

Deep allophones in the Old English laryngeal system

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The laryngeal features of Old English fricatives, while fully predictable, nonetheless behave contrastively in the phonology. According to traditional notions of contrastiveness, this would appear to be a paradox. The paradox is resolved using the contrastive hierarchy (Dresher 1998): in the OE hierarchy, the voicing feature takes scope over all obstruents. Segments traditionally assumed as surface variants will be analyzed as “deep allophones,” a characterization that explains their behaviour in OE and their subsequent historical development.

Introduction

It is regarded as an uncontroversial fact that the voicing of Old English (OE) fricatives is determined entirely by context. The [+anterior] phonetic fricatives [f θ s v ð z] are merely surface variants of segments, perhaps archiphonemes (Lass and Anderson 1975; Kim 2001), underlyingly unspecified for laryngeal features. On inspection of voicing processes within the language and the OE laryngeal system as a whole, however, we discover that this characterization of fricatives cannot hold. Specifically, voicing assimilation processes offer evidence that the voiceless fricatives are underlyingly specified for voicelessness—contrary to all expectations given the predictability of this feature. What is more, the relationship between voicing assimilation (VA) and the rule deriving the surface variants of the fricatives (hereafter FVR) suggest that the voiced fricatives do not behave as typical surface variants either. We will see that [v ð z] have a curious status in the voicing contrasts of OE: they are neither phonemes nor canonical surface variants, but, for lack of a better description, they are “deep” allophones. This study will argue that the contrastive hierarchy of Dresher (2001) provides a formal explanation for the observation. Moreover, this characterization of voiced fricatives is supported by their historical development in Middle English, an explanation for which will be sketch out at the end of this study.

I begin in Section 1 by outlining the facts of voicing assimilation (VA) in OE, and their implications for underlying representations. We will see that voicing processes in OE, along with the ranking of features using the contrastive hierarchy, support the specification of voicelessness on fricatives. The OE laryngeal system is then analyzed within the framework of Avery (1996) and Avery and Idsardi (2001). Section 2 provides an account of the surface variation of fricatives. Given the formulation of OE fricative voicing rule presented here (FVR), and insights of Kim (2001), we will discover that this

rule operates at a “deeper” level in the phonology than is traditionally assumed. Empirical evidence for a “deep” FVR is provided by its interaction with VA and the ordering forced on these rules. On a theoretical level, we consider the problems the FVR poses for the notion of structure preservation, and how the contrastive hierarchy can explain the problem. We will see that the principle of contrast as encoded by the contrastive hierarchy better captures the unique status of OE voiced fricatives.

Section 3 turns to the historical development of English voicing contrasts. I contend that various explanations of the phonemicization of voiced fricatives, including the proposal of Kurath (1956), elaborated by Béjar (1999), do not place the change within the laryngeal system of the language in general. It is here proposed that the emergence of a laryngeal contrast among the fricatives was aided by the unique status of these fricatives in OE. Specifically, the interaction of VA and FVR created an opportunity for learners to reanalyze the OE laryngeal system. The laryngeal contrast in the fricatives emerges from this reanalysis. As with the synchronic analysis, the contrastive hierarchy sheds light on the diachronic development.

Voicing assimilation

The voicing assimilation processes that affect all OE obstruents will serve as a basis for the present analysis since these processes demonstrate the necessity for specifying fricatives for underlying voicelessness, and the nature of the OE laryngeal system in general. These voicing assimilation processes each involve the assimilation of voiced (or perhaps unspecified) obstruents to voiceless obstruents. Voiceless segments, then, are triggers for voicing assimilation whether they precede or follow the target. Crucially, fricatives in addition to stops trigger this voicing assimilation.

First, progressive assimilation is found among verbs inflected for the past tense known as weak forms (Campbell 1959). The forms in (1) consist of the stem plus a stem extension /-i-/ (Dresher 1978), the preterit suffix /d/, and the person marker /-e/. The actual phonetic content of these morphemes is not crucial. For instance, the preterit suffix need not be specified for voicing, a point that will become clear when we look at laryngeal representations.

(1) Progressive Voicing Assimilation in Preterit weak forms

	UR	PR	
a.	/sæt/ + /i/ + /d/ + /e/	[sette]	‘I/he sat’
b.	/slæ:p/ + /i/ + /d/ + /e/	[slæpte]	‘I/he slept’
c.	/wæk/ + /i/ + /d/ + /e/	[wæhte]	‘I/he met’
d.	/send/ + /i/ + /d/ + /e/	[sende]	‘I/he sent’
e.	/hi:er/ + /i/ + /d/ + /e/	[hi:erde]	‘I/he heard’
f.	/frem/ + /i/ + /d/ + /e/	[fremede]	‘I/he did’
g.	/cys/ + /i/ + /d/ + /e/	[cyste]	‘I/he kissed’
h.	/pyf/ + /i/ + /d/ + /e/	[pyfte]	‘I/he puffed’

The stem extension is syncopated in certain forms, creating the consonant cluster that serves as the context for VA. Crucial, then, is that this syncopation occurs at an early

stage. In (1a-c), a voiceless stop triggers assimilation of /d/ to [t]. In (1d), the (surface) voicing features agree, telling us nothing about assimilation. In (1d), the adjacent voiced consonants later undergo degemination. The stem-final fricatives in (1g,h), however, trigger assimilation.

