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AKADÉMIAI KIADÓ

Another fortis-lenis language: A reanalysis of Old English obstruents

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ABSTRACT

The theoretical framework adopted in the analysis of Old English obstruents is laryngeal realism, a framework using privative features in modelling laryngeal oppositions. Equipollent oppositions, although real in the phonetic sense, must clearly be delineated from phonology. Old English obstruents are either unmarked (lenis/neutral) or marked: ⟨b⟩ /b/, ⟨d⟩ /d/, ⟨cg⟩ /dʒ/ or /ɟ/, ⟨g⟩ /g/ are not marked for [voice] (although they are passively voiced between sonorants) and as such cannot regressively voice obstruents, singleton ⟨p⟩ /p/, ⟨t⟩ /t/, ⟨ć⟩ /tʃ/ or /c/, ⟨c⟩ /k/ are marked for [spread] (aspiration, or GW 'glottal width'), singleton ⟨f⟩, ⟨þ/ð⟩, ⟨s⟩, ⟨g⟩, ⟨h⟩ are unmarked, but are passively voiced in the ÝFricV/Son environment. Fricatives in unstressed syllables (even when couched between sonorants) are not voiced. If there is a sonorant separating the fricative from the stressed vowel there is no voicing (ÝSonFricV/Son). The only voiced fricatives after a stressed vowel+sonorant consonant are /f/ [v] and /x/ [ɣ] (but this is a historical coincidence). (Phonetically voiceless) Geminates, s+stop and f/h+stop clusters are special in that they constitute a sequence of a fortis followed by a lenis obstruent impervious to passive voicing.

KEYWORDS

Old English, West Germanic, privativity, laryngeal realism, obstruent, lenis-fortis, conditions on voicing of (geminate) obstruents, phonologically contrastive fricatives, degemination

1. INTRODUCTION

The debate over whether Old English (OE) had a phonemic contrast between voiced and voiceless obstruents and whether this contrast had something do with the internal processes

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of the language (loss of stress, syncopation of unstressed vowels) or perhaps areal influence of Celtic[1] still generates interest. The topic was discussed in classical structuralist terms by, among many others, Moulton (1954, 1972), Kurath (1956), Hogg (1992), but also in terms of Government Phonology (Wójcik 2001).

The question whether the topic is still worth pursuing lies in deciding whether earlier analyses dismissed any aspect of analysis (or perhaps did not consider raising it). As the likelihood of finding any new OE manuscripts with patterns of data radically different to those that have already shaped our understanding of the phonology of this language is almost non-existent, we must resort to analysing the existing data from a different perspective.

The shift of analysis will have to involve the reinterpretation of OE along the dimension of laryngeal oppositions. The question of whether OE was a language which contrasted phonologically voiced obstruents with phonologically neutral (= voiceless) ones will be answered in the negative. OE is better analysed as having contrastive fortis (marked) and lenis (unmarked, neutral) stops and only one series of (neutral) fricatives. Unmarked means phonologically unspecified for any laryngeal feature phonologically, marked means being phonologically specified for a particular feature (in OE, the fature of aspiration, spread glottis or GW 'glottal width (dimension)' of some analyses). In other words, an analysis based on privative features is adopted here.

Stops must be delimited from the fricatives based on their behaviour. It is well-known that there were two series of stops and one series of fricatives in OE. Judging by what we can gather from the manuscripts, stops that are traditionally taken to show voiced sounds are not normally found devoiced: *scandful* 'shameful' is not normally found as ***scantful* in spite of being followed by *f* [f], a phonetically voiceless fricative (in all known accounts on fricatives). It is also commonly accepted that fricatives were voiced between voiced sounds (as in *hūsian* 'to house', which contains a voiced fricative as evidenced by modern English *house*). The stops are (held to be) voiced in their own right (*bīdan* 'wait', representing [bīdan], phonologically /bīdan/). Yet, there are no examples of regressive voicing (*lēohtbǣre* 'luminous' is not found as ***lēohdbǣre/lēogdbǣre*).

