

A NOTE ON DOUBLE-STRESSED DISYLLABIC WORDS IN ENGLISH

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An attempt will be made to analyze historical change of word stress in terms of cross-linguistic preferences of stress languages. Universal constraints will be ranked for each historical period of the English language, whose stress system is assumed to change so that arrhythmic structures become more rhythmic. It will become clear, however, that the requirement of rhythm is not the only force which triggers stress change. Words with clashing stresses, and even double-stressed disyllabic words with initial light syllables, will be proved to have the most preferable stress contour in certain historical periods. Our investigation will lead us to the conclusion that edge-marking, as well as rhythm and quantity-sensitivity, plays an important role in the historical change of English stress.

Keywords: historical change of word stress, cross-linguistic properties of stress languages, ranking of universal constraints, stress clash

1. Introduction

One distinctive phonological characteristic of stress is that it is generally rhythmic, in the sense that stressed and unstressed syllables tend to occur spaced apart at regular intervals. Indeed, in many languages, words with, for instance, six syllables realize the binary alternation of stresses as in (1), where $\acute{\sigma}$ stands for a stressed syllable and $\check{\sigma}$, an unstressed syllable.

(1) a. $\acute{\sigma} \check{\sigma} \acute{\sigma} \check{\sigma} \acute{\sigma} \check{\sigma}$ b. $\check{\sigma} \acute{\sigma} \check{\sigma} \acute{\sigma} \check{\sigma} \acute{\sigma}$

Such rhythmic alternation is manifested by avoidance of stress clashes and stress lapses. That is, words with the same syllable number as those in (1) above usually do not receive the stress patterns listed below.

(2) a. $*\acute{\sigma} \acute{\sigma} \check{\sigma} \check{\sigma} \check{\sigma} \check{\sigma}$ b. $*\acute{\sigma} \check{\sigma} \check{\sigma} \check{\sigma} \acute{\sigma} \acute{\sigma}$

This characteristic is known as the rhythmic property of stress languages and is often assumed to be the most important factor in stress placement. Actual stress

distribution is, of course, not so straightforward. Middle English, for example, is one of the languages where stress is rhythmically distributed, as hexasyllabic words such as *multiplicácioun* 'multiplication' and *voluptuosité* 'voluptuousness' exhibit the alternating stress pattern in (1b) above. The same language, however, contains words with clashing stresses such as *certain* 'certain' and *honour* 'honor'.

Analyzing the historical change of English word stress within the framework of metrical phonology, Tanaka (1998, 2000) claims that the stress system changes so that arrhythmic structures become more rhythmic ones. As the stress contours of the words above in Present-day English indicate, they lost their secondary stress during the period of Middle or Modern English, becoming single-stressed words of *certain* [sə:tn] and *honor* [ánər]. The loss of secondary stress is schematized as in (3).

(3) $\acute{\sigma} \acute{\sigma} > \acute{\sigma} \check{\sigma}$

As Tanaka points out, the metrical structure of these

double-stressed disyllabic words has become more rhythmic than it was in Middle English in that stress clashes have been resolved. A question naturally arises here, however: why did English allow arrhythmic structures like this early in its history? The answer proposed in the present paper is that other requirements than the rhythmic one have priority over it in Middle and Early Modern English. That is, the rhythmic requirement is not the only force governing the historical change of word stress.

In this paper, we will reanalyze the historical change of English word stress in the framework of Optimality Theory, which is proposed by Prince and Smolensky (1993) and McCarthy and Prince (1993a, b), since the theory is equipped to capture the interaction of conflicting requirements. The rest of the paper is organized as follows. In section 2, we will introduce other cross-linguistic properties than the rhythmic one. Then, after reviewing some metrical constraints, section 3 will present an Optimality Theoretic analysis of Old and Middle English word stress. Section 4 will be devoted to the discussion of double-stressed disyllabic words. Concluding remarks will be made in section 5.

