tôtáality

As for the second condition, we will consider the behaviour of prefixes with respect to destressing in the following section.

3.4.2. Initial Destressing Is a Level 1 Rule

SPE (1968), Siegel (1974), Kiparsky (1982) and Selkirk (1982) recognize the existence of two types of derivational affixes in English: stress nonneutral affixes (level 1) and stress neutral affixes (level 2). Selkirk (1982) claims that the stress system of English does not allow a distinction between prefixes of level 1 and level 2. However, we will show (i) that they can in fact be distinguished on the basis of their destressing properties

and (ii) that this distinction can be captured by a level 1 rule of Initial Destressing within a noncyclic approach to English word stress.

Some of the main claims made in the literature concerning the existence of these two types of English affixes are the following:

- (60) a. Level 1 affixes enter into the canonical patterns of English word stress, whereas level 2 affixes do not.
- b. Some rules of segmental phonology apply in level 1 affix-stem structures, but not in level 2 affix-stem structures.
- c. Level 1 affixes may attach to bound roots, while those of level 2 normally attach only to words.
- d. "Class 2 affixes may appear outside [nonneutral] affixes, but Class 1 affixes may not appear outside [neutral] affixes." (Siegel's (1974, p.163) Affix Ordering Generalization).
- e. "Class 2 affixes may appear inside or outside (native) compounds, while Class 1 affixes appear only inside (native) compounds." (Selkirk's (1982, p.92) Compound-Affix Ordering Generalization).
- f. Level 2 affixes "do not readily fuse semantically with the words to which they attach." (Aronoff 1983).

On the basis of the above claims we assume the assignment of *in-*, *con-*, *ab-* and *per-* to level 1 and *un-*²⁵ and *non-* to level 2. As noted by Aronoff (1976) and Selkirk (1982), some affixes belong to both levels. In particular, we assume here the dual membership of *re-*, *de-* and *pre-* since, like level 1 affixes, (i) they may attach to bound roots ([*deserve*], [*remit*], [*preclude*]), (ii) they may enter into the canonical patterns of English stress ([*déference*], [*rérelative*], [*précedent*]), and (iii) they may appear inside level 1 affixes ([*de-populat*] *ion*), [*re-compos*] *ition*), [*pre-fabricat*] *ion*); and, like level 2 affixes, they may appear outside compounds ([*de-upgrade*], [*re-undercut*], [*pre-underline*]). These prefixes with dual status seem to behave like level 1 prefixes when they are semantically opaque (e.g., the prefix in *récréate* 'refresh' enters into the canonical patterns of word stress), and like level 2 prefixes when they are semantically transparent (*rè-create* 'create anew'), which is in accordance with Aronoff's claim in (60)f.

Recall now Kiparsky's claim that Initial Destressing is a word-level (i.e., postcyclic or level 2) rule that bleeds phrasal applications of the RR (*exàct chángé*) and is bled by word-internal applications of the RR (*èxpêctátion*).

Let us examine first those cases where Initial Destressing bleeds phrasal applications of the RR. We follow Kiparsky and L&P in assuming that the destressing of initial light syllables blocks phrasal applications of the RR (*atòmic bómb*, *essèntial óil* vs. *thìrtêén mén*). Consider, however, the destressing behaviour of prefixes in the face of the distinction between level 1 and level 2 affixes. The examples given by Kiparsky (*exàct chángé*) and L&P (*exàct ánsweér*, *intènsè líght*) to show that Initial Destressing bleeds phrasal applications of the RR have level 1 prefixes. Compare now those examples with the ones in (61) with level 2 prefixes.

(61)	ûnbéaten – ûnbêaten téam	nôndáiry – nòndâiry pródúcts
	ûnéven – ûnêven gróund	nônnúclear – nònnûclear wéapon
	ûnmêlted – ûnmêlted snów	nôn Rústable – nòn rûstable métal
	ûnskîlled – ûnskîlled lábor	nôn fíction – nòn fîction nóvels
	ûnmárried – ûnmârried mán	nôn crédit – nòn crêdit cóurse

The (phrasal) RR applies in the examples in (61), showing that the (level 2) prefixes have not been destressed, since the RR never shifts stress onto a stressless syllable (L&P 1977, p.319; Kiparsky 1979, p.425; Selkirk 1984, p.173; Halle and Vergnaud 1987, p.235). In other words, Kiparsky's and L&P's examples together with the ones in (61) indicate that Initial Destressing applies to light syllables and level 1 prefixes, but not to level 2 prefixes.

To account for these facts, two analyses seem possible in principle: either we assign Initial Destressing to the level 1 domain and provide an alternative to Kiparsky's explanation for the destressing of the prefix in *expect* but not in *expectation*, or else we assign Initial Destressing to the level 2 domain and somehow prevent this rule from applying to level 2 prefixes. The present study explores the first analysis and shows that it leads to a noncyclic approach to English word stress, an approach which is pursued in section four.

As for the second analysis, we next offer an argument against the assignment of Initial Destressing to the level 2 domain. We have already referred twice to Selkirk's claim that "All syllables of an utterance enter into the overall rhythmic organization of the sentence" (Selkirk 1984, p.90). In section two, we resorted to this claim to justify the assignment of a demibeat to underlying schwas; it was then pointed out that confirmation of this move would be offered in section four (see the derivation of *subliminality* in section 4.4). In section 3.3.1.1, we have referred again to Selkirk's claim, this time to support the

assignment of a demibeat to final (nonsyllabic) -y's right after they have been syllabified. This claim will be formalized in section four as follows: as a universal convention, Demibeat Alignment will be assumed to apply whenever it can. Obviously, by this convention, Demibeat Alignment must then be the first (prosodic) rule to apply after level 2 affixation. As a result, if Initial Destressing were a level 2 rule, it should apply at least after Demibeat Alignment. Notice, however, that ordering Initial Destressing after Demibeat Alignment would incorrectly prevent this destressing rule from applying to a level 1 stem where Initial Destressing were defined, whenever a level 2 prefix were attached. This is illustrated below.

(62)	[non ₂ [conductive] ₁]	[non ₂ [essential] ₁]	(after level 1 rules)
	x x x	x x x	
	x x	x x	
	x	x	
	[non ₂ [conductive] ₁]	[non ₂ [essential] ₁]	<i>Level 2 Rules</i>
	x x x x	x x x x	DBA
	x x	x x	ID ... n/a because <i>con</i>
	x	x	and <i>e</i> are not initial
			but medial
	*nòncôndúctive	*nòncêsséntial	(after all level 2 rules) ²⁶

Medial Destressing is not applicable to *con* and *e*, either, because it is a level 1 rule. Thus, there is no way of deriving the correct forms with the rules given so far.

We turn now to the first analysis proposed to account for the destressing of level 1, but not level 2 prefixes, according to which Initial Destressing is a level 1 rule. Given this assumption, how do we explain the destressing of the prefix in *expect* but not in *expectation*? One alternative could be that after being destressed on the first cycle, *ex-* is restressed on the second cycle by the Initial Basic Beat Rule. However, this possibility is ruled out by the Strict Cycle Condition.

Let us assume (i) that English word stress rules²⁷ are level 1 rules which precede the level 1 rules of Medial Destressing (MD), Initial Destressing (ID) and TSS, and (ii) that there is no "cyclic stratum"--i.e., stress and destressing rules do not reapply after each step of level 1 word-formation, but apply instead after all level 1 affixation and before level 2 affixation. Given these assumptions, Selkirk's (1984) stress rules as modified in section two, and Medial and Initial Destressing as stated in (54) and (58) respectively, the derivation of *expect* and *expectation* would proceed as follows:

(63)	expect	expectation	
	x x	x x x x	DBA
	x x	x x x	HBR
	expect	expectation	
	x x	x x x x	MSR-(10)
	x x	x x x	BA (3rd level)
	x	x	
	x	x	
	expect	expectation	
	x x	x x x x	MD ... exceptionally n/a in
	x	x x x	<i>expectation</i>
	x	x x	ID
	x	x	

The correct result is obtained. Such a noncyclic approach would also account for the the different phonological properties of the words in (64)a, with level 1 prefixes, and those in (64)b, with level 2 prefixes. Although these properties will be examined in section four, we offer some illustrative derivations in (65) (only level 1 rules are applied).

(64)	a. r ^è f ^ò r ^m át ⁱ on ('revision')	b. r ^è [f ^ô r ^m át ⁱ on] ('formation again')
	pr ^ò v ^ô cát ⁱ on ('stimulus')	pr ^ò [v ^ô cát ⁱ on] ('in favour of vocations')
	pr ^è j ^û dí ^c ial ('detrimental')	pr ^è [j ^û dí ^c ial] ('before judgement')

(65)	[reform] ₁	[reformation] ₁	[re[formation] ₁] ₂	
	x x	x x x x	x x x	DBA
	x x	x x x	x x	HBR, IBR
	x	x x	x	MSR-(10)
	x	x	x	BA (3rd level)
	[reform] ₁	[reformation] ₁	[re[formation] ₁] ₂	
	x x	x x x x	x x x	MD
	x	x x	x x	ID
	x	x x	x	TSS in
	x	x	x	[reformation] ₁
	[r ^ɪ 'f ^ɔ rm]	[,r ^ɛ f ^æ 'm ^{eɪ} fən]	[,r ^ɪ yf ^ɔ r'm ^{eɪ} fən] ²⁸	(after level 2
	x x	x x x x	x x x x	rules have
	x	x x	x x	applied)
	x	x x	x	
	x	x	x	

Reform and *reformation* ('revision') are derived the same way as *expect* and *expectation*, the only difference being that, unlike *expectation*, *reformation* is not an exception to MD; therefore, MD applies feeding TSS. However, in (64)b the syllables

-form-, *-voc-* and *-ju-* are not in medial position by the time level 1 rules apply and, as a result, they cannot be destressed by MD. ID does not apply either because, although initial (at the relevant level), these syllables are neither light nor prefixes.

To summarize, we have suggested that the different destressing properties of level 1 and level 2 prefixes can be accounted for by a level 1 rule of Initial Destressing within a noncyclic analysis of word stress assignment. We will explore this approach in section four and see that, in addition to capturing the destressing properties of level 1/ level 2 prefixes, it provides an explanation for the vowel alternations exhibited by these prefixes.²⁹

3.5. Selkirk's Destressing Rules

Selkirk defines destressing rules as rules of basic beat deletion whose application is constrained by the following conditions:

- (66) a. Destressing cannot affect CVV syllables.
- b. Destressing is either postcyclic, or else "cyclic, but . . . it has constituents of level Word (and perhaps higher) as its domain." (Selkirk 1984, p.112).
- c. No strong basic beat can be deleted (*Higher Prominence Preservation Condition*).