The contested question of whether a voiced environment on both sides of a fricative was sufficient for a phonetically voiced fricative must also be addressed, and whether it was possible to have a phonetically voiceless (!) fricative when it was surrounded by voiced sounds in a stressed syllable. The most controversial issue of all is whether OE had phonologically contrastive voiceless fricatives, the answer to which will be yes, it did have them, but not as traditionally assumed. We will try to reanalyse some of the views on the laryngeal oppositions in OE and see whether these are better described in terms of lenis-fortis, rather than voiced-voiceless, a claim which has not been made so far for OE (but one that has been proposed for Old High German, and Common Germanic). Before we try to reassess the data, it will be necessary to look at OE from the perspective of laryngeal oppositions. The article is structured as follows: in §2 OE is presented in terms of laryngeal oppositions; in §3 the fricatives are analysed. §4 is devoted to the history of fricatives in OE. In §5 a reanalysis of the stops along the lines of lenis-fortis is attempted. §6 tries to reassess the status of lenis and fortis geminates, and finally, §7 tackles some of the contentious issues of OE fricative (de)voicing.

[1] Laker (2009), or less seriously, Nielsen (1994), Kristensson (1994).

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2. OLD ENGLISH IN TERMS OF LARYNGEAL OPPOSITIONS

The reference accents of Modern English (MoE), like Southern Standard British, General American, or German are phonologically different from the reference dialects of Hungarian, Serbo-Croatian or Dutch. The latter three have a contrast between phonologically voiced (marked) and voiceless (unmarked) obstruents, the former three a phonological opposition between fortis (marked) as opposed to lenis (unmarked) obstruents. The phonological difference between these two types of languages is not that English invariably has phonetic aspiration on /p t k/ in all positions, as opposed to a language like Hungarian, which never does. It is the behaviour of the two classes of obstruents in the two types that is responsible for the classification. There is a long-standing tradition behind the classification of languages into either voice/voiceless or aspirated/non-aspirated, as discussed by Honeybone (2002, 2005). The question of what feature to choose to represent the opposition in a language with a binary set of oppositions in the obstruents is a moot question.

A mere look at the orthography of a language is not revealing: seeing a ⟨b⟩ (as in English *book*, Serbo-Croatian *braniti* 'defend') (orthographically) opposed to a ⟨p⟩ (*pack*, *praviti* 'do') does not say much about which feature of the opposition is relevant phonologically. Phonology does, however, show which feature is active: in English there is no regressive voicing assimilation in, for example, *backbone* ([bakbəwn], **[bagbəwn]), just as there is no regressive assimilation of voicelessness in *bagpipe* ([bagpajp], **[bakpajp]). In Serbo-Croatian, however, there *is* such an assimilation: the prefix *od-* 'away from' is found as either [ot] or [od] depending on the voicing specifications of the first obstruent of the verbal stem (*odbraniti* 'defend against', *otpraviti* 'send away').[2] The question of why there is no voicing assimilation in either *backbone* or *bagpipe* can be handled in two ways: under the assumption that English and Serbo-Croatian have the same set of underlying voiced (/b/) vs voiceless (/p/) phonemes, the difference can be handled as deriving from the absence of some kind of assimilation rule (in English). This tradition (called tradition (i) in Honeybone 2005, 327) views English and Serbo-Croatian as being underlyingly identical in their set of oppositions in the obstruents (cf. Lisker & Abramson 1964; Lombardi 1991, 1994; Wiese 1996; Hammond 1999, and many others). T.A. Hall (2001, 32) refer to this as the 'broad' interpretation of the feature [voice]. In the 'broad' interpretation of [voice] originating in Lisker & Abramson (1964, 389), who emply binary features, oppositions between plosives at the phonological level may be implemented by any two of the following three phonetic categories: *negative* voice onset time (as in Serbo-Croatian ***b**raniti*), *short-lag* voice onset time (as in standard English ***b**one*) and *long-lag* voice onset time (as in English ***p**ony*).

