

SHIBATA Chikako, *English Stress Shift and
the Hierarchy of Constraints on Prosodic Structure*

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This book is a revised version of the author's dissertation submitted to Tsuda College in 1998. In the framework of Optimality Theory, the author attempts to show that leftward and rightward stress shift in the history of English words is the result of reranking of phonological constraints.

In Chapter 1 "General Introduction," Shibata argues that stress accent has the demarcative function and the morphological function. Stress indicates a word boundary at the beginning or the end of a word. For example, primary stress demarcates the beginning of a word in Old English (OE), while it demarcates the end of a word in Middle English (ME). Stress also serves to preserve the linguistic identity of a morpheme: a root or stem is usually identified by receiving primary stress. For example, primary stress is in principle assigned to the initial syllable of a stem in OE. Shibata also points out that in English derived words, the morphological function of subsidiary stress competes with the demarcative function. For example, *icónoclast* has two derived forms: *ìconoclástic* and *icònoclástic* as the result of the tension between the two subfunctions of subsidiary stress. She suggests that the morphological function has priority over the demarcative function in a recently derived word.

The latter half of the chapter is devoted to a brief review of previous approaches to English stress. Shibata outlines the linear model (Halle and Keyser (1971)), the metrical grid theory (Halle and Vergnaud (1987)), and the constraint-based approach (Burzio (1994)). She also explains the hierarchy of prosodic constituents,

referring to Selkirk (1995).

Chapter 2 is titled “Introduction to Optimality Theory.” Shibata outlines the theory in terms of the hierarchy of constraints and the categories of constraints. Citing data from English and Spanish, she explains the basic idea of constraint ranking and evaluation procedure. She also demonstrates the ranking logic by citing Itô and Mester’s (1995) analysis of the Japanese lexicon. Following McCarthy and Prince (1993, 1995), she categorizes the constraints into the identity constraints (e.g. MAX-IO, DEP-IO, and IDENT(F)), the alignment constraints, and the structural constraints (e.g. ONSET, PEAK, and NOCODA). In the last section of the chapter, she discusses the relevant set of constraints on prosodic structure. She modifies McCarthy and Prince’s (1995) Identity constraints into the following constraints (p. 34):

- (1) a. IDENTITY: An output form must preserve the prosodic structure of the input form.
- b. IDENT-BA: A derived form must preserve the prosodic structure of the base form.
- c. IDENT-AF: A derived form must preserve the prosodic structure of the affix.

For example, an ME output is required by IDENTITY (1a) to preserve the final tonic foot of the loan words from Norman French. She argues that these constraints on morphological transparency will conflict with the following Alignment constraints (p. 35):

- (2) a. ALIGN-FOOT-L: Align (PrWd, L; Ft, L)
- b. ALIGN-HEAD(Ft)-L: Align (Ft, L; H (Ft), L)
- c. ALIGN-FOOT-R: Align (Ft, R; PrWd, R)
- d. ALIGN-HEAD(PrWd)-R: Align (PrWd, R; H (PrWd), R)

While IDENT-BA (1b) and IDENT-AF (1c) realize the morphological stress, the Alignment constraints in (2) realize the demarcative stress on the left or right edge of a prosodic word. A candidate form which satisfies ALIGN-FOOT-L (2a) will have the word-initial stress if trochaic feet are constructed under ALIGN-HEAD(Ft)-L (2b). Interaction of ALIGN-HEAD(Ft)-L (2b) with ALIGN-FOOT-R (2c) will result in penultimate stress. If they are dominated by ALIGN-HEAD(PrWd)-R (2d), the word-final trochaic foot will carry primary word stress. According to Selkirk (1995), Shibata employs the constraints on prosodic phrases in order to predict the position of primary word stress (p. 36):

- (3) a. ALIGN-HEAD(PrPh)-R: Align (PrPh, R; H (PrPh), R)
 b. ALIGN-PRWD-R: Align (PrWd, R; PrPh, R)

ALIGN-HEAD(PrPh)-R (3a) aligns the head of a prosodic phrase with the right edge of a prosodic phrase, and ensures that phrase stress is carried by the rightmost prosodic word in a prosodic phrase in English. (3a) can be considered as the OT version of the Nuclear Stress Rule (NSR) in the derivational approach. ALIGN-PRWD-R (3b) aligns every prosodic word with the right edge of a prosodic phrase, excluding a candidate phrase with more than one prosodic word. When a prosodic word is isolated in a prosodic phrase, the word receives final stress under ALIGN-HEAD(PrWd)-R (2d). When a prosodic word is followed by another word in a single prosodic phrase, the preceding word violates ALIGN-PRWD-R (3b), and loses its final stress. The word-final stress is eliminated by the Nonfinality constraint (4).

