

Fricative Voicing in Old English*

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One of the major problems in the description of phonological systems in languages is how to identify the boundary between the systematic phonemic alternations and the allophonic variations. It is quite natural to assume that the distinction may have some significant import in the study of diachronic linguistic phenomena as well as in that of synchronic phenomena. The theory of Lexical Phonology as propounded by Kiparsky (1984, 1985, 1995) offers a solution to this question of phonemic contrasts vs. allophonic variations by invoking a set of principles. In his studies of sound changes in language, Kiparsky (1980, 1988, 1995) attributes the significant dichotomy of "*Neogrammarian*" *sound change* and *Lexical diffusion* to phonological systems that govern the allophonic variation vs. phonemic distinctions in languages. The present paper is concerned with the nature of the Fricative Voicing (hereafter, FV) in Old English and will present a new way of analyzing its seemingly phonemic properties within the theoretical framework of Lexical Phonology.

1. The Framework of Lexical Phonology

The term *Lexical Phonology* in its general usage refers to the theoretical framework of phonology that crucially distinguishes between the lexical rule application and the postlexical application in phonology of individual languages¹⁾. Among others, I would like to adopt Kiparsky's proposals on the framework of Lexical Phonology. It is organized by several principles governing the derivational and representational aspects of phonology: (i) the Structure Preservation (SP), (ii) the Radical Underspecification (RU), (iii) the Strong Domain Hypothesis (SDH), and (iv) the Elsewhere Condition (EC). Let us discuss their properties somewhat in detail in turn. I have argued elsewhere that the net effects of the SP can be accomplished by a constraint on feeding relationships among phonological rules in the lexicon: ²⁾

* I would like to thank Takahiro Ioroi and Haruki Yamaguchi for their invaluable comments on earlier versions of this paper. Thanks go to Douglas Huff, who suggested stylistic improvements. Remaining errors are my own.

1) The major proponents of Lexical Phonology are Paul Kiparsky and K.P. Mohanan. For its theoretical survey and recent investigations, see Kaisse and Shaw (1982), Archangeli (1984) and Hargus and Kaisse (1993).

2) Cf. Takahashi (1995), where I have tried to make it clear that Macfarland and Pierrehumbert's (1991) extension of an autosegmental constraint (that is, the Linking Constraint) to the interpretation of marking conditions does not work as a feasible hypothesis at all.

(1) Lexical Constraint on Feeding Relationship (LCFR)

In the lexicon, default rules cannot feed unmarked rules.

The formulation of the hypothesis on the SP is directly related to the distinction of the types of sound changes in language that I referred to above. In the present paper I would like to adhere to (1) and to commit myself to verifying its adequacy in the context of the phonology of Old English.

Kiparsky (1995) elaborates on the subprinciples of the RU :

- (2) a. For each feature F, a universal default rule of the form $[] \rightarrow [\alpha F]$ applies in every language.
- b. In each environment E in underlying representations, a feature must be either specified as $[\alpha F]$ or unspecified, where E is defined by the most specific rule R, and R assigns $[-\alpha F]$.
- c. Default feature values are filled in before the first rule that mentions a specific value of that feature.

Archangeli (1984 : 85) posits an ordering constraint on default rules and phonological rules, which she calls *Redundancy Rule Ordering Constraint* (RROC)³⁾. It is very akin to (2c). We may note that Calabrese (1988 : 203) criticized Archangeli's RROC on the ground of its unfalsifiability. It may be an intriguing question whether (2c) is falsifiable or not, but I would like to leave open the question to future research.

Kiparsky's theory of Lexical Phonology differs from Mohanan's theory essentially with respect to the hypothesis on the assignment of domain of application of phonological rules. According to Kiparsky (1984), the domain of application will be assigned by the following principle :⁴⁾

- (3) Strong Domain Hypothesis
 - a. All rules are available at the earliest level of the phonology.
 - b. Rules may cease to apply, but may not begin to apply at a later level by stipulation.