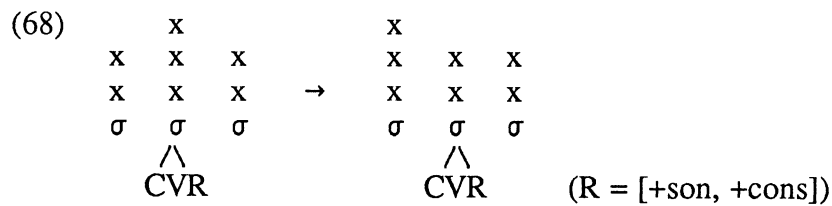
The condition in (66a) is crucially related to the assumption that the laxing of long vowels by means of TSS is morphologically conditioned. It has already been shown that this assumption is untenable. Consequently, in order to account for forms such as those in (67), where TSS applies, the (Pre/Poststress) destressing of long vowels in medial position must be allowed.

- | | | |
|------|----------------|----------------|
| (67) | der[í]lvătive | def[é]mằtòry |
| | prov[á]cằtive | expl[é]nằtòry |
| | excl[é]mằtive | s[é]nằtòry |

The condition in (66b) cannot be maintained either, since Medial Destressing must precede TSS. We have argued for the level 1 status of Medial (Pre/Poststress) Destressing on the basis that it feeds the level 1 rule of TSS. A crucial assumption for this argument is

that level 1 rules and level 2 rules form two disjoint blocks and that rules from one block cannot be interspersed with rules from the other block.³⁰

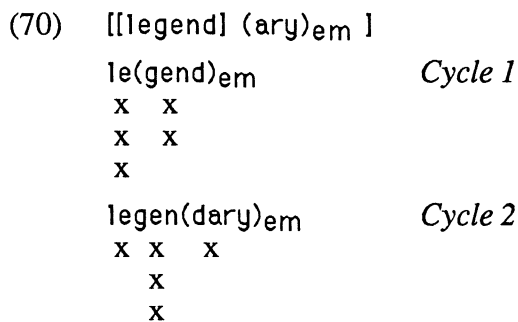
By this assumption, it is also possible to claim that Medial (Pre/Poststress) Destressing is not the only level 1 destressing rule of English: Sonorant Destressing (SD) must also be level 1 since it precedes the MSR. Selkirk formulates SD as in (68) to account for words such as those in (69). Recall that, according to her, all destressing is either postcyclic, or else cyclic and assigned to the Word level domain. Notice that our assumption that never-alternating surface schwas are unstressable, makes unnecessary the application of Sonorant Destressing in all the monomorphemic words in (69) and some of those with internal constituent structure, e.g., *merchandise*, *voluntary*, and *legendary*.



(69)

Hackensack	legendary
Algernon	momentary
cavalcade	commentary
Aberdeen	repertory
Hottentot	voluntary
merchandise	fragmentary

Observe now that the derivation of a morphologically complex word given by Selkirk to illustrate the application of SD is not clear.



legendary	<i>Postcycle</i>
x x x	SD
x x x	
x	

(The rule of Monosyllabic Destressing completes the derivation.)

As she does not show the steps within each cycle, there is no way to know how she gets from the grid in the first cycle to the one in the second cycle, and then to the final grid. In fact, the derivation in (70) is incorrect and should proceed instead as follows, under Selkirk's assumptions:

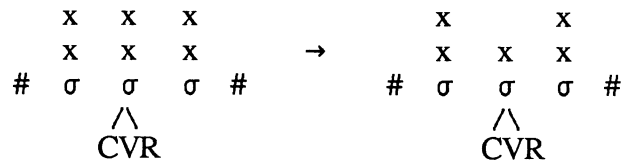
(71)	[[legend] (ary)em]	
	le(gend)em	<i>Cycle 1</i>
	x x	DBA
	x x	HBR, IBR
	x	MSR
	legen(dary)em	<i>Cycle 2</i>
	x x x	DBA
	x x x	HBR
	x x	MSR
	x	
	legendary	<i>Postcycle</i>
	x x x	SD ... n/a as stated in (68)
	x x x	
	x x	
	x	

This derivation cannot be pursued successfully. Even assuming that SD can be reformulated to apply in this context as in (72) below, Monosyllabic Destressing could not destress *gen* to complete the derivation, because of Selkirk's third condition on destressing that prevents strong basic beats from being deleted.

(72)	legen(dary)em	<i>Cycle 2</i>
	x x x	
	x x x	
	x x	
	x	
	*legendary	<i>Postcycle</i>
	x x x	SD
	x x x	Monosyllabic Destressing ... n/a
	x x	
	x	

To account for the stress pattern of the words in (69), we follow Hayes and Kiparsky's proposal that SD precedes the MSR, assigning this destressing rule to the level 1 domain and restating it as:

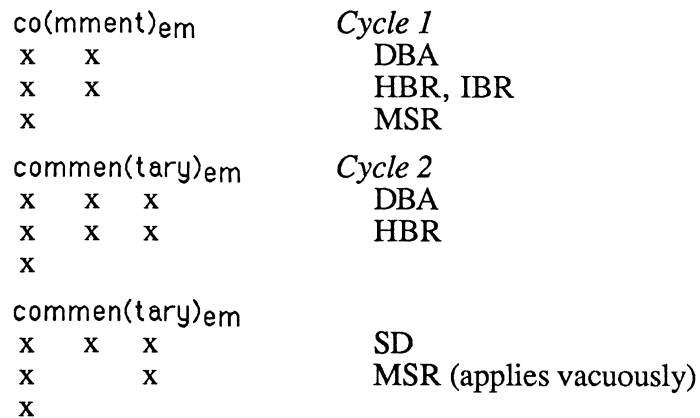
(73) *Sonorant Destressing* (SD)



where R = [+son, +cons], and # represent word boundaries

Since, by our assumptions, no destressing is necessary to derive the stress contour of *legendary*, the application of Sonorant Destressing as revised in (73) is illustrated with the derivation of *commentary* (*cómmènt* motives a full vowel in the underlying representation of the second syllable).

(74) [[comment] (ary)_{em}]



Recall now the claim made in section two that *-atory* and *-ative* are extrametrical and must be added to bases in one step. The fact that adjectives ending in these suffixes do not undergo SD can be explained in terms of the condition that the rule applies only to tri-syllabic words.

(75)	a. [[altern] (ate) _{em}]	b. [[altern] (ative) _{em}]	
	alter(nate) _{em}	alter(native) _{em}	<i>Cycle 1</i>
	x x x	x x x x	DBA
	x x x	x x x	HBR
	alter(nate) _{em}	alter(native) _{em}	
	x x x	x x x x	SD
	x x	x x x	
	alter(nate) _{em}	alter(native) _{em}	
	x x x	x x x x	MSR
	x x	x x x	
	x	x	

(Initial and Medial Destressing complete the b-derivation.)

Finally, Selkirk postulates a single noncyclic rule to account for cases of Initial and Medial Destressing. However, given our discussion of Kiparsky's and Hayes's destressing rules, such a unified version of these two rules must be rejected.

3.6. Conclusions

The analysis of destressing rules made in this section has suggested the following proposals:

- (76)
- Kiparsky's Pre- and Poststress Destressing can be collapsed as a level 1 rule of Medial Destressing, since they both feed the level 1 rule of TSS. In addition, it has been argued that the open-syllable condition on Medial Destressing can be eliminated.
 - In order to account for the different destressing behaviour of level 1 and level 2 prefixes, Initial Destressing has been assigned to the level 1 domain within a noncyclic approach to English word stress.
 - Selkirk's Word level rule of Sonorant Destressing has been reformulated as a level 1 rule that crucially precedes the Main Stress Rule.

In sum, this section has provided evidence for the level 1 status of three destressing rules of English and, in the case of Initial Destressing, the need has been suggested for the noncyclic application of stress rules. This noncyclic approach will be motivated in the section that follows, where it will be shown that it is the level 1 status of all destressing

rules and not their cyclic mode of application that is crucial to the derivation of the right stress patterns of English words.

A summary of the rules motivated up to this point is given at the outset of section four.

4. A Noncyclic Approach to English Word Stress

In sections two and three we introduced the stress and destressing rules that will play a role in our noncyclic analysis of English word stress. A stress system was proposed in terms of Selkirk's grid theory. Kiparsky's rules of medial destressing were collapsed as a single level 1 rule. Finally, it was argued that, within a noncyclic approach to word stress, a level 1 rule of Initial Destressing can capture the different destressing properties of level 1 vs. level 2 prefixes.

In addition to the rules, we have presented some crucial claims that concern the notion of extrametricality, the rule of TSS and the underlying representation of vowels that always surface as schwa.

In this section another stress rule is proposed. Then, on the basis of the rules and assumptions thus far considered, we show that the noncyclic approach suggested in connection with the destressing behaviour of prefixes accounts for the basic stress contours of English words. Finally, some of the arguments that have been proposed in favour of the cyclic application of English word stress rules are discussed.

4.1. Secondary Stress Enhancement Rule

In order to make a distinction between the stress on the first syllables of *Asiatic* and *magnetic*, Halle and Clements (1983) propose a rule of stress enhancement that we adopt here and reformulate as in (77).

(77) *Secondary Stress Enhancement Rule* (SSER)

Create a stress crest by assigning third-level prominence to a basic beat if it is followed by an unstressed syllable.

(mirror image)

Using the grid notation, this stress rule looks like (78).

(78)

x			x
x	x	→	x
σ	σ		σ

(mirror image)

Condition: the rule only applies if it creates a stress crest

(The condition will be motivated just below.)

This rule applies at both levels 1 and 2 and allows a consistent distinction between secondary and tertiary stress as shown in (79).

(79)

Asiati(c)em	magneti(c)em	
xx x x	x x x	
x x	x x	DBA
x	x	HBR, IBR, BA (2nd level)
x	x	MSR-(10)
Asiati(c)em	magneti(c)em	
xx x x	x x x	SSER
x x	x x	
x x	x	
x	x	

It becomes now obvious why in section two we modified Selkirk's Main Stress Rule so as to assign grid marks at both the third and fourth metrical levels: main stress will be represented by a grid mark at the fourth metrical level, secondary stress by a grid mark at the third metrical level and tertiary stress by a grid mark at the second metrical level.

The stress-crest condition on the Secondary Stress Enhancement Rule accounts for its failure to apply to the syllable preceding the one bearing main stress in the forms in (80). Medial Destressing applies optionally to that syllable in some of the forms depending on the speaker. The derivation in (81) also shows that the Secondary Stress Enhancement Rule must follow the MSR.

(80)

representation	civilization
manifestation	organization
ornamentation	argumentation
implementation	recommendation
colonization	documentation

(81)	representation	
	x x x x x	DBA
	x x x	HBR
	x	MSR-(10)
	x	
	representation	
	x x x x x	SSER
	x (x) x	MD ... optional
	x x	
	x	

At level 1, the Secondary Stress Enhancement Rule crucially precedes Medial Destressing, preventing it from applying in derivations like the following:³¹

(82)	Ticonderoga ³²	
	x x x x x	DBA
	x x x	HBR
	x	MSR-(10)
	x	
	Ticonderoga	
	x x x x x	SSER
	x x x	MD ... n/a
	x x	
	x	

Recall that the Higher Prominence Preservation Condition does not allow the deletion of a strong basic beat. So, grid marks assigned by the Secondary Stress Enhancement Rule may only be affected by Beat Movement (Rhythm Rule), which, under the right conditions, will shift them to the left onto another stressed syllable.

