Master's Thesis

The Rhythm of English: Stress Clash and Stress Shift

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The Rhythm of English: Stress Clash and Stress Shift

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Department of English Language and Literature

GRADUATE SCHOOL

JEJU NATIONAL UNIVERSITY

To my wife Seongsim

and

my children Junsoo and Eunsoo

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ABSTRACT

The Rhythm of English: Stress Clash and Stress Shift

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Since Liberman and Prince (1977, hereafter LP) introduced the notion of stress clash, many linguists, including Prince (1983), Selkirk (1984), Hayes (1984), and Giegerich (1984), have elaborated rhythm rules that account for stress clash and stress shift. Most of them have adopted three different kinds of theories: grid-only theory, tree-full (or tree-only) theory, and grid-and-tree theory.

Prince (1983) and Selkirk (1984) advocate grid-only theory, arguing that it is enough to account for stress clash. Selkirk (1984) elaborates the rhythm rule of Prince (1983) by adding such rules as Silent Demibeat Alignment, Beat Addition, and Beat Movement. Giegerich (1992) argues that stress shift occurs only when there is a clash at the level of foot. Therefore, the notion of foot is important. Hayes (1984) embraces both grid and tree theories, arguing that a grid-and-tree theory is not redundant. By Hayes' (1984) account, trees represent stress and grids represent rhythmic structure. Hayes (1984) introduces the Rule of Eurhythmy: Quadrisyllibic Rule, Disyllibic Rule, and Phrasal Rule.

In this thesis, first, I will review the previous literature. And second, I will propose an

attempt to incorporate the Rule of Eurhythmy proposed by Hayes (1984) into a tree structure of Giegerich. To this end, I will further delve into the internal structure of the foot and its relations with syllables.

In my proposal, two things are suggested, using counterexamples of Hayes (1984). First, a clashing foot is resistant to shift when within a clashing foot, the final syllable node labeled ‘w’ c-commands two or more nodes labeled ‘s’. To prove this, I will consider what happens under the two different conditions: a binary-branching structure and a tertiary-branching structure. With a binary-branching structure, it is more convincingly accounted for. Then, I will explain how strong and weak syllables are responsible for stress shift at the level of foot by exploring the internal structure of the foot and the relations between the foot and the syllables dominated by it. Second, it is also resistant to reversal when a clashing foot dominates the syllable nodes across word boundaries.

Chapter 1

Introduction

English is a stress-timed language. Stress occurs at isochronous intervals and the foot is considered the principle unit of timing in English. One of strategies to increase eurhythmy is by shifting stresses.

The purpose of this thesis is to explore stress shift by reviewing the previously suggested phonological rules that govern stress clash and stress shift in English, and delving into some problems and attempt to suggest possible solutions by incorporating Hayes' (1984) Rule of Eurhythmy into a tree structure by Giegerich (1992).

Before exploring problems, related literature will first be reviewed: grid-only theory, tree-full theory, and grid-tree theory. Liberman and Prince (1977), Prince (1983), and Selkirk (1984) are considered major linguists to propose grid-only theory. In terms of tree-full theory, the theory Giegerich (1985) proposed will be introduced. And Hayes (1984) argues that both grid and tress are needed because grid provides rhythm structure and tree contains stress information.

Next, in order to explore problems and suggest possible solutions, show some counterexamples the previously suggested theories fail to solve.

In chapter 2, three main perspectives on stress clash and stress shift will be briefly introduced: grid-only theory, tree-full theory, and grid-tree theory. In chapter 3, questions will be raised by using counterexamples, and in chapter 4, in order to solve those problems, possible solutions will be proposed. In this chapter, a stress clash and its resistance to shift will be examined, and the internal structure of the foot will be explored in order to decide if it should have a binary-branching structure or a tertiary-branching structure. Then we will explore the relations between components under the foot, and propose possible solutions.

Chapter 2

Review of the Literature

In this chapter, three main theories will be briefly reviewed: grid-only theory, tree-full theory, and grid-tree theory. First grid-only theory will be explained by introducing the theories of Liberman and Prince (1977), Prince (1983), and Selkirk (1984). Then, tree-full theory (or called tree-only theory) will be reviewed with special reference to Giegerich's theory (1992). Note that the focus will be on tree-full theory proposed by Giegerich (1985) because we explain counterexamples based on tree-full theory. Finally, grid-tree theory will be introduced.

2.1 Grid-only Theory

2.1.1 Grid Construction

Grid construction[1] forms from the lowest level (L1) to the next higher level (L2, L3, ...). Every syllable at the lowest level is assigned a grid (x), and the strongest syllable at the next level is assigned a grid. Theoretically, the number of levels is not definite. In this way, prominence is vertically represented and proximity between syllables is horizontally represented. Let us look at the example:

---

[1] *Grid construction* (from LP, 315-316, 322)

a. As a place marker, assign every syllable a mark on the lowest level of the grid.

b. Assign a mark at level two to the strongest syllable of every phonological word.

c. Assign sufficient additional marks so that the strongest syllable of every constituent labeled S has a higher grid column than the strongest syllable of its weak sister.

(Hayes, 1984: 35)

(1)

a.

L1 x x x
thirteen men

b.

L2 x x
L1 x x x
thirteen men

c.

L3 x
L2 x x
L1 x x x
thirteen men

In (1a), every syllable at level 1 (L1) is assigned x, and at level 2 (L2) as shown in (1b), the strongest syllables *-teen* and *men* are assigned x but the first syllable of the phrase *thirteen men*, *thir-* is not assigned x because it is less prominent compared to other syllables. Finally, in (1c), at the level 3 (L3) x is given to the most prominent syllable *men*.

2.1.2 Move *x*

Move *x*[2] is a rhythm rule to improve eurhythmy[3]. When stresses clash, a grid entity may move at one time. And the direction of movement depends on a particular language. Prince (1983: 33) claims that 'The Rhythm Rule is universally constrained from moving the absolute stress peak of the phrase to which it applies, even when moving the peak is the only to improve the rhythm.'

[2] At glance at the clashes... and the resolutions... suggests a simple grid operation to relate them: we might dub it *Move x*. An entry... is moved within its level away from a position of clash... to the position it can legitimately occupy. (Prince, 1983: 33)

[3] …there is such a thing as 'perfect rhythm' (or eurhythmy): the arrangement of weak and strong units… (Giegerich, 1992: 272-273)

(2)[4]

a.

x

x x

x x x x

achromatic

b.

x

x x

x x

Dundee

(3)

a.

x

x - - -x

x x x

x x x x x

achromatic lens

b.

x

x - - -x

x x x x

x x x x x

Dundee marmalade

(4)

a.

x

x x

x x x

x x x x x

achromatic lens

b.

x

x x

x x x x

x x x x x

Dundee marmalade

Now take a look at the example *achromatic* and *Dundee*. In (2a), the primary stress falls on the third syllable of *achromatic* (*-ma-*), and the secondary stress falls on the first syllable of *achromatic* (*a-*). In (2b), *Dun-* has the secondary stress and *-dee* is primarily stressed. The secondarily stressed syllable has two grid-marks on it and the primarily stressed syllable has three grid-marks on it, which means the primarily stressed syllable is more prominent than

[4] Prince (1983: 32)

the secondarily stressed one. In (3a), the grid-mark on *-ma-* at level 3 clashes that on *lens* at the same level, so x moves leftwards on *ach-* at the same level to avert clash as in (4a). Another example is the phrase *Dundee Marmalade*. In the same way, in (3b) the grid-marks on *-dee* and *mar-* clashes at level 3. In order to avoid the clash, x on *-dee* at level 3 moves on *Dun-* at the same level as in (4b).

Hogg and McCully (1983: 173) adds three constraints to this rule:

> Firstly, *x* must move leftwards… so Move *x* operates in an obligatory direction…
>
> Secondly, only one *x* may move at any one time…
>
> Thirdly, *x* must move within its own level to the nearest leftward landing site… Move *x* should skip grid columns until it finds the nearest leftward landing site on its own level.

Let us consider the following examples (Prince 1983: 33) and see how Hogg and McCully's constraints to this rule operate:

(5)

a.

Wd	x		x	
	x---*---x		x	x
∑	x x	x	x x	x
σ	x x	x x	x x	x x
	antique	dealer	*antique	dealer

↛

b.

Phr.	x			x
Wd	x--*-- x		x	x
∑	x x x		x x	x
σ	x x x		x x	x
	antique chair	→	antique chair	

Let us compare *antique dealer* with *antique chair*. In a compound *antique dealer*, *antique* is more prominent than *dealer*, so the second syllable of *antique* which has a primary stress has four grid-marks on it while the first syllable of *dealer* has three grid-marks on it. On the other hand, in the case of *antique chair*, *chair* is more prominent than *antique*, so the second syllable of *antique* has three grid-marks and *chair* has one more grid-mark than the second syllable of *antique*.

In the case of (5a), the level-3 entry on *-tique* cannot move leftward because if it moves leftward, we have a hole in the column over *-tique* between levels 2 and 4, making the grid construction ill-formed. On the other hand, in (5b) there is a clash at level 3 and in this case a grid-mark at level 3 can move leftwards without making any hole in the column over *-tique*.

Still, Move *x* has some problems[5] and Prince himself was aware of it[6]. To make this clear, let us apply Move *x* to the underlying representation for the phrase *Japanese bamboo*. The underlying grid is as follows:

[5] Thus it has been claimed in the literature (see Dogil 1984; Giegerich 1985) that despite the grid level/prosodic category equation made throughout P's work on the grid theory in English, the lack of phonological structure in this model does not always allow for instances of Move *x* in structures where it might be expected to occur quite straightforwardly. (Hogg and McCully, 1987: 174)

[6] Regrettably, no such strong conclusion can be drawn. A closer look at the relevant data suggests rather that our notion of stress clash is not strong enough to actually motivate all instances of Move *x*.

(6)

Phr.[7] x

Wd x x

∑ x x x x

σ x x x x x

Japanese bamboo

In (6), *-nese* and *-boo* are expected to clash at the Wd-level, but the presence of the ∑-level grid-mark on *bam-* removes the expected clash. Therefore Move *x* does not operate.