The other approach (referred to as tradition (ii) in Honeybone 2005, 328, something already present in Jakobson 1949, 423–424) has a 'narrow' interpretation of the feature [voice] with 'voiced' applied to only those phonetically voiced sounds with actual vocal fold vibration that disclose phonologically testable voicing (as in regressive voicing assimilation) as opposed to merely phonetic/predictable/passive voicing (cf. the first clear proposal for the 'narrow'

[2]The only environment where we can see the 'underlying' form of the prefix (/od/) is the prevocalic/pre-sonorant position: *odudarati* 'differ', *odluka* 'decision', *odmazda* 'revenge'. The underlying voiceless prefix /s(a)/ 'with' is also found both voiced (*zbogom* 'goodbye' < *sa bogom* 'with god') and voiceless (*s pravom* 'rightly' < *sa pravom* 'with right'). Note also that Serbo-Croatian orthography shows the category change from a voiced obstruent to a voiceless one (as in *otpraviti*).

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interpretation of voice by Rooy & Wissing 2001).[3] In terms of the 'broad' interpretation (of Lisker & Abramson 1964) the [voiced] member of a pair of opposites must have negative voice onset time phonetically (as in Serbo-Croatian ***b**raniti*) to be relevant phonologically. The 'narrow' interpretation holds that Serbo-Croatian and English embody two different types of languages: the former has a phonologically marked/voiced series of obstruents (whatever the graphical exponent is) opposed to an unmarked/neutral series (/b/ *braniti* vs /p/ *praviti*), the latter has a marked/aspirated series opposed to an unmarked/neutral one (/p^h/ *pack* vs /p/ *back*). The orthographic coding of these differences is immaterial phonologically: English /b/ may be spelled ⟨b⟩, as in *cab* or *asbestos*, or ⟨p⟩, as in *apt* (cf. Szigetvári 2020). English [p^h], however, is never spelled ⟨b⟩. How close the relationship is between orthography and the underlying phonological reality is again a matter of tradition, the cultural background behind the tradition of literacy, the conservatism of a spelling system, etc.[4]

This 'Germanic' tradition refers to /p/ as lenis, /p^h/ as fortis. This tradition can be traced back at least to Sievers 1876, Winteler 1876, Jacobson 1949, Jacobson, Carl Gunnar Michael Fant & Halle 1952, Catford 1977, Kohler 1984, Iverson & Salmons 1995, 1999, 2003, Petrova 2011, Stahlke 2003, Honeybone 2005, Szigetvári 2020, and many others use phonological arguments to support this 'Germanic' view of the nature of oppositions in the (Germanic) obstruents. In Honeybone (2002, 2005) this view is termed 'laryngeal realism', describing a set of assumptions rooted in the phonological reality of the laryngeal features (as measured against the set of phonological processes likely to result from these). The features used to embody the fortis-lenis opposition are many and varied, but the underlying assumption remains the same: lenis obstruents are unmarked/neutral/possessing no phonologically encoded feature, fortis ones are marked by possessing a [spread glottis] (Iverson & Salmons 1995), [+tense] (Jessen 1999), H (Harris 1994), [aspiration] (Lombardi 1991, 1994) feature or a GW 'glottal width' dimension (Avery & Idsardi 2001). Strictly speaking, which mnemonic label is used to encode the opposition is immaterial (cf. also Lisker 1986, 4). The basic tenet, however, remains that in laryngeal realism only *privative* features can be used and consequently oppositions can only be privative.

The question now is what characteristics fortis-lenis languages such as English exhibit phonetically. They will:

(i) typically have aspiration on the phonetically voiceless obstruents (in English, a fortis obstruent is strongly aspirated in word-initial position and/or when followed by a stressed vowel),
(ii) lenis series will be passively voiced between sonorants (in English, a lenis obstruent is phonetically voiced when both followed and preceded by a sonorant or other lenis obstruents which are in turn preceded/followed by other sonorants or lenis obstruents, cf. Stahlke (2003, 200), Cruttenden (2014, 164), Szigetvári (2020) another),

[3]Their conclusion is worth repeating here (p. 325): "The hypothesis proposed in this paper is that the distinctive feature [voice] automatically entails the presence of regressive voicing assimilation in a particular language, provided that the feature [voice] is interpreted in the narrow sense of the actual presence of vocal fold vibration. This is evident from the widespread occurrence of regressive voicing assimilation in language of the world that all happen to share the distinctive feature [voice]."