Thus, the Flapping of American English, which may be assumed to be a postlexical process,

3) The RROC is defined as follows:

A redundancy rule assigning " α " to F, where " α " is "+" or "-", is automatically ordered prior to the first rule referring to $[\alpha F]$ in its structural description.

4) Mohanan (1982) formulates the Stratum Domain Hypothesis:

The Domain of a rule is specified as a set of continuous strata.

This is based on the assumption that the phonological component of a language is composed of mini phonologies which Mohanan calls "ordered strata" (= levels). Notice that within Kiparsky's model of phonology there is no "level n" rule: some rules may be applicable only at "level n" because of the interaction of those phonological principles and parameters, but this does not necessarily mean it is labeled as "level n" rules.

should be available at all levels of the phonology, while the Trisyllabic Shortening and the Velar Softening of English may be marked [+level 1] and cease to apply there.

The Elsewhere Condition has played a significant role in phonology as well as other fields of linguistic investigation :⁵⁾

(4) Elsewhere Condition (EC)

Rules α , β in the same component apply disjunctively to a form ϕ iff :

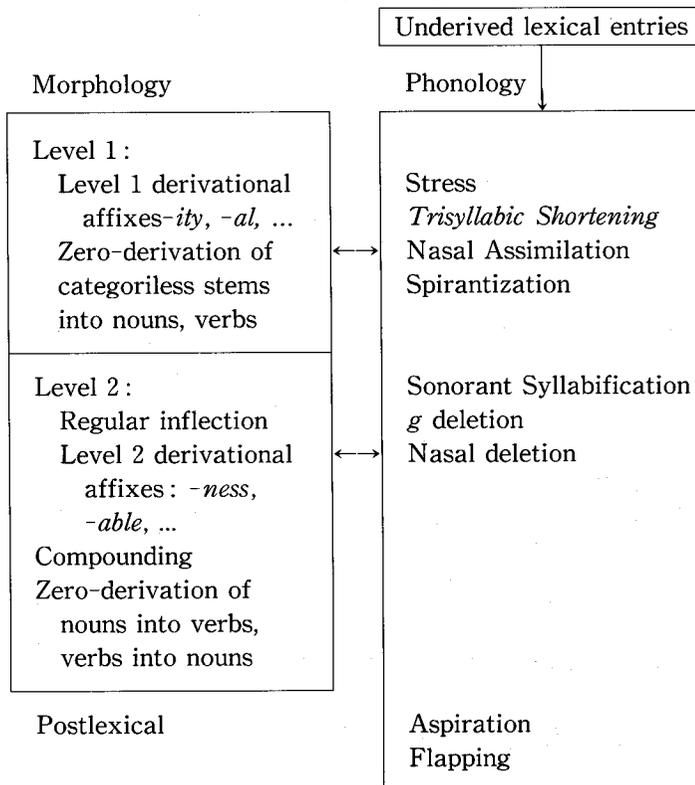
- i) The structural description of α (the special rule) properly includes the structural description of β (the general rule)
- ii) The result of applying α to ϕ is distinct from applying to β to ϕ

In that case, α is applied first, and if it takes effect, β is not applied.

I assume that the EC governs derivations at all levels of phonology. I would like to follow Kiparsky (1982, 1993) in supposing that the strict cycle effect is derivable from the interaction of the EC and parameters encoded in individual languages.

For ease of exposition, I would like to cite Hargus's (1985 : 25) assumption on the system of phonological rules of Present-day English :

(5) The lexical and postlexical phonology of English :



5) Cf. Kiparsky (1982, 1983) for its applicability in morphology and semantics.

As for these phonological and morphological rules, readers are referred to Halle and Mohanan (1985), Kiparsky (1979) and Kiparsky (1983).