2.1.3 The Rhythm Rule: Silent Demibeat Alignment and Beat Addition

Selkirk (1984) argues that it is possible to explain the rhythm of English by employing grid only. She also suggests SDA (Silent Demibeat Alignment) and BA (Beat Addition) to solve related problems with Move *x*. Consider the following examples (Selkirk 1984: 184):

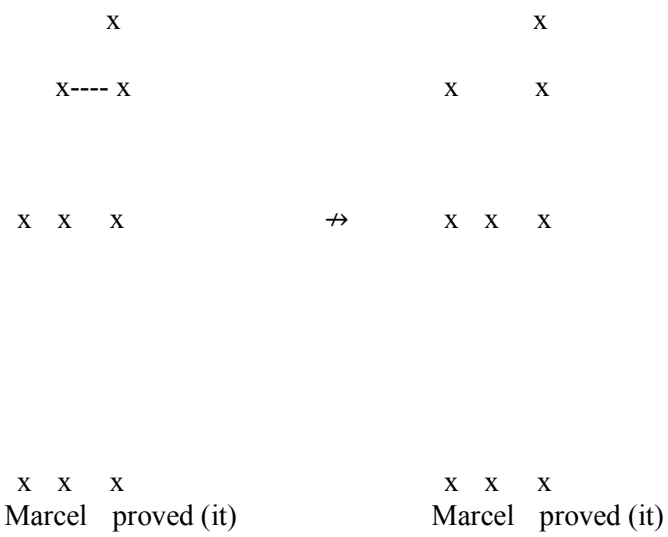
(7)

a.

x		x	
x---- x		x ------- x	
x x x	→	x x x	
x x x		x x x	
Marcel Proust		Marcel Proust	

[7] σ, Σ, Wd, and Phr. denote syllable, foot, word, and phrase, respectively.

b.



Now, let us consider *Marcel Proust* and *Marcel proved (it)*. In both cases, stress clash occurs at level 3. However, they are differently responsive to stress clash and stress shift. In the case of *Marcel Proust*, stresses reverse to avert stress clash as in (7a). On the other hand, in the case of *Marcel proved (it)*, although the grid-marks on *-cel* and *proved* clash at level 3, the grid-mark on *-cel* at level 3 cannot be moved on *Mar-* at level 3. This cannot be explained by Move *x*.

In order to elaborately show a clashing condition, Selkirk (1984) proposes the rules of syntactic timing. Silent Demibeat Alignment (SDA) provides syntactic information. (SDA) is placed in syntactic constituent breaks to show syntactic differences. Selkirk (1984: 184) supposes that the rules of syntactic timing are as follows:

A. Silent Demibeat Alignment

a. Optionally, place a demibeat at the end of a word

b. Place a demibeat at the end of a branching constituent

c. Place a demibeat at the end of a daughter of the sentence node

Selkirk (1984) also proposes Beat Addition (BA) to elaborate the Rhythm Rule. BA heightens the stress degree of a certain syllable. The effect BA creates is eurhythmy. In English, BA occurs on the constituent preceding the primary stress.

B. Beat Addition (Selkirk 1984: 185)

```
        x
x   x   →   x   x
```

Then, let us take the following examples:

(8)

a.

```
        x                                   x
    x-------- x                         x       x
  x   x       x                       x   x       x
  x   x  (x)  x                       x   x  (x)  x
Marcel  Proust        →             Marcel  Proust
```

b.

```
          x                                   x
    x-----------x                         x       x
  x   x         x                     x   x     x   x
  x   x  (x)  x   x                   x   x  (x)  x   x
Marcel  proved (it)   →             Marcel  proved (it)
```

In (8a), Beat Movement operates and produces the well-formed grid construction. As for (8b), a (silent) beat is given on the second metrical level by applying Beat Addition, and the added beat undoes the clash and blocks Beat Movement.

2.2 Tree-full Theory

Three-full theory (also called three-only theory) shows relative prominences in constituents by using tree structure. Sister nodes should have w-s or s-w relations because their prominences are always relative. Giegerich (1992) argues that the foot is an essential phonological constituent to explain the rhythm of English. He also contends that stress reversal occurs on the foot level, not on the syllable level. Therefore, it is important to explain what the foot is.

2.2.1 The Foot

English is a stress-timed language[8], so stressed syllables occur at more or less isochronous intervals, For now, we will postulate that the foot is a phonological constituent which is related to our perception of the speech signal and is a central part of the rhythm of English speech. And later, we will show some pieces of evidence that the foot is a phonological constituent.

A stressed syllable (either primary stress or secondary stress) is an obligatory part of a foot. A foot in English consists of a stressed syllable and any following unstressed syllables.[9] Let us take a look at the example below (Giegerich 1992: 259):

(9) This is the house that Jack built.

[8] The notion "foot" is very important to explain the rhythm of a stress-timed language. Giegerich puts as follows: … the following two points make stress-timing, despite the lack of hard evidence in speech production, a phonologically useful concept. Firstly, the observed deviations from strict foot isochrony… seem to show that English is at least more stress-timed than it is syllable-timed… Secondly, such deviations from the isochronous ideal as occur in English are… ironed out in speech perception, so that stress-timing is probably more valid as a perception phenomenon… (Giegerich, 1992: 259)

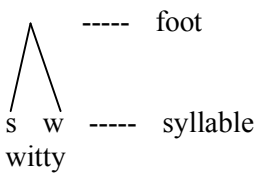
[9] the interval stretching from the onset of one unstressed syllable to the onset of the next stressed syllable. (Giegerich, 1992: 259)

This utterance consists of four feet. Despite the fact that the number of syllables that each foot contains differs, the rhythm of this utterance is isochronous. Note that the first foot (*This is the*) contains three syllables, the second foot (*house that*) consists of two syllables, and the third and fourth feet (*Jack* and *built*, respectively) have only one syllable.

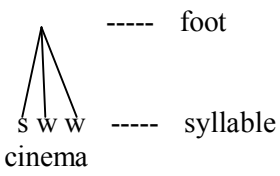
Now, let us explore foot structure in terms of branching tree structures case by case. Any stressed syllables (either primary or secondary) are labeled 's' which means it is stronger compared to other syllables, and unstressed syllables are represented with 'w' which means it is weaker than others. The s/w notation will be used to represent the relative strength. Consider the following foot structure:

(10)

a.



b.

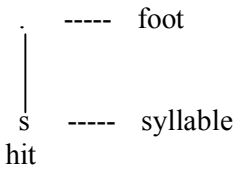


In (10a), *witty* consists of a binary-branching foot. Stress falls on the first syllable *wi-* and the second syllable *-tty* is unstressed. *Cinema* in (10b) is an example of a tertiary-branching foot. Stress falls only on the first syllable *ci-*. The second and third syllables (*-ne-* and *-ma*) have no stress.

Two different cases are possible in monosyllabic words: monosyllabic lexical words and monosyllabic non-lexical function words.

Monosyllabic lexical words are typically stressed, therefore they can constitute the foot by themselves. Consider the following example:

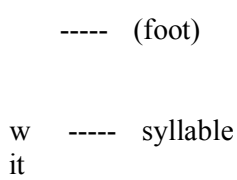
(11)



In the case of monosyllabic lexical words as in (11), they have a single stressed syllable that builds a non-branching foot. A single s-labeled syllable is dominated by a non-branching foot node.

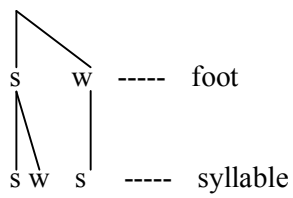
Unlike monosyllabic lexical words, in the case of monosyllabic non-lexical function words[10], they have a w-labeled syllable but no foot structure above that level. Consider the following example:

(12)



There are some words that contain two feet and have s-w pattern at the foot level. Let us consider the example, as in (13):

(13)



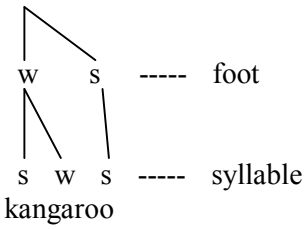
[10] Monosyllabic non-lexical *function* words, such as pronouns (e.g. *he, she, me, it*), prepositions (e.g. *in, on, at*), articles (*a, an, the*) and conjunctions (e.g. *and, but, if*) are typically unstressed.

photograph

The word *photograph* contains two feet. The first syllable and the second syllable constitute the first foot and the third syllable builds the second foot. The primary stress falls on the first syllable (*pho*-) and the secondary stress is on the third syllable (-*graph*). Therefore, the first foot starts with *pho*- and -*graph* becomes the onset of the second foot. And the first foot is stronger than the other because the primary stress falls on the syllable that constitutes the first foot.

Not all English words that consist of two feet have s-w pattern at the level of foot. Some words have w-s pattern at the foot level. Consider the following example, as in (14):

(14)



The example in (14) shows the structure of words that has a secondary stressed syllable followed by an unstressed syllable, then followed by a primary stressed syllable. Compared with *photograph* in (13), *kangaroo* has the same s-w-s structure at the syllable level. However, *kangaroo* has the w-s structure at the fool level, which is different from that of *photograph* (s-w). The second foot is more salient because the primary stress falls on the third syllable that constitutes the second foot.

So far, we have explored the fundamental structures of the foot. All the examples we have considered so far start with a stressed syllable except for monosyllabic non-lexical function words.

