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High Vowel Deletion in Old English: A+n Optimality-theoretic Analysis

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1. Introduction

Old English (OE) unstressed high vowels in open syllables delete after a heavy syllable as in (1ai), after two light syllables as in (1aii) or a sequence of a light and a heavy syllable as in (1aiii), but not after a light syllable as in (1bi) or a sequence of a heavy and a light syllable as in (1bii). This phenomenon is often called High Vowel Deletion (HVD).[1] The following data are adopted from Campbell (1959: § §345-353):

(1) a. i)	word-u > word	nom.acc.pl. of word 'word'
	cwēn-i > cwēn	nom.acc.sg. of cwēn 'queen'
ii)	werod-u > werod	nom.acc.pl. of werod 'troop'
iii)	færeld-u > færeld	nom.acc.pl. of færeld 'journey'
b. i)	scip-u cf. *scip	nom.acc.pl. of scip 'ship'
ii)	nīten-u cf. *nīten	nom.acc.pl. of nīten 'animal'

HVD has been an important issue in studies of OE phonology because it 'yields insight into the prosodic structure of Pre-OE' (Murray 1995:323) and represents OE 'metrical coherence' (Dresher & Lahiri 1991:251). It has been understood to be a result of the interaction of syllable structure, stress and related processes. Depending on environments, linear analyses have to formulate several deletion rules such as apocope and syncope (e.g. Peinovich 1979). In contrast, a series of nonlinear analyses recently proposed (Dresher & Lahiri 1991, Halle, O'Neil & Vergnaud 1993, Idsardi 1994) gives us a more principled account of HVD by introducing the notion of 'foot'. They capture the prosodic nature of HVD: HVD is explained on the basis of foot structure which is sensitive to syllable structure. These formulations of HVD differ from one another partly because they

1) There are many exceptions to HVD as well as dialectal variants. Even within one dialect, many analogical forms coexist in OE. I focus on the forms which follow the pattern mentioned and do not consider exceptions, analogical forms or dialectal variants in the analyses of HVD. The data treated in this paper are from the West Saxon dialect of OE.

construct feet within different frameworks, and partly because they build internal foot constructions differently even in the same framework. As do other rule-based approaches, however, they still need a language-specific rule of HVD in which HVD is not a direct result of prosodization. Previous analyses do not explain the motivation for HVD in OE since they do not recognize the relation between HVD and prosodic well-formedness.

In this paper, I will analyse HVD within the framework of Optimality Theory (OT) (Prince & Smolensky 1993, McCarthy & Prince 1993ab, 1995). In contrast to previous analyses, it will be shown that in an Optimality-theoretic analysis presented here, HVD is directly motivated by a consideration of prosodic well-formedness. Furthermore, the proposed OT analysis of HVD reveals that HVD is an attempt to maintain a bimoraic minimal word in OE as well as other prosodic requirements. First, however, a brief survey of previous analyses is presented.

2. Previous Analyses of High Vowel Deletion

Keyser & O'Neil (1985) (KO) introduce the notion of foot into the account of HVD. However, as Dresher & Lahiri (1991) (DL) point out, the problem of KO's rule of HVD goes back to KO's right-headed binary foot to which the rule of HVD refers. The foot constructed for HVD deviates from the foot constructed for stress in OE. Every other process in OE phonology that makes use of feet requires the stress foot, namely a left-headed foot (or a trochaic foot). DL assert that HVD is explained without assuming two different kinds of feet in OE. DL also claim that DL's Germanic foot explains OE stress as well as some other phenomena such as OE HVD and Sievers's Law in Gothic. DL's HVD is as follows:

(2) Foot-based HVD (DL 1991:255)

Delete a high vowel in a weak branch of F.

```
                 F
                  \
                   W
                   |
V → ø / ______
|
[+high]
```