- (4) NON-FIN(Ft): Stress must not be assigned to the final foot of a prosodic word.
 Shibata assumes NON-FIN(Ft) (4) to be active only when the prosodic phrase under evaluation violates ALIGN-PRWD-R (3b) (p. 37), that is, only when there are more than one prosodic word in a single prosodic phrase. The Nonfinality constraint, when

active, prevents stress clash by prohibiting the final stress of the preceding prosodic word. In the same way, NON-FIN(σ) excludes a candidate form with final subsidiary stress.

- (5) NON-FIN(σ): Stress must not be assigned to the final syllable of a prosodic word.

Another constraint FT-BIN (6) reflects the alternating stress pattern of many languages.

- (6) FT-BIN: Feet must be binary under syllabic or moraic analysis.

The way how these constraints work in a hierarchy is demonstrated in the next chapter.

In Chapter 3 “A Diachronic Study of English Stress,” Shibata explains the historical change from Old English through Present-day English in terms of reranking of constraints. She discusses the stress pattern of underived words, affixed words, and compound words in turn. In the following, I will show the constraint ranking in each period and some examples to illustrate how reranking causes stress shift.

Shibata shows the OE ranking of constraints on stress distribution as in (7), where the usual notational conventions are used (e.g. \gg : ‘dominates’; $\{C_1, C_2\}$: C_1 and C_2 are ranked equally. See McCarthy (2002)).

- (7) Constraint Ranking in Old English
- $\{ \text{ALIGN-HEAD(PrPh)-R, ALIGN-PRWD-R} \} \gg$
 $\text{NON-FIN(Ft)} \gg \text{IDENT-BA} \gg \{ \text{ALIGN-HEAD(PrWd)-L,}$
 $\text{ALIGN-FOOT-L, ALIGN-HEAD(Ft)-L, FOOT-BINARITY}(\mu) \} \gg$
 $\{ \text{IDENT-AF, ALIGN-FT-R} \} \gg \text{NON-FIN}(\sigma) \gg \text{PARSE-}\sigma$.

Word initial primary stress (e.g. *lúfian* ‘love’), which is dominant in OE, is correctly predicted by putting ALIGN-HEAD(PrWd)-L highly in the ranking of constraints.

- (8) ALIGN-HEAD(PrWd)-L: Align (PrWd, L; H (PrWd), L)

Non-initial primary stress of affixed verbs (e.g. *ed(léan)* ‘reward’) is realized by ranking

IDENT-BA higher than ALIGN-HEAD(PrWd)-L. The optimal candidate is identified by the pointing hand in (9).

(9)

ed-(léan)	ID-BA	HD(PW)-L	FT-L	HD(Ft)	FT-BN	Parse
a.  ed(léan)		*	*			*
b. (éd)lean	*!					*

On the other hand, primary stress is located on prefixes of nouns and adjectives (e.g. *bígàng* ‘way’). NON-FIN(Ft), ranked higher than IDENT-BA and ALIGN-HEAD(PrWd)-L, excludes the candidate with final stress *be(gáng)*, and the candidate with non-final stress *(bí)gàng* is evaluated as optimal. When a prosodic phrase contains more than one prosodic word (e.g. *(under)\$eod* (*cýning*)]_p), a prosodic word in the nonhead position of the prosodic phrase violates ALIGN-PRWD-R. Then NON-FIN(Ft), which is activated now, excludes the candidate with final stress *(under(\$éod)* (*cýning*)]_p), and the candidate with prefixal stress *((únder)\$eod* (*cýning*)]_p) is selected. When a prosodic word is isolated from other prosodic words (as in *under(\$eod)]_p*), both ALIGN-HEAD(PrPh)-R and ALIGN-PRWD-R are satisfied. Shibata assumes that the two constraints on prosodic phrases govern NON-FIN(Ft) and that satisfaction of these constraints turns NON-FIN(Ft) off. Thus the candidate with root stress *(under(\$éod)]_p* is selected.

Turning to subsidiary stress, *synfull* ‘sinful’ has secondary stress on its suffix as in *sýnfull* because IDENT-AF outranks NON-FIN(σ). She also argues that we do not need to posit a stress contour which is unique to compound words. She proposes ALIGN-FT-R which requires the right edge of a prosodic word to be aligned with the right edge of *some* foot. This constraint, which is ranked higher than NON-FIN(σ), excludes a candidate with penultimate stress (e.g. *(déo)fol(gield)hus*), and the final stress *((déo)folgield(hùs))* is selected.

Shibata argues that there are only minute changes from the Old English ranking to the Middle English ranking. In the following ranking, I show the newly introduced constraints and domination relation with boldface. Reranked constraints are shown in italics.