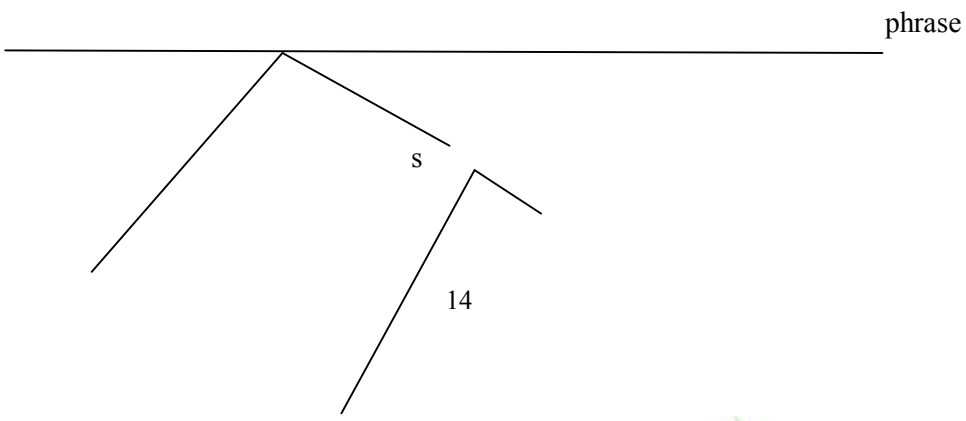
2.2.2 Metrical Structure

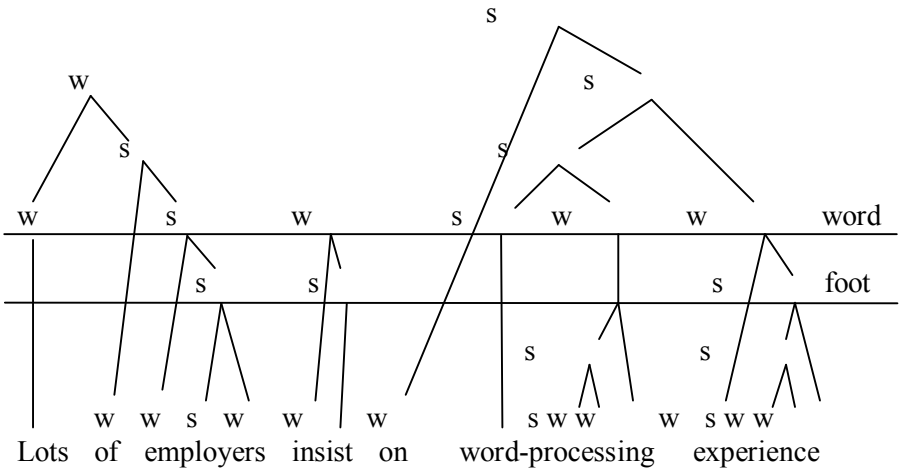
There is something important to consider before showing metrical structure by tree structure. We have to decide which one to focus on phonological structure or syntactic structure because it is impossible to provide both phonological structure, especially foot structure, and syntactic information at the same time. Therefore, it is advisable to consider the two cases (syntax overrides phonology or phonology overrides syntax) before deciding how to construct tree structure.

2.2.2.1 Syntax Overrides Phonology

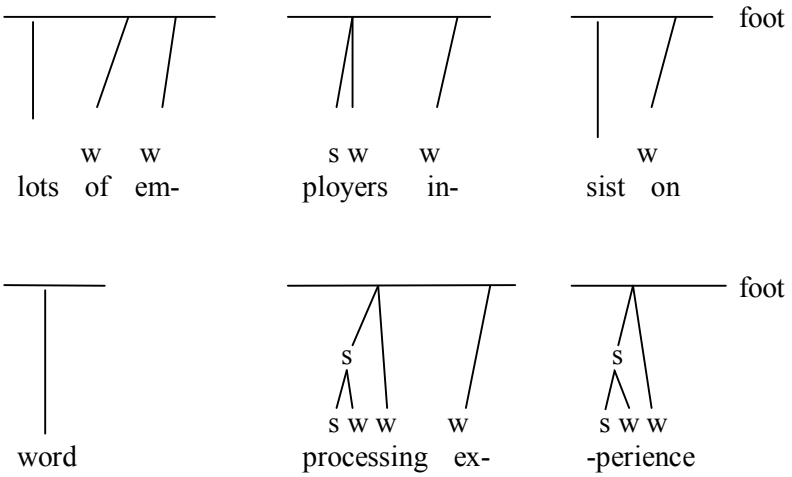
Let us copy the syntactic structure and place function words in the phrase-level structure. The tree in (15) has nothing wrong in terms of the prominence relations. However, it fails to identify feet as phonological constituents. First, unstressed word-initial syllables are not part of feet. Second, the function words are not grouped into the foot. To adopt the tree in (15) we have to revise the definition of the foot. Note that we need a foot level in the word tree to explain word stresses. The trees in (15) and (16) do not satisfy this (Giegerich 1992: 263-264).

(15)





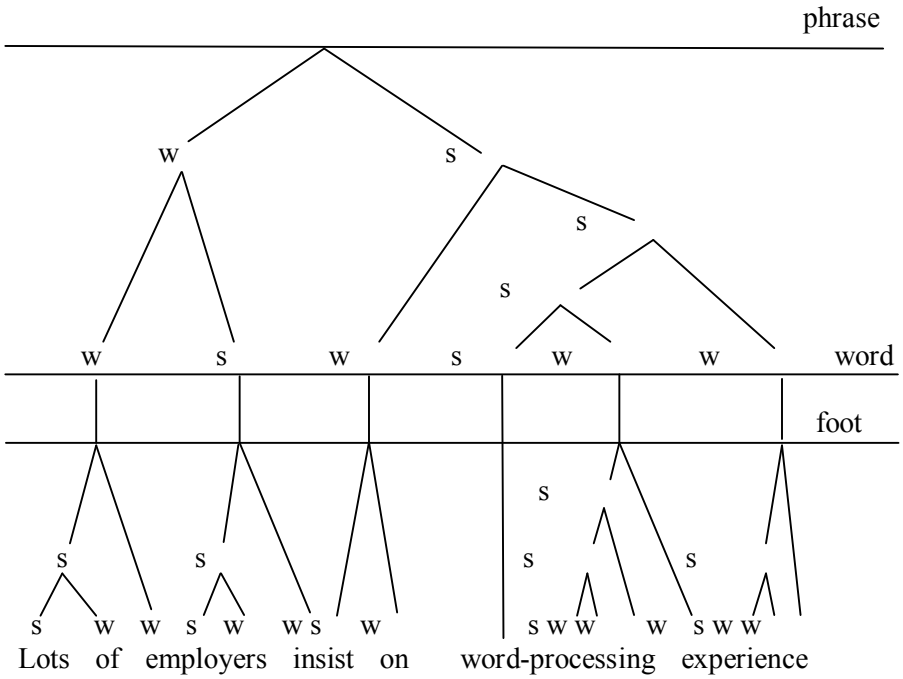
(16)



2.2.2.2 Phonology Overrides Syntax

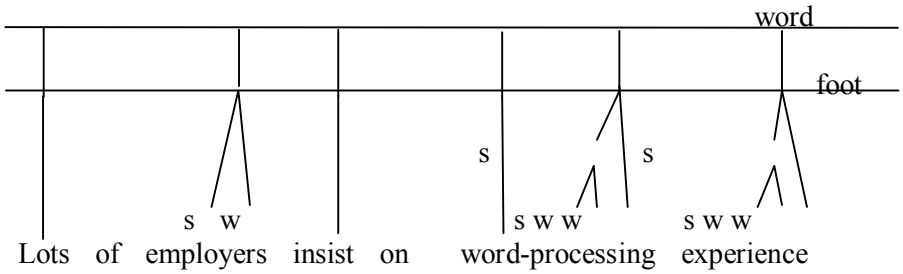
We now know that a foot level is an important phonological constituent to analyze word stress. Feet should be represented by nodes on the foot level to be phonological constituent. All syllables can be grouped into feet by grouping every unstressed syllable with the preceding stressed syllable as in (17) (Giegerich 1992: 265):

(17)



Note that in (15) the function words are grouped with the following words like: *of employers*, and *on word-processing experience*.

(18)



In order to get (17) from (18), we need to incorporate unstressed function words and unstressed initial syllables into preceding feet.

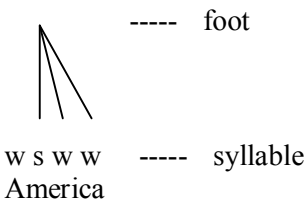
The tree structure built by just copying the syntactic structure provides a lot of syntactic

information but we have to sacrifice information about foot structure. On the other hand, the tree structure revised to get phonological units on the foot level lacks syntactic information on the foot level. We choose the second one as a legitimate one at the expense of the first one. Refer to evidence that foot is a phonological constituent in section (2.2.5).

2.2.3 Stray Unstressed Syllable

Now let us consider what happens in the case of words that start with an unstressed syllable. We dub this unstressed syllable 'stray unstressed syllable.'

(19)



If we take a look at the example *America* as in (19), the foot node dominates the second, third, and forth syllables (*-me-*, *-ri-*, and *-ca*) but not the first syllable (*A-*). The first syllable (*A-*) remains stray because the foot should always start with a stressed syllable in English. From this example, we know the foot does not always directly map into word. And a word may not be exhaustively divisible into feet.

2.2.4 The Evidence that the Foot is a Phonological Constituent[11]: Flapping and Aspiration

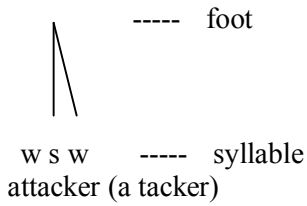
So far, we have postulated that the foot is a phonological constituent without any discussion further. In this section, we will show two pieces of evidence that the foot is a

[11] One kind of evidence was… the foot is the principal timing unit in connected speech… A second kind evidence for the foot is provided by generalizations in the segmental phonology: some such generalizations - for example, a number of allophonic rules… Here is a third kind of evidence: the phenomenon of enclisis in English. (Giegerich, 1992: 268)

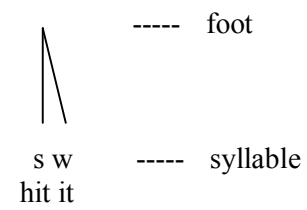
phonological constituent: flapping and aspiration.

Note that some phonological generalizations are sensitive to foot structure. Let us first take the generalization of flapping. An alveolar stop becomes a voiced flap when preceded by a stressed vowel and followed by an unstressed vowel. This rule can be explained in the other way: alveolar stops /t/ and /d/ becomes a flap between vowels but this rule does not apply if there is a foot boundary in between. Let us consider the following example:

(20)



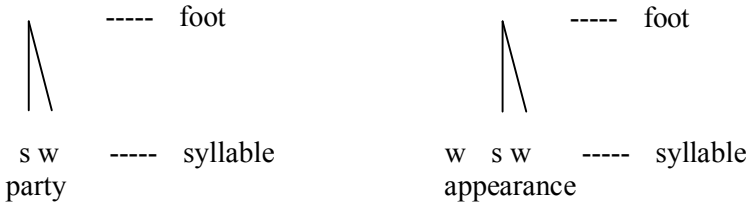
(21)



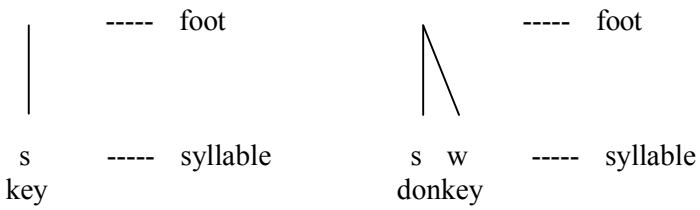
As in (20), /t/ is between vowels, but it does not become a flap because there is a foot boundary between the first syllable and the second syllable. There is a word boundary in the phrase *hit it* as in (21), but /t/ becomes a flap. This proves that the rule of flap is sensitive to foot boundary, not word boundary.