[4]Serbo-Croatian and English spelling are both based on Latin, but the phonological system of the two languages is very different.

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(iii) there will be instances of assimilation to voicelessness, rather than voicedness, so post-fortis sonorants are often phonetically devoiced (in English, *prime, queen, tune* all have phonetically voiceless/aspirated sonorants: r̥ w̥ j̊). In English, lenis obstruents word-initially and finally are phonetically voiceless, but the cues for recovering a phonetically voiceless (lenis) obstruent after a stressed vowel are not lost: stressed vowels are longer before lenes than they are before fortes (*ridge* vs *rich*), cf. Stahlke (2003), Cruttenden (2014), Kaye (2014), Wells (2008), Szigetvári (2020). Quite to the point, Lisker (1986) lists 16 properties associated with voicing in English and expressly states that the list is incomplete.

(v) A lenis obstruent in a language like English is not strong enough to carry phonetic voice on its own, but this does not preclude it from being passively voiced phonetically (as in *abbot*, where /b/ is lenis phonologically and passively voiced phonetically, i.e. [b], in want of a better symbol)[5]

(vi) A fortis obstruent can never be phonetically voiced, but it can appear without aspiration (in *bat*, the /t/ is fortis phonologically and not aspirated phonetically). It must be noted that a feature like H 'aspiration' carries intuitively a rather well-defined phonetic interpretation ('a puff of air'), but this feature (or the one used in its stead, 'h', here) is more abstract than this: in some languages it can be realised as pre-aspiration (as in Icelandic under certain conditions, e.g. *epli* 'apple' [ɛhplɪ], *opna* 'open' [ohpna], cf Árnason 2011), its presence in a fortis fricative does not necessarily imply an aspirated fricative, given that there is no audible release phase in a fricative, but rather an articulatory gesture that can be timed to be sufficiently different from that of a lenis fricative (cf. Vaux (1998) who argues that voiceless fricatives in Julfa Armenian are [spread] glottis). (Phonetically) Aspirated fricatives, however, are not an impossibility, as shown by Burmese (Ladefoged & Maddieson 1996).

(vii) Stops that are laryngeally marked for 'h' may not be aspirated at all: MoE *hit*, with /t^{h}/, has no aspiration on [t], but it can always be distinguished from /d/ (phonetically [t]) in *hid* by virtue of other acoustic cues (a shorter vowel before [t] or pre-glottalisation, or a combination of the two, not found for /d/ in *hid*). This is why the term fortis (vs lenis) is more neutral with respect to the acoustic correlates that the feature 'h' stands for.[6] No analyst working with privative features will deny that while phonology is stripped to the barest relevant minimum, phonetics is overspecified and brimming with *equipollent* oppositions (cf. Avery & Idsardi's (2001) analysis of English and Korean): in *atop* vs *adopt* the phonological opposition between fortis /t/ and lenis /t/ is not only characterised phonetically by aspiration but also (passive) voicing ([t^{h}] vs [d]), to mention just two of the commonly assumed differences.

After this short detour into modern English, let us see what we can glean from OE. Quite understandably, in the major works on OE phonology, like Hogg (2011) or, more recently, Ringe & Taylor (2014), the terms 'aspirated' or 'lenis' are not even mentioned. Hogg (1992, 90), however, says "there is no way of telling whether these stops [/p t k/] would have aspiration in initial

[5]Prevocalic fricatives can be phonetically voiced even if they are not preceded by a lenis or a sonorant (as in *vile* vs *file*, cf. Jansen 2004). This distinguishes them from the stops (in *din*, the ⟨d⟩ is phonetically voiceless, distinguished from the ⟨t⟩ of *tin* by aspiration).