Finally, the mirror image case of the Secondary Stress Enhancement Rule accounts for the final secondary stress in words such as *cătămăràn*, *áltěrnàte* and *děmócrătìze*, whose derivations are given in (86), (100) and (125) below.

4.2. Rules

To account for the data presented in sections two and three, we propose the following set of rules and crucial orderings.³³ Some of these rules have been introduced in earlier sections and are presented here under new names that, we think, facilitate the understanding of what the rules do.

(83) LEVEL 1 RULES

Syllable Alignment (SA) (earlier, DBA)
Align each syllable with a single x on grid row 1.

Heavy Syllable Rule (HSR) (earlier, HBR)
Align a heavy syllable with an x on grid row 2.

Alternating Stress Rule (ASR) (earlier, BA)
Add an x on grid row 2 (parameters: right-to-left, left-dominant).

Initial Stress Rule (ISR) (earlier, IBR)
Align an initial syllable with an x on grid row 2.

Sonorant Destressing (SD)

x	x	x	→	x	x		
x	x	x		x	x	x	
#	σ	σ		#	σ	σ	#
		VR				VR	

where R = [+son, +cons], and
represent word boundaries

Main Stress Rule (MSR) ³⁴
Assign 4th-row prominence to the rightmost x on grid row 2.

Secondary Stress Enhancement Rule (SSER)

				x	
				x	
x	x	→	x	x	
σ	σ		σ	σ	

(mirror image)

Condition: the rule only applies if it creates a stress crest

y-Syllabification ((22)d)

Medial Destressing (MD)

				x		
x	x	x	→	x	x	x
σ	σ	σ		σ	σ	σ

(mirror image)

Trisyllabic Shortening (TSS) ((22)c)

Initial Destressing (ID)


				x		
				x		
x	x	→	x	x		
#	σ	σ		#	σ	σ

Condition: the syllable to be destressed must be light or a prefix

Vowel Reduction (VR)

ǃ → ʌ_e

LEVEL 2 RULES



<i>Heavy Syllable Rule</i> (HSR)	
<i>Alternating Stress Rule</i> (ASR)	Add an x on grid rows above 2nd (parameter: left-dominant).
<i>Secondary Stress Enhancement Rule</i> (SSER)	
<i>Rhythm Rule</i> (RR)	..... (earlier BM, (11))

As a universal convention, Syllable Alignment is assumed to apply whenever it can. Hence, final nonsyllabic y's are incorporated into the grid by means of an x on row 1 immediately after they have been syllabified. Also by this convention, Syllable Alignment is the first prosodic rule to apply after level 2 affixation.

4.3. Derivations

In this section representative derivations are given to show the (noncyclic) application of the rules in (83) to the kind of data we have been dealing with throughout this study, namely, morphologically simple words and morphologically complex words which are the result of derivational processes.

The data will be presented in the following order: first monomorphemic words, then words that involve the application of Medial Destressing, Initial Destressing or Sonorant Destressing and, finally, words that specifically illustrate the need for some of the crucial orderings in (83).

4.3.1. Monomorphemic Words

(84) Monongahe(la) _{em}	abracadabra	Ticondero(ga) _{em}	
/məŋəŋəhē(lə)/	/æbrəkədæbrə/	/tɪkandərō(gə)/	<i>Underlying R.</i> ³⁵
x x x x x	x x x x x	x x x x x	SA, HSR
x x	x x	x x x	ISR, ASR
x x	x x	x x	MSR, SSER
x	x	x	ID ... n/a
[mə,ŋəŋə'hɪlə]	[,æbrəkə'dæbrə]	[təy,kandə'rowgə]	<i>Surface R.</i> ³⁶

The correct results are obtained in (84), given both the stress rules in (83) and the postulation of underlyingly featureless V-elements in the first syllable of *Monongahela* and

the second of *abracadabra*, which prevents the application of the Initial Stress Rule and the Alternating Stress Rule respectively. As for *Ticonderoga*, one of its possible pronunciations is derived, namely, [təy.kəndə'rowgə]; notice that the Secondary Stress Enhancement Rule bleeds Medial Destressing in this derivation as well as in the derivation of all the words in (85). The other pronunciation, [ˌtəy.kəndə'rowgə], could be the result of an optional application of the Rhythm Rule, a level 2 rule that, therefore, will not feed the level 1 rule of Medial Destressing. As shown in (85), optional applications of the Rhythm Rule that create the word-internal configuration $\bar{\sigma} \hat{\sigma} \bar{\sigma}$ seem to be possible only when the initial syllable has a long vowel.

- | | | |
|------|---------------------------|-----------------------|
| (85) | a. RR applies optionally: | b. RR does not apply: |
| | Tìcônderóga-Tìcônderóga | sênsàtionálicity |
| | ícônoclástic-ícônoclástic | sûblìminálicity |
| | tòtâlítárian-tòtâlítárian | âmbàssadóriality |
| | Dòdêcanésus-Dòdêcanésus | hêrmàphrodíticity |

We will return to these examples later. Finally, as pointed out in section two, the correct stress contour of *cátamaràn* is derived assuming that its last syllable is extrametrical and its second syllable is underlyingly /tə/.

- | | | |
|------|---------------------------|---------------------------|
| (86) | catama(ran) _{em} | |
| | /kætəmə(ræn)/ | <i>Underlying Repres.</i> |
| | x x x x | <i>Level 1 Rules</i> |
| | x x | SA |
| | x | HSR, ISR |
| | x | MSR |
| | kætəməɾən | <i>Level 2 Rules</i> |
| | x x x x | SSER |
| | x x | |
| | x x | |
| | x | |
| | ['kætəmə,ɾən] | <i>Surface Repres.</i> |

Some comments regarding the notion of extrametricality are in order in connection with the derivation of *catamaran*. First, according to Selkirk (1984) extrametricality is a property of lexical items in their lexical entries. Hayes's (1982) proposal is that extrametricality markings are assigned by rule. Although we will not take a position on this

issue here, we find it convenient to indicate extrametricality markings in underlying representation. Second, Hayes (1982) and Selkirk (1984) constrain extrametricality markings so as to be allowed only within cyclic domains. We will follow this proposal, restricting extrametricality markings to the level 1 domain. By this restriction, all level 1 stress rules should ignore extrametrical constituents.³⁷ Note, however, that the Heavy Syllable Rule has applied to an extrametrical syllable in (86). This is predicted by Selkirk's proposal "that syllable extrametricality is *relevant* only to grid construction rules for which the position of a syllable with respect to the limits of a cyclic domain [*the level 1 domain* in the present analysis] is relevant, or to those grid construction rules whose structural descriptions refer to sequences of grid positions (and by extension the sequences of syllables aligned with those positions)." (Selkirk 1984, p.90). In other words, under Selkirk's proposal, which we assume here, the only level 1 stress rule that may apply to extrametrical syllables is the Heavy Syllable Rule. The structural description of the Secondary Stress Enhancement Rule refers to a sequence of grid positions. Therefore, this rule will assign secondary stress to the last syllable of *catamaran* only at level 2.

4.3.2. Medial Destressing

The derivations given here are representative of those cases discussed in section three in connection with Kiparsky's and Hayes's destressing rules.

4.3.2.1. Words in *-ative*

(87)	deri(vative) _{em}	irri(tative) _{em}	
	/dēṛī(vātiv)/	/irə(tātiv)/	<i>Underlying Repres.</i>
	x x x x	x x x x	<i>Level 1 Rules</i>
	x x x	x x	SA, HSR, ISR
	x	x	MSR
	x	x	
	dēṛī(vātiv)	irə(tātiv)	
	x x x x	x x x x	MD, ID
	x	x x	TSS
	x	x	
	x	x	
			VR

dərivətɪv	ɪrətætɪv	<i>Level 2 Rules</i>
x x x x	x x x x	SSER
x	x x	
x	x x	
x	x	
[də'rivətɪv]	['ɪrə,tɛɪtɪv]	<i>Surface Repres.</i> 38

4.3.2.2. Words in *-ory* and *-ary*

(88) advi(sory)em	transi(tory)em	<i>Underlying Repres.</i>
/ædvī(sōry)/	/trænsi(tōry)/	<i>Level 1 Rules</i>
x x x	x x x	SA, HSR
x x x	x x	MSR
x	x	
x	x	
ædvī(sōri)	trænsi(tōri)	y-Syllabification, SA
x x x x	x x x x	MD, ID
x	x x	TSS ... exceptionally n/a
x	x	in <i>advisory</i>
x	x	
ædvīsəri	trænsətōri	VR
x x x x	x x x x	<i>Level 2 Rules</i>
x	x x	SSER
x	x x	
x	x	
[əd'vayzəri]	['trænsə,towri]	<i>Surface Repres.</i> 40

4.3.2.3. Words in *-atory*

(89) sa(natory)em	dedi(catory)em	<i>Underlying Repres.</i>
/sæ(nætōry)/	/dedə(kætōry)/	<i>Level 1 Rules</i>
x x x	x x x x	SA, HSR, ISR
x x x	x x x	MSR
x	x	
x	x	
sæ(nætōri)	dedə(kætōri)	y-Syllab., SA
x x x x	x x x x x	MD
x x	x x	TSS
x	x	
x	x	VR

sænətōri	dedəkətōri	<i>Level 2 Rules</i>
x x x x	x x x x x	SSER
x x	x x	
x x	x x	
x	x	
['sænə,towri]	['dɛdəkə,towri]	<i>Surface Repres.</i>

4.3.2.4. Words in *-ation*

(90)	proclamation	information	<i>Underlying Repres.</i>
	/prōklēmātyən/	/informātyən/	<i>Level 1 Rules</i>
	x x x x	x x x x	SA, HSR
	x x x	x x x	MSR
	x	x	
	x	x	
	prōklēmātyən	informātyən	MD
	x x x x	x x x x	TSS (in <i>proclamation</i>)
	x x	x x	
	x	x	
	x	x	VR
	prōklēmātyən	infərmātyən	<i>Level 2 Rules</i>
	x x x x	x x x x	SSER
	x x	x x	
	x x	x x	
	x	x	
	[,praklæ'meyʃən]	[,ɪnfə'meyʃən]	<i>Surface Repres.</i> ⁴¹
(91)	sedimentation	dispensation	<i>Underlying Repres.</i>
	/sedəmentātyən/	/dispensātyən/	<i>Level 1 Rules</i>
	x x x x x	x x x x	SA, HSR, ISR
	x x x	x x x	MSR
	x	x	
	x	x	
	sedəmentātyən	dispensātyən	SSER
	x x x x x	x x x x	MD ... optional
	x (x) x	x (x) x	
	x x	x	
	x	x	
	sedəme/əntātyən	dispe/ənsātyən	VR if MD applies
	x x x x x	x x x x	<i>Level 2 Rules</i>
	x (x) x	x (x) x	ASR in <i>dispensation</i>
	x x	x x	if MD has not applied,
	x	x	or, otherwise, SSER
	[,sedəme/ən'teyʃən]	[,dispe/ən'seyʃən]	<i>Surface Repres.</i>

We saw in section three that Medial Destressing has many lexical exceptions. In (90) two derivations are given to exemplify the obligatory application of Medial Destressing, which feeds TSS in *proclamation*. The derivations in (91) show an optional application of Medial Destressing: if the rule does not apply in *dispensation*, secondary stress is assigned to the first syllable by the Alternating Stress Rule (level 2); if it does, then secondary stress on the second syllable comes from the application of the Secondary Stress Enhancement Rule (level 2). Finally, words like *recantation*, that are exceptions to Medial Destressing, would be derived the same as [ˌdɪspənˈseɪʃən].