The other example of a generalization which is sensitive to foot structure is aspiration. When the voiceless stop is in foot-initial position, aspiration is strongest and it is not related to syllable-initial position. Consider the following examples as in (22):

(22) a.



b.



In (22a) *party* and *appearance*, aspiration is strongest in the foot-initial position. In the case of *party*, /p/ is in the foot-initial position as well as in the syllable-initial position. Compare it with *key* vs. *donkey* as shown in (22b). Strong aspiration in *key* is not the result of its syllable-initial position. It becomes clear when compared to *donkey*. Aspiration becomes weaker in *donkey* compared with *key*. The difference between *key* and *donkey* is a foot boundary that exists in *donkey*. Therefore, aspiration is evidence of the foot.

2.2.5 Eurhythmy

Giegerich (1992) argues that there are two levels of phonological structure: the foot level and above the foot level.[12] Let us consider the following nursery rhyme (Giegerich 1992: 273):

[12] Notice that this passage is eurhythmic on two levels of phonological structure: on the foot level, the number of unstressed syllables per foot is restricted to a maximum of two… Above the foot level, the passage is eurhythmic in that weaker and stronger stresses alternate… (Giegerich 1992: 273)

(23) Georgie Porgie, pudding and pie

Kissed the girls and made them cry.

When the boys came out to play

George Portie, ran a way.

According to Giegerich (1992), in order for a passage to be eurhythmic, the number of unstressed syllables per foot is a maximum of two, and weaker and stronger stresses alternate. When a speaker processes less eurhythmic sentences, he may take two strategies to make them eurhythmic: one is to move words around and the other is to improve rhythmic pattern by creating, dropping or moving stresses.[13]

2.2.6 Stress Clash and Stress Shift

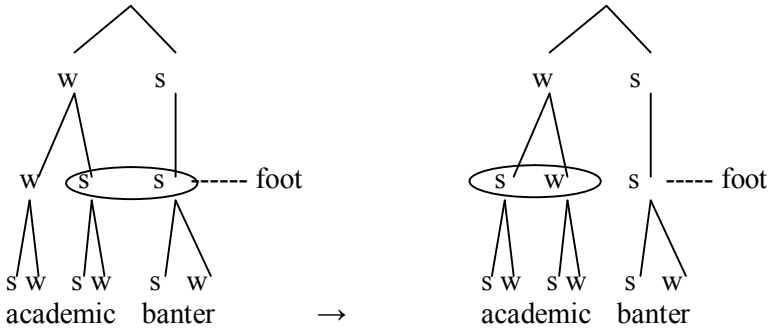
In English, stresses reverse when they clash in an attempt to improve eurhythmy. The foot is a crucial part of the rhythm of English, and stress shift occurs at the foot level, not syllable. In other words, when stresses clash at the foot level, they reverse but when they clash at the syllable level, they do not shift. Giergerich (1992) stated the regularity of stress shift in terms of the following rule:

(24) Reversal

[13] Two strategies are available: the speaker may either move words around in the sentence and produce a more eurhythmic paraphrase of the sentence, or the speaker may keep the sentence as it stands and improve its rhythmic pattern by creating, dropping or moving stresses. (Giegerich 1992: 273)

Note that only when stresses clash at the foot level does stress shift occur. This rule does not operate when stresses clash at the syllable. Then, let us explore more examples:

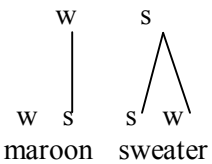
(25)



If we take a look at the foot structure *academic banter* as in (25), the stress pattern at the foot level is w-s-s, so in order to avoid stress clash, stresses shift into s-w-s. This is how stress shift works.

Now let us see the internal foot structure of the phrase that contains stray unstressed syllable as in (26):

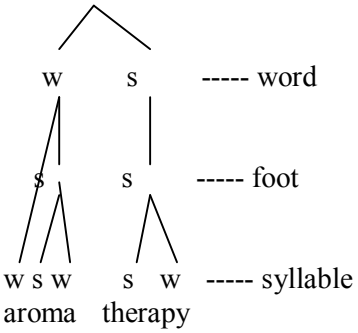
(26)



In the case of *maroon sweater* as in (26), a stressed syllable *-roon* and a stressed syllable

swea- clash, but the reversal rule does not operate because they clash at the syllable level, not the foot level. Then, now let us consider another example:

(27)



In this case, as you see in (27) the foot of *-roma* is stressed and the foot of *therapy* is also stressed. The two stresses clash at the foot level, but the reversal rule does not apply in this case. Note that the first foot node dominates the second and third syllables (*-roma*) but it does not dominate the first syllable (*a*-). In order for the reversal rule to operate, the node should dominate the entire feet.[14]

2.3 Grid-Tree Theory

Hayes (1984) argues a grid-and-tree theory is not redundant, and that trees represent stress; grids rhythmic structure.[15] He proposes a revised conception of the rhythmic target of the stress rules to solve previous problems and develops an argument that both trees and

[14] Reversal only happens among nodes in a metrical tree that dominate (at least) entire feet… There is no reversal in cases like *deferred entry*, *divine will*, *aroma therapy* where the initial syllables are unstressed. (Giegerich 1992: 278)

[15] (a) Separate representations are required for rhythmic structure and for linguistic stress. These representations should be identified with Liberman and Prince's metrical grids and metrical trees, respectively. The two representations will be shown to play sharply distinct roles in rhythmic phonology.
(b) It is accordingly mistaken to suppose that a theory incorporating both grids and trees is redundant…
(Hayes, 1984: 33-34)

grids are necessary.

2.3.1 Counterexamples against LP's Rules

Hayes (1984) argues that there are a variety of examples that do not fall into two classes the LP's Rhythm Rule applies.[16] Let us consider the following examples (Hayes 1984: 35-46):

(28) a.	2 3 1 Mississippi Marbel	b. 2 3 1 ?Minneapolis Mike
	2 3 1 Punxatawny Pete	2 3 1 ?Passaconaway Pete
	2 3 1 analytic thought	2 3 1 ?analytical thought
	2 3 1 diacritic markings	2 3 1 ?diacritical markings
	2 3 1 the Passamaquoddy verb	2 3 1 ?the Potawatomi verb
	2 3 1 Alabama relatives	2 3 1 ?Alabama connections
	2 3 1 European history	2 3 1 ?European historian
	2 3 1 Oklahoma congressman	2 3 1 ?Oklahoma congressional district
	2 3 1 two thousand one	2 3 1 ?two thousand and one

[16] LP's system predicts that phrases eligible for the Rhythm Rule will fall into two classes: those containing stress clashes, in which relabeling is preferred; and those lacking them, in which the basic stress contour is normally retained. (Hayes, 1984: 39)

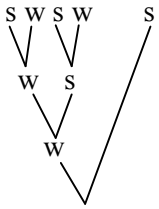
According to LP's theory, there is no difference between (28a) and (29b) and in both cases stresses clash. However, examples in (28b) sound strange. It proves that there is something different between (28a) and (28b). Hayes (1984) argues that there is difference between disyllabic cases and the trisyllabic cases, and that trisyllabic cases are more resistant to relabeling.

Let us take a look at an example above as in (29):

(29)

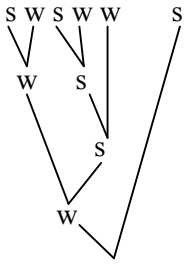
a.

```
          x
     *x       *x
   x   x       x
 x x x x       x
analytic  thought
```



b.

```
          x
     *x       *x
   x   x       x
 x x x x x     x
analytical  thought
```



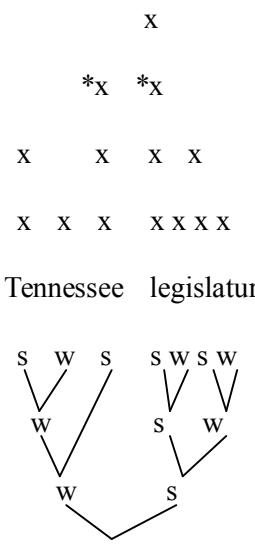
By LP's theory, there is no difference between (29a) and (29b). In the case of the phrase *analytic thought* the grid marks on *-ly-* and *thought* clash at level 3. Therefore, the LP's Rhythm Rule operates and stresses reverse. There is no problem here. Again, the LP's Rhythm Rule should operate in the phrase *analytical thought* as in (29b) because just like the phrase *analytic thought* as in (29a) in *analytical thought*, the grid marks on *-ly-* and *thought* clash at level 3. However, in this case, if the LP's Rhythm Rule operates and stresses shift, the results become ill-formed.

Note that there is an example that cannot be explained under LP's theory. Consider the

following example, as in (30):

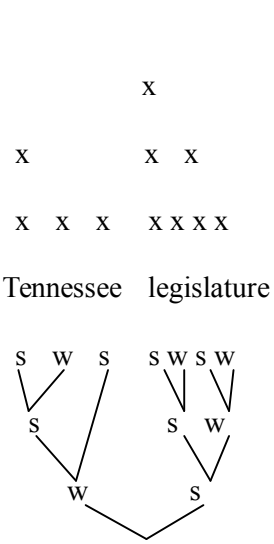
(30)

a.



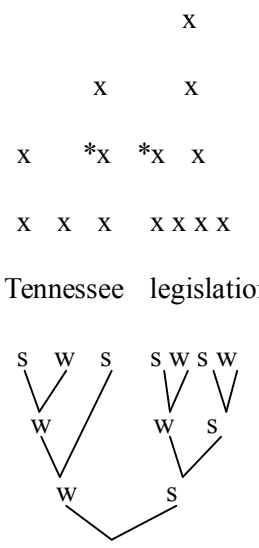
→

b.



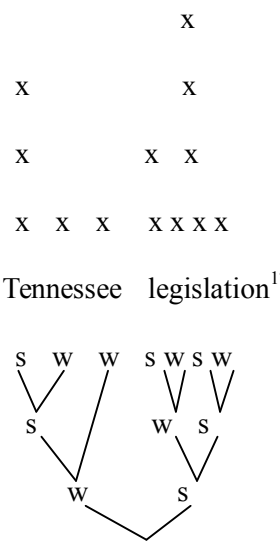
(31)

a.