The high vowel under a weak foot does not undergo this rule, e.g. *nītenu* 'animal', while the high vowel under a weak branch of a foot does, e.g. *werodu* > *werod* 'troop'. (2) also predicts that a high vowel in a closed syllable does not delete since it always constitutes a weak foot, not a weak branch of a foot, e.g. *wordum* 'word'.

```
(3)  a.                    b.                    c.
         /\                     F                   /\
        F  F                   /\                  F  F
       /\  |                  s  w                 |  |
       s w |                 /\  |                 |  |
       nI tenu               werodu               wordum
                                 ↓
                                 ø
```

The problem of DL's analysis lies not in their HVD rule itself, but in their new-type of foot, i.e. Germanic foot. Halle, O'Neil & Vergnaud (1993)(HOV) argue that they can account for the OE stress pattern without adding a new foot to the inventory. HOV's treatment of HVD, based on their construction of the foot, is given in (4).

(4) High Vowel Deletion (HOV 1993:532)
Delete a high vowel in a noninitial syllable if it constitutes a nonbranching foot (light syllable).

```
(5)  a. wordu          b. werodu          c. nI tenu
        ( **(*            (* *( *            (**(* *
             ↓                  ↓
             ø                  ø
```

Rule (4) deletes a high vowel when it constitutes a single-membered foot (5a-b) but not a high vowel which is a member of a branching foot (5c). (4) is governed by HOV's foot formation for OE and is required to apply between the main stress assignment rules and the secondary stress assignment. This ordering of application is necessary in order for HOV's analysis to work. The reverse ordering (=secondary stress assignment first and then HVD) obscures the environments where a high vowel deletes. HOV's secondary stress assignment rules are defooting rules, whereas HVD applies to a high vowel constituting a nonbranching foot. HVD in (4) does not apply to the defooted vowel. If the secondary stress assignment rules apply first and thereby *u* in *wordu* 'word' is defooted (6a→6b), the high vowel cannot undergo HVD as in (6c). Hence *wordu* will incorrectly preserve a high vowel in final position.

```
(6)  a. wordu       →      b. wordu     →      c. *wordu
        (**(*   Defooting     (**       HVD
                                       (not applied)
```

HVD in (4) does not apply to a high vowel which does not belong to any metrical constituent nor to a high vowel which is a member of a branching foot. There are, however, cases where a high vowel which is a member of a branching foot deletes.

```
(7)  a. hā lIge        b. hēafUde        c. wī tIu
        (**(* *          (**(* *           (**(**
         *  *             *  *              *  *
```

The capitalized high vowels in (7) must delete. However, they cannot undergo (4) since they do not constitute a nonbranching foot but are a part of a branching foot. In order to derive correct outputs, HOV postulate a 'non-stress bearing unit' which fails to project an asterisk on line 0. In each example of (7), one of the vowels in the last foot is marked as non-stress bearing. By virtue of being a 'non-stress bearing unit', a high vowel to be deleted becomes a single-membered foot as in (8).

```
(8)  a. hā lIge        b. hēafUde        c. wī tIu
        (**(*            (**(*             (**(*
           *                *                 *
```

Idsardi (1994) points out two problems in HOV's account of HVD. First of all, the determination of non-stress bearing units is idiosyncratic. The assignment of non-stress bearing units is not regulated, but differs from word to word. Idsardi (1994) also identifies a second problem with HOV's analysis: HOV's account contradicts the basic assumption of a grid theory, which is that deletion or weakening is more likely to occur to the less prominent constituent. In HOV's analysis, however, some high vowels delete when they are more prominent than neighboring vowels. For example, mid vowels in (8a-b) and the word final high vowel in (8c) which do not project an asterisk on line 0 stay. In other words, in (8) the more prominent high vowels delete, whereas the less prominent high or mid vowels stay. In HOV's analysis, the deletion of high vowels occurs irrespective of their relative prominence.