4.3.3. Initial Destressing

In section three a noncyclic approach to English word stress was suggested in connection with the destressing of level 1 and level 2 prefixes. However, the examples given then did not show how the derivation of level 2 prefixes proceeds. Furthermore, no explanation was provided for the vowel alternations exhibited by the prefixes. This will be done here. To begin with, we return to those examples, repeated in (92).

- (92) a. rɛ̃fɔ̃rmátiɔ̃ ('revision') b. rɛ̃[fɔ̃rmátiɔ̃] ('formation again')
 prɔ̃vɔ̃cátiɔ̃ ('stimulus') prɔ̃[vɔ̃cátiɔ̃] ('in favour of vocations')
 prɛ̃jũdíciál ('detrimental') prɛ̃[jũdíciál] ('before judgement')

Consider the level 1/ level 2 prefix *re-*⁴² As listed by Kenyon and Knott (1953) (KK), the stressed form of this prefix is pronounced as [riɪ] or [rɛ] and the unstressed one as [rɪ], [rə] or [riɪ], the last pronunciation, [riɪ], being used in more careful speech or when a vowel follows. To account for KK's observations, which we interpret as in (93), we propose the rules and crucial orderings in (94).

(93)	Prefix	Underlying R.	Surface Representation	
			unstressed	stressed
	re- ₁ (level 1)	..... /rē/	[riɪ] (Vowel Shift when a V follows) [rɪ] / [rə] (VR) ⁴³	[riɪ] (V. Shift in careful sp.) [rɛ] (TSS)
	re- ₂ (level 2)	..... /rē/		[riɪ] (V. Shift)

(94) LEVEL 1 RULES ⁴⁴*Medial Destressing* (MD)*TSS**Initial Destressing* (ID)*Vowel Shortening* :

$$\begin{array}{ccc} \check{V} & C & \rightarrow & V & / & _ & C \\ \vee & & & | & & _ & \\ [- \text{ cons}] & & & & & & \end{array}$$

Long vowels shorten when unstressed and followed by a consonant
(e.g., *réform*, *advísory*, *deríivative*).

Vowel Reduction :

$$\begin{array}{ccc} \check{V} & \rightarrow & V_e \\ | & & \\ [- \text{ cons}] & & \end{array}$$

Short unstressed vowels reduce to schwa, i.e., they lose their features.

LEVEL 2 RULES

Heavy Syllable Rule (HSR)*Vowel Shift* : affects long vowels (Halle and Mohanan 1985)*Diphthongization* (Halle and Mohanan 1985)

An important observation is in order concerning the application of the Heavy Syllable Rule at level 2. Recall our claim in section two that "empty Vs" cannot be stressed. Consequently, the Heavy Syllable Rule will be blocked from applying to "restress" (destressed) heavy syllables containing vowels which have been reduced at level 1 (e.g., the second syllable of *áltěrnàte*).

Given the rules in (83) and (94), we can now show the complete derivation of [reform]₁, [reformation]₁ and [re [formation]₁]₂.

(95) [reform] ₁	[reformation] ₁	[re[formation] ₁] ₂	<i>Underlying Repres.</i>
/rěform/	/rěformǣtyən/	/formǣtyən/	<i>Level 1 Rules</i>
x x	x x x x	x x x	SA, HSR
x x	x x x	x x	MSR
x	x	x	
x	x	x	

rēform	rēformǣtyǣn	formǣtyǣn	MD
x x	x x x x	x x x	ID
x	x x	x x	
x	x	x	
x	x	x	
reform			V. Shortening
	reformǣtyǣn		TSS
rɪform	refǣmǣtyǣn		V. Reduction
rɪform	refǣmǣtyǣn ₁	rēformǣtyǣn ₂	<i>Level 2 Rules</i>
x x	x x x x	x x x x	SA
x	x x	x x x	HSR
x	x x	x x	ASR <i>reformation</i> ₂
x	x	x	SSER <i>reformation</i> ₁
	refǣmētyǣn	rīformētyǣn	V. Shift
			Diphthongization
[rɪ'form]	[,refǣ'meyfǣn]	[,rɪyfor'meyfǣn]	<i>Surface Repres.</i>

The contrast between *reform* and *react*--whose derivations are given in (96) below--justifies the requirement that Vowel Shortening be applied in the context of a following consonant. The prefix in *react* is destressed but, unlike in *reform*, its vowel is not shortened because another vowel follows and, as a result, it is not reduced. Since the vowel has not been shortened, it will be shifted and diphthongized.

(96)	[reform] ₁	[react] ₁	[relpaint] ₁] ₂	
	/rēform/	/rēækt/	/pǣnt/	<i>Underlying Repres.</i>
	x x	x x	x	<i>Level 1 Rules</i>
	x x	x x	x	SA, HSR
	x	x	x	MSR
	x	x	x	
	rēform	rēækt	pǣnt	
	x x	x x	x	ID
	x	x	x	
	x	x	x	
	x	x	x	
	reform			V. Shortening
	rɪform			V. Reduction
	rɪform	rēækt	rēpǣnt	<i>Level 2 Rules</i>
	x x	x x	x x	SA
	x	x	x x	HSR
	x	x	x	
	x	x	x	

	rīækt	rīpēnt	V. Shift Diphthongization
[rɪ'fɔrm]	[riy'ækt]	[riy'peynt]	<i>Surface Repres.</i> ⁴⁵

Assuming that prefixes do not destress in careful speech, we can account for the pronunciation [riy] of the (according to KK) "unstressed" form of *re*-₁: as the prefix is not destressed, its vowel will not be shortened and, therefore, it will be shifted.

Notice now the pronunciation of the level 1 prefix *re*- in the pairs of words in (97). The first member of each pair is a verb and always bears main stress on the second syllable. The second member is a noun and either bears main stress on the first syllable or may bear main stress on the first or second syllable. The vowel alternations exhibited by these prefixes can be explained in terms of the rules of Initial Destressing and Vowel Reduction: they will only apply in the nouns when mainstressed on the second syllable, and in the verbs.⁴⁶

(97) a. Verbs:

r[ɪ]lcéss
r[ɪ]clíne
r[ɪ]jéct
r[ɪ]fléx

b. Nouns:

r[í](cêss)_{em} r[ɪ]lcéss
r[í](clîne)_{em} r[ɪ]clíne
r[í](jêct)_{em}
r[í](flêx)_{em}

(98)	[recess] _v	[re(cess) _{em}] _N	[recess] _N	
	/rēses/	/rē(ses)/	/rēses/	<i>Underlying Repres.</i>
	x x	x x	x x	<i>Level 1 rules</i>
	x x	x x	x x	SA, HSR
	x	x	x	MSR
	x	x	x	
	rēses	rē(ses)	rēses	
	x x	x x	x x	ID
	x	x x	x	
	x	x	x	
	x	x	x	
	reses		reses	V. Shortening
	rises		rises	V. Reduction
		rīses		<i>Level 2 Rules</i>
				V. Shift
				Diphthongization
	[rɪ'ses]	['riyses]	[rɪ'ses]	<i>Surface Repres.</i>

Returning now to the derivations of *derivắtive*, *advíisŏry*, *sanắtory*, *dedicắtory* and *proclắmation* given in section 4.3.2, notice that Vowel Shortening applies to the destressed vowels feeding Vowel Reduction, so that the correct surface form is derived. On the other hand, the stressed long vowels in *advíisŏry*, *sanatŏry*, *dedicatŏry* and *proclamắtion* undergo Vowel Shift and Diphthongization.

Those cases where Medial Destressing applies optionally to syllables with long vowels are accounted for under our analysis, as shown in (99). If destressing does not apply, Vowel Shortening will not either; consequently, the long vowel will be shifted and diphthongized. On the other hand, the application of Medial Destressing will trigger Vowel Shortening, which will feed Vowel Reduction.

(99)	real/ĩ/zation	real/ĩ/zation	
	x x x x x	x x x x x	<i>Level 1 Rules</i>
	x x x	x x x	SA, HSR, ISR
	real[ĩ]zation	real[ĩ]zation	
	x x x x x	x x x x x	MSR
	x x x	x x	SSER
	x x	x x	MD (optional)
	x	x	
	real[ĩ]zation	real[i]zation	V. Shortening
		real[ə]zation	V. Reduction
			<i>Level 2 Rules</i>
	real[ay]zation		V. Shift, Diphth.

In words such as *rôbúst*, whose initial syllable has a long vowel and is not a prefix, Initial Destressing will not apply and, therefore, its vowel will not be shortened and reduced, but shifted and diphthongized instead.

4.3.4. Sonorant Destressing

We offer here some derivations which involve the application of Sonorant Destressing. Then, we discuss an argument for the phonological cycle presented by Kiparsky (1979) and Hayes (1982), which makes crucial reference to the rule of Sonorant Destressing.

(100)	commen(tary) _{em}	alter(nate) _{em}	
	/kamen(tæry)/	/oltɜ:(næt)/	<i>Underlying Repres.</i>
	x x x	x x x	<i>Level 1 Rules</i>
	x x x	x x x	SA, HSR, ISR
	kamen(tæry)	oltɜ:(næt)	
	x x x	x x x	SD
	x x	x x	
	kamen(tæry)	oltɜ:(næt)	
	x x x x	x x x	MSR
	x x	x x	y-Syllabification, SA
	x	x	
	x	x	
	kamən(tæri)	oltɜ:(næt)	V. Reduction
	kaməntæri	oltɜ:næt	<i>Level 2 Rules</i>
	x x x x	x x x	SSER
	x x	x x	
	x x	x x	
	x	x	
	kaməntəri	oltɜ:næt	V. Shift
			Diphthongization
	['kamən,târi]	['oltɜ:,neyt]	<i>Surface Repres.</i> ⁴⁷

Kiparsky (1979) and Hayes (1982) present the stress pattern of some morphologically complex words as evidence for the cyclic application of stress rules (cf. (100)). Hayes's derivation of one of these words is given in (102).

- (101) [in'firm] ary
[dis'pens] ary
[com'puls] ory

- (102)
- | | |
|--------------|------------------------------|
| [infirm] ary | <i>First Cycle</i> |
| | |
| infirmary | <i>Second Cycle</i> |
| | foot construction |
| | Sonorant Destressing ... n/a |

(104) a. Level 1 Rules:



b. Level 2 Rules:



With regard to level 1 orderings, the words in (105) show that the Secondary Stress Enhancement Rule feeds Initial Destressing and bleeds Medial Destressing (see (106)). So, the Secondary Stress Enhancement Rule must precede both of these destressing rules.