(10) Constraint Ranking in Middle English

{ALIGN-HEAD(PrPh)-R, ALIGN-PRWD-R} >>

NON-FIN(Ft) >> {**IDENTITY**, **ALIGN-HEAD(PrWd)-R**, *ALIGN-*

FOOT-R} >> {ALIGN-HEAD(Ft)-L, FT-BIN(μ)} >>

IDENT-AF >> {*ALIGN-FOOT-L*, NON-FIN(σ)} >> PARSE- σ

The IDENTITY constraint, which replaced the OE correspondent IDENT-BA, requires an output form to preserve the prosodic structure of a borrowed form from Norman French. ALIGN-HEAD(PrWd)-R and ALIGN-FOOT-R, which replaced the OE correspondents ALIGN-HEAD(PrWd)-L and ALIGN-FOOT-L, realize word-final primary stress. ALIGN-FT-L is reranked below IDENT-AF, which prevents a suffix from failing to receive secondary stress. Shibata argues that the two constraints on prosodic phrases do not govern NON-FIN(Ft) as strictly in ME as they did in OE, and that NON-FIN(Ft) usually turns on in ME. Thus, primary stress was retracted to the head syllable of the pretonic foot in ME. For example, the stress pattern of polysyllabic loans (e.g. *supériòur*) is predicted as shown in (11).

(11)

	superi(óur)	NF(Ft)	ID	HD(W)-R	AL-FT-R	FT-L
a.	su(pèri)(óur)	*!			$\sigma\#$	*
b.	su(péri)(òur)		*	*	$\sigma\#$	*
c.	(súpe)ri(òur)		*	*	$\sigma\sigma\#$!	

Here NON-FIN(Ft) excludes word-final stress at the cost of the identity of the input form.

In Modern English, primary word stress began to move rightward to the adjacent heavy syllable (e.g. *útenzil/uténsil*). Shibata claims that this is a consequence of the reranking of ALIGN-HEAD (PrWd)-R above the IDENTITY constraint. The loan words of Romance origin have lost the information they had at the moment of being borrowed. In the following ranking, two constraints C_1 and C_2 that are ranked equally and conflicting with each other are tied with a double cross (#) as $C_1 \# C_2$.

(12) Constraint Ranking in Modern English

{ALIGN-HEAD(PrPh)-R, ALIGN-PRWD-R} >>
 {NON-FIN(Ft) # ALIGN-HEAD(PrWd)-R} >> {**IDENTITY-BASE** #
 ALIGN-FOOT-R} >> {ALIGN-HEAD(Ft)-L, FT-BIN(μ)} >>
 IDENT-AF >> {ALIGN-FOOT-L, NON-FIN(σ)} >> PARSE- σ

Shibata assumes that the initial foot is retained in the input but the final foot has collapsed after the secondary stress was reduced as shown in (13b).

(13)

(úten)sil	NF(Ft)	HD(PW)-R	ID	Ft-R	HD(Ft)-L
a. (úten)(sìl)		*!		*	
b. u(ténsil)	?	?	*	?	

Thus, rightward stress shift is correctly predicted.

Shibata also supplements ALIGN-HEAD(Ft)-L with the Weight-to-Stress Principle (WSP).

(14) Weight-to-Stress Principle: Heavy syllables are prominent within the foot.

This principle reflects the fact that the word-initial primary stress is likely to move one syllable to the right when the initial syllable is quantitatively subordinated to the presuffixal syllable (e.g. *reféctory*).

(15)

(réfec)tory	NF(Ft)	HD(PW)-R	ID	Ft-R	HD(Ft)-L
a. (réfec)(tòry)		*		**	*WSP!
b. re(féctory	?	??	*	?	

The candidate (15a) violates WSP, and the other candidate (15b) is selected as optimal.

Shibata claims that IDENT-BA is being outranked by ALIGN-FOOT-R in Present-day English and that this reranking causes the rightward stress shift to the following light syllable.

(16)

(étric-(à)ble)	NF(Ft)	HD(PW)-R	Ft-R	ID-BA	HD(Ft)-L
a. (étric)(càble)		*	**!		
b. ex(trícable)	*			*	

When a prosodic word is well-aligned with the right edge of the prosodic phrase, ALIGN-PRWD-R is satisfied and NON-FIN(Ft) is inactive. Then the undominated ALIGN-HEAD(PrWd)-R will exclude the candidate with initial stress (16a).

(17) Constraint Ranking in Present-day English

{ALIGN-HEAD(PrPh)-R, ALIGN-PRWD-R} >>

{NON-FIN(Ft) # ALIGN-HEAD(PrWd)-R, ALIGN-FOOT-R # IDENTITY-BASE} >> {ALIGN-HEAD(Ft)-L, FT-BIN(μ)} >>

ALIGN-FOOT-L # IDENT-AF >> NON-FIN(σ) >> PARSE- σ

Shibata also claims that IDENT-AF is being outranked by ALIGN FOOT-L in Present-day English (e.g. (*indi*)(*cátory*) rather than *in*(*díca*)(*tòry*)). ALIGN-HEAD(PrWd)-R is also supplemented by the condition Optimal Foot Weight (OFW) (cf. Burzio (1994)).