[6]In a dead language like OE finding such phonetic distinctions is beyond any possibility. What's more, there are no squabbling OE orthoepists with an 'axe to grind'. OE remains locked within itself, with no testamentary evidence of any kind from any extraction, foreign or otherwise.

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position in the syllable, a characteristic feature of present-day English which distinguishes it from, say, Dutch." It is 'voice' and 'voiceless' that are found to the exclusion of 'fortis' and 'lenis'. But then, the justification for the use of exactly these features (and their ramifications) is never explained: does 'voiced' in any description of OE mean phonetically voiced or phonologically voiced? Naturally, the effect of phonological voicing would be the only feature that is relevant for a historical analysis and expected to show up as such.[7] The lack of reference to fortis/lenis or, indeed, the unquestioned acceptance of a phonological system rooted in a voiced-voiceless set of oppositions may have its origin in the Latin-based spelling system of OE, (blindly) applied to the phonology of OE. After all, a ⟨b⟩ in *bone* ought to be a /b/, which is phonologically voiced. What's more, what does a change from ⟨b⟩ in *describe* to ⟨p⟩ in *description* show, if not devoicing (and what distinguishes it from the apparent lack of such a change witnessed by ⟨b⟩ in *sub* in *subscribe/subscription*)? Almost all technical textbooks (e.g. Hogg 2011, 246) contend that pre-OE /b/, for example, was realised as [b], as in **bindan* 'bind', **habbjan* 'raise', etc. Little discussion is offered on the correspondence between recorded OE ⟨b⟩ and the supposed phonological representation (/b/), whose pronunciation was [b] word-initially (*bindan*). We will see that we have reasons to suppose that ⟨b⟩ was in fact [p], and ⟨p⟩ (at least) word-initially was [p^h]. Whatever the phonetic difference was between the sounds represented by ⟨b⟩ and ⟨p⟩, the opposition must have been a real one in phonological terms.

A notable difference is Minkova (2014, 27), who devotes a short discussion to the degree of glottal opening viewed from the history of the language: (i) the non-cooccurrence of /h/ on aspirated stops (**hp, **ht, **hk, cf. hn, hl, hr, hw) and (ii) the distributional facts (aspirated stops and /h/ are found in identical environments: *betoken – behave*) suggest that aspiration may have been phonologically relevant. However, Minkova chooses to follow the tradition on 'voiced' vs 'voiceless' in her account of (O)E phonology, noting though that it may have its flaws.

We should find those points of reference which could help determine whether OE was a fortis-lenis or voiced-voiceless type of language in its system of obstruents. One piece of evidence could come from voicing assimilation across morphemes. The evidence we can gather can only come from the spelling of the stops from, for example, ⟨d⟩ for expected ⟨t⟩ or ⟨t⟩ for ⟨d⟩, not the fricatives (discounting certain examples of 'hardening' from, /θ/ to /t/, for example, which may or may not show a change in the laryngeal specification), whose phonetic voicing depended on context (or at least so it seemed to OE scribes), so their differentiation was never attempted by any scriptorium.

Theoretically, we could expect to find signs of voicing assimilation across any free (root) morpheme. This, however, is not a characteristic feature of OE: in a sequence like *eft byreð* 'bears again', post-lexical voicing (if any) of ⟨t⟩ to ⟨d⟩ is not shown (***efd*), neither is post-lexical devoicing shown in a sequence like *friðusibb folca* 'peaceful tie of nations' (***-sip(p)*). The data in (1) shows the principal derivative suffixes (morphemes that can be thought of as forming a close-knit unit with the preceding word) beginning with a letter not showing a sonorant sound or a vowel.

[7]Looking at MoE forms like *rose* with /z/ (for expected /rəws/, from *rās* 'Pt' of *rīsan* 'rise') we can see that after the phonemicization of the laryngeal opposition in the fricatives in ME times following the loss of word-final schwa, it was possible (by analogy) to transfer the /z/ of *rise* to *rose* (a form in which it was never found in OE). This is traditionally known as secondary split. French loans like *rose* (from Latin *rosa*) into ME also show a (by then) entrenched opposition of /s/ and /z/.