Idsardi's (1994) analysis achieves what HOV's does not. His analysis based on Simplified Bracketed Grid theory (SBG theory) captures the relation between prominence and weakening. Idsardi (1994) relies on the distinction between open constituents versus closed constituents and unparsed elements versus parsed elements.

```
(9)  a. hēafUde        b. worda
        (**)* *)          (**)
         *                 *
```

Closed constituents (or closed feet) are those which have 'paired' boundaries, as shown in the word initial foot of (9a). Open constituents (or open feet) are those which have only one boundary. In the case of OE stress assignment, the left edge of a foot is permitted to be open. The open foot is seen in the second foot of (9a). Elements in closed and open constituents are both parsed ones. They belong to a certain prosodic structure. Unparsed elements indicate those which are not included in any metrical constituents, as in the final syllable in (9b). Unparsed constituents are weaker in prominence than the closed constituents.

The high vowels which undergo deletion are either unparsed (10a) or are found in open constituents (10b). The high vowels in closed constituents do not delete as in (10c).

```
(10)  a. wordU          b. hēafUde         c. lofu
         (**) *            (**)* *)           (* *)
          *                 *                  *
```

Even though Idasrdi's (1994) analysis of HVD correctly maintains the relation between prominence and weakening, he still needs an independent rule for HVD. Idsardi (1994) assumes extrametricality of the word final consonant for his general account of OE secondary stress since a word final heavy syllable does not bear secondary stress. Because of this, the question of whether word final syllables are light or heavy in the metrical structure is obscured. For example, *wordu* and *wordum* have identical metrical grid structures, although their final syllables differ. Since HVD occurs only to *wordu*, Idsardi (1994) must assume that HVD deletes a high vowel in an open syllable which is an unparsed element or in open constituent. He formulates a context-sensitive rule of HVD (11) in which the reference to the status of syllable structure is directly included.

```
(11) High Vowel Deletion
        V → ø / ) *     line 0
        |         |
     [+high]     __ ]σ
```

In summary, previous nonlinear analyses of HVD make explicit the connection between HVD and the prosodic structure of OE. Specifically, they explicate the relation between foot construction and HVD. Among these analyses, Idsardi's (1994) analysis most directly captures the relation between deletion and prominence. Nevertheless, as do other rule-governed analyses, he also needs a language-specific rule to account for the fact of HVD, since not every unparsed vowel (or vowel in an open constituent) is deleted. In other words, HVD is not treated as an automatic consequence of the construction of prosodic structure. None of the previous analyses, moreover, succeeds in explaining the motivation for HVD. They do not give us an answer to why high vowels, not other vowels, delete and why high vowels delete in some specific environments not in others. None of these analyses recognizes the relation between HVD and prosodic well-formedness in OE. In the next section, I will propose an OT-theoretic analysis in which HVD is directly motivated by prosodic well-formedness.

3. An Optimality-Theoretic Analysis of High Vowel Deletion

Following previous analyses, an Optimality-theoretic analysis of OE High Vowel Deletion (HVD) will confirm that HVD is a prosodically-related phenomenon. Unlike the previous analyses, an OT account of HVD dispenses with a language-specific rule and gives us an answer to why HVD occurs in OE.

First, let us summarize the environments in which a high vowel deletes and those in which it does not.

(12) a. *i/u*-deletion:	(H)__	wordu > word	nom.acc.pl. of word 'word'
	(LL)__	weordu > weord	nom.acc.pl. of werod 'troop'
	(LH)__	færeldu > færeld	nom.acc.pl. of færeld 'journey'
b. *i/u*-detention:	(L__)	lofu	nom.sg. of lofu 'love'
	(H)(L__)	nītenu	nom.acc.pl. of nīten 'animal'

(H= heavy syllable, L= light syllable: ( ) indicates foot boundaries)

The deleted high vowels in (12a) belong to an unparsed syllable. The high vowels appear to be sacrificed in order to preserve an appropriate edge. I propose two constraints relevant to the preservation of an appropriate edge of a word.

(13) ALIGN (Infl, L, FT, R): The left edge of an inflectional ending coincides with the right edge of a foot.

(14) FTBIN: Every foot is syllabically or moraically binary. (Prince & Smolensky 1993, McCarthy & Prince 1993ab, etc.)