2. Capturing Sound Changes within the Framework of Lexical Phonology

Within the framework of Lexical Phonology presented in the foregoing section, the possibility of sound changes in languages will be localized into the following two options :

- (6) a. changes in rule system of a particular language
- b. changes of information encoded in lexical entries

Following Kiparsky's (1982) suggestion, I will assume that lexical entries are themselves rules in the grammar, which we may call "identity rules," whose inputs are identical to their outputs. Therefore, within the framework we are assuming, sound changes in languages are reduced to changes in the rule system of the language.

We have to note, however, that the coverage of the structural description of identity rules is restricted to the lexical item, while the structural descriptions of typical phonological rules involved in the type of sound changes in (6a) is generally wider and is assumed to capture natural classes in phonology. It follows from this distinction of the two types of rule that the change of rules of the type (6a) will invite concomitant changes in wider sets of the forms of lexical items while that of rules of the type (6b) may be reflected only in a lexical item of the language.

The linguistic dichotomy of "Neogrammarian" sound change and Lexical diffusion follows from the classification of rule types in (6). By definition, the type of sound change in (6b) may occur word by word : The relevant identity rule will apply only lexically to one lexical entry, which we may call the lexical diffusion. In (6a) two types of rules are involved : (i) rules whose domain of application is limited to a certain lexical level and (ii) rules that are applicable at all levels of the grammar. By the SP (LCFR), the type (i) rules cannot derive allophonic variants : They can only produce phonemic contrasts in the lexicon. The type (ii) rules cannot apply lexically if some default rules apply in the lexicon to feed them : they may apply postlexically to derive allophonic variants. In the present paper, the term "Neogrammarian sound change" refers to sound changes brought about by either of these two types of rules.

3. Fricative Voicing in Old English

The phonemic status of segmental variations is defined relative to (i) the system of phonological rules in the language and (ii) the inventory of the default rules applicable in the language. As we may notice, the phonemic contrast found in voiced vs. unvoiced fricatives in Present-day English does not necessarily hold in cases of Old English.

3.1 Relevant Default Systems

We may adopt Kiparsky's (1982 : 109) assumption that the Default Voicing (7) "is a universal rule that is part of the grammar of every language. Not only the rule itself but also its order is fixed given the rest of the system."

(7) Default Voicing: [α sonorant] → [α voiced]

By the SP, the Default Voicing cannot apply in the lexicon to feed unmarked rules.

3.2 Relevant Data

The voicing of fricatives can generally be predicted from phonological and morphological environments in Old English. Two comments are in order in the following paragraphs.

As noted in Moore and Knott (1972 : 14), fricatives are voiced in the environment in which they are preceded by vowels and followed by voiced segments :

- (8) a. vowel _____ vowel : ofer, rīsan, swī ð e, cwe ð an
 b. sonorant consonant _____ vowel : healfe, eor ð e
 c. vowel _____ voiced obstruent : hǣfde, liefde
 d. vowel _____ sonorant consonant : hūsles, hǣ ð nan
 e. of-linnan, ā-sittan, ā-ferian

As illustrated in (8e), fricative voicing does not apply cross-morphemically (Moore and Knott : 14 fn) : The fricatives found in the initial or last portion of the members of compound words are not voiced.

Assuming a version of theoretical framework of Lexical Phonology, Suphi (1988 : 195) argues for the existence of two different classes of derivational suffixes in Old English : she cites some cases of fricative voicing to point out that the voicing is blocked by the level 1 suffixes while it is performed at the position to the left of the derivational (class 2) and inflectional suffixes :

- (9) a. Class 1 Suffixes
 wyn[s]um "pleasant"
 fela[f]eald "manifold"
 wunder[f]ull "wonderful"
 trēo[f]æst "faithful"
 nor[θ]weard "northward"
 weor[θ]lēas "worthless"
- b. Class 2 Suffixes
 forgi[v]ness "forgiveness"
 sū[ð]erne "southern"
 dy[z]ig "foolish"

al̄y[z]ing "redemption"
 dri[v]an "to drive"
 hū[z]a "house" gen.pl.

The data might be taken as evidence for Borowsky's (1993) notion "Word Cycle Phonological Rules," but as I discussed elsewhere it is not theoretically well-motivated within the framework of Lexical Phonology that assumes Radical Underspecification.