→

b.

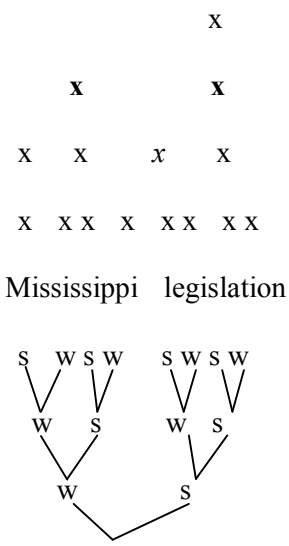


Hayes (1984) shows other examples that contain a clash in LP's sense, but a shift does not happen. Then, he argues that LP's theory fails to explain the reason why the same

[17] The additional grid mark on *Tennessee* would be derived by Beat Addition.

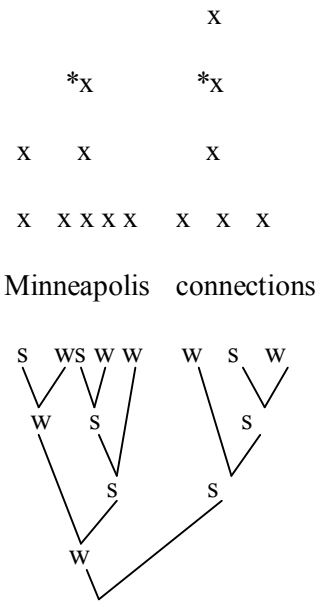
adjustment should not happen in *Tennessee legislation* as in (31) while stress adjustment take place in *Tennessee legislature* as in (30). He tries to provide the remedy to LP's theory. Let us consider the following example:

(32)



Boldface gird marks in (32) clash, but the italicized "intervener" stress on the immediately lower level prevents a shift from happening. Let us see the version where this intervener is removed as in (33):

(33)



This introduces clash, but does not tend to undergo the Rhythm Rule.[18] By these counterexamples, Hayes argues that resistance to relabeling depends on the number of syllables, and proposes the Rule of Eurhythmy: Quadrisyllabic Rule and Disyllabic Rule. In the next section, it will be reviewed.

2.3.2 The Rule of Eurhythmy

2.3.2.1 Quadrisyllabic Rule

Hayes (1984) argues that stress shift is less likely to occur as the interval of the output is increased beyond four syllables.[19] And Quadrisyllabic Rule is motivated from this.

[18] Other pairs of examples behave the same way: cf. *Punxatawny celebrations* vs. *Passaconaway conventions*, *achromatic aberration* vs. *mathematical inventions*, *sympathetic Presbyterians* vs. *evangelical Republicans*. (Hayes, 1984: 41)

[19] Further, when the interstress interval of the input is kept constant, the propensity to relabel decreases as the interval of the output is increased beyond four syllables. (Hayes, 1984: 46)

(35) *Quadrisyllabic Rule* (Hayes, 1984: 46)

A grid is eurhythmic when it contains a row whose marks are spaced close to four syllables apart.

Hayes dubs the level selected by the Quadrisyllabic Rule as the *level of scansion*. The Quadrisyllabic Rule stipulates that when the space between the two grid marks is close to four syllables apart on the level of scansion where the second stressed grid mark is placed, it is eurhythmic. The strength of the Hayes' Quadrisyllabic Rule is that it can easily explain the resistance to relabeling which cannot be accounted for by LP's theory.

(36)

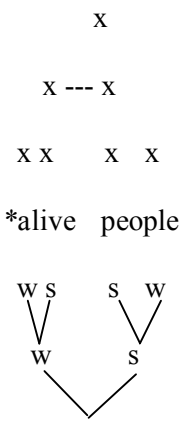
	x			x	
	x---------x			x ----------x	
x	x x x		x	x x	
x x x	x x x x		x x x	x x x x	
Tennessee	legislation	→	Tennessee	legislation	

In the case of *Tennessee legislation* as in (36), stress clash exists at the level 3, but if the grid mark moves leftward by the iambic reversal, the space between the two grid marks becomes five syllables apart, which does not increase eurhythmy. And the pattern after the iambic reversal applies is less natural than before. In this way, it can be accounted for that the form *Tennessee legislation* is reluctant to relabel.

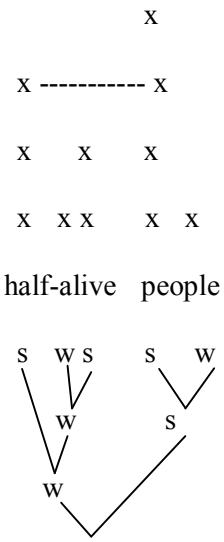
Now let us consider in (37) the reason why the form *half-alive people* is more eurhythmic than *alive people*. Take a look at the following example:

(37)

a.



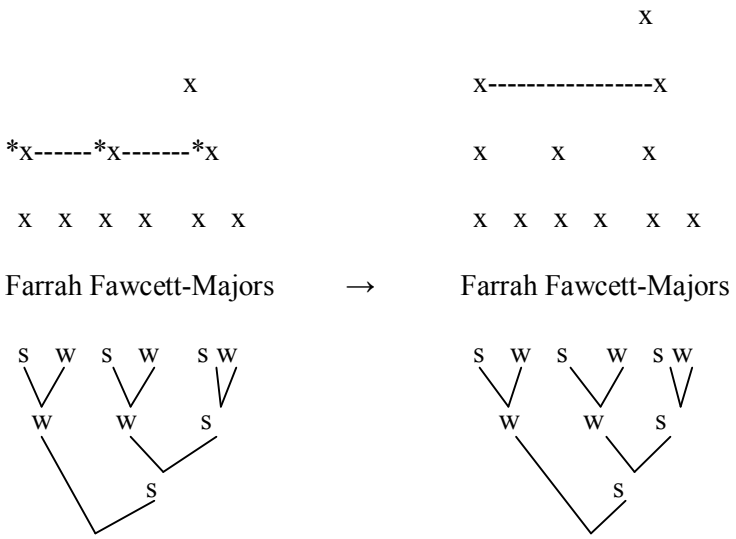
b.



If we take a look at the example in (37), in the case of *alive people* in (37a), its level of scansion includes only one syllable, on the other hand, the scansion level of *half-alive people* includes three syllables which are closer to four syllables. Hayes (1984: 47) argues that 'the form *half-alive people* is more eurhythmic than *alive people*, because its level of scansion includes three syllables instead of one.'

Another strength of this rule is that it can explain the structural description which the rule of Beat Addition lacks. The rule does not clearly say which syllables deserve amplification. Let us take a look at the example below (Hayes 1984: 48):

(38)



The rule of Beat Addition does not mention which syllables should be amplified. By Hayes (1984) account, in order to increase eurhythmy, the number of syllables the level of scansion includes should be close to four. Therefore, by adding the grid marks on the first syllable *Fa-* and the fifth syllable *Ma-*, the Quadrisyllabic Rule is satisfied.

2.3.2.2 Disyllabic Rule

While the Quadrisyllabic Rule operates on the level of scansion, the Disyllabic Rule applies on the level below it called the level of even division.[20]

(39) *Disyllabic Rule* (Hayes, 1984: 48)

The domains delimited on the level of scansion should be divided evenly by a mark on the next lower grid level.

First, let us consider the following example, as in (40):

[20] The level of scansion is primary, but the general principle that rhythmic intervals should be equal holds both for the level of scansion and for the level below it as well. (Hayes, 1984: 48)

(40)

a.

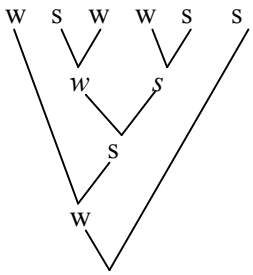
x

*x---*x

x x x

x x x x x x

a hundred thirteen men



→

b.

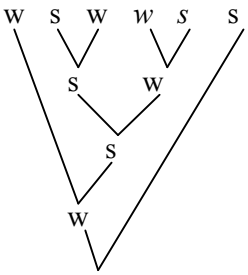
x

x---------- x

x x x

x x x x x x

a hundred thirteen men



c.

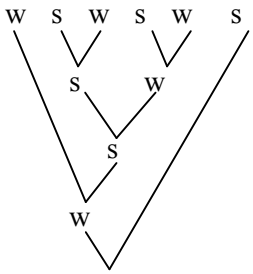
x

x x

x-------- x-------- x

x x x x x x

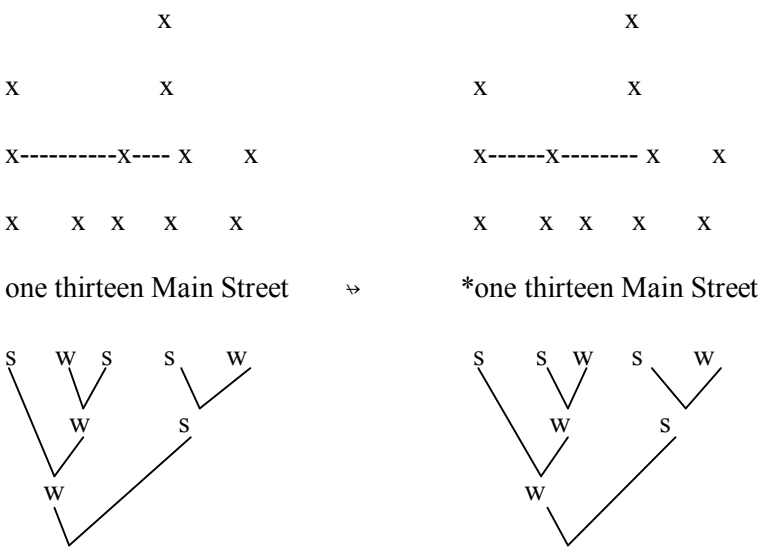
→ a hundred thirteen men



In (40), if the Rhythm Rule is applied to (40a), then it becomes (40b). In (40b), a clash still exists between *thirteen* and *men* at a lower level. Again, the application of the Rhythm Rule

to (40b) makes it (40c). However, this does not apply to the following example, as in (41):

(41)



In (41), note that there exists a clash between *thirteen* and *Main*. The Rhythm Rule does not operate because the rule only shifts the patterns of two syllables and one syllable to that of one syllable and two syllables, which does not increase eurhythmy. On the other hand, in (40c) at level 2, the interval of the grid mark is two syllables.