The interaction of the two constraints with other constraints shown in (15) and (16) correctly winnows an optimal output for the following example in (17).[2]

2) For ease of exposition, I will treat candidates which satisfy constraints on OE stress such as FTFORM, PARSE-SYL and ALIGN Head, in this paper. In the same vein, I exclude the candidates violating FTBIN, except for the case in which the introduction of FTBIN in the tableaux is crucial in the account.

(15) ONS: Syllables must have onsets. (Prince & Smolensky 1993, McCarthy & Prince 1993ab, etc.)

(16) MAX-IO (V): Every vowel in the input has a correspondent in the output. (no phonological deletion) (McCarthy & Prince 1995)

(17) /wordu/ > (word) nom.acc.pl.neut. of word 'word'

	ONS	ALIGN(Infl, L, FT, R)	MAX-IO(V)
☞ a. (word)			*
b. (wor)du		*!	
c. (word)u	*!		

Candidate (17a) deletes the inflectional high vowel, thereby vacuously meeting ALIGN (Infl, L, FT, R). The retention of a high vowel in this word incurs a fatal violation of the constraints relatively highly ranked in the constraint hierarchy for OE. Candidate (17b) fatally violates ALIGN (Infl, L, FT, R). Candidate (17c) produces a bad syllable structure, instead of satisfying ALIGN (infl, L, FT, R). The optimal output sacrifices MAX-IO(V), in favor of ALIGN (Infl, L, FT, R) and ONS. Namely, OE sacrifices the faithfulness between input and output in order to maintain an appropriate edge of a word and syllable structure.

Words with a different vowel as their inflectional ending, however, do not delete it in order to satisfy ALIGN (Infl, L, FT, R). In these words, the constraint must be overbidden. The deletion of a low or a mid vowel of the inflectional ending is not permitted in order to meet ALIGN (Infl, L, FT, R). I suggest that this observation is related to the interaction of the relative markedness of vowels and their deletion. On the basis of the markedness of vowels, I explode MAX-IO(V) into a hierarchy of constraints as in (18).

(18) MAX-IO(Low Vowel)>> MAX-IO(Mid Vowel) >> Max-IO(High Vowel).

The hierarchy of constraints in (14) suggests that the more sonorous a vowel is, the more likely it is to be preserved. In accordance with the hierarchy of constraints in (18), the deletion of high vowels is better than that of mid vowels. The deletion of mid vowels is preferred over that of low vowels. Given the explosion of MAX-IO(V) into a hierarchy of constraints as in (18), MAX-IO(V) in the tableau (17) actually refers to MAX-IO(High Vowel).

We have seen the interaction of MAX-IO(High Vowel) with other constraints in tableau (17), in which MAX-IO(High vowel) is lower than ALIGN (Infl, L, FT, R). The following tableau illustrates that MAX-IO(Low Vowel) interacts with other constraints in a different way.

(19) /word+a/ > (wor)da gen.pl. of word 'word'

	MAX-IO(Low V)	ONS	ALIGN (Infl, L, FT, R)
a. (word)	*!		
☞b. (wor)da			*
c. (word)a		*!	

The violation of ALIGN (Infl, L, FT, R) is forced since parsing a low vowel (or mid vowel for other case endings) is more important than making the edges of Infl and a foot well-aligned. The optimal output in the tableau is selected at the expense of ALIGN (Infl, L, FT, R) and in favor of MAX-IO(Low Vowel) and ONS.

Through the two tableaux (17) and (19), we have obtained the following hierarchy of constraints.

(20) MAX-IO(Low Vowel), MAX-IO(Mid Vowel) >> ONS
>> ALIGN (Infl, L, FT, R) >> MAX-IO(High Vowel)

The hierarchy of constraints in (20) accounts for why only *high* vowels are deleted in OE, but not mid vowels and low vowels. The deletion of high vowels is related to their markedness.