3.3 A System of Redundancy Rules and the Doubling of Fricatives

From a diachronic perspective, it is natural to ask whether there is any phenomenon that triggers the doubling of the consonantal system of fricatives in Middle English: Middle English exhibits the voiced vs. unvoiced phonemic distinctions in fricatives. Malsch (1971: 70) advances an argument for the affirmative move and attributes the doubling to the loss of a redundancy rule that inserts [+long] into the intervocalic environment. Under Malsch's account, the rule of fricative voicing in Old English is formulated as (10a), which is then partially bled by (10b):

(10) a. Fricative Voicing

$$\left(\begin{array}{l} -\text{sonorant} \\ +\text{continuant} \\ -\text{voiced} \\ -\text{long} \end{array} \right) \longrightarrow [+voiced] \quad / \quad [+voiced] \quad ______ \quad [+voiced]$$

b. Gemination

$$\left(\begin{array}{l} -\text{syllabic} \\ +\text{consonantal} \\ +\text{anterior} \end{array} \right) \longrightarrow [+long] \quad / \quad \left(\begin{array}{l} +\text{syllabic} \\ -\text{consonantal} \\ -\text{long} \end{array} \right) \quad ______ \quad \left(\begin{array}{l} -\text{consonantal} \\ +\text{high} \\ -\text{back} \end{array} \right)$$

c. *i*-Deletion

$$/i/ \rightarrow \emptyset / \left\{ \begin{array}{l} [V, +long] C_1 \\ VC_2 \end{array} \right\} \quad ______$$

d. Redundancy Rule

$$\left(\begin{array}{l} -\text{sonorant} \\ +\text{continuant} \end{array} \right) \longrightarrow [-voiced]$$

In order to capture the fact that the specification of voicing in fricatives is redundant, Malsch added (10d) to the grammar of Old English⁶. A sample derivation is quoted in (11):

(11) underlying /miS=i+an/"miss" /ri:S+an/"rise"

6) For the simplicity of explanation, I deliberately changed the notation of the rules (10) a and b: (i) eliminating the specification "<+sonorant>" from the structural description of the Gemination, and (ii) simplifying the segmental notation in *i*-Deletion. The aim of the angle bracket notation is to prevent the gemination of /r/ in the phonological environment.

Gemination miS : ian
i-Deletion miS : an
 Fricative Voicing ri : zan
 Redundancy mis : an

We may cite Malsch's (1971 : 77) observation that geminate consonants were lost before 1200. He posits a universal meta-theory of rule loss and rule addition in individual languages :

(12) Universal Meta-Theory of Rule Loss

- a. If a phonological rule P1 is added to the grammar, such that its structural output is a sub-matrix of the structural description of a phonological rule P2, the rule P2 is lost from the grammar.
- b. If a phonological rule P1 is lost from the grammar and there is in the lexicon of that grammar a redundancy rule R1 such that the structural output of R1 is a sub-matrix of the structural description of P1, then R1 is also lost from the grammar.

Malsch identifies the initiation of the change in the Old English phonology as the addition of the rule (13) :⁷⁾

(13) Redundancy Rule

$$\left(\begin{array}{l} -\text{syllabic} \\ +\text{consonantal} \\ +\text{long} \end{array} \right) \longrightarrow [-\text{long}]$$

By the condition (12a), Fricative Voicing (10a) and Gemination (10b) are lost because their structural descriptions (SD) properly include the structural output (SO) of the newly introduced rule (13) :

(14) SD : Fricative Voicing	SD : Gemination	SO : Redundancy Rule (13)
-syllabic	-syllabic	-syllabic
+consonantal	+consonantal	+consonantal
-long	-long	-long
-sonorant		
+continuant		
-voiced		
+anterior	+anterior	

7) I agree with Ioroi that the rule (13) cannot be regarded as a redundancy rule because it is feature-changing.