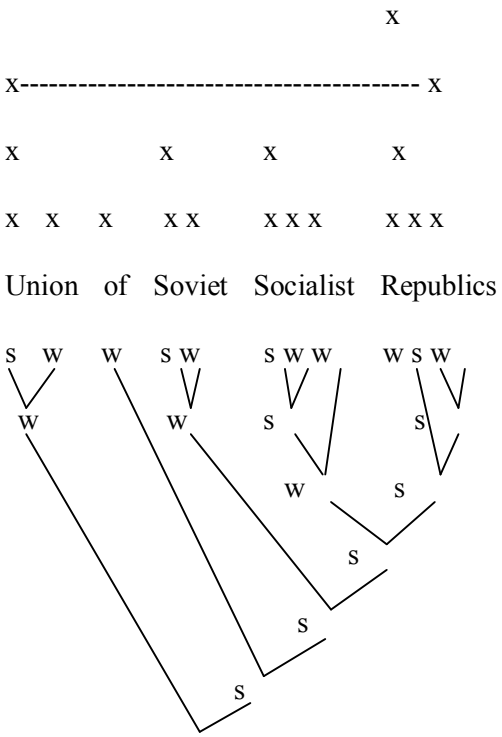
2.3.2.3 Phrasal Rule

Phrasal Rule is proposed to explain phrases that contain more syllables than four or two.

(42) *Phrasal Rule* (Hayes, 1984:52)

A grid is more eurhythmic if its second highest level bears two marks, spaced as far apart as possible.

(43)

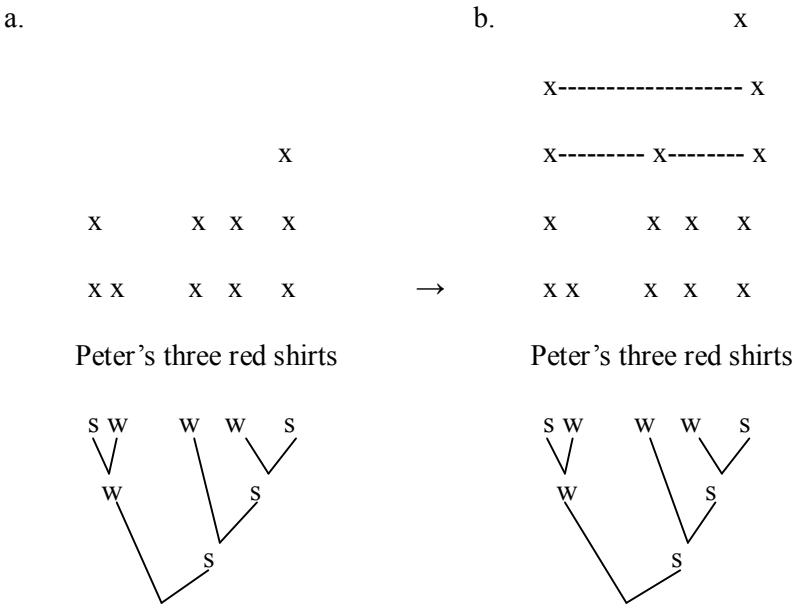


In (43), there are nine syllables between the primary stressed syllable and the secondary stressed syllable. Hayes (1984) proposes the Phrasal Rule to explain phrases like this.

2.3.3 The Necessity of Tree Structure

Prince (1983) and Selkirk (1984) argue that tree structure is unnecessary because only with grids can stress pattern be fully accounted for. On the other hand, Giegerich (1992) uses tree structure only to explain stress clash and stress shift. Hayes (1984) argues that a grid-and-tree theory is not redundant and that both trees and grids are needed to represent stress and rhythmic structure, respectively. Let us consider the following examples:

(44)



In (44), multiple applications of Beat Addition to *Peter's three red shirts* lead to the well-formed representation as in (44b). Now our attention should be shifted to *overdone steak blues* in (45):

(45) a.

x

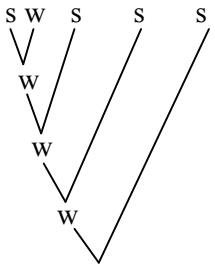
x

x x x

x x x x

x x x x x

overdone steak blues



→ b.

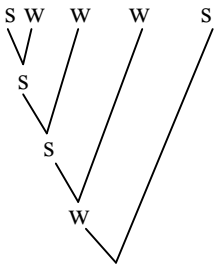
x

x---------- x

x x x x

x x x x x

overdone steak blues



c.

x

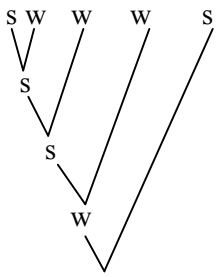
x ---------- x

x------ x---------- x

x x x x

↛ x x x x x

*overdone steak blues



In (45a), there is a clash at the level 3 and the grid mark moves leftwards, resulting in (45b). Although (45b) has a similar grid structure with (44), Beat Addition cannot be applied to (45b). Hayes (1984) argues that this cannot be explained only with grid structure because

there is a difference in tree structure between them. This is why both grid and tree structures are necessary.

Chapter 3

Problems: Major Questions Posed in the Study

So far, we have reviewed different theories that explain stress clash and stress shift. Prince (1983) and Selkirk (1984) argue that the grid is enough to explain the rhythm of English. Selkirk adds Silent Demibeat Alignment (SDA) and Beat Addition (BA) to elaborate the rhythm rule. Hayes (1984) argues that both grid and tree are needed to provide syntactic information and phonological structure by showing counterexamples that cannot be explained by grid-only theory. Giegerich (1992) elaborates the tree structure to prove that the foot is a phonological constituent and explains stress clash and stress shift based on that.

Still, there are some cases that cannot be fully explained by the previous theories. In this chapter, we will show some examples and explore what happens when grid theory and tree theory operate case by case.

3.1 Unstressed Initial Syllables

It is difficult to explain with grid-only theory why stress shift does not happen even when there is a clash in phrases whose initial syllables are unstressed as shown in the examples below:

(46) a. deferred entry

b. divine will

c. aroma therapy

d. maroon sweater

Let us first draw the grid structure of each example in (46):

(47) a. b.

x x

x------x ↛ x----------x

x x x x x x
deferred entry *deferred entry

(48) a. b.

x x

x---- x ↛ x ------- x

x x x x x x
divine will *divine will

(49) a. b.

x x

x------- x ↛ x----------x

x x x x x
aroma therapy

x x x x x
*aroma therapy

(50) a.

x

x-------x ↛ x-----------x

x x x x
maroon sweater

b.

x

x x x x
*maroon sweater

By LP's account, every example above includes a clash. However, if the grid mark moves leftward in order to avoid the clash, ill-formed results are derived in (47b), (48b), (49b), and (50b).

At the same time, these examples defy the application of the Rule of Eurhythmy proposed by Hayes (1984).[21] Let us consider the first example in (47). There is a clash between *-ferred* and *entry*, as seen in (47a). By Hayes' (1984) Disyllabic Rule, the grid mark should move leftward to increase eurhythmy, but if it moves leftward as in (47b), it results in

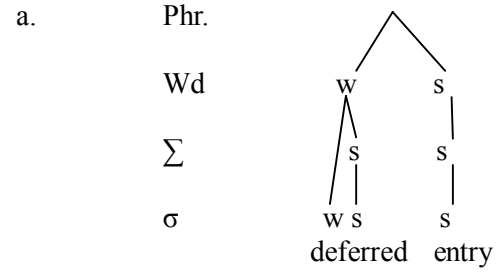
[21] The Rule of Eurhythmy: Quadrisyllabic Rule, Disyllabic Rule, and Phrasal Rule (Hayes, 1984)

the ill-formed description.

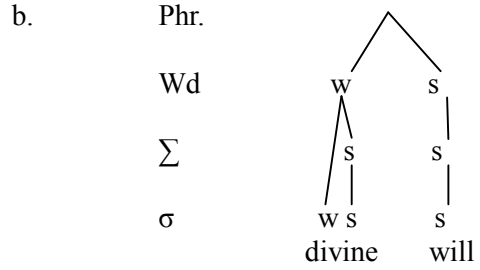
Now, let us see how Giegerich (1992) explains why stress shift does not occur even though there is a clash at the foot level. Consider the tree structures below:

(51)

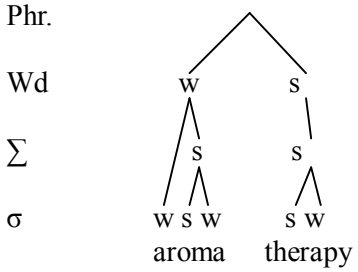
a.



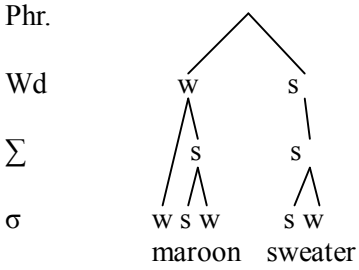
b.



c.



d.



In *deferred entry* as in (51a), *-ferred* is strong at the foot level and *entry* is also strong at the foot level, so there is a clash. In *maroon sweater* as in (51d), the final syllable of maroon is weak and the onset of sweater is strong, showing w-s alternation at the level of syllable. However, if we look at the level of foot, it shows s-s pattern, and there occurs a clash. But in both cases, stress shift does not happen because the unstressed initial syllables (*de-* and *ma-*) are not included in the foot node. It is directly connected to the level of word. In order to explain these examples, Giegerich (1992) constrains the environment where stress shift occur.[22] Then, by Giegerich's (1992) account, these examples can be clearly accounted for why the Reversal Rule does not operate. Note that all these examples include stray unstressed syllables.[23]

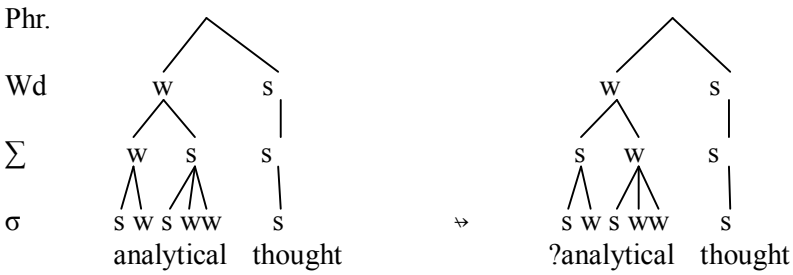
3.2 Tertiary-branching Tree

[22] Reversal only happens among nodes in a metrical tree that dominate (at least) entire feet… (Giegerich, 1992: 278)

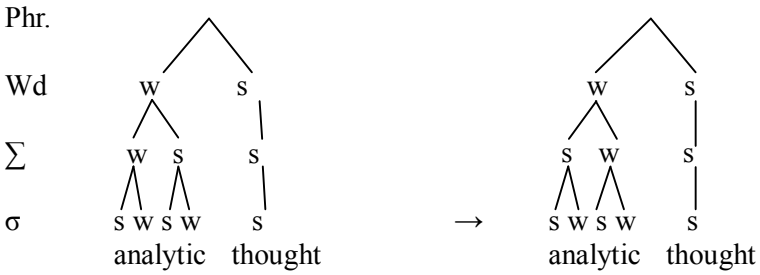
[23] For this reason, I think it might be worth exploring the characteristics of stray unstressed syllables later.