A high vowel does not delete in a closed syllable, such as in *-um* dat.pl.masc.fem. The deletion of *u* in *-um* ending is prohibited since it incurs the violation of the constraint called Sonority Sequencing Principle (SSP), which requires that the sonority of a phone consistently decrease from the nucleus to the margin. The relative ranking between ALIGN (Infl, L, FT, R) and SSP is established in tableau (21).[3]

(20) Sonority Sequencing Principle (SSP): In the demisyllable, $.XVC_1C_2..C_n$ or $C_n..C_2C_1VX.$, $|C_1| > |C_2| > ... > |C_n|$ ($|X| > |Y|$ represents that the sonority of X is more sonorous than that of Y.)

(21) /word+um/ > (wor)dum dat.pl. of word 'word'

	SSP	ONS	ALIGN (Infl, L, FT, R)
a. (wordm)	*!		
☞b. (wor)dum			*
c. (word)um		*!	

3) For the ranking argument of the constraints, SSP and ONS, refer to Moon (1996).

Note that an alternative analysis is possible. (21a) is excluded by another constraint, called as CONTIGUITY, which specifies a domain such as syllable or foot. This is a variant of McCarthy & Prince's (1995) I-CONTIGUITY.

(22) Domain-Contiguity (F) (D-CON): In foot domain, the portion of input standing in correspondence forms a contiguous string. ("No skipping in foot domain")

The candidate *(wordm)* violates Domain-Contiguity (F) since, in foot domain, *d* and *m* are not contiguous in the input.

Domain-Contiguity (F) plays a part in culling out nonoptimal candidates in other words. This is certified by the following tableau in which SSP cannot sieve an optimal output:

(23) /hālig+ne/ > /(hā)(lig)ne acc.sg.masc. of hālig 'holy'

	DON-CON(F)	RhHAR	ALIGN(Infl, L, FT, R)
☞ a. (hā)(lig)ne			
b. (hāl)gne			*!
c. (hālg)ne	*!		
d. (hā)(ligne)		*!	*

The deletion of a high vowel in the above example does not bring about illegitimate consonant cluster with respect to SSP. When we compare two candidates (23b) and (23c), candidate (23b) escapes the violation of Domain-Contiguity(F) by syllabifying the stem final consonant *g* into the following syllable. This misaligns the inflectional ending and foot, by including the stem final consonant *g* in the foot domain. Including the stem final consonant in a foot domain leads to the violation of Domain-Contiguity(F) since *l* and *g*, which are in the same foot domain, are not contiguous in the input. Candidate (23d) incurs the misalignment of foot and inflection, but also the violation of RhHAR which bans a foot consisting of a heavy and a light syllable. Candidate (23a), which best satisfies the constraint hierarchy, is chosen as an optimal output.

In summary of the distribution of HVD in (12), all of the retained high vowels are closed by a foot. This creates a generalization about the environments in which high vowels escape the deletion. Focusing on the retained position, I propose a constraint which aligns a high vowel with foot.

(24) ALIGN (High Vowel, FT, R): The right edge of a high vowel coincides with the right edge of a foot.

Similar to ALIGN (Infl, L, FT, R), ALIGN (High Vowel, FT, R) also checks whether a high vowel stays in an appropriate place. This does not mean that every high vowel in OE is closed by a foot, as suggested by the violability of the constraint in OT.

Let us consider the cases in which ALIGN (High Vowel, FT, R) plays a role in selecting the optimal output. They are usually found when the deleted high vowel is not an inflectional ending but a part of a stem. The following tableaux (25) and (26) show that ALIGN (High Vowel, FT, R) interacts with other constraints in selecting an optimal output.

(25) /hēafud+e/ > (hēaf)de dat.sg. of hēafod 'head'

	MAX-IO (Mid Vowel)	ALIGN (Infl, L, FT, R)	ALIGN (HighV, FT, R)	MAX-IO (High Vowel)
☞ a. (hēaf)de		*		*
b. (hēa)(fude)		*	*!	
c. (hēa)fud	*!			

Candidate (25c) vacuously satisfies ALIGN (Infl, L, FT, R), due to the deletion of an inflectional ending. However, this incurs a fatal violation of MAX-IO(Mid Vowel). This highly ranked constraint demands that the mid vowel have an output correspondent. The candidates (25a) and (25b) tie with respect to the violation of ALIGN (Infl, L, FT, R). The deletion of a high vowel in (25a) does not save the output from violating ALIGN (Infl, L, FT, R). Yet, this does prevent (25a), but not (25b), from violating ALIGN (High Vowel, FT, R). Thus the optimal output is (25a).