(105) convèrtibíity
 recrìminátion
 orìgináality
 matèriáality

(106) convertibili(ty)em

/kənvɜːtəbɪlə(tɪ)/

x x x x x x
 x x x
 x
 x

*Underlying Repres.**Level 1 Rules*

SA
 HSR, ASR
 MSR

kənvɜːtəbɪlə(tɪ)

x x x x x x
 x x
 x x
 x

SSER
 MD ... n/a
 ID

The derivation of the words in (85)b above (e.g., *sensàtionáality*) proceeds as the one in (106), except for the fact that Initial Destressing is not applicable.

Turning now to the level 2 rules in (104), we just offer some derivations to show the application of the Alternating Stress Rule (grid row 3 and above) and the Rhythm Rule.

The need for the Alternating Stress Rule (level 2) is evidenced by words such as [nòn[îdéntical]₁]₂, [ùn[âuthéntic]₁]₂, [ùn[hârmónious]₁]₂, [rè[trânsporté]₁]₂, etc.

(107) non [identi(cal)em] *Level 1 Rules*

x x x x
 x x
 x
 x

nonidentical	<i>Level 2 Rules</i>
x x x x x	SA, HSR
x x x	ASR
x x	
x	

The Rhythm Rule is required to account for the stress contour of the forms in (108).

(108)	nònâlcóhólic	ùnsâtisfáctory
	nònpêrpendícular	ùnpôpularíty
	nònrêsidéntial	ùncônstitútional
	nònrêprodúctive	ùncêremónious

(109)	non [alcoholi(c)em]	<i>Level 1 Rules</i>
	x x x x	SA
	x x	HSR, ASR
	x x	MSR
	x	SSER
	nonalcoholic	<i>Level 2 Rules</i>
	x x x x x	SA
	x x x	HSR
	x x	
	x	
	nonalcoholic	
	x x x x x	RR
	x x x	
	x x	
	x	

Finally, we leave open the question of the ordering between the Rhythm Rule and the Alternating Stress Rule.

4.4. An Examination of Arguments for the Phonological Cycle

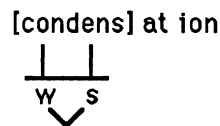
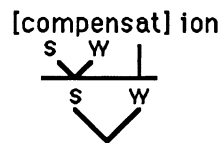
A number of arguments in favour of the cyclic application of word stress rules in English have been made on the basis of the contrast between either morphologically complex words with different derivational histories, or else monomorphemic and morphologically complex words. Next, we present and discuss some of them.

- (110) a. *còndênsátion* vs. *còmpeñsátion* (SPE 1968, Hayes 1982)
 b. *sênsàtionáality* vs. *Tìcònderóga* (Kiparsky 1979, Selkirk 1984)
 c. *sublìmináality* vs. *Òkefenókee* (Hayes 1982, p.261)
demòcratizátion vs. *Àpalàchicóla* (Hayes 1982, p.261)

'Còndênsátion' vs. 'còmpeñsátion'

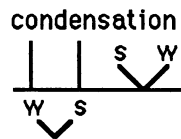
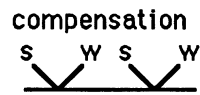
A standard argument in favour of the cycle was originally presented in SPE (1968) and later cited by Hayes (1982). The different derivational history of *compensation* and *condensation* is argued to account for their different stress patterns, as shown below:

(111)



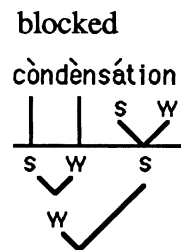
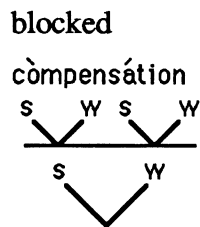
First Cycle

Long Vowel Stressing
 English Stress Rule
 Strong Retraction
 Word Tree Construction



Second Cycle

Noun Extrametricality
 English Stress Rule
 SSA



Strong Retraction
 Word Tree Construction
 Rhythm Rule

We saw in section three that Medial Prestress Destressing, as stated by Hayes, is constrained to apply only in open syllables; consequently, the second syllable of *condensation* cannot be destressed in the above derivation. However, we proposed a revised version of Medial (Pre/Poststress) Destressing with no segmental conditions and many lexical exceptions. Thus, under our analysis, the different stress contours of *compensation* and *condensation* are accounted for in terms of whether Medial Destressing does (*còmpeñsátion*) or does not apply (*còndênsátion*). This account is confirmed by the fact that there are examples with [ã] and the bracketed structure of condensation, e.g,

[[*rɛfɔ̃rm*]átiɔn] [ˌrɛfæ'meɪʃən], [[*lãmɛ̃nt*]átiɔn] [ˌlæmən'teɪʃən], [[*òbsɛ̃rv*]átiɔn] [ˌɒbzæ'veɪʃən], etc (see (51)bc for additional examples).

Sênsàtionáality vs. Tìcònderóga

In this section we examine Kiparsky's, Hayes's and Selkirk's cyclic accounts of the contrast between *sensationality* and *Ticonderoga*. Then, we turn to our noncyclic analysis of this contrast.

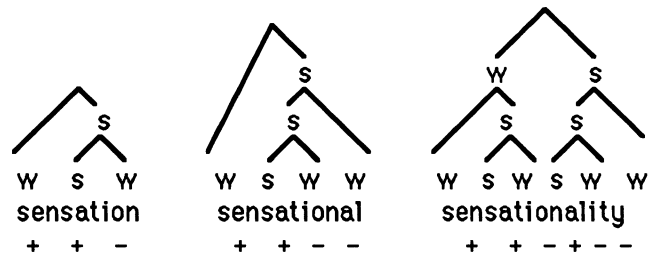
Kiparsky gives the two sets of words in (112) and claims that the availability of two secondary-stress patterns for the monomorphemic words in (112)a and only one for the complex words in (112)b is due to the cyclic assignment of stress in the latter: "the relative prominence of the first two syllables in the embedded words *sênsátional*, *icónoclàst*, etc., is preserved in the derivative." (Kiparsky 1979, p.423).

- | | |
|----------------------|----------------------------------------------|
| (112) a. Ticonderoga | b. sensationality, superiority, inferiority, |
| Dodecanesian | totalitarian, egalitarian, theatricality, |
| Srirangapatnam | anticipation, posteriority, iconoclastic |

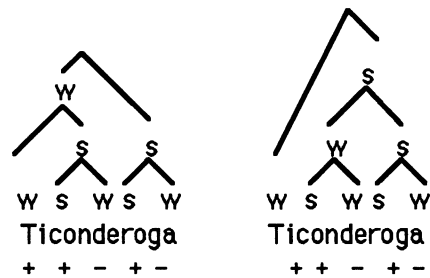
First, as pointed out by Halle and Vergnaud (1987), of the nine words given by Kiparsky--repeated here under (112)b--only seven are listed in Kenyon and Knott, four of them with the two secondary-stress patterns displayed by *Ticonderoga* : *totalitarian*, *inferiority*, *iconoclastic*, *anticipation*.

Second, let us very briefly compare Kiparsky's and Hayes's analyses insofar as their differences are relevant to the present argument. In order to account for the contrast between *sensationality* and *Ticonderoga*--illustrated in (113) and (114)--Kiparsky adopts L&P's (1977) stress rules and claims that (i) stress is assigned cyclically and (ii) word trees in English are freely constructed as right- or left-branching when there is no metrical structure from previous cycles to dictate their shape. Accordingly, he derives the stress patterns of these two words as follows:

(113)

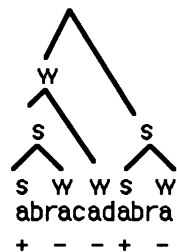


(114)



By L&P's rules, *abracadabra* only has one stress pattern, as shown in (115).

(115)

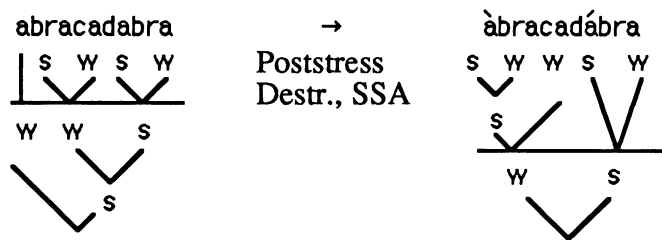


However, as Hayes notes, L&P's rules cannot explain why "Whenever stress retraction occurs across a domain of four syllables [and not three like in *àbracadábra*], the normal case is for two binary feet to be created, rather than a nonbranching and a ternary one" (Hayes 1982, p.260).

- (116) Àpalàchicóla hàmamèlidánthemum
 Pòpocàtepétl ìpecàcuána
 Hànamànióa ònomàtopóeia

On the other hand, Hayes's analysis--specifically, his rule of Strong Retraction--accounts for the stress patterns of *abracadabra* and the words in (116), but faces a different problem. In connection with the two possible stressings of *Ticonderoga*, Hayes refers to Kiparsky's claim that word trees are freely constructed (as right- or left-branching) in monomorphemic words. Then, he indicates that this claim presents a problem for his analysis, since it predicts that the two derivations of *abracadabra* given below should be possible (cf. (114) above).

(117) a.



b.



As (117)b shows, the correct output cannot be derived if a left-branching word tree is constructed: the foot *braca* cannot be (poststress) destressed because it is metrically strong. So, Hayes must "venture" some explanation (referred to in section 2.1) for the fact that, unlike *Ticonderoga*, monomorphemic words such as *abracadabra* only have one stress pattern, which reflects right-branching word tree construction. The aim of this brief comparison is to suggest that neither analysis completely solves the problems involved.

Turning now to Selkirk's (1984) analysis of the contrast between *sensationality* and *Ticonderoga*, we offer in (118) and (119) the output of her (cyclic) derivations of these two words.

(118) a. *Ticonderoga*

x x x x x
x x x
x x
x

b. *Ticonderoga*

x x x x x
x x x
x

DBA, HBR
MSR
BA 3rd level (optional)
(TPPC)

- (119) [[[sensation] al] ity]
 x x x x x x BM blocked by filter * ò ô õ
 x x x
 x x
 x

She indicates that Beat Movement cannot apply in *sensationality* because of the filter that disallows the word-internal configuration ò ô õ. With regard to the two stress patterns of *Ticonderoga*, she assumes that the one in (118)b represents the pronunciation [tay,kandə'rowgə], the second pronunciation, [ˌtaykandə'rowgə], being the result of an optional application of Beat Addition (3rd metrical level), as shown in (118)a. Therefore, just in order to account for the availability of two stress patterns for monomorphemic words such as *Ticonderoga*, Selkirk must assume that the filter referred to above is absolute with respect to Beat Movement in words, but not with respect to Beat Addition.

Finally, we suggested in section 4.3.1 that, under our noncyclic approach, the two secondary-stress patterns available for words like *Ticonderoga* could be the result of an optional application of the Rhythm Rule that would be allowed word-internally only when the first syllable has a long vowel. Such a suggestion does not account for the two stress patterns assigned in KK to *inferiority* and *anticipation*, although, as a matter of fact, some native speakers find the pattern [ò ô...] (i.e., *înfêríórité*, *àntîcipátion*) hard to get.