2. Cross-linguistic properties of stress languages

2.1. The culminative property

At the outset of the paper, we stated that there is a general agreement on the rhythmic property of stress languages. The best known of the other cross-linguistically common properties of stress languages are the culminative property, the demarcative property, and quantity-sensitivity. In this section, we will briefly outline these properties in that order. Let us begin with the culminative property of stress languages.

As Liberman and Prince (1977: 262) states, in stress languages, each morphological or syntactic constituent has a single strongest syllable which bears the main stress. English, as well as many other languages, imposes this requirement of culminativity on content words but not on function words. As words like *book* [bʊk], *city* [sɪ.tɪ], *elephant* [ɛ.lə.fənt], and *polygamy* [pə.lɪ.gə.mɪ] indicate, for instance, every content word has a single syllable with primary stress regardless of its length, while function words such as *the* [ðə] [ðɪ], *a* [ə], and *an* [ən] do not contain stressed syllables.

This stressability requirement is related to a minimum which many languages placed on the size of a word. The syllable configurations of the content words above indicate that Present-day English requires every stressed word to contain at least two moras, that is, two light syllables or a single heavy syllable. It is also reflected by the fact that the function words above are pronounced with long vowels or diphthongs when they are read as separate words, namely [ði:], [eɪ], and [æn]. This minimal word is, in turn, equal to a foot in English, as well as in many other languages. The discussion so far tells us that English feet are composed of a single heavy syllable or two light syllables, of which the first is stronger. This foot is called a moraic trochee and defined as in (4), where a heavy syllable is represented by a bold-faced σ and a foot is enclosed by a pair of brackets.

$$(4) (\sigma \sigma) \text{ or } (\sigma)$$

The binary foot size above is of course related to the rhythmic property of stress languages, which will be discussed in section 3.

2.2. The demarcative property

Now that we have seen that each word or phrase has one and only one syllable with primary stress, it is quite natural for us to consider that primary stress plays a key role in processing grammatical units in perception. This idea is supported by studies of cross-linguistically favored positions for primary word stress, which are investigated by scholars such as Hyman (1977). These studies show that stress is typically placed near edges of constituents, which is known as the demarcative property of stress languages. According to Hyman, the most preferred position for primary stress is the initial syllable and the second preferred position is the penultimate syllable. The former clearly marks the beginning of a word and the latter seems to demarcate the end of a word. Contrary to our expectation, final primary stress is not so popular as penultimate primary stress.¹

2.3. Quantity-sensitivity

So far, we have seen that stress tends to be rhythmic, culminative, and demarcative. The last of the well-known

cross-linguistic properties of stress languages is what is called quantity-sensitivity, that is, attraction of stress by heavy syllables. Literature on English word stress, especially a work by Hayes (1982), shows that the language is one of the quantity-sensitive languages. In the case of English nouns, for example, it is widely assumed that primary stress falls on one of the last three syllables depending on its weight. To be precise, primary stress goes on to the final syllable if it is heavy; otherwise the penultimate heavy syllable is stressed; and in all other cases, primary stress is assigned to the antepenultimate syllable of a word. This is illustrated by the following schematized syllable structures and foot structures of *kangaroo*, *museum*, and *polygamy*.² Here a full stop is used to mark syllable edges.

- (5) a. $\acute{\sigma} \check{\sigma} \acute{\sigma}$ (kæn.gə).(rú:)
 b. $\acute{\sigma} \acute{\sigma} \check{\sigma}$ (mjú:).(zí:um)
 c. $\check{\sigma} \acute{\sigma} \check{\sigma} \check{\sigma}$ pə.(lí.gə).mɪ

In the examples above, heavy syllables attract secondary stress as well as primary stress, while a light syllable bears stress only when there is no syllable with intrinsic prominence.

3. An Optimality Theoretic analysis of stress change

3.1. Metrical constraints

In his extensive research in the typology of word stress, Hayes (1995) has shown that stress patterns are a domain of potentially conflicting preferences. The best known of these forces are rhythm, edge-marking, and quantity-sensitivity, all of which are now familiar to us. Within the framework of Optimality Theory, the interaction of these preferences is translated into a ranking argument for some competing constraints, among which are Foot Binariness (FTBIN), EDGEMOST, and WEIGHT-TO-STRESS (WSP). After Prince and Smolensky (1993), we will state those constraints as follows.