By (12b), (10d) will be lost :

(15) SD: Fricative Voicing	SO: Redundancy Rule (10d)
-syllabic	
+consonantal	
-long	
-sonorant	-sonorant
+continuant	+continuant
-voiced	-voiced
+anterior	

As a result of the addition of (13) to the grammar, we have a system of phonological rules that does not allow fricative voicing.

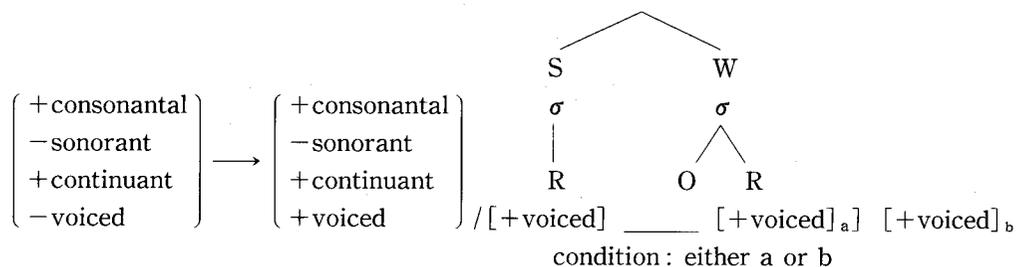
4. A Lexical Phonological Analysis of Fricative Voicing in Old English

Malsch (1971) attempts to integrate the observations on the processes of fricative voicing and gemination into a unified model of phonology, assuming a system of redundancy rules and a meta-theoretic conditions on rule loss. But it does not provide any principled way of describing the allophonic status of the OE fricative voicing.

4.1 Fricative Voicing

Before we go on to consider the form of the rule of fricative voicing in OE, I would like to refer to two ingenious observations. The first one comes from Suphi (1988 : 195), who formulates a rule of OE fricative voicing within the non-linear framework of phonology :

(16) OE Fricative Voicing (Suphi (1988 : 195))



One of the significant observations that Suphi makes is that the process is restricted within the metrical foot.

The second appears in Lass and Anderson's (1975 : 176) diachronic study of OE phonology, where the distribution of voicing of OE fricatives is summarized as follows:⁸⁾

8) The featural notation is translated into the one that we assume.

(17) Voice distribution in OE fricatives

- a. $[-\text{sonorant}, +\text{continuant}] \rightarrow [-\text{voice}] / \left\{ \begin{array}{l} \# \\ [-\text{sonorant}] \end{array} \right\}$ mirror image
- b. $[-\text{sonorant}, +\text{continuant}] \rightarrow [+voice] / [+sonorant] \text{ ______ } [+sonorant]$

The forms of rules in (17) are quite reminiscent of the rules that are governed by the EC.

As a working hypothesis, I will assume that the following system of rules is incorporated into the grammar of OE:⁹⁾

(18) a. Algorithms of Syllable Structure Assignment:

- i. Universal Syllable Template
- ii. Strength Hierarchy
- b. Tensing
 $C \rightarrow [+spread\ glottis] / [\dots \text{ ______ } [-consonantal] \dots]_{Foot}$
- c. Fricative Voicing
 $[-\text{sonorant}, +\text{continuant}, -\text{spread glottis}] \rightarrow [+voiced] / \text{ ______ } S$

d. Default Rules:

- i. $[] \rightarrow [-spread\ glottis]$
- ii. $[\alpha\text{sonorant}] \rightarrow [\alpha\text{voiced}]$

cf. Kenstowicz (1994: 64)

The rules in (18) are assumed to be unmarked: that is, they are applicable at all levels of the OE phonology. By the LCFR, Fricative Voicing (18c) cannot apply lexically, because it is crucially fed by a default rule (18di) in the lexicon.

The system (18) alone cannot account for the two cases: (i) the cases listed in (8c), in which the orthographic *f*'s are realized as $[v]$ at the position to the left of the voiced obstruents, and (ii) the cases noted in (9), which exhibit a syndrome of Borowsky's (1993) notion of "Word Cycle Phonological Rules."