In other morphological combinations, regressive voicing assimilation is found. The verbal inflections /-est/ (2nd person singular) and /-eþ/ (3rd person singular) trigger a voicing alternation in the verb stem (2,3).

(2) 2nd person singular present indicative

	UR	PR	
a.	be:əd + est	bietst	‘you command’
d.	ræ:d + est	ræ:st	‘you read’
c.	find + est	fintst	‘you find’
d.	bring + est	brinǰst	‘you bring’
e.	stiy + est	stixst	‘you ascend’

(3) 3rd person singular present indicative

	UR	PR	
a.	be:od + eθ	bi:etθ > tt > t	‘he commands’
b.	ræ:d + eθ	ræ:tt	‘he reads’
c.	stand + eθ	stent	‘he stands’
d.	bind + eθ	bintθ > bintt > t	‘he binds’
e.	bring + eθ	brinkθ	‘he brings’
f.	ha:t + eθ	hæ:tt	‘he calls’

In (2) and (3), as in the formation of weak preterit forms, the intervening vowel is syncopated (Campbell 299). Again, syncopation occurs before assimilation, thus creating the necessary environment. Cluster simplification rules, degemination, and vowel mutation (ordered before syncopation) give the surface forms. Regressive voicing assimilation occurs in other morphological combinations, such as compounding and derivational affixation (4).

(4) Voicing assimilation across derivational and compound boundaries¹

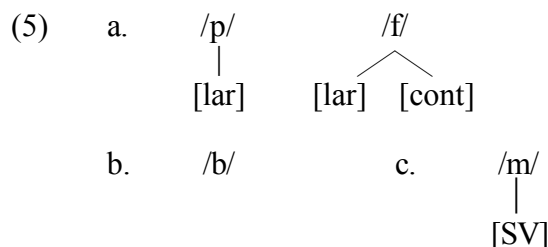
	UR	PR	
a.	hund + teontig	hunteontig	‘ten hundred’
b.	syld + truman	syiltruman	‘shield-strong’
c.	med + trum	mettrum	‘infirmity’
d.	sund + corn	suntcorn	‘Saxifraga, sundcorn’
e.	ed + sihθ	etsihθ	‘a looking again’
f.	blo:d + sian	bletsian	‘to bless’

1. Some of these compounds may not be synchronic; a VA rule still holds though.

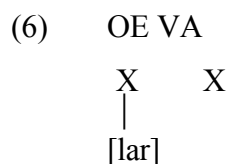
g.	med + sceatt	metsceatt	‘payment, wages, fee’
h.	lad + ðeow	latteow	‘leader, guide’
i.	ang + sum	anksum	‘troublesome’
j.	leng + ð	lenkð	‘length’
k.	strang + ð	strenkð	‘strength’

As in the data in (1)-(3), other processes simplify certain coronal clusters and mutate the vowels.

The facts are clear enough: voiceless obstruents trigger assimilation with an adjacent obstruent.² Given an autosegmental analysis of assimilation, the voicing features of the trigger spreads to an adjacent segment. This mechanism for assimilation requires the trigger be specified. If we posit privative features and adopt, following Béjar (1999), the representations of Avery (1996) for OE, we can represent the voiceless segments as in (5a), where the feature [laryngeal] specifies voiceless obstruents. Voiced obstruents are not specified at all for voice (5b), which predicts their behavior as targets for assimilation. Avery represents sonorant consonants’ voicing feature with a different node, sonorant voicing, [SV] (5c):



Avery terms this type of laryngeal system “Contextual Voice” (CV) (1996), as opposed to other systems in which the voiced obstruents are specified for voice (a Laryngeal Voice system) or by SV (a Sonorant Voice system). We can now formulate the rule of VA as a spreading a spreading rule.³



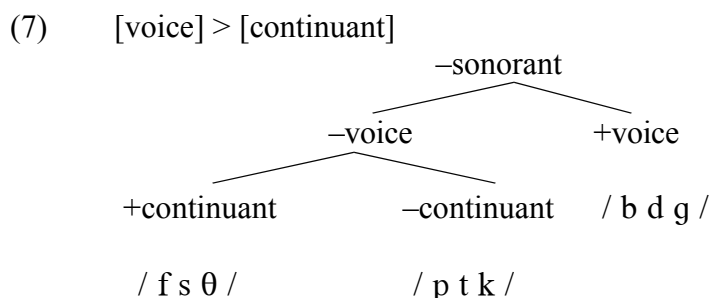
Note that VA correctly predicts that voiced obstruents are targets, since only unspecified segments can receive spreading. On the other hand, sonorant consonants will block VA since they have an SV node.