The most harmonic output for *hēafudum* dat.pl. of hēafod 'head' is selected in a similar way.

(26) /hēafud+um/ > (hēaf)dum dat.pl. of hēafod 'head'

	SSP	DOMAIN-CON(F)	ALIGN(HV,FT,R)	MAX-IO(HV)
a.(hēa)(fudum)			**!	
b.(hēa)fudm	*!		*	*
☞ c.(hēaf)dum			*	*
d.(hēafdm)	*!	*		*

The deletion of a high vowel in an inflectional ending leads to the fatal violation of SSP in (26b) and (26d). The retention of *u* incurs the violation of ALIGN (High Vowel, FT, R). The dominant constraint, SSP chooses candidate (26c) as an optimal output, since it satisfies SSP and minimally violates ALIGN (High Vowel, FT, R).

Thus far, we have concentrated on words with a deleted high vowel, ALIGN (High Vowel, FT, R) is proposed as a constraint that checks whether a high vowel is in an appropriate place. Word which have been classified as not undergoing HVD will satisfy the constraint. Then, why aren't the light stem words allowed to delete high vowels as in (1b) (or (12b))? The answer is given in the following constraint tableau:

(27) μ_i μ_j μ_i μ_j
| | | |
/šipu/ > (šipu)   nom.acc.pl. of scip 'ship'

	FTBIN	ST-INV	DEP-IO(μ)	A(Infl,L,FT,R)	MAX-IO(HV)	MAX-IO(μ)
☞ a. μ_i μ_j (šipu)				*		
b. μ_i (šip)	*!					
c. $\mu_i\mu_j$ (šip)		*			*!	
d. $\mu_i\mu_k$ (šip)			*		*!	

Although the retention of a high vowel in a light stem such as *scipu* nom.acc.pl. of *scip* 'ship' violates ALIGN (Infl, L, FT, R), it is not fatal. The deletion of a high vowel with its underlying mora leaves the root (or stem) too light to constitute a foot. This seems to show that OE words need to keep minimal weight. I suggest that the minimal weight of OE words be bimoraic. In other words, FTBIN is one of constraints which represent the bimoraic minimal word in OE. There are two ways of avoiding the FTBIN violation in case of the deletion of a high vowel. One is to delete only a segment (=a RT node) of a high vowel and to realize an underlying mora on the surface. This is shown in candidate (27c). In (27c), the underlying mora in the input has a correspondent in the output, although its correspondent is not the same as in the input. Since the consonant links to an underlying mora, (27c) has a geminate in the stem as in *scipp*. This candidate violates Stem-Invariance (ST-INV).[4]

(28) Stem-Invariance (ST-INV): A stem is invariant throughout a noun paradigm.

4) This constraint is also active in account for other phenomenon in OE such as gemination. For the motivation of this constraint, see Moon (1996).

An examination of the paradigm of *scip* shows that in the paradigm every form to which an inflectional ending is added is *scip-*, not *scipp-*.[5] The other way of avoiding FTBIN violation is to add to the output a mora which is not present in the input. This is shown in candidate (27d). The addition of a mora on the surface is motivated by Weight by Position (Hayes 1989, Zec 1995). The insertion of a mora in the output, however, violates a constraint called DEP-IO(μ).

(29) DEP-IO(μ): Every mora in the output must have a correspondent in the input.

The actual output (27a) requires that DEP-IO(μ) be ranked higher than MAX-IO, i.e. MAX-IO(High Vowel) or MAX-IO(μ).