(18) Optimal Foot Weight: The word-final foot must not be quantitatively subordinated to the nonfinal feet.

For example, Optimal Foot Weight (18) excludes (*Ticonde*)(*róga*) and (*Ticon*)*de*(*róga*), and *Ti*(*cònde*)(*róga*) is selected as optimal.

In Chapter 4 “Summary and Conclusions,” Shibata summarizes the leftward stress shift, the rightward stress shift, and the ongoing stress shift. She also suggests that the unique system of English stress may be ascribed to the inconsistency of the headedness in syntax. In English, the syntactic head is left-aligned in VPs, but it is right-aligned in NPs. Since the prosodic head is consistently right-aligned, leftward stress shift occurs in the non-rightmost constituent of a prosodic phrase.

Shibata concludes that the English language has a single constraint hierarchy, which is invariant throughout the history, and that reranking is limited to the Identity constraints as hypothesized by Itô and Mester (1995). IDENTITY was outranked by ALIGN-HEAD(PrWd)-R in Modern English; IDENT-BA is being outranked by ALIGN-FOOT-R while IDENT-AF is being outranked by ALIGN-FOOT-L in Present-day in English. ALIGN-HEAD(PrWd)-R and ALIGN-FOOT-R will realize word-final primary stress, while ALIGN-FOOT-L will realize word-initial subsidiary stress. The reranking of these constraints above the ID constraints indicates that stress accent is fulfilling the demarcative function at the cost of the morphological function in Present-day English.

This book has Appendix A “Summary of Constraints and Conditions” and Appendix B “List of Words in *-able/-ible* and *-ary/ory*,” which will help readers to follow the discussion.

This book provides a comprehensive characterization of the history of English word stress. The author succeeds in explaining the stress shift in terms of the demarcative function and the morphological function of stress. I would like to comment some points, hoping the author to give us more feedback from her future research. First, examining the validity of constraints and reducing the number of them always help to establish a more restricted and desirable theory. Shibata proposes three

identity constraints, nine alignment constraints, four structural constraints, and two supplementary conditions. To be sure, how many constraints you need depends on the complexity of the phenomena to be explained. However, it would be fruitful to compare the hierarchy of constraints proposed with that of Bermúdez-Otero (1996) and Alcantrá (1998), who also try to explain the stress pattern of English in Optimality Theory.

Second, Shibata assumes that when candidates satisfy the constraints on prosodic phrases (ALIGN-HEAD(PrPh)-R and ALIGN-PRWD-R), the NON-FIN(Ft) is ‘turned off,’ as we have seen above. For example, when *under\$eod* is at the end of a prosodic phrase, *under(\$éod)* is selected as optimal output of the underlying *under-(\$éod)* in spite of the violation of NON-FIN(Ft). However, such a mechanism of turning constraints on and off is unfamiliar in OT literature, and moreover it complicates the evaluation procedure. Some independent arguments seem to be necessary to support the analysis. I suppose that this mechanism is needed to explain the type of stress shift which occurs in order to avoid stress clash with the following word. Then it might be possible to separate this type of stress shift from word phonology and to leave it to phrasal phonology of verse. Alternatively, we could put another constraint *CLASH (cf. McCarthy 2002) in place of NON-FIN(Ft) in OE. It would exclude *under(\$éod) (c’yning)]_p* but not *under(\$éod)]_p*. Shibata also assumes that IDENT-BA is turned off if the base form cannot be identified in the English lexicon (p. 98). However, this assumption is not necessary, because IDENT-BA cannot be violated in any way if the base form is not identified. Then we can dispense with the mechanism of tuning constraints on and off, and can make the evaluation procedure simpler and more plausible.

Third, the null hypothesis in Optimality Theory is that all constraints are

universal and universally present in the grammars of all languages (cf. McCarthy 2002, p. 11). However, some constraints Shibata proposes in order to explain stress phenomena at some period are not present in the constraint ranking of another period. For example, IDENT-BA is not present in ME ranking while IDENTITY is present only in ME. ALIGN-HEAD(PrWd)-L is present only in OE while ALIGN-HEAD(PrWd)-R is present in all the periods but in OE. Where have they gone to and come from? If they have gone to and come from below the ranking shown in the hierarchy, the reranking of constraints in English is more drastic than Shibata assumes. Whether such drastic change can be allowed in the history of a language should be questioned in the light of the general theory of diachronic constraint reranking (cf. Anttila and Cho (1998)).

To conclude, when Nakao (1985), from which Shibata cites examples and observations, wrote that it was most urgent that we apply new theories to the described data of historical change, he did not have Optimality Theory in mind. However, this book should be widely welcomed as one of the best theoretical studies in historical phonology.

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