2. If we wish to think in constraints, all OE obstruent clusters are voiceless; this characterization, however, may be too strong, as we will see below that voiced obstruent cluster arise.

3. Notice that in all the cases of VA a morpheme boundary intervenes between the obstruent cluster; for now, we will not include this in the VA rule, since it is not necessary given the rules ordering argued for.

The contrastive hierarchy

The VA rule in (6) requires that voiceless fricatives be specified for voicing. As we will see in greater detail in the next section, however, the voicing feature is entirely predictable. Thus most scholars underspecify OE fricatives for voice underlyingly, deriving both voiced and voiceless surface variants by rule (Anderson 1988, Lass and Anderson 1975, Lass 1994, Kim 2001). We can see, however, that VA will be impossible if we do not specify voiceless fricatives in the same manner as we do the voiceless stops. We can motivate the specification of a seemingly redundant feature, however, using the contrastive hierarchy (Dresher 2001). The feature specifications that are necessary to account for voicing assimilation can be derived by ranking voicing over continuancy in the hierarchy. By this ranking, the fricatives are not contrasted immediately with the stops, but are contrasted with the voiced obstruents. Thus voicing is contrastive in the domain of all the obstruents. This leads to specification of [-voice] for fricatives (7).



Note that we use binary features in the contrastive hierarchy, while the representations in (5) employ privative ones. Since one interpretation of the contrastive hierarchy is that it simply serves as a method of arriving at specifications, I maintain that this is not a contradiction. That is, the features may be encoded differently in the actual phonological representations. Note also that the ranking in (7) groups the voiceless obstruents together as a natural class, which is consistent with their behavior with respect to VA.

FVR and “deep” allophones

Since we have good motivation for specifying a “logically redundant” feature, we need now to reconsider the status of the allophonic rule deriving the voiced fricatives. The distribution of the voiced fricatives is often taken for granted, even though the contexts are more complicated than sometimes assumed (Bennet 1955; Welny 1998; Kim 2001). It is useful to review the facts. The [+anterior] fricatives are voiceless in initial (8a) and final position (8b), or when adjacent to another voiceless segment (8c) and (8d) (data from Kim 2001):

- (8) a. [f]æder
 b. hu[s]
 c. cy[ss]an
 d. æ[f]ter

The environment of the voiced counterparts is more complex, and the subject of differing opinions in the literature (see Welna 1998). What is clear is that between sonorant segments (vowels and sonorant consonants), singleton fricatives appear voiced under two conditions: they are preceded by a stressed syllable, and are either word-internal or precede an inflectional morpheme boundary:

(9) Morpheme internally

- | | | |
|---------------|-----------|------------------|
| a. /héafəd/ | [héəvəd] | ‘head’ |
| b. /nósu/ | [nózu] | ‘nose’ |
| c. /héafədəs/ | [héəvðəs] | ‘head’ (gen.sg.) |

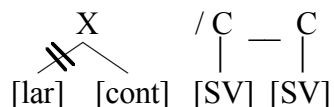
(10) Across inflectional suffix boundary

- | | | |
|--------------|----------|------------------|
| a. /dríf+an/ | [drívan] | ‘drive’ (inf.) |
| b. /wúlf+as/ | [wúlvəs] | ‘wolf’ (nom.pl.) |

The forms in (9a,b) and (10a,b) show that FVR is triggered by vowels and sonorant segments, such as /l/. What is unclear is whether in (9c) the FVR applies before /ð/ is syncopated.⁴ On the assumption that FVR applies after syncopation, we would have to assume for a form such as *heofdes* that voiced obstruent /d/ triggers fricative voicing, and thus pattern with sonorant consonants and vowels in this respect. This would be a difficult assumption to maintain since, as is shown quite conclusively by VA, voiced segments are inert in the phonology, acting only as targets and not triggers. Moreover, based on the behavior of OE as a CV system, voiced obstruents do not have a laryngeal node to spread (Avery). (We will return to this possibility, however, when we consider the historical development of fricatives.) Furthermore, voiced clusters do not appear in OE outside of cases where the FVR appears to have applied; that is, OE only has voiceless assimilation. The evidence thus points to the FVR operating between vowels or sonorant consonants.