- (6) a. Foot Binariness (FTBIN)
 Feet are binary under moraic or syllabic analysis.
 b. LEFTMOST
 Align (Hd-Ft, Left, PrWd, Left)
 The head foot is leftmost in PrWd.

- c. RIGHTMOST
 Align (Hd-Ft, Right, PrWd, Right)
 The head foot is rightmost in PrWd.
 d. WEIGHT-TO-STRESS (WSP)
 Heavy syllables are stressed.

These constraints, as well as other constraints, are assumed to be violable and universally present in all grammars. In the following subsections, we will see how these and other constraints are ranked in Old and Middle English.³

3.2 Initial stress of Old English

Although stress is not directly indicated in Old English manuscripts, facts about vowel reduction and metrics can tell us about word stress. Like other Germanic languages, Old English had a stress system in which primary stress was assigned to the initial syllable of a word. Some data are given in (7) from Nakao (1985).

- (7) a. $\acute{\sigma}$ bōc 'book' séan 'strike'
 b. $\acute{\sigma} \check{\sigma} / \acute{\sigma} \check{\sigma}$ déofol 'devil' atol 'terrible'
 c. $\acute{\sigma} \check{\sigma} \check{\sigma} / \acute{\sigma} \check{\sigma} \check{\sigma}$ fēolaga 'partner' æþele 'noble'

The initial stress in these examples tells us that the demarcative force plays an important role in the language. In the Optimality Theoretic terminology, the demarcative stress of this type is realized if LEFTMOST outranks RIGHTMOST in the language. This is shown in the following tableau for *æþele*, where relevant constraints are given in columns to the right and relevant candidates are given in rows.

(8)

	æþele	LEFTMOST	RIGHTMOST
☞	(æþe)le		*
	æ(þe)le	*!	

As the asterisks mark, both candidates get violation, but the winning candidate is the upper one indicated by the pointing hand, since the higher violation is that of LEFTMOST, which is indicated with an exclamation point. The shading of the lower-ranked constraint shows that the violation of RIGHTMOST is irrelevant here.

The description of secondary stress, on the other hand, tells us how FTBIN competes with WSP. Following Sievers (1893), Campbell (1959: §§87-92) generalizes that secondary stress is observed on the penultimate syllable of a simple word if the syllable is preceded by a heavy syllable or two light syllables. Exemplary words are listed below from Nakao (1985: 476).

- (9) a. $\acute{\sigma} \acute{\sigma} \acute{\sigma}$ rǣdelsas 'riddle' Pl. Acc.
 b. $\acute{\sigma} \acute{\sigma} \acute{\sigma} \acute{\sigma}$ æþelinges 'prince' Sg. Gen.
 c. $\acute{\sigma} \acute{\sigma} \acute{\sigma}$ cýninges 'king' Sg. Gen.

Note that the penultimate heavy syllable is not stressed when it is preceded by only a single light syllable. The double-stressed and single-stressed words above indicate that both rhythm and quantity-sensitivity are respected and that the moraic version of FTBIN is called for in the language. The following tableau of the single-stressed word in (9c) serves to illustrate the activity of the three forces. Here a dotted line is used to note that the ranking of the first two constraints remains to be considered.

(10)

cýninges	LEFTMOST	FTBIN	WSP
$\acute{\sigma}$ (cýnin)ges			**
(cý)(nín)ges		*!	*
cy(nín)ges	*!		*

As the traditional generalization implies, the penultimate heavy syllable is not stressed when it is preceded by only a single light syllable. As the ranking of these two constraints indicate, in Old English, rhythm and edge-marking are respected at the cost of quantity-sensitivity. In other words, the requirements of rhythm and edge-marking have priority over that of quantity-sensitivity.