4.2 OE Spirantization

A process recurs in natural languages which we may call Spirantization. Lass and Anderson (1971: 177) assumes on diachronic grounds that "the segments represented by *f* in these forms [in *hæfde* and *lifde* — YT] are not underlying fricatives, but realizations of lexical /b/." The assumption is supported by cross-linguistic data. As noted in Harris (1969: 37ff), Spanish /b d g/ are realized as $[\beta \delta \gamma]$ in the Allegretto rate of utterance in certain phonological environments (see also Kenstowicz (1994: 487ff)). We may cite the Fricativization of coronals in Ancient Greek (Sommerstein (1973: 15ff)). Chiosáin (1994: 91) notes that in Irish non-coronal obstruents and nasals are spirantized word-initially. In

9) The rule system that I here introduced is modeled after the one proposed by Kiparsky (1979). As a working hypothesis, I will assume Kiparsky's systems of syllabification.

Tiberian Hebrew, the spirantization fails to apply post-vocally to the voiced stop /b/ if it is a member of a geminate sequence (Sagey (1990 : 17ff)).

Tentatively, we may formulate the rule of spirantization in OE as follows :

(19) OE Spirantization

$$/b/ \rightarrow [+continuant] / V \begin{array}{c} \text{---} \\ | \\ C \end{array}$$

The rule (19) is not immune from the Linking Constraint (cf. Hayes (1986)). It accounts for the alternations in certain OE weak verb paradigms :

(20)		“have”
	Infinitive	habban
	Pres. 1 sing.	hæbbe
	Pres. 2 sing.	hafast
	Pres. Pl.	habbað

It also accounts for the cases in (8c).

4.3 Surface Unvoiced Fricatives in Derived Environments

The cases in (9a) do not present problems at all : If we rigorously apply the principle of the Radical Underspecification to them, it follows that they are underlyingly marked as $[\emptyset \text{voiced}]$ because the feature values are totally predictable by rules. Let us begin with the cases in (9a). At level 1, the /f/ of *-fæst* in *trēofæst* may be marked as $[+\text{spread glottis}]$ by the Tensing because the word forms a binary foot and escapes from the application of the Fricative Voicing. At level 2, the specification may block the application of the Fricative Voicing. Postlexically the Fricative Voicing does not apply to the /f/ because of its $[+\text{spread glottis}]$ specification, and it receives $[-\text{voiced}]$ by the Default (18dii). Let us go on to examine cases in (9b). The word *forgif* does not have a suffix *-ness* at level 1. It is crucial that the word stress rules do not apply at level 2 and the word includes two feet. Nor does the Tensing apply at level 2, but the LCFR prevents the Fricative Voicing from applying at level 2 because it may be fed by a default rule. Postlexically, the Fricative Voicing can apply to those cases in (9b) to fill the feature value $[+\text{voiced}]$. Therefore they are not positive evidence for the notion “Word Cycle Phonological Rules.”

5. The Dynamism of Sound Change

It is a well-established fact that the loss of final *m* and *n* and the weakening of unstressed /a o u e/ into $[\text{ə}]$ triggered the extinction of many OE inflections in Early

ME, when, according to Malsch (1971), geminate consonants are lost. Notice that the system noted in (18) presupposes the rules (10) a and b that conspire with each other to derive geminates of unvoiced fricatives before inflectional vowels. It is a natural consequence of the principles of Lexical Phonology that the extinction of OE inflections changed such *X-(i)an* forms into opaque contexts, whose morphological complexities cannot be recovered: The unvoiced vs. voiced contrast in fricatives as illustrated in (11) is not derivable by rules and it has to be directly encoded into the underlying representations¹⁰.

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10) As an alternative to (10) a and b, we may assume that Gemination is a sort of compensatory process that spreads [+consonantal, +anterior] onto the vacant timing slot produced by the *i*-Deletion. But our conjecture does not depend crucially on this alternative.

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(1995年3月28日受理)