The FVR, then, applies before syncopation in (9c). We have two logical options for formulating the FVR. Since, as I have argued from VA processes, the fricatives are underlyingly voiceless, the FVR could involve the delinking of [lar] from fricatives when in the appropriate sonorant environment:

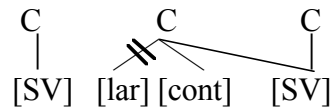
(11a) FVR (delinking version)



Alternatively, the fricatives could be specified for voicing via the spreading of SV. This would result in what Avery terms a “sonorant obstruent,” with a formulation approximated in (11b):

4. We will encounter other instances where syncopation obscures the context for FVR.

(11b) FVR (delinking and SV spreading version)



Clearly (11b) needs to be improved, since it is not clear which [SV] node spreads, although both are necessary in the context of the rule. Nevertheless, I leave the exact formulation of FVR—and the choice between (11a) and (11b)—undetermined at this point, since the difference is not crucial. For now, we note that [v ð z] will have either one of the following representations. (12a), as a result of delinking rule, equates voiced fricatives with underlyingly voiced obstruents; (12b), the result of an SV-spreading FVR, aligns voiced fricatives with sonorants:

- (12) a. [v ð z] b.
$$\begin{array}{c} \text{[v ð z]} \\ | \\ \text{[SV]} \end{array}$$

We will return to the representations of voiced fricatives when we consider their historical developments; there, we will see that these alternatives are indicative of the reanalysis which the laryngeals undergo.

When does the FVR apply? Kim (2001) and Lexical Phonology

Kim (2001) attempts to formulate the FVR in lexical phonology, but demonstrates that the rule exhibits both lexical and postlexical properties. FVR appears at once to be a postlexical rule—since it introduces a new, allophonic segments not present in the underlying inventory, and it is non-cyclic, a hallmark of postlexical rules. At the same time, however, the FVR must make reference certain morphological environments. This last requirement is shown by the morphological environments in which the FVR does not apply, summarized by Kim (2001):

(13) Between unstressed syllables

- i) In non-derived words: *Lúci*[f]*er*
- ii) In derived words across inflectional boundary: *fáro*[θ]*e* ‘shore’

(14) Across prefix boundary

- i) [-stress] prefix:⁵
 - a. *be*-[f]*óran* ‘before’
 - b. *ge*-[s]*éon* ‘to see’
 - c. *a*-[θ]*éncan* ‘to devise’
- ii) [+stress] prefix:
 - a. *àn*-[s]*únd* ‘sound’

5. Kim here includes the form *wi*[θ]-*drifan* (‘to repel’), claiming that the FVR fails here because the fricative is in a pretonic syllable. However, if we follow my argument that FVR only occurs between

(15) Across derivational suffix boundary

i) After stressed syllables

a. *ðæ[s]-lice* ‘suitably’b. *wýn-[s]um* ‘pleased’

ii) After unstressed syllables

a. *séofon-[θ]a* ‘seventh’

(16) In degeminate forms

i) After stressed syllables

a. *py[ff]an* ‘to puff’b. *cy[ss]an* ‘to kiss’

ii) In unstressed syllables

a. *hægte[s]-e* (< *hægtess-e*) ‘fury, witch’

iii) In weakly stressed function words

a. *þi[s]-es* (< *þiss-es*) ‘this’b. *þi[s]-um* (< *þiss-um*) ‘this’ dat.

(17) Across a compound word boundary

a. *éald-[f]æder* ‘forefather’b. *wín-[s]æl* ‘wine hall’

(18) Across word boundary within phrase

a. *þæt hu[s] is min* ‘the house is mine’

Recall that FVR did apply morpheme internally (9) and across inflectional morpheme boundaries (10). From these facts, Kim concludes that FVR is a lexical rule since it “applies to the domain of the word—to both non-derived forms [(9)] and derived forms [(10)].”⁶ Kim proposes three morphological levels for the lexicon of Old English:

(19) I. [-stress] prefixes

II. a. [+stress] prefixes

b. derivational suffixes

c. compounding

III inflectional suffixes

sonorant segments, and not voiced obstruents, then this form fails to meet the structural description of FVR in the first place. In fact, I take this form as further evidence for my formulation of the FVR.

6. These data suggest that a prosodic account may be possible for FVR (see Yamada 1998). Kim considers stress “not crucial for the analysis of the data” (fn 8). But FVR always applies to a fricative “in the initial position of post-tonic unstressed syllable” (Yamada 430). If it this is the case, then FVR is not a lexical rule. However, Anderson (1988) points out “that the morpheme boundary is the crucial one is suggested by the forms in [(i)], which show initial [s] in a suffix, despite a preceding (and following) voiced segment”:

(i) *wynsum* ‘pleasant,’ *fremsum* ‘benign,’ *wilsum* ‘desirable’

Anderson does not indicate stress on these elements, so the issue is by no means resolved. While outside the scope of this study, a investigation of the prosodic contexts for FVR is in order. However, the arguments made in this study do not hinge on the matter. As we will see, the argument here depends on the ordering of FVR before syncopation. Even if FVR were a purely post-lexical rule operating on syllable structure, it would have to precede syncopation (and thus VA) since the latter rearranges syllable structure.