3.3. Final stress of Middle English

In the previous subsection, we saw that some longer words in Old English exhibit double-stress with primary stress on their initial syllables and secondary stress on the penultimate syllables. Listing the examples below, Nakao (1985: 319) illustrates that these double-stressed words

began to lose their secondary stress in Late Old English.

- (11) bóccere > bócre 'writer' óðerre > óðre 'other'
 wǣþenman > wǣþman 'male' fúlwihtere ~ fúlhtere

Since the penultimate vowels are deleted after losing their stress, words of native origin became largely monosyllabic in Middle English, if final *-e* is ignored. Some exemplary words are cited from Nakao (1985: 479).

- (12) crónycle 'chronicle' líþer 'bad' bécyyn 'beckon'
 wight 'person' lef 'dear' leet 'let'

After the Norman Conquest, on the other hand, many longer words entered English mainly from French, where primary stress falls on final syllables. According to Pope (1934: 100-101), Old French stress had developed from Late Latin, whose position of primary stress was not dissimilar to that of Classical Latin. In Classical Latin, as is widely known, stress is placed on the penultimate syllable if it is heavy, and otherwise, the antepenultimate syllable is stressed. Pope (1934: 112) states that the final unstressed vowel was either deleted or reduced to schwa in Old French and that stress fell either on the final heavy syllable or on the penultimate syllable followed by a schwa. The development of stress patterning is exemplified in (13).

- (13) a. àmicus 'friend' > àmi:
 b. òrnaméntum 'ornament' > òrnémént
 c. fémina 'woman' > féme

In his close investigation into Middle English, Nakao (1972: 456-7) states that the final stress of French words was retracted leftward in Middle English, making the original stress secondary. The historical development of stress patterning is exemplified in (14).

- (14) bàcheler > bachelèr 'bachelor'
 bènefíce > bénefíce 'benefice'
 astrònomíe > astrónomíe 'astronomy'

The examples above show that rhythmic alternation of strong and weak syllables is observed in the language, which implies that the moraic version of FTBIN is replaced

by the syllabic version of the constraint. The stress patterning of these French words further suggests that WSP now outranks FTBIN. A tableau of *bachelor* below illustrates that WSP allows us to select among some of the candidates.

	WSP	FTBIN
☞ (báche)(lèr)		*
ba(ché)ler	*!	
(bá)(chè)ler	*!	*

Although English did not necessarily place stress on a heavy syllable in the period of Old English, as a result of French borrowings, English now comes to stress one of the last two syllables depending on its weight.

Note, however, that, the rightmost stress of Middle English words is not primary but secondary. It implies that LEFTMOST still outranks RIGHTMOST in English despite the influence of French stress. As the following tableau of *astronomie* indicates, English stress contour is selected if LEFTMOST outranks RIGHTMOST, and French stress contour is the winner if the former is overridden by the latter.

	LEFTMOST	RIGHTMOST
a(stròno)(mie)	*	
a(stróno)(mie)		*

In this and the previous subsections, we analyzed Old and Middle English word stress in the framework of Optimality Theory. The rankings of the four constraints, which are presented at the beginning of this section, are summarized as follows.

- (17) OE: LEFTMOST >> RIGHTMOST; FTBIN >> WSP
 ME: LEFTMOST >> RIGHTMOST; WSP >> FTBIN

It is now clear that rhythm is not the only force which governs the historical change of English stress. Edge-marking and quantity-sensitivity also seem to play an important role in the history of English stress. Taking this into consideration, we will move on to a discussion of

double-stressed disyllabic words of Middle and Early Modern English, which would not be accounted for in a theory which assumes rhythm is the only factor in stress placement.

4. Stress clashes in English

4.1. Initial stress in Middle English

In the previous section, we have seen that Middle English realizes the alternating distribution of stressed and unstressed syllables, which was not always observed in Old English, but that, in Middle English, the rhythmic force itself is dominated by quantity-sensitivity, which was dominated by rhythm in the preceding historical period. What remains to be considered is how the requirement of rhythm interacts with that of edge-marking, that is the ranking of FTBIN and LEFTMOST. In order to define their ranking, let us now proceed to an analysis of stress patterning of disyllabic words.