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(1) Old English derivative suffixes beginning with non-spontaneously voiced sounds (Hogg 2011, §2.89)
-bǣre, -bora, -cund, -dōm, -fæst, -feald, -full, -hād, -scipe, -sum

The expectation in a voiced type of language could be to find ⟨b⟩ regressively voicing the preceding non-sonorant sound, or ⟨c⟩ /k, c/ regressively devoicing the preceding non-sonorant sound (as it would be the case in Serbo-Croatian or Hungarian). As Fulk (2002, 2.1) remarks: "certainly assimilation was not an absolute requirement in quasi-compounds." Using Fulk's examples, see (2) below for something we never find in OE.

(2) Absence of (de)voicing in words formed with derivational suffixes
swicdōm 'fraud', *lēohtbǣre* 'luminous', *scandful* 'disgraceful', *sibsum* 'peaceable', and *rǣdfæst* 'resolute', never ***swi**cg**dōm,*[8] ***lēo**gd**bǣre,* ***scen**t**ful,* ***si**p**sum,* ***rǣ**t**fæst,* etc.

All this despite the ease with which consonants seem to assimilate in voicelessness across clusters (to which we return in 7.7): **blēdsian* > *bledsian/bletsian/blitsian* 'bless', **bīdiθi* >**bīdθ* > *bītt/bīt* 'waits', etc. If OE stops had been phonologically voiced, one would expect to find more (haphazard) examples of regressive voicing or at least some regularity applying to some of the places of articulation (the velar as opposed to coronal or labial, for example). One could say that in words formed with the suffixes in (1) the spelling of the derived words with the voiced or voiceless sounds was reinforced by the simplices, but then the question of (regular) forms like *bītt/bīt* (from *bīdan*) remains obscure. We can also see that whatever feature was responsible for the differentiation of ⟨b⟩ and ⟨p⟩, ⟨d⟩ and ⟨t⟩, ⟨g⟩ and ⟨c⟩, ⟨cg⟩ /ɟ/ or /dʒ/ and ⟨ć⟩ /c/ or /tʃ/, this feature was salient enough phonologically to cue the laryngeal contrast in phonologically weak positions, too, i.e. word-finally and intervocalically. Although not every pair of laryngeally differentiated stops could occur in all positions for diachronic reasons (⟨cg⟩ /dʒ/, for example, was not found word-initially, or /g/, which did not occur word-finally and intervocalically), the contrast was not generally neutralised, see (3), which is not an exhaustive account of the positions in which non-sonorant stops are found.

(3) Non-sonorant stops in the weak positions

	word-final	intervocalic
b – p	*sib(b) – scip* 'relation, ship'	(no intervocalic [b]) *crypel* 'cripple'
d – t	*brȳd – fēt* 'bride, feet'	*blēdan – blǣtan* 'bleed, bleat'
(d)dʒ – tʃ	*brycg – dīć* 'bridge, ditch'	*secges – īćan* 'man GSg, add'

[8] ⟨cg⟩ shows the result of a theoretically possible change from [tʃ] (or [c]) to [dʒ] (or [ɟ]) depending on the age of the text, ⟨gd⟩ [ɣd] a possible case of regressive voicing affecting [xt] (this would certainly be possible in Serbo-Croatian: *odmah dolazi* [ɣd] 'comes immediately').

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All in all, there are no signs for any lenition in the two weak positions displayed in (3): no regular devoicing word-finally,[9] no voicing intervocalically. Of course, the word-initial position remains ideal for cuing all the oppositions, but even that position will lack some of the theoretically possible oppositions with a following vowel (/g/, for example, will not be found word-initially before a front vowel in recorded OE, having been palatalised). OE is thus unlike Danish, in which only the word-initial position can cue the laryngeal differences in the stops. In the weak positions, the Danish stops are all voiceless lenes for all places of articulation, cf. Haugen (1982, 81), Page (1997): *tyk* 'thick', *lække* 'leak', and *tyg* 'chew', *lægge* 'lay' all have [g̊ ß]/[k]). We will return to the question of whether OE had lenis stops. The spelling itself is no evidence, but the absence of regressive assimilation across morpheme boundaries may point towards lenes. We will see more data as we proceed.