Since FVR applies across inflection morpheme boundaries, FVR is a level 3 (last word-level) rule. Kim's FVR is then formulated as (20).

(20) Kim's FVR

$$\begin{bmatrix} +\text{obs} \\ +\text{cont} \\ +\text{ant} \end{bmatrix} \rightarrow [+vd] / \begin{bmatrix} +vd \\ +\text{stress} \end{bmatrix} \begin{array}{c} \text{---} \\ | \\ \text{C} \end{array} [+vd]]$$

As a lexical rule, however, (20) poses problems since it is non-structure preserving and non-cyclic (restricted to one level)—both characteristics of postlexical rules. Kim resolves this apparent paradox using underspecification. Kim adopts the marking convention in (21), which prohibits any lexical voicing feature on fricatives since this is a non-distinctive feature for fricatives.

(21) $\begin{bmatrix} +\text{ant} \\ \alpha \text{vd} \end{bmatrix}$]
 $\begin{array}{c} | \\ \text{C} \end{array}$

Once (21) is enforced, the FVR becomes a feature-filling rule rather than a feature changing rule, and the structure preservation problem is obviated. Thus the FVR acts on segments unspecified for voicing which Kim characterizes as the archiphonemes /F S Θ/. FVR and an attendant default rule convert [0vd] to [+vd] or [-vd] rather than changing [-vd] to [+vd].

Kim's FVR, though, cannot hold since, as we have seen, we require underlyingly voiceless fricatives. However, let us grant Kim the facts about the lexical nature of FVR. Now, given our formulation of FVR (as a spreading rule), which we now posit as a lexical rule, we must ask how it interacts with VA. VA is a post-lexical rule—it makes no reference to morpheme boundaries (cf. fn. 2). Given the principles of lexical phonology, FVR should occur before VA. On first inspection, this ordering appears to contravene certain principles, the least of which is that an allophonic rule should not precede a neutralization rule. Moreover, the use of Kim's FVR would result in a default feature [-voice] driving a phonological process—VA. The most obvious solution, then, is to order FVR after VA, a natural sequence of rules.

Things are not so simple, though. When we consider the relationship of syncopation to both FVR and VA we discover that the rules require certain intrinsic orderings given the facts outlined above. First, we saw from the VA assimilation data that syncopation must occur before VA, since it is precisely this syncopation which provides VA with consonant clusters.⁷ Conversely, the FVR—if indeed it applies only between sonorant segments—must be ordered before syncopation. For instance, the derivation of *heofdes* 'head' (gen.sg.) shows that FVR must apply before syncopation:

7. Certainly OE had different syncopation processes, as we will see later on. However, the syncopation that deletes the vowel in *heofdes* (from /heofodes/) appears identical to that which gives *slæpte* (from /slæpide/): an unstressed vowel is deleted following a heavy open syllable. It is only natural to assume this is the very same syncopation rule which operates post-lexically.

(22) syncopation > FVR

UR	/heafədəs/
sync.	heafdes
FVR	—
PR	*[heafdes]

(23) FVR > syncopation

UR	/heafədəs/
FVR	heəvədəs
sync.	heəvdes
PR	[heəvdes]

This form offers quite conclusive evidence for the ordering. Now, since FVR precedes syncopation, and since this same syncopation process must precede VA, then by the logic of transitivity, FVR precedes VA. We therefore have motivation outside lexical phonology for positing an allophonic rule preceding a neutralization rule.

Empirically, this ordering also finds support. It has the benefit of predicting some apparent anomalies in the data. Consider the forms below:

- (24) a. [cyssan] ‘to kiss’ (inf.)
 b. [cyste] ‘he kissed’
 c. [pyffan] ‘to puff’ (inf.)
 d. [pyfte] ‘he puffed’

VA uncontroversially applies in these cases. Campbell (1959: 180) notes the forms below, however, where VA fails:

- (25) a. [ræ:zde] *[ræ:ste] ‘he rushed’
 b. [ræ:zan] ‘to rush’ (inf.)
 c. [ky:ðde] *[ky:θte] ‘he informed’
 d. [ky:ðan] ‘to inform’ (inf.)

But for these forms VA applies in the present tense forms (only the forms for *cyþan* are available):

- (26) a. /ky:θ + est/ [ky:θst] ‘you inform’
 b. /ky:θ + eθ/ [ky:θ] ‘he informs’

(26b) undergoes degemination of the final /θ/; both forms undergo syncopation. The syncopation of these forms is clearly of a different sort than that of the above past tense stem extension. Still we can assume even for (26) that FVR applies before syncopation. What is interesting, though, is that the forms in (25a,c) are opaque, on the surface, as to

how the stem final fricatives acquire their voicing. Assuming that syncopation occurs before FVR, then we have the following derivation:

(27)	UR	a. /ræ:s + ide/	b. /ræ:s + an/	c. /ky:θ + ide/	d. /ky:θ + an/
	sync.	ræ:sde	—	ky:θde	—
	FVR	—	ræ:zan	—	ky:ðan
	VA	ræ:ste	—	ky:θte	—
	PR	*[ræ:ste]	[ræ:zan]	*[ky:θte]	[ky:ðan]
	spelling	<i>ræsde</i>	<i>ræsan</i>	<i>cyþde</i>	<i>cyþan</i>

Notice that VA cannot apply to these forms, since VA is assimilation to voicelessness; that is, VA does not create voiced clusters. Recall that we motivated this fact on the CV laryngeal system behavior of Old English. While it might be tempting to propose that there is a similar VA rule for voiced clusters, such a rule would require active voicing—contrary to CV systems and the empirical evidence put forth in section 2. We can see that ordering VA before FVR will also predict the wrong forms, since this would defer syncopation and in a ‘regular’ form such as *slæpte* ‘he slept’ the consonant cluster would not be formed early enough for VA to apply.

FVR preceding syncopation and VA *does* make the correct predictions, however.

(28)	UR	a. /ræ:s + ide/	b. /ræ:s + an/	c. /ky:θ + ide/	d. /ky:θ + an/
	FVR	ræ:zide	ræ:zan	ky:ðide	ky:ðan
	sync.	ræ:zde	—	ky:ðde	—
	VA	—	—	—	—
	PR	[ræ:zde]	[ræ:zan]	[ky:ðde]	[ky:ðan]
	spelling	<i>ræsde</i>	<i>ræsan</i>	<i>cyþde</i>	<i>cyþan</i>

Furthermore, note that this ordering correctly predicts the present tense forms:

(29)	UR	a. /ky:θ + est/	b. /ky:θ + eθ/
	FVR	ky:ðest	ky:ðeθ
	sync.	ky:ðst	ky:ðθ
	VA	ky:θst	ky:θθ
	Degem.	—	ky:θ
	PR	[ky:θst]	[ky:θ]
	spelling	<i>cyþst</i> (or <i>cyst</i>)	<i>cyþþ</i>

The order of syncopation of the vowel in the present tense suffixes is not crucial, since a late VA will ensure the cluster is voiceless. We could easily order the syncopation before FVR—note that this syncopation operates differently from that in the preterit—resulting in the VA applying vacuously. It is important to note also from the derivation of the preterit form of *ræsde* and *cyþde* that the surface voiced obstruent cluster

is derived not through assimilation, but through FVR preceding syncopation—an ordering which will destroy the operation of VA if the suffix is a voiced (hence completely unspecified for voice) obstruent.

Crucially, this ordering poses no problems for the ‘regular’ forms cited in (24), repeated below:

- (24) a. [cyssan] ‘to kiss’ (inf.)
 b. [cyste] ‘he kissed’
 c. [pyffan] ‘to puff’ (inf.)
 d. [pyfte] ‘he puffed’

The infinitives contain a geminate, which resists FVR. Assuming that the lexical stems contain this geminate as well, we may order FVR before syncopation with no adverse effects:⁸

(30)	UR	a. /kyss + ide /	b. /kyss + an/	c. /pyff + ide/	d. /pyff + an/
	FVR.	—	—	—	—
	sync.	kyssde	—	pyffde	—
	VA	kysste	—	pyfte	—
	degem.	kyste	—	pyfte	—
	PR	[kyste]	[kyssan]	[pyfte]	[pyffan]

We thus have convincing evidence for the ordering of FVR before VA—and not just the theory-internal evidence of lexical phonology. It should be pointed out, though, that if FVR is lexical, then syncopation and VA are both post-lexical: neither refers to morphological boundaries. But we still are faced with the problem that this ordering poses theoretically, since a non-structure preserving rule is ordered before a neutralization rule. It is to this issue we turn directly.

Structure preservation and the contrastive hierarchy: preserving what?

Kim’s formulation of FVR—which hinges on underspecified voiceless fricatives—introduces a redundant rule which drives subsequent phonological processes. But without underspecification Kim argues that the rule violates structure preservation. We can resolve both these problems with the laryngeal specifications and the FVR proposed here. Since fricatives are underlyingly voiceless, my FVR introduces only one novel (phonetic) segment. Crucially, this novel segment is not active anywhere in the phonology. By broadening the notion of structure preservation, we notice then that the FVR does not introduce new “structure” in the contrastive hierarchy. The specification of voicing on fricatives is thus already available as an underlying representation, since voicing is

8. I have found one form for which this ordering is problematic: *porfte*. There is no evidence that the fricative is a geminate, and therefore blocking FVR. By my account it should surface as *por[v]de*. However, the verb is different in two respects. (1) The verb is a preterit-present verb, for which the derivation may be very different. (2) It has been argued that /t/ may not provide the proper context for FVR (see Welna 1998).

contrastive for all obstruents given the ranking in (7). Clearly, this expansion of “structure preservation” is only speculation. What is required is a better understanding of the status of the contrastive hierarchy in the phonology. I supported the view earlier that the hierarchy is merely a method of arriving at specifications (see Drescher 2001). We need to consider, though, whether the hierarchy persists once the phonology is initiated. If this is the case we might suggest that while the actual segments [v ð z] are not underlying, the specifications that would provide for such underlying segments is in place. What is more, we have already contravened structure preservation to begin with in the contrastive hierarchy proposed here since an entirely predictable feature—voicelessness on fricatives—is specified underlyingly.