As we saw in the previous section, words of French origin shifted their primary stress two syllables to the left of the right-most stressed syllable, making stresses alternate rhythmically. When there is only a single syllable to the left of the syllable with original primary stress, however, secondary stress is assigned to the only available syllable, the initial syllable. Nakao (1978: 456) provides the following examples of stress change.

- (18) hònour > hónour 'honor' nature > nàtur 'nature'

The shift of original primary stress inevitably makes French words of the above syllable configurations double-stressed, which clearly deviates from the rhythmic alternation of stress. More examples are quoted below from Nakao (1985: 483-4).

- (19) a. $\acute{\sigma} \grave{\sigma}$ sérmoun 'sermon' cértàyn 'certain'
 b. $\acute{\sigma} \grave{\sigma}$ solàas 'solace' colòur 'color'
 c. $\acute{\sigma} \grave{\sigma} \check{\sigma}$ ýmage 'image' vísìte 'visit'
 cf. $\acute{\sigma} \check{\sigma}$ bódi 'body' héuy 'heavy'

While words of native origin, whose final syllables are light, constantly show single-stress, the words of French origin above contain clashing stresses, even when the initial syllable is light, as shown in (19b) and (19c).

One might think that this type of stress contour is exceptional, or transitional, in the system of Middle English stress. Indeed, as we have already noted, double-stressed words lost their secondary stress during the period of Middle or Early Modern English. Listing the words in (20), however, Nakao argues that words of native origin, which had been single-stressed words at the end of the Old English period, came to exhibit double-stress following the new stress system of Middle English.

- (20) féllow ‘fellow’ mórrow ‘morrow’
 yéllow ‘yellow’ hóloghe ‘hollow’
 réscòwe ‘rescue’ swállow ‘swallow’

Recall that the initial stress of those words demarcated the beginning of the words in Old English and that LEFTMOST is higher-ranked also in Middle English. It may be natural to assume, therefore, that the demarcative force plays a key role in assigning primary stress at least to the initial light syllable of Middle English words. An example of this is illustrated in the tableau below.

(21)

hónour	LEFTMOST	WSP	FTBIN
☞(hó)(nòur)			*
(hónour)		*!	
ho(nòur)	*!		*

It is now clear that the form with initial stress is optimal in Middle English in that it respects edge-marking, though the stress contour is realized at the cost of rhythm.

4.2. Final primary stress in Early Modern English

Our analysis now successfully explains why English allowed words with arrhythmic metrical structures early in its historical stage. Although rhythm plays an important role, it is not the only force governing stress placement. In this subsection, analyzing the stress patterning of Modern English words, we will give an answer to the question why the stress system seems to have changed so that arrhythmic structures became more rhythmic.

As we stated in section 1, Middle English double-stressed words lost their secondary stress during the period of Middle or Modern English, and the vowels which

formerly received stresses were reduced to short vowels or schwas. On the other hand, in Early Modern English, words with rising stress contour appeared. Nakao (1985: 488) lists the following two words as examples.

- (22) a. màgazine b. àntique

Words with the new stress contours are selected if we rank RIGHTMOST over LEFTMOST. Let us take (23) as an example.

(23)

antique	RIGHTMOST	LEFTMOST
☞(à)(tíque)		*
(án)(tíque)	*!	

As the following tableau shows, higher-ranked WSP allows us to select the form with initial secondary stress, although the constraint of LEFTMOST is demoted in Present-day English.

(24)

antique	RIGHTMOST	WSP	FTBIN
☞(à)(tíque)			*
(ántique)		*!	
an(tíque)		*!	*

The tableau below tells us that the same ranking works for words of French origin, which were formerly double-stressed but are now single-stressed.

(25)

honor	RIGHTMOST	WSP	FTBIN
(hò)(nór)			*!*
☞(hónor)			
ho(nór)			*!

Although FTBIN is ranked the lowest among the three constrains, the crucial violation here is that of FTBIN. This is why stress change from Middle to Modern English is regarded as a change toward rhythmically well-formed structures.