Some of the examples that cannot be explained by Giegerich's account have tertiary-branching tree structure at the foot.[24] The foot node dominates three syllables or more. Consider the examples below:

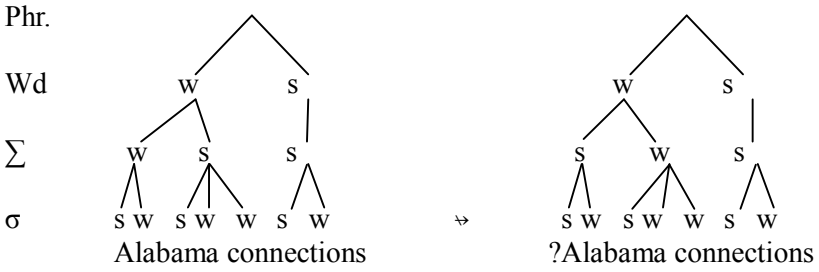
(52) a.



b.



(53)



However, these types of examples can be explained by Hayes' (1984) Rule of Eurhythmy.

[24] Whether the internal structure of the foot is binary- or tertiary-branching should be later discussed. But for now, I consider it tertiary-branching.

(54) a.

x

x---------x

x x x

x x x x x x
analytical thought

b.

x

x-------------x

x x x

x x x x x x
?analytical thought

In (54a), the grid marks on *-ly-* and thought clash at the level 3. By LP's Rhythm Rule, the grid moves leftwards. However, Hayes (1984) proposes Quadrisyllabic Rule. By this rule, (54b) does not help increase eurhythmy because in (54a) clashing grid marks are three syllables apart and in (54b) they are five syllables apart.

Chapter 4

Proposal

In this chapter, problems posed in chapter 3 and other problems will be examined and I will attempt to devise the method to explain them. First, it can be intuitionally perceived that the many of syllables the foot node dominates is closely related to the Rule of Eurhythmy proposed by Hayes (1984). If it is proved true, without applying the Rule of Eurhythmy, stress clash can be explained only with tree structure.

There are also some examples that are resistant to stress shift even though their internal foot structure is binary-branching, not tertiary branching. I will explore what are the differences, and how they can be accounted for.

To this end, I will initially propose possible solutions and check if there is no problem. If there is any problem, I will try to find out why, and try to find another solution again. The objective of my proposal is to incorporate the Rule of Eurhythmy proposed by Hayes (1984) into the tree-full theory proposed by Giegerich (1992). The examples considered in this chapter are as follows:

(55)

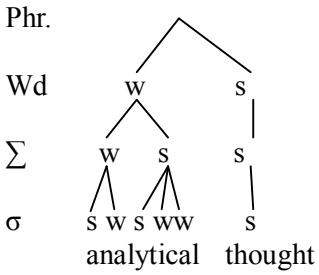
Alabama relatives	Alabama connections
European history	European historian
analytic thought	analytical thought
diacritic markings	diacritical markings
Mississippi Mabel	Minneapolis Mike
Tennessee legislature	Tennessee legislation

4.1 The Internal Structure of Foot

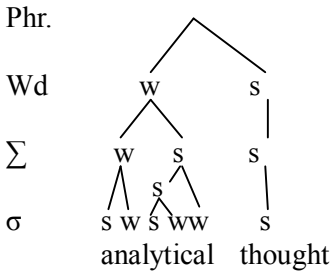
In the previous chapter, we considered the examples that are resistant to relabeling. The foot node that dominates three syllables tends to resist stress reversal. Giegerich (1992) argues that if a passage is eurhythmic, the number of unstressed syllables per foot is restricted to a maximum of two. And Hayes (1984) proposes Quadrisyllabic Rule and Disyllabic Rule. First, let us consider the following example in (52), which is repeated here as (56):

(56)

a.

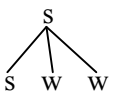


b.



Compare the internal structure of foot with focus on the difference in the second foot as in (57a) and (57b):

(57) a.



b.

We have two possible analyses of the internal structure of foot. (57a) represents a tertiary-branching constituent structure while (57b) shows a binary-branching structure. We have to decide which of the two analyses is the better one.

4.1.1 Binary-branching Constituent Structure

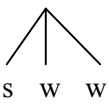
Hulst and Smith (1982: 31) accounts that within metrical theory the stress pattern of a word (or larger units) is represented in terms of a binary branching constituent structure where sister nodes are labeled ‘s’ (meaning ‘stronger than’ or ‘dominant’) and ‘w’ (weaker than’ or ‘dependent’). Following their accounts, the node labeled ‘s’ is relatively stronger or dominant compared to the sister node labeled ‘w’. They argue that ‘stronger-than’ relation is binary, asymmetrical and irreflexive. Hulst and Smith (1982) proposed the basic building blocks are as follows:

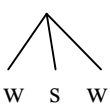
(58) a. b.

And they excluded the following structures:

(59) i. Binary

a. * b. *

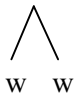




ii. Asymmetrical

a. *

b. *



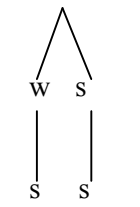
iii. Irreflexive

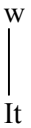
a. *

b. *

However, the application of the binary-branching structure to foot has some problems. Let us consider the following examples:

(60) a. b. c.





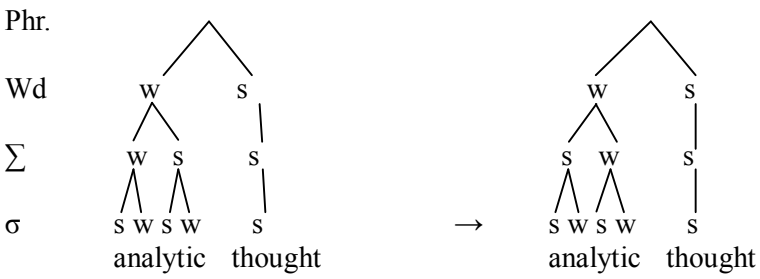
If we take a look at champagne as in (60a), we can see s-s pattern is possible because *champagne* has the secondary stress on the first syllable and the primary stress on the second syllable. However, note that the first syllable labeled ‘s’ is not the sister node of the second syllable labeled ‘s’. Nevertheless, examples in (60) have the same structure as in (59iiia).

Here, for the sake of our arguemtn, we will focus only on ‘binary’ as in (59i), excluding discussion on ‘asymmetrical’ as in (59ii) and ‘irreflexive’ as in (59iii).

Back to the issue of binary-branching or tertiary branching, we will choose a binary-branching structure as a preferable one based on Hulst and Smith (1982). Another reason we choose a binary-branching structure as a more desirable one is that it opens a possibility to shed light on the structure between syllable and foot. Hayes’ (1984) Rule of Eurhythmy implies that the position of syllables and its relation to foot is something important to increase eurhythmy.

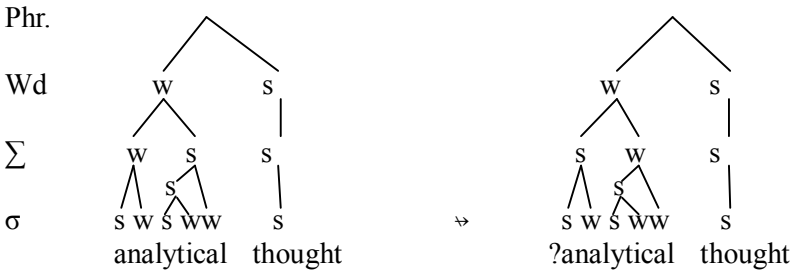
Now, let us consider *analytic thought* vs. *analytical thought*, which is represented as (61) and (62), respectively:

(61) a. b.



In (61a), the stress pattern of *analytic thought* at the level of foot is w-s-s and to avoid a clash the weak-strong pattern of *analytic* is reversed to strong-weak.

(62) a. b.

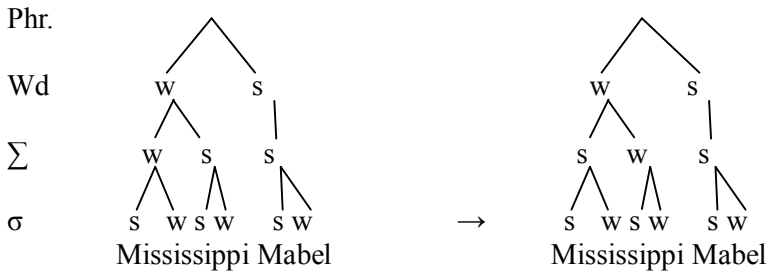


Analytical thought has the same stress pattern as *analytic though* at the level of foot: weak-strong-strong. There exists a stress clash. Unlike *analytic thought* in (61), however, *analytical thought* in (62) is resistant to stress shift. *Analytical thought* has one thing different from *analytic thought*. That is the internal structure of its feet. As in (61), in the case of *analytic thought*, the second foot directly dominates the entire syllables below. On the other hand, the second foot of the phrase *analytical thought* does not directly dominate the entire syllables below. The internal structure of the second foot is as follows:

(63)

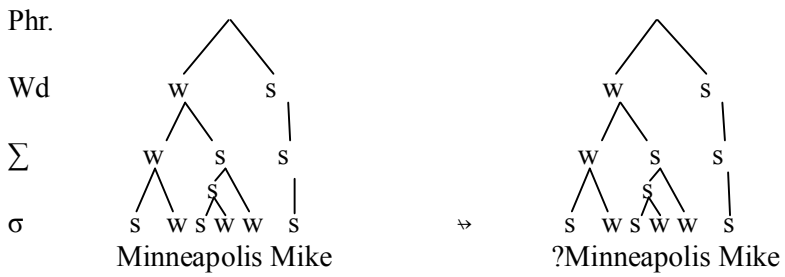
Note that the first node labeled ‘s’ is the sister of the second node labeled ‘w’, but the third node labeled ‘w’ is not the sister of the first node labeled ‘s’. The status of each syllable dominated by the clashing foot is not the same. Therefore, we can assume that in order for stress shift to occur, each syllable dominated by the clashing foot should have the same status in the tree structure. Let us consider another example, *Mississippi Mabel* vs. *Minneapolis Mike*:

(64)



In Mississippi Mabel as in (64), syllables dominated by a clashing foot are sister nodes. Therefore, there is no problem to reverse.