Implications for “surface” variants

Given the status of the FVR—as an early, perhaps lexical, rule—we also need to question how “surface” the voiced variants of the fricatives are. The voiced fricatives are clearly not underlying segments, nor, however, does the FVR behave as a typical allophonic rule. While we see that voiced fricatives are not active in the phonology, they are, in a sense, “deeper” than other, more canonical allophonic variants—such as the modern English flapping rule or aspiration. This observation carries no theoretical weight, serving merely as an impressionistic speculation. However, the contrastive hierarchy again provides a potential explanation for the voiced fricatives. Since the hierarchy specifies voicing as contrastive for all obstruents—and thus by logical extension for the fricatives—the fact that a voiced counterpart behaves unlike an allophone is consistent with oppositions determined by the contrastive hierarchy.

Historical evidence: the emergence of fricative voicing contrast

The phonemicization of voiced fricatives in Middle English has received various explanations. Handbooks cite the influence of French loanwords and the loss of inflectional endings, both of which lead to a voicing contrast among fricatives in initial and final position. A more systematic proposal—and one that has the merits of motivating the change language-internally—is that of Kurath (1956), who relates the loss of long consonants to the emergence of voiced fricatives as phonemes. Each of these proposals, however, fails to situate the voicing changes in the fricatives within laryngeal system of the language in general.⁹ That is, not only is voice contrastive for fricatives in ME, but certain voicing assimilation processes—ones entirely absent in the Old English sound system—emerge in ME. For instance, voiced obstruent clusters appear in later English (including PDE), whereas voiced obstruent clusters arise in OE only through other processes (as shown in section 2). For instance, the familiar modern English third person present tense allophonic rule emerges in late Middle English (Millward 1996), so that voiced obstruent clusters emerge in any number of words, such as *reads* or *robs*. However we characterize this phenomenon, we note that post-OE English has a rule (or perhaps a

9. There is a strong argument that Kurath’s proposal fails to explain the emergence of contrast. I omit this discussion for brevity.

constraint) requiring clusters to agree in voicing features, given standard, textbook accounts of this phenomenon (e.g. Gussenhoven and Jacobs 1998). Crucially, though, it appears modern English has voiced obstruent clusters, as well as voiceless obstruent clusters—i.e., clusters agree for voicing. We note, too, that OE has voiced obstruent clusters and voiceless ones. However, as was extensively shown in section 3, the OE voiced clusters emerge not via a voicing assimilation rule, but through FVR and syncopation. Thus the voiced clusters in forms such as *ra[zd]e* and *heo[vd]es* are only apparent voiced clusters. No rule of voicing assimilation (to [+voice]) is operative in OE. It is this related change that earlier accounts of the historical change fail to consider. With this in mind, we now turn to explaining the emergence of voiced obstruent clusters and voicing contrast in fricatives. It should be note that the following proposal is only a preliminary sketch of changes within the English laryngeal system.

FVR revisited: reanalysis of voicing specification of [v ð z]

As we saw in section 3, certain forms appear opaque as to whether FVR is triggered by voiced obstruents or just by sonorants. For instance, in the forms below, the surface forms are ambiguous:

- (31) a. [heavdes] ‘head’ (gen.sg.)
 b. [ræ:zde] ‘he rushed’
 c. [ky:de] ‘he informed’

Now, (31) b. and c. each have forms in which the fricatives surface as voiceless: [ræ:st] ‘you rush’ and [ky:θst] ‘you inform.’ The learner, then, would have evidence that there was allophonic variation. Still, however, the environment which triggered FVR might be reanalyzed: that is, the fricatives may be analyzed as becoming voiced in voiced obstruent contexts. The FVR formulated in (11b)—the one which assigns SV to fricatives—then will be reanalyzed as the rule in (11a), where the fricatives receive the voicing specification of voiced obstruents. Thus the learner reanalyzes the specification of voiced fricatives with the bare node of the neighboring voiced obstruent.