In tableau (27), MAX-IO(High Vowel) plays a major role in the determination of the optimal output. (27a), which is the most faithful, is chosen as the most harmonic output. As in (27b), the total deletion of a high vowel, its RT node and mora brings about the fatal violation of FTBIN. Although a high vowel and a mora in the input are deleted in the output, the violation of FTBIN can be escaped when a mora is inserted in the output as in (27d). In addition to the violation of DEP-IO(μ), (27d) fatally violates MAX-IO(High Vowel). Deleting a RT node of a high vowel and retaining its mora in the output also saves the form from the violation of FTBIN as in (27c). (27c), however, fatally violates MAX-IO(High Vowel).

Does the fact that candidate (27d) is ruled out mean that it is always impossible for a stem final consonant to get a mora in OE? The following tableau (30) demonstrates that this is not always the case. Let us consider the word *scip* nom.acc.sg. of *scip* 'ship'.

(30) μ_i $\mu_i\mu_k$
/šip/ > (ši p)   nom.acc.sg. of scip 'ship'

	FTBIN	DEP-IO(μ)
☞ a. μ_i μ_k (šip)		*
b. μ_i (šip)	*!	

5) The paradigm of scip 'ship' is as follows:

sg.nom.acc.	scip-ø	pl.nom.acc.scip-u	
gen.	scip-es	gen.	scip-a
dat.	scip-e	dat.	scip-um

Since the inflectional ending is zero, ALIGN (Infl, L, FT, R) is vacuously satisfied. Both candidates in this tableau meet ST-INV as well. In order for a candidate to avoid the fatal violation of FTBIN, the insertion of a mora in the output is allowed as in (30a). A comparison of two tableaux, (27) and (30), shows that the two output candidates in the tableaux, (27d) and (30a), react differently to the same hierarchy of constraints, although they have the same prosodic structure. (27d) is ruled out as an optimal output, while (30a) is chosen as an optimal output. This different reaction to the same hierarchy results form the different inputs: the input of (27a) is */šip+u/* nom.acc.pl. and the input of (30b) is */šip+ø/* nom.acc.sg. of *scip* 'ship'. These examples support one of the premises of OT, namely that the surface differences reflect properties of different inputs, not the different hierarchies of constraints governing one phenomenon.

4. Conclusion

OE High Vowel Deletion (HVD) has been treated in relation to stress (or foot) (DL, HOV, Idsardi 1994). Depending on the stress pattern of words, HVD can be triggered or blocked. Previous analyses describe the environments in which HVD occurs. They do not explain why HVD is permitted in certain words and why it must not happen in other words. To briefly summarize the main idea of an OT analysis of HVD proposed here, the deletion of a high vowel in heavy stem words such as *word* (< *word+u* nom.acc.pl. of *word* 'word') is permitted since heavy stem already have enough weight, satisfying the bimoraicity of the minimal word. However, the deletion of a high vowel in light stem words such as *scipu* nom.acc.pl. of *scip* 'ship' is banned since the deletion obliterates an appropriate prosodic shape, i.e. a bimoraic minimal word. The appropriate prosodic shape, namely bimoraicity of a minimal word in OE, is regulated by the constraints, FTBIN and ALIGN (Infl, L, FT, R). Ultimately HVD is governed by the same requirements of OE prosody, such as the requirement of syllable well-formedness, the requirement of faithfulness of input and output and the requirement on foot construction.

Another merit of the OT analysis results from one of tenets of Optimality Theory. In the previous nonlinear analyses, the syllable structure and grid structure representing stress patterns are separated. Syllabification and stress assignment are derived as disparate processes. An analysis such as Idsardi's (1994) must specify that the deleted high vowel is an open syllable since he assumes extrametricality in stress assignment. And the remaining analyses require resyllabification at the very least after HVD. Parallelism in OT, however, eliminates the need for resyllabification after HVD and the specification of the site of high vowels. In OT, syllabification, stress assignment and deletion are all treated at the same time. We will directly obtain *(word)<u>* as a surface form, rather than *(wor)d<u>* (Here, *<u>* indicates a deleted vowel on the surface.). A serial account of HVD requires that a consonant which was an onset before deletion be resyllabified as a coda. This is because the deletion occurs after foot construction which is based on syllabification. Within an OT framework, HVD is recognized as a direct consequence of prosodization.

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