3. THE FRICATIVES OF OLD ENGLISH

The obstruental stops of OE showed no signs of lenition in phonologically weak positions. Generally, all the stops could be found in all the positions, weak and strong. The fricatives of OE are altogether more interesting. The general consent is that there was just a single series of fricatives phonologically in recorded OE not distinguished by opposing laryngeal specifications, just place of articulation. Phonetically, there were voiced and voiceless allophones of each (voiceless) phoneme. The standard literature (e.g. Campbell 1959; Hogg 1992; Lass 1994; Ringe & Taylor 2014) does not discuss the potentially interesting ramifications of the claim that the [+/−voice] feature was just a surface phenomenon. The discussions all converge on the claim that voicelessness (i.e. [−voice]) is the default value of a fricative. The feature [−voice] is changed into [+voice] in a voiced environment: voicing can come from both voiced obstruents and vowels/sonorants, which means the voicing value of a fricative depends on the environment, i.e. they are not strong enough to license their own [+voice] feature, even in a phonologically strong position (like the initial). Ringe & Taylor (2014, 6.7.2), for example, claim that the anterior fricatives ([f, θ, s]) were voiced ([v, ð, z]) in fully voiced environments if the preceding syllabic nucleus was stressed. In other words, fricatives were not voiced before a stressed vowel, even word-initially, or after an unstressed vowel: in ***f****aran* 'go', *be****f****áran* 'go round', ***s****endan* 'send', *a****s****éndan* 'send forth', ***þ****ýncan* 'seem', *ge****þ****ánc* 'mind' we have no reason not to suppose that the consonants in bold were not phonetically voiceless. Hogg (2011, §7.54) formulates the rule (somewhat incompletely) as shown in (4) below.

(4) The voicing of fricatives in voiced environments
[C, +cont] > [+voic] / [+voic] ___ [+voic]

[9]There are no systematic examples for word-final devoicing, cf. Hogg (2011, §7.65) though for a few sporadic cases in early OE: *ðrēt* 'thread', *kyninc* 'king', *ðinc* 'thing', *lamp* 'lamb', etc. This makes OE very different to the rest of the West Germanic languages.

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Hogg (2011) makes no reference to the stressed syllable as a conditioning factor, he simply contends that a fricative is not voiced if there is an unstressed syllable immediately preceding it (as in *befaran*). The rule in (3) is followed by 4 explanatory notes, which take care of some of the contentious issues. One of the two relevant notes for the discussion is note no. 2, which tackles the absence of voicing in geminate fricatives and **/sk/ with the palatalised reflex /ʃʃ/. They regularly fail to abide by the rule in (3), but no argumentation is given for this. If a geminate is simply a sequence of two voiceless fricatives, why aren't they voiced given the right environment? They obviously were not; not a single example survives with a voiced fricative originating in a voiceless geminate, which must be more than just a coincidence. Note no. 4 concerns the (apparently) many exceptions to the rule in (3). Fricatives in an unstressed syllable in early (or pre-)OE were not voiced. This explanation is due to Luick (1914–40, §639.2) and concerns some of the suffixes: the abstract suffix **-iθo* and the ordinal suffix **-oθa,* for example (there are no modern reflexes that show a voiced fricative: *mirth*, *seventh,* from OE *mirð, seofoða*), as well as the suffix **-isōjan*, found in MoE *cleanse* (with /z/, from OE *clǣnsian*), and *bless* (with /s/, from OE *bletsian*, *bledsian* < **blōdisōjan*). Also problematic is MoE *adze* (with /z/, from OE *adesa* < **adesan-*, which shows that the fricative was originally in an unstressed syllable, so here a voiced fricative is unexpected), etc. We will return to these in Section 7. Perhaps not every voiced (or voiceless) fricative of MoE can be regarded as showing a direct continuation of the OE voiced (or voiceless) fricative. They are not odd, in any way, from the point of view of MoE phonology (*cleanse* is like *lens*).