- (32) a. [r æ: z d ə s] reanalyzed as [r æ: z d e]
 | | | |
 [SV] [SV] [SV]
- b. [h e ə v d ə s] reanalyzed as [h e ə v d e s]
 | | | | |
 [SV] [SV] [SV]

Adding support to this claim, we note that there are other surface [v]’s which do not arise from underlying /f/. Medial singleton /b/ is spirantized intervocally as [v], as shown by the verb *habban* ‘to have.’ We adopt the derivation of Peinovich (1979), abstracting from the complications of the geminate in the infinitive form:

(33)	UR	/hab + est/	/hab + ide/
	Spirantization	havest	havide
	syncope	havst	havde
	VA	hafst	—
	misc.	hæfst	hævde
	PR	[hæfst]	[hævde]

Notice that the surface [v] in the past tense form does not acquire a voicing specification through any process: its voicing specification is underlying, since the process of /b/ > [v] involves no change in voicing. Thus, this surface [v] has the representation of a voiced obstruent, shown below, where [v] is underspecified just like /d/:

(34)	h	æ	v	d	ə

The reanalysis, then, of [v] < /f/ is motivated on analogy to this surface [v] which, in fact, carries an underlying voicing specification. This reanalysis has effects on the contrastiveness of voicing in fricatives. The learner knows that obstruents with [SV] specification acquire that specification by contextual rule (assuming that there are no underlyingly [SV] obstruents) and thus an [SV] obstruent is non-contrastive for voicing. The learner also knows that a voicing specification such as that given to voiced obstruents is a contrastive specification. So, once the voiced fricatives are reanalyzed with the specification previously reserved for contrastive voice, the fricatives are in a position to be reanalyzed as contrastively voiced.

The reanalysis of the specification on fricatives also points to the change in status of voiced obstruent clusters in Middle English. Since FVR is reanalyzed as occurring in the context of a vowel and voiced stop, then a rule for cluster voicing agreement may emerge. Notice that English does not change in the nature of its laryngeal system—OE and Modern English are both CV systems (Avery 1996). The differences arise when we consider whether voiced obstruent clusters arise through syncope (where agreement for voicing is “accidental”) or whether they arise through a cluster agreement rule, which appears to be the case from ME on. It has been argued here that sometime during OE, or perhaps ME, obstruent clusters were subject to a voicing agreement rule, rather than just the voiceless assimilation rule.

It is not clear here whether the phonemicization of voiced fricatives is a symptom of this reanalysis, whether this reanalysis aided the emergence of a voicing contrast, or whether phonemicization of fricatives helped bring about this reanalysis. This question of teleology requires us to return to other arguments put forth for the change (Kurath 1956). Moreover, it might be argued that there is nothing in the reanalysis proposed here which explains why the voicing contrast emerged when it did. Since the interaction of VA and FVR shown here existed throughout OE, the question is why the reanalysis did not take

place earlier.¹⁰ However, the voicing reanalysis adopted here may go to explain why the language was receptive to contrastively voiced fricatives.

Moreover, given that the contrastive hierarchy in (7) shows voicing to be contrastive in the domain of all obstruents, then we arrive at the surprising conclusion that no voicing contrast actually emerged among the fricatives in ME. Rather, the voicing contrast was always there, just at the level of the contrastive hierarchy.

Conclusion

We have seen that the voiced fricatives of OE contravene a number of typical characteristics of allophonic variation. First, their voiceless counterparts are specified, as shown by VA. Second, the rule which derives the “surface” variants is early in the phonology, perhaps even a lexical rule (Kim 2001). In these respects, [v ð z] are “deep” rather than surface variants. At the same time, too, the interaction of FVR with syncopation creates surface voiced obstruent clusters. These clusters create the opportunity to reanalyze the voicing specification of voiced fricatives, from a contextual voicing (SV) to a voicing representation identical to the underlying specification associated with voiced stops. In this respect as well, voiced fricatives show a tendency to behave as underlyingly voiced.

The formal mechanism which captures this tendency of voiced fricatives is the contrastive hierarchy. Technically speaking, the contrastive hierarchy predicts that voicing is contrastive in fricatives—since it is contrastive for the super set of obstruents. The question now becomes why there are no underlyingly voiced fricatives in OE (but cf. Lass 1991 and Bennett 1955 which suggest that there might be). We can speculate that the gap in the contrastive hierarchy is not a featural gap but a segmental gap. And the phonetic voiced fricatives are prone to fill this gap. The interaction of syncopation and VA feed this tendency, as do surface voiced obstruent clusters and the spirantization of /b/ to [v].

It may be less of a surprise, then, that French loan-words were accepted into English in ME with contrastive voicing. The contrastiveness was always available, but English needed the lexical items to fill the gap. This proposal now asks us to reconsider how we interpret the distribution of voiced and voiceless fricatives in OE. The absence of voiced fricatives initially and finally is not a systematic gap, as is assumed. It is an accidental gap, which the contrastive hierarchy presented here encodes.

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10. See Lass (1991) for a dramatic reanalysis of the orthodox characterization of this very allophonic variation in OE; Anderson presents orthographic and dialectal evidence which questions the allophonic status of voiced fricatives in OE.

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