In addition to the words cited by Kiparsky, Halle and Vergnaud (1987) offer a list of ninety-eight entries--from the first half of KK's dictionary--also with alternative stress patterns on the first two syllables. They refer to the etymology as a possible explanation for the availability of one (*solícit* → *solìcítation*, **sòlîcítation*) vs. two stress patterns, although they point out (i) that other factors must be at play since the etymology is often not decisive and (ii) that they have not found a solution to the problem. We have no solution either, but we have added to Halle and Vergnaud's list--the complete list is given in footnote 49--and we think that the data itself suggests an interesting preliminary observation: in most words (with two possible stressings) the first syllable either has a long vowel (see the forms in (85)a), or else is a "transparent" prefix (e.g., *de-population*, *re-combination*, *in-sensitivity* vs. *děstrùctibility*, *rěnùnciation*, *întěnsífication*), the very few remaining words (e.g., *inferiority*, *anticipation*, *canalization*) being difficult, if not impossible, for native speakers to get with two different stressings (e.g., *cànālízation* vs. **canàlízation*, *înfêríórité* vs. ?*înfêríórité*). If that were the case--i.e., assuming that forms like *înfêríórité*, *àntîcipátion* and *canàlízation* are at most marginal--then our noncyclic analysis would make the right predictions--as illustrated in (120) below--for all

words other than those with transparent prefixes. As for the words with transparent prefixes, we leave them for further study, since there are several controversial issues involved which are not relevant to the main concern of the present work. Those issues refer to the distributional and phonological properties of these "transparent" prefixes, as well as to native speakers' judgments on (i) the true availability of two stress patterns for these words, and (ii) the interpretation of the pattern [ò ô...] if available--do the transparent prefixes actually bear secondary stress or a pitch accent characteristic of focused constituents?

We now offer noncyclic derivations of some of the words referred to in this section.

(120) T̄iconderoga	sensationali(ty) _{em}	solicitation	<i>Level 1 Rules</i>
x x x x x	x x x x x x	x x x x x	SA, HSR
x x x	x x x	x x	ASR, MSR
x x	x x	x x	SSER
x	x	x	
T̄iconderoga	sensationality	solicitation	<i>Level 2 Rules</i>
x x x x x	x x x x x x	x x x x x	RR optional in
x x x	x x x	x x	<i>Ticonderoga</i>
x x	x x	x x	
x	x	x	
Tîcônderóga-(RR) sênsàtionálicity	sòlicitátion ⁵⁰		
Tîcônderóga-(no RR)			

Summarizing our examination of different explanations for contrasts such as the one between *Ticonderoga* and *sensationality*, neither the data presented in this section, nor its discussion gives at this point conclusive proof for a cyclic or a noncyclic approach.

'Sublîminálicity' vs. 'òkefenóke' and 'demòcratizátion' vs. 'Àpalàchicóla'

In what follows, we give Hayes's account of the contrast between *sublîminálicity* vs. *òkefenóke*,⁵¹ and then show that this contrast follows from our claim that schwas may occur in underlying representation. Furthermore, in section 4.5 we will offer additional evidence to support that claim, evidence that does not come from the comparison between morphologically simple and complex words, but between pairs of words with different derivational histories.

Hayes (1982) offers the following derivations as evidence for the cycle.

(122)	subliminali(ty)em	Okefeno(kee)em	
	/sʌblimənələ(tɪ)/	/ōkəfənō(kē)/	<i>Underlying Repres.</i>
	x x x x x x	x x x x x	<i>Level 1 Rules</i>
	x	x x x	SA, HSR
	sʌblimənələ(tɪ)	ōkəfənō(kē)	
	x x x x x x	x x x x x	ASR ... n/a in
	x x x	x x x	<i>Okefenokee</i>
	x	x	MSR
	x	x	
	sʌblimənələ(tɪ)	ōkəfənō(kē)	
	x x x x x x	x x x x x	SSER
	x x	x x x	ID
	x x	x x	
	x	x	
	səblimənələ(tɪ)		V. Reduction
			<i>Level 2 Rules</i>
			V. Shift
			Diphthongization
		owkəfənowkɪy	
	[səb,lɪmə'nələtɪ]	[,owkəfə'nowkɪy]	<i>Surface Repres.</i>

Notice that the different stress patterns of these two words comes from the application of the Alternating Stress Rule (level 1). The Alternating Stress Rule cannot apply to the second syllable of *Okefenokee* because it has an underlyingly featureless vowel. On the other hand, the Alternating Stress Rule applies in *subliminality*, which shows that although syllables with underlying schwas cannot be stressed, they (i.e., their aligned x's on grid row 1) are "counted" by the relevant stress rules. This demonstrates that these unstressable syllables have in fact been incorporated into the grid by Syllable Alignment.

As for the second contrast offered by Hayes--*demòcratizátion* vs. *Àpalàchicóla*--it follows from the fact that the syllable preceding the one bearing main stress in *democratization* has an underlyingly long vowel. This causes the Alternating Stress Rule to apply differently in the two words:

(123)	democrat/ī/zation	Apalach/i/co(la)em	
	x x x x x x	x x x x x	SA
	x x x	x x	HSR, ISR
	democrat[ī]zation	Apalach[i]co(la)	
	x x x x x x	x x x x x	ASR
	x x x x	x x x	MSR
	x	x	
	x	x	

democratization	Apalachico(1a)	SSER
x x x x x x	x x x x x x	MD ... optional
x (x) x	x x x	ID
x x	x x x	
x	x	

In discussing Hayes's arguments for the cyclic application of stress rules, we have provided an alternative noncyclic account based on the postulation of underlying schwas when no alternations occur.

4.5. Word Stress Assignment is Noncyclic

So far in section 4 we have (i) shown that the noncyclic analysis suggested in section 3 in connection with the destressing behaviour of prefixes accounts for the basic stress patterns of English words and (ii) provided a noncyclic alternative to some standard arguments in favour of the phonological cycle. In what follows, we present two arguments that word stress assignment in English is noncyclic.

'Cátamaràn' and 'nóminálìze' vs. 'demócratìze

In the previous section we have provided a noncyclic account of the different distribution of secondary stress in *sublìminálity* vs. *òkèfènékee* and *demòcratizátion* vs. *Àpalàchicóla* on the basis of our claim that underlying schwas must be postulated for those vowel elements that always surface as schwa. Further evidence for the occurrence of underlying schwas as well as for a noncyclic approach comes from the comparison between the monomorphemic word *cátamaràn* and the complex words in (124).

- (124) a. démocrat → demócratìze órigin → oríginàte
 cátholic → cathólicìze lúxury → luxúriàte
 hábit → habítual hýdrogen → hydrógenàte
- b. nóminal → nóminálìze péregrine → péregrinàte
 Américan → Américanìze díscipline → dísciplinàry
 spírit → spíritual líberal → líberalìze

In section two we referred to the blocking of stress rules whenever their application would assign stress to syllables with underlyingly featureless V-elements. We then offered

cátamaràn as an example of this blocking effect, and we now add the forms in (124)b as additional evidence.

(125)	catama(ran) _{em}	nomina(lize) _{em}	democra(tize) _{em}	
	/kætəmə(rən)/	/nəməˈnæ(līz)/	/dəmækɹə(tīz)/	<i>Underlying R.</i>
	x x x x	x x x x	x x x x	<i>Level 1 Rules</i>
	x x	x x	x x	SA, HSR, ISR
	x	x	x	ASR ... only in
	x	x	x	<i>democratize</i>
				MSR
	kætəmə(rən)	nəməˈnæ(līz)	dəmækɹə(tīz)	
	x x x x	x x x x	x x x x	ID
	x x	x x	x x	
	x	x	x	
	x	x	x	
		nəməˈnæ(līz)	dəmækɹə(tīz)	V. Reduction
	kætəməˈrən	nəməˈnæ(līz)	dəmækɹəˈtīz	<i>Level 2 Rules</i>
	x x x x	x x x x	x x x x	SSER
	x x	x x	x x	
	x x	x x	x x	
	x	x	x	
		nəməˈnæˌleɪz	dəmækɹəˈteɪz	V. Shift, Diphth.
	['kætəməˌrən]	['nəməˈnæˌleɪz]	[dəˈmækɹəˌteɪz]	<i>Surface R.</i>

Interestingly, in (125) we have two complex words--*nominalize* and *democratize*--formed by the same derivational process but displaying different stress contours. Even more interesting, one of these complex words has the same stress pattern as the monomorphemic word *catamaran*. In sum, our position regarding these facts is that the differences and similarities in stress contour exhibited by the words in (125) do not follow from cyclic assignment of stress, but instead from purely phonological properties of the underlying forms of those words.

'Expéct' and 'èxpêctátion'

In this section we show that, given the level 1 domain assignment of the rule of Initial Destressing, the stress contour of words such as *expectation* cannot be derived within a cyclic approach to English word stress.

In section 3.4.2 we argued for the level 1 status of Initial Destressing to account for the destressing of level 1 but not level 2 prefixes. Then, in order to provide an alternative

to Kiparsky's (1979) explanation for the destressing of the prefix in *expect* but not in *expectation*, we suggested the need for the noncyclic application of word stress rules.

Observe now that given the level 1 membership of Initial Destressing the correct stress pattern of *expectation* cannot be derived if stress rules apply in a cyclic fashion. Consider the cyclic derivation below.

(126) <i>expect</i>	<i>First Cycle</i>
x x	stress rules
x x	
x	
x	
<i>expect</i>	
x x	Initial Destressing
x	
x	
x	
<i>expectation</i>	<i>Second Cycle</i>
x x x x	stress rules
x x	
x x	
x	
* <i>expèctation</i>	(correct: <i>èxpèctation</i>)

It is evident that no further rules can apply in the second cycle. In particular the Rhythm Rule would be inapplicable here since Initial Destressing has removed the stress on the first syllable. (Recall that, as pointed out in section 3.4.2, the Rhythm Rule never shifts stress onto a stressless syllable.)

5. Conclusions

The noncyclic analysis of English word stress presented in this article has proved capable of deriving the basic stress patterns of words formed by derivational processes.

Independently from our claim that stress and destressing rules apply noncyclically, we have made a crucial assumption regarding the issue of abstractness of lexical representations, namely, that underlying schwas must be postulated for those vowel elements that always surface as schwa. We have further proposed that schwas cannot be stressed.

An interesting aspect of our analysis is the simplicity of the derivations that follow from these three claims. In addition, it provides a straightforward explanation for the stress

contour of words such as *cátamaràn* and for contrasts such as *demócratìze* vs. *nóminalizè*. It is to be hoped that our analysis will be confirmed by a study of those stress issues that have not been addressed in the present work, namely, the stress contours of words that involve inflectional affixation and/or compounding. Finally, we are aware that we have just taken a first step towards characterizing the phonological behaviour of English prefixes, a complex topic that requires further study.