(65)



In (65), the clashing foot does not directly dominate the entire syllables below. In other words, syllables dominated by the clashing foot have different status. The syllable *-a-* is the sister of the following syllable *-po-*, but is not the sister of *-lis*. Therefore, it is resistant to stress reversal. Let us take a look at the internal structure of the foot that is resistant to reversal again:

(66) a. b.

In (66a), A c-commands C, D, and E. In the same way, in (66b) the node labeled ‘w’ in the position of A c-commands the node labeled ‘s’ in C, the node labeled ‘s’ in D, and the node labeled ‘w’ in E. Compare this with the internal structure of the foot that allows reversal:

(67) a. b.

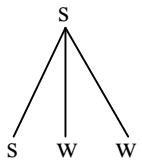
In (67a), A c-commands C. In (67b), the node labeled ‘w’ in the place of A c-commands the node labeled ‘s’ in C. Note that the foot whose node labeled ‘w’ c-commands two or more nodes labeled ‘s’ is resistant to stress shift.

In this way, all examples, including *Alabama relatives* vs. *Alabama connections*, *analytic thought* vs. *analytical thought*, *diacritic markings* vs. *diacritical markings*, *Mississippi Mabel* vs. *Minneapolis Mike*, and *Tennessee legislature* vs. *Tennessee legislation*, can be clearly accounted for. Unfortunately, it still defies the explanation of *European history* vs. *European historian*.

4.1.2 Tertiary-branching Constituent Structure

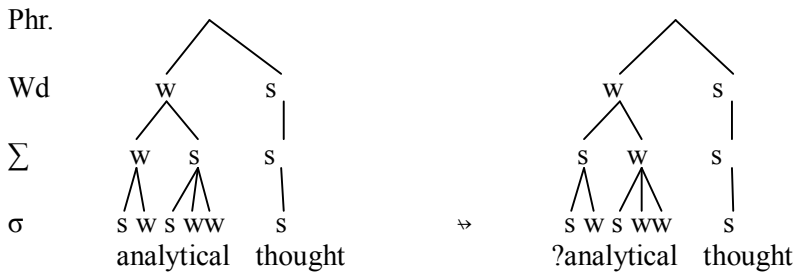
By adopting a binary-branching constituent structure, we can clearly account for the examples with one exception. Then, let us consider what if we assume that foot has a tertiary-branching constituent structure. Consider the basic building block of a tertiary-branching constituent structure:

(68)



The foot node dominates three syllable nodes, and they have the same status: all sisters. Therefore, there is no way to explain the internal structure by using status differences and c-command. The only way is to use the fact that the foot dominates three syllable nodes. Then look at the example (52) again, which is repeated as (69):

(69)



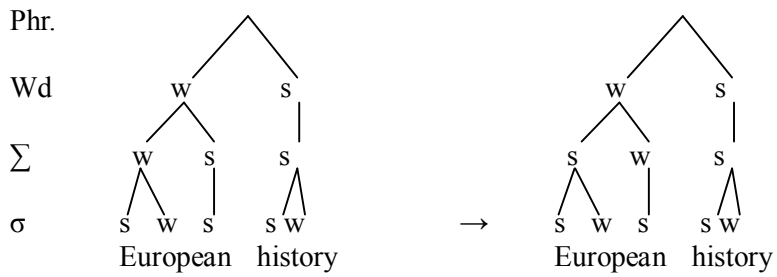
In (69), there is a clash in *analytical thought* at the level of foot but stress shift does not occur. To explain why, we can use the internal structure of the clashing foot. When we assume that the foot structure is binary-branching, we can logically explain the resistance to stress reversal. However, if we assume that the foot structure is tertiary-branching, we have only one way to explain the resistance: a tertiary-branching constituent structure itself. Therefore, we have no choice but to say it is resistant to reversal because the foot structure is tertiary-branching, which is less convincing than our assumption that the internal structure is binary-branching.

4.2 Word Boundary

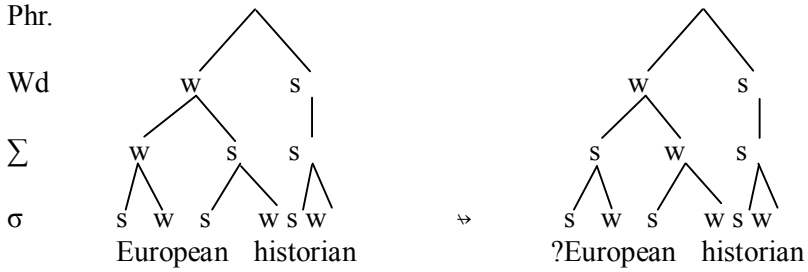
If we explore the examples that defy the explanation in the previous section, the foot node dominates the syllable nodes across word boundaries. Let us consider the internal

structures of *European history* and *European historian*:

(70) a.



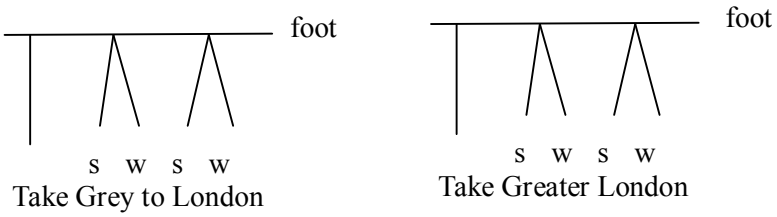
b.



If we take a look at *European historian* as in (70b), the clashing foot dominates the final syllable of *European* and the first syllable of *historian*. It dominates two syllables across word boundaries. Intuitionally, we know where the word boundary is. But a question is raised: How can we distinguish the word boundary by looking at the phonological structure? By Giegerich's (1992: 270) account, the phonological structure is the same where it goes across syntactic boundaries as it is within words.[25] Consider the following example:

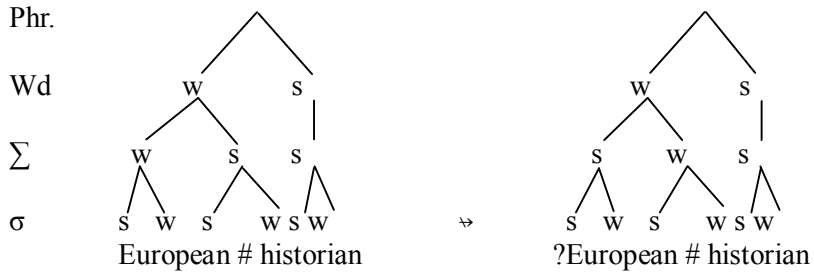
[25] These observations suggest three things in turn: firstly, the domain in which enclisis happens is the foot; secondly, the foot is a phonological unit that overrides… syntactic structure; and thirdly, the representation of this phonological unit should be the same where it goes across syntactic boundaries as it is within words. (Giegerich 1992: 269-270)

(71) a. b.



Take Grey to London and Take Greater London as in (71) have the same foot structures and phonemic representations in nonrhotic accents. However, there is a difference in the length of stressed vowels: vowels are relatively long before word boundaries. In *Grey to*, the first syllable is longer than the second while the ratio is almost the same in *Greater*. Then if we have syntactic information, the duration differences can be viewed as structural differences because word boundaries within the foot are responsible for the duration differences. Therefore, by adding word boundaries to the structure we can explain the differences in the foot with or without word boundaries. Consider the following example:

(72)



In (72), there is a word boundary (#) between the syllable *-pean* and the syllable *his-* that are dominated by a clashing foot. Now we can say that if a clashing foot includes a word boundary (#), it is resistant to shift.

Chapter 5

Conclusion

In this thesis, I reviewed previous literature related to the rhythm rule. Prince (1983) and Selkirk (1984) explain the rhythm of English, focusing on grid-only theory, but fail to fully explain different results from the application of the rhythm rule to some examples, including *analytic thought* vs. *analytical thought*, and *diacritic markings* vs. *diacritical markings*. Hayes (1984) proposes Rule of Eurhythmy to account for the difference between *analytic thought* vs. *analytical thought* and *Alabama relatives* vs. *Alabama connections*. Giegerich (1984) adopts the metrical tree structure to explain the English stress. By his count, *analytic thought* and *analytical thought* have the same structure on the foot level. Therefore, the resistance of *analytical thought* to reversal cannot be explained.

In my proposal, I argue that Hayes' (1984) Rule of Eurhythmy can be incorporated into the tree-full theory if we further explore the internal structure of the foot and shed light of the relations between the constituents.

To this end, first I compared a binary-branching tree and a tertiary-branching tree. When the foot node dominates three syllable nodes, it shows resistance to stress shift. I argue this is closely related to Hayes' (1984) Quadrisyllabic Rule because if the foot node dominates two syllable nodes there is a possibility to increase eurhythmy by moving the foot node leftwards. However, if the foot node dominates three syllable nodes, removing the foot node leftwards does not help increase eurhythmy because removing the foot node leftwards makes the space more than four syllables apart.

Second, I shed light on the relations between the syllables dominated by the foot. And I argue the syllables have not the same status and that stress shift depends on the different status. When the syllable node labeled 'w' c-commands two or more syllable nodes labeled 's', it is resistant to stress shift even thought there is a clash at the foot level. In this way, the type of analytic thought vs. analytical thought can be accounted for. But examples like

European history vs. *European histor*ian still defy the description.

Third, in order for the stress shift to occur, the foot does not dominate syllable nodes across word boundaries. With this rule, the examples like *European history* vs. *European historian* can be explained.

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