4.3. Initial secondary stress in Present-day English

To sum up so far, the four metrical constraints introduced in (6) have been ranked for each historical period of English in the following way.

- (26) OE LEFTMOST >> RIGHTMOST; FTBIN >> WSP
 ME LEFTMOST >> RIGHTMOST; WSP >> FTBIN
 ModE RIGHTMOST >> LEFTMOST; WSP >> FTBIN

Before closing this section, we should refer to Present-day English words with clashing stresses. Let us look at the following disyllabic and trisyllabic words.

- (27) a. $\acute{\sigma} \acute{\sigma}$ bamboo [bæm.bu:]
 $\acute{\sigma} \acute{\sigma} \acute{\sigma}$ bandana [bæn.dæ.nə]
 b. $\acute{\sigma} \acute{\sigma} \acute{\sigma}$ confetti [kən.fetɪ]
 $\acute{\sigma} \acute{\sigma} \acute{\sigma}$ cantata [kən.tɑ:tə]
 c. $\acute{\sigma} \acute{\sigma}$ racoon [ræ.ku:n]
 $\acute{\sigma} \acute{\sigma} \acute{\sigma}$ paprika [pæprikə]
 d. $\acute{\sigma} \acute{\sigma}$ machine [mə.ʃi:n]
 $\acute{\sigma} \acute{\sigma} \acute{\sigma}$ spaghetti [spəʒetɪ]

Like Middle English words with clashing stresses, those words in (27a) and (27c) receive stress on their initial syllables. The situation is quite different from that of Middle English, however. While words of the syllable configurations above are always double-stressed in Middle English, in Present-day English words with the same syllable make-up exhibit different stress contours. That is, the initial heavy syllables in (27a) receive stress but those in (27b) do not, and the initial light syllables in (27c) are stressed but those in (27d) are not. This implies that one of the two stress contours should be marked as exceptional.

Recall that LEFTMOST is demoted in Present-day English. The stress patterning that our ranking in (25) can capture is that of (27a) and (27d). The following tableaux show how words with an initial heavy syllable are treated and how the same ranking of the constraints works for a word with an initial light syllable.

(28)

/bændænə/	RIGHTMOST	WSP	FTBIN
$\acute{\sigma}$ (bæn)(dænə)			*
bæn (dænə)		*!	

/spəʒetɪ/	RIGHTMOST	WSP	FTBIN
(spæ)(gétɪ)			*!
$\acute{\sigma}$ spə (gétɪ)			

Because of the higher-ranked WSP, an initial syllable followed by a stressed syllable receives stress if it is heavy, but the demotion of LEFTMOST leaves an initial light syllable followed by a stressed syllable unstressed. In order to select the forms in (27b) and (27c) with exceptional stress contours, we need other constraints, though we do not include this in the discussion, as it is beyond the scope of this paper.

5. Conclusion

In metrical theory, which was first proposed by Liberman (1975) and Liberman and Prince (1977), stress is represented as a hierarchically organized rhythmic structure. For example, stress patterns of longer words considered in the preceding sections are assigned the following metrical structures.

(29) a. Old English b. Middle English

x	x
x x	x x
x x x x	x x x xx
æþelinges	astronomie

Above the words is placed a metrical grid. The grid columns are equally spaced in time, which vary in prominence according to their height. We see that this type of representation suffices to depict a rhythmic aspect of stress, as it clearly illustrates that strong and weak syllables alternate. Once words with stress clash appear, however, grid structures can only show that the stress contours in question are rhythmically not well formed. The grid structures do not tell us that stresses are placed on the adjacent syllables because the syllables in question are heavy or are located at the edge of the words.

The same applies to historical change of word stress. Let us consider the following metrical structures, where we underline the grid mark which interrupts rhythmic alternation of stress.

Tanaka, Akiko Sawada (2000) "A Metrical Analysis of the Stress Change from Old to Middle English," *Bulletin of the Institute for Research in Language and Culture, Tsuda College* 15, 128-140.