Appendix

In this appendix we briefly reconsider the level 1 assignment of Vowel Reduction proposed in section 4.3.3, and we do so on the basis of its interaction with two well-known segmental rules of English, Final Tensing and Prevocalic Tensing, which Halle and Mohanan (1985) state as follows:

(127) *Final Tensing* ⁵²

$$\begin{bmatrix} \text{-cons} \\ \text{-low} \end{bmatrix} \rightarrow [+tense] / \underset{\text{R}}{\text{---}}] \text{ except before -ly, -ful}$$

(Nonlow vowels are tensed in absolute constituent-final position.)

Prevocalic Tensing

$$\begin{bmatrix} \text{-cons} \\ \text{-back} \end{bmatrix} \rightarrow [+tense] / \text{---} [-\text{cons}]$$

(Front vowels are tensed when followed by a [-cons] segment.)

In (128) below, we show that whenever a vowel is tensed by one of these two rules that vowel does not undergo reduction, despite the fact that it is short and unstressed. (Recall that Vowel Reduction as stated in section 4.3.3 reduces all unstressed short vowels.)

(128)	Indiana	happy	nicely	
	[indiæənə]	[hæpi]	[nɪsli]	
	x x x x	x x	x x	(after stress rules
	x x	x	x	have applied)
	x x	x	x	
	x	x	x	
	[,indi'ænə]	['hæpi]	['naysli]	<i>Surface Representation</i>

Notice that at least Final Tensing must be a level 2 rule since it applies to the final vowel of the level 2 suffix *-ly*.

So, on the one hand, Prevocalic Tensing and Final Tensing bleed Vowel Reduction and, on the other hand, at least Final Tensing is a level 2 rule. Therefore, we must

conclude that Vowel Reduction must also be assigned to the level 2 domain, restating this rule as follows:

$$(129) \text{ Vowel Reduction} \\ \begin{array}{ccc} \check{V} & \rightarrow & V_e \\ | & & \\ [-\text{tense}] & & \end{array}$$

Now the question that arises is whether the assignment of Vowel Reduction to the level 2 domain affects the noncyclic analysis proposed in this article. The answer is no if it is assumed (Sainz, in preparation) that level 1 stems and level 2 affixes are derived independently but in a parallel fashion, as suggested in Halle and Mohanan (1985). We will not get into the details of this proposal as far as stress assignment is concerned and simply assume that after the level 1 stress rules have applied these affixes exhibit the same stress pattern as the one proposed in section 4.3.3, i.e. *rê-*, *-hôd*, *-lěss*, etc. This is illustrated below.

(130)	[re ₂ [formation] ₁]	[reformation] ₁	
	[re] ₂	[formation] ₁	
	x	x x x	
	x	x x	
		x	
		x	
			(after level 1 stress and destressing rules have applied)
	[re [formation]]		<i>Level 2</i>
	x x x x		Affix adjunction
	x x x		
	[re [formation]]	[reformation]	
	x x x x	x x x x	
	x x x	x x	
	x x	x x	
		x	
			ASR
			SSER

So, [re-]₂, [formation]₁ and [reformation]₁ are assigned stress at level 1. Then, level 2 affix adjunction takes place and, finally, the application of the level 2 rules of Secondary Stress Enhancement and Alternating Stress completes the derivation of these words as far as the grid is concerned.

Notes

1. This study is a revised version of my 1988 Cornell master's thesis.
I would like to thank all the people who along the way have given me assistance and encouragement. I feel especially grateful to my adviser Nick Clements.
 2. Halle and Vergnaud's (1987) account of English word stress was not considered as a possible alternative framework because we did not receive this manuscript in time to evaluate its consequences for the analysis of stress presented here.
 3. Crucial to our analysis are the claims that (i) never-alternating surface schwas (i.e., "reduced" vowels) are schwas underlyingly and (ii) schwas, as opposed to all other vowels, are unstressable elements. However, whether these claims are best formalized by characterizing schwas as occupying V slots in the CV-tier which are unassociated with any segmental tiers, or in some other way is a question that we leave open.
 4. In this study, we use a double symbolism to indicate different degrees of stress:

´	and	'σ	=	primary stress
ˊ	and	,σ	=	secondary stress
ˆ	and	<i>full vowel</i>	=	tertiary stress
˜	and	<i>reduced vowel</i>	=	no stress
 5. "Vowels are never reduced to a single exact vowel; the schwa sound varies, sometimes according to the 'full' vowel it is representing and often according to the sounds surrounding it." The American Heritage Dictionary 1982, p.43).

 "Medial unaccented short i ɪ not followed by a vowel may become -ə- in nearly all words (*editor* 'ɛdɪtə, 'ɛdətə). When final ɪ becomes medial by the addition of a suffix, this change from ɪ to ə must often be assumed, as in *fragmentary* 'frægmən, tərɪlɪ -lɪ = 'frægmən, tərɪlɪ or -, tərəlɪ." (Kenyon and Knott 1953, p. xxxviii).
- On the basis of the above observations we will assume that reduced vowels can be realized as ə or ɪ, leaving open the questions of (i) how ə and ɪ are distributed and (ii) how the full vowel ɪ can be distinguished from the reduced vowel ɪ.
6. We assume [- tense] to be the default value for the feature [tense].
 7. The "variants" being referred to by Hayes are the right-branching word tree variant (i.e., *àbracadábra*) and the nonoccurring left-branching word tree variant (i.e., **abràcadábra*). Hayes's derivation of these two variants is given in (117), below.
 8. Basic beats are the grid positions on the second metrical level.

9. To fill the hole in the third metrical level which results from the application of the Main Stress Rule-(10) we resort to Halle and Clements's (1983) "fill-in" convention, restating it as follows:

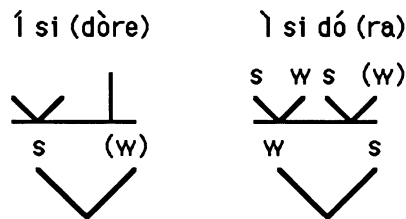
If a beat (i.e., a grid position) is placed in a particular slot in the metrical grid, the slot on each inferior metrical level is automatically filled with a beat

10. A basic beat is strong if it is aligned with a beat on a higher metrical level.

11. As we will see, Selkirk's claim is confirmed in section 4.4 by the derivation of *subliminality*.

12. In footnote 18 Selkirk refers to Nanni's (1977) suggestion that the entire morpheme *-ative* is extrametrical, a suggestion adopted by Hayes. Then, she points out that an alternative analysis to account for the special destressing of *-at-* is given in section 3.3 of her book. We understand that the analysis referred to by Selkirk is crucially related to the morphologized version of Trisyllabic Shortening (TSS) she proposes (Selkirk 1984, p.128-9). We will see in section 3.1 that such a version of TSS is untenable.

13. Word Tree Construction is stated by Hayes (1982, p.271) in the following way: "make right nodes strong". As shown below with two examples from Hayes, this rule ignores any extrametrical feet.



14. Under Hayes's analysis, exceptional cases such as *chìmpànzée* or *ròdomòntáde* are accounted for by the idiosyncratic application of Strong Retraction.

15. TSS is a level 1 rule because it never applies when its structural description is met in level 2-stem structures, as shown below:

Level 2-stem structures:

gr[éy]t-ful-ness
n[éy]tion-hòod
pr[iy]-posítion ('position before')
r[iy]-créate ('create anew')
pr[òw]-abórtion

Level 1-stem structures:

gr[æ]tifý
n[æ]tional
pr[è]posítion
r[é]créate ('refresh')
pr[à]clamátion

16. As we interpret this term, Kiparsky's "word stress assignment" involves the application of all of Hayes's stress rules, i.e., Long Vowel Stressing, the English Stress Rule, Strong Retraction, Word Tree Construction and the Rhythm Rule (see footnote 17).

17. Kiparsky points out that "Trisyllabic Shortening follows the assignment of word stress (more precisely, the 'English Stress Rule' of Hayes 1981)." (Kiparsky 1982, p.42). The second cycle of the derivation in (26) shows that TSS must follow not only the English Stress Rule of Hayes, but also Word Tree Construction and the Rhythm Rule.

18. See footnote 15.

19. We show in section 3.3.2 that there are in fact too many exceptions to the condition that only open syllables may destress medially.

20. Hayes assumes that Stray Syllable Adjunction (SSA) "is a universal convention, which applies whenever it can after the rules of foot construction have applied" (Hayes 1982, p.35). He formulates a first version of this convention as follows:

SSA : Adjoin a stray syllable as a weak member of an adjacent foot.

21. Hayes's (1982) statement of Sonorant Syllabification is as follows:

Sonorant Syllabification
[+ son] → [+ syl] / C __ #

22. In footnote 52 Selkirk (1984, p.431) refers to a derivation (repeated below) that shows "the last-stage effects of 'minimalizing,' i.e., eliminating excess verticality."

explanation	→	explanation	→	explanation
x x x x	Monosyllabic	x x x x	Minimalizing	x x x x
x x x	Destressing	x x		x x
x x		x x		x
x		x		

In Selkirk's derivation (p.131) *minimalization* takes place after Monosyllabic Destressing. However, in order to derive the correct output in (49) *minimalization* would have to apply before Initial Destressing; otherwise, the initial syllable could not be destressed because of the condition on destressing that prevents strong basic beats from being deleted.

23. The list in (51) contains all the words we have been able to collect from different sources: Kenyon and Knott 1953, Kiparsky 1979, The American Heritage Dictionary 1982, Selkirk 1984 and Halle and Vergnaud 1987.

24. As formulated by Kiparsky (1979), Initial Destressing applies in prefixes and open syllables.

25. *Un-* has the distributional properties of both level 1 and level 2 affixes, i.e., it may appear outside level 2 affixes ([*un[healthy]*]) and compounds (*un-self-sufficient*), and inside level 1 affixes ([*un-grammatical[ity]*]). Otherwise, it behaves like a level 2 affix.

We leave open the question of how ordering paradoxes such as [*un-grammatical[ity]*] can be handled and assume the level 2 membership of this prefix.

26. No matter how these derivations would proceed as far as the level 2 prefix *non-* is concerned, if Initial Destressing were assigned to the level 2 domain the second syllable of *nonconductive* and *nonessential* would end up incorrectly bearing some degree of stress.

27. Specifically, by English word stress rules we are now referring to the following rules (introduced in section two): Demibeat Alignment, Heavy Syllable Basic Beat Rule, Initial Basic Beat Rule, Beat Addition (2nd metrical level), Main Stress Rule as stated in (10), Beat Addition (3rd metrical level). However, within the noncyclic approach we will propose in the section four Beat Addition (3rd metrical level) will not be assigned to level 1, but to level 2 instead.

28. As we will see in section 4.3.3, the stress on *re-*₂ comes from the application of Demibeat Alignment, the Heavy Syllable Basic Beat Rule and Beat Addition (3rd metrical level) at level 2.

29. Although we are finally claiming that both Initial and Medial Destressing are level 1 rules, we will keep them as separate rules for the reasons given at the end of section 3.4.1, namely, that (i) Medial Destressing cannot be defined in two-syllable words, whereas Initial Destressing may be and (ii) Medial Destressing has no segmental conditions, while Initial Destressing only applies to light syllables and prefixes.

30. "In the case of some languages the predictions that follow from the concept of blocks must be somewhat weakened. Recent work in Lexical Phonology has uncovered some instances of rules that apply in more than one component [= level or stratum]. Halle and Mohanan's (1985) Basic Accentuation Principle is one such instance. The rule applies both cyclically and postcyclically. Given our view, we will say that in the case of Vedic no prediction is made regarding the status of rules that are critically ordered with respect to the Basic Accentuation Principle, since such rules could be either cyclic or postcyclic" (Booij and Rubach 1987, p.13). Both Kiparsky (1985) and Christdas (1986) argue that some rules must be assigned to more than one stratum.

31. See section 4.3.5 for more derivations exemplifying the crucial orderings proposed for the Secondary Stress Enhancement Rule.

32. We return to the stress pattern of *Ticonderoga* in sections 4.3.1 and 4.4.

33. A link between two rules indicates that the first is crucially applied before the second.

34. See footnote 9 to recall Halle and Clements's (1983) "fill-in" convention.

35. In the application of rules, "✓" is satisfied by an x on grid row 1 which is not aligned with an x on a higher grid row.

36. Recall that with regard to different degrees of stress we are using a double symbolism:

´	and	'	σ	=	primary stress
˘	and	,	σ	=	secondary stress
ˆ	and		full vowel	=	tertiary stress
̃	and		reduced vowel	=	no stress

37. The level 2 rules of Vowel Shift and Diphthongization proposed in section 4.3.3 account for the surface long vowels in *Monongahela* and *Ticonderoga*.

38. If, as just noted, extrametricality markings are restricted to cyclic (level 1, for us) domains, then it is necessary to indicate that any analysis which claims the cyclic (level 1) status of Sonorant Destressing (Kiparsky 1979, Hayes 1982 and our own analysis) will have to assume that extrametrical units are invisible to stress rules, but not to destressing rules. The assumption that extrametricality is not relevant to destressing rules is confirmed in our analysis by the examples below, which illustrate the application of Medial Destressing as stated in (54).

èlemén(târy) _{em}	→	èlemén(tăry) _{em}	
âltér(nâtive) _{em}	→	âltér(nătive) _{em}	
dédi(câtôry) _{em}	→	dédi(cătôry) _{em}	([dédicatôry], after the SSER applies at level 2)

39. In order to account for the two stress patterns of words such as *generative*, *operative*, *imaginative* and *nominative*, where *-at-* can be pronounced as [eyt] or [ət], Nanni (1977) proposes an optional rule of At-Destressing that we restate informally as follows:

$$[\tilde{a}] \rightarrow [-\text{stress}] \quad / \quad V ([+ \text{sonorant}]) + ___ \text{tiv}$$

As we will see in section 4.3.3, if At-Destressing applies, it feeds the the level 1 rules of Vowel Shortening and Vowel Reduction, the final output being [ət]. In sum, under our analysis all destressing takes place at level 1.

gene(rative) _{em}	gene(rative) _{em}	<i>Level 1 Rules</i>
x x x x	x x x x	SA
x x	x x	HSR, ISR
x	x	MSR
x	x	
gene(rative) _{em}	gene(rative) _{em}	<i>At-Destressing (optional)</i>
x x x x	x x x x	
x	x x	
x	x	
x	x	
generative	generative	<i>Level 2 Rules</i>
x x x x	x x x x	SSER
x	x x	
x	x x	
x	x	

40. Rules such as *S -Voicing*, *Final Tensing* or *Long Vowel Tensing* which are not relevant to stress assignment are assumed to apply at some point in the derivation. (For a statement of these rules see Rubach (1984b) and Halle and Mohanan (1985)).

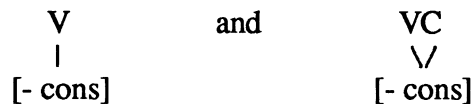
41. See Rubach (1984b) for the derivation of the surface form [ʃ] of *t* in *-at-*, as well as for the underlying form of the suffix *-ion* (we have replaced the vowel proposed by Rubach with a schwa in accordance with our assumptions). As for the rule of *ʊ*-Unrounding, see Halle and Mohanan (1985).

42. Our analysis of *re-* can be extended to other level 1 / level 2 prefixes such as *de-* or *pre-*.

43. Recall our assumption in section two that reduced vowels may be realized as [ə] or [ɪ].

44. Only those rules in (83) that are relevant to the purposes of this section are repeated in (94).

We invoke Hayes's (1986) Linking Constraint to interpret



as a short vowel and a long one respectively in our statement of the rules of Vowel Shortening and Vowel Reduction.

45. The prefix in *react* [rɪɹ'ækt] is an exception to our regular use of full vowels to indicate tertiary stress, since, according to the derivation in (96), *re-* is unstressed.

46. We do not have an explanation for the surface vowel of the prefix *re-* in 'r[é]cord' and 'r[é]fuse'.

47. The American Heritage Dictionary uses the symbol $\hat{a}r$ to represent a nonhigh front vowel that has been altered by a following *r*. On the basis of the complementary distribution of [ey] and [$\hat{a}r$], we postulate the underlying form / $\hat{a}ry$ / for the suffix *-ary*.

48. The Heavy Syllable Rule will apply to level 2 suffixes such as *-hood*. However, other level 2 suffixes such as *-ness* or *-less* will only be aligned with an x on grid row 1 by Syllable Alignment, since they always surface with the vowel [ə].

49. Acceptability, acceleration, accessibility, anticipation, antipathetic, apotheosis, aristocrat(ic), arithmetician, articulation, asphyxiation, authentication, canalization, certification, coagulation, cooperation, decapitation, deceleration, decentralization, delectation, degeneration, delimitation, demagnetization, demobilization, depolarization, depopulation, desensitization, devitalization, dicotyledon, disapprobation, disconsolation, disembarka-

tion, disfiguration, disingenuous, disintegration, disorganization, disqualification, Dodecanese, domesticity, elasticity, electricity, ellipticity, experimental, humanitarian, humiliation, iconoclastic, illegibility, immobilization, immovability, immutability, impalpability, impassability, impeachability, impeccability, impedimenta, imperial, imperishability, impermeability, impersonality, impersonation, impetuosity, implacability, imponderability, impossibility, impracticability, impracticality, impressibility, inalienability, innamorata, inapplicability, inaudibility, incalculability, incapability, incomparability, incomprehensible, inconsequentiality, incontrovertible, incorrigibility, incredibility, incrimination, incurability, indisputability, indissolubility, indoctrination, inedibility, ineffability, ineligibility, inevitability, inexplicability, infallibility, inferiority, infinitival, inflammability, inflexibility, inquisitorial, insatiability, inscrutability, insemination, insensibility, insensitivity, inseparability, insociability, invalidation, invariability, invincibility, inviolability, invisibility, invulnerability, irrefutability, irregularity, irreparability, irresolution, Louisiana, metempsychosis, misericord, misestimation.

50. By our assumptions, the first vowel of *solicitation* is underlyingly a schwa.

51. Some speakers do not pronounce *Okefenokee* with a [ə] on the second syllable but with a [i] or a [ʊ].

52. Halle and Mohanan (1985) point out that the beginning and end of constituents are indicated by means of double square brackets [[]] to contrast with the regular square brackets [] that enclose distinctive feature complexes.

References

- The American Heritage Dictionary* (1982), Boston: Houghton Mifflin Company.
- Aronoff, M. (1976) *Word Formation in Generative Grammar*, Linguistic Inquiry Monograph 1, MIT Press, Cambridge, Massachusetts.
- Aronoff, M. and S. N. Sridhar (1983) "Morphological Levels in English and Kannada or Atarizing Reagan", in *Papers from the Parasession on the Interplay of Phonology, Morphology, and Syntax*, Chicago Linguistic Society, University of Chicago, IL.
- Booij, G. and J. Rubach (1987) "Postcyclic versus Postlexical Rules in Lexical Phonology, *Linguistic Inquiry* 18, 1-44.
- Chomsky, N. and M. Halle (1968) *The Sound Pattern of English*, Harper and Row, New York.
- Clements, G. N. (1986), class handout.
- Christdas, P. (1986) "On Constraining the Power of Lexical Phonology: Evidence from Tamil," in NELS 17 proceedings.
- Halle, M. and G. N. Clements (1983) *Problem Book in Phonology*, MIT Press. Cambridge, Massachusetts.
- Halle, M. and K. P. Mohanan (1985) "Segmental Phonology of Modern English," *Linguistic Inquiry* 16, 57-116.
- Halle, M. and J. -R. Vergnaud (1987) *An Essay on Stress*, MIT Press, Cambridge, Massachusetts.
- Hammond, M. T. (1984) *Constraining Metrical Theory: a Modular Theory of Rhythm and Destressing*, revised UCLA dissertation, distributed by the Indiana University Linguistics Club.
- Hayes, B. (1981) *A Metrical Theory of Stress*, revised MIT dissertation, distributed by the Indiana University Linguistics Club, Bloomington, Indiana.
- Hayes, B. (1982) "Extrametricity and English Stress," *Linguistic Inquiry* 13, 227-276.
- Hayes, B. (1986) "Inalterability in CV Phonology," *Language* 62, 321-351.

- Kenyon, John S., and Thomas A. Knott (1953) *A Pronouncing Dictionary of American English*, Springfield, MA: Merriam.
- Kiparsky, P. (1973) "Abstractness, Opacity, and Global Rules," in O. Fujimura, ed., *Three Dimensions of Linguistic Theory*, Tokyo, TEC.
- Kiparsky, P. (1979) "Metrical Structure Assignment is Cyclic," *Linguistic Inquiry* 10, 421-442.
- Kiparsky, P. (1982) "Lexical Morphology and Phonology," in *Linguistics in the Morning Calm*, 3-91, Seoul: Hanshin.
- Kiparsky, P. (1985) "Some Consequences of Lexical Phonology," *Phonology Yearbook* 2, 85-138.
- Liberman, M. and A. Prince (1977) "On Stress and Linguistic Rhythm," *Linguistic Inquiry* 8, 249-336.
- Mascaró, Joan (1976) *Catalan Phonology and the Phonological Cycle*, MIT dissertation, distributed by the Indiana University Linguistics Club, Bloomington, Indiana.
- Nanni, D. (1976) "Stressing Words in -Active," *Linguistic Inquiry* 8, 752-761.
- Prince, A. S. (1983) "Relating to the Grid," *Linguistic Inquiry* 14, 19-100.
- Rubach, J. (1984a) *Cyclic and Lexical Phonology: The Structure of Polish*, Foris, Dordrecht.
- Rubach, J. (1984b) "Segmental Rules of English and Cyclic Phonology," *Language* 60, 21-54.
- Sainz, S. (in preparation) *Metrical Phonology and the Phonological Cycle*.
- Selkirk, E. O. (1982) *The Syntax of Words*, Linguistic Inquiry Monograph 7, MIT Press, Cambridge, Massachusetts.
- Selkirk, E. O. (1984) *Phonology and Syntax: The Relation between Sound and Structure*, MIT Press, Cambridge, Massachusetts.
- Siegel, D. (1974) *Topics in English Morphology*, MIT dissertation, Cambridge, Massachusetts.