There existed only the graphemes ⟨f⟩ (in early manuscripts also ⟨b⟩), ⟨s⟩, ⟨þ, ð⟩, ⟨h⟩ (also ⟨g⟩), ⟨sc⟩ to represent the fricatives of OE. No attempt was ever made to systematically distinguish ⟨þ⟩ from ⟨ð⟩, which points to an allophonic distribution of the voiced as opposed to the voiceless pronunciation: word-finally they are voiceless, word-internally in a stressed syllable they are voiced (some often-cited examples follow in (5)).

(5) Allophonic distribution of the anterior voiced and voiceless fricatives
wulf [f], *wulfas* [v] 'wolf', 'wolves'
pæþ [θ], *paþas* [ð] 'path', 'paths'
wæs [s], *wesan* [z] 'I was', 'be'

According to Luick (1914–40, §639.2) there was no voicing of fricatives in unstressed syllables, as in the ones shown in (6).

(6) No voicing of the highlighted fricatives in unstressed syllables in voiced environments in (pre-)OE
*daro**þ**a* 'spears', *dugu**þ**e* 'military company', *earfo**þ**u* 'hardships', **blēdi**s**ōjan* 'bless', *seofo**þ**a* 'seventh', etc.

If the distribution of the allophones in (5) and (6) is correct, the rule in (4) is obviously inadequate to capture this complexity. The question is why there is no voicing of the underlined fricatives in a voiced environment in (6). Note also that the rule in (4) makes no reference to

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whether the presence of a sonorant consonant on either side of a fricative made any difference to the allophonic rule (we will see later that it did).

There is a further problem, one with the importance (or not) of the notion of syllable. Even those who believe that no OE stressed syllable could be light (having a short vowel only)[10] in a polysyllabic word, would not find it convincing that a word like *wulfas* [wulvas] or *earfoþu* [earvoθu] should be syllabified as *wulf.as* or *earf.oþu* just to ensure that /f/ finds itself forced into a stressed syllable. *Wul.fas* and *ear.foþu* would make the first syllable heavy, no further consonants need to be captured by the stressed vowel.[11] Appealing to further 'captured consonants' is theoretically suspicious.

However, if this is so, even the often-cited example of *wulfas* is not straightforwardly transparent anymore: ⟨f⟩ /f/ is in the onset of an unstressed syllable now, so it should be [f] (as in *faran*). If one still argued that in *wesan* the syllabification was *wes.an* to make sure that no stressed syllable of OE was light through coda-capture,[12] we would now be faced with an unrecorded and unwarranted bifurcation of voiced and voiceless allophones: voiceless after heavy syllables (*wul**f**as, ear**f**oþu*), voiced after heavy syllables that show the result of coda-capture (*we**s**an*). Furthermore, if *wesan* is syllabified as *wes.an*, the next step is to admit that /s/ is now in the coda (the end of the syllable), where no voicing is expected otherwise (*pæþ, wulf*). One would certainly have to make stipulations about the difference between word-internal and word-final codas. The syllable as a theoretical notion does not satisfactorily explain why *wulfas* and *wesan* both have voiced fricatives. The question of whether the feature [−voice] is theoretically justified must also be answered in the negative. If a fricative is voiceless, it may merely be *phonetically* voiceless and, simply, unmarked/neutral *phonologically*. Its phonetic realisation is either voiced or voiceless depending on the environment, phonologically, however, it is not marked for any laryngeal feature. Such an obstruent is a lenis one phonologically, it does not bear the feature [voice], it is neutral. Now it is time to see how this state of affairs came about.

4. THE HISTORY OF OLD ENGLISH FRICATIVES (NOCH EINMAL)

Moulton (1954, 1972) gives a structuralist account of the consonants of Common Germanic (CG) from the point of view of the developments of some of the Germanic daughter languages, including OE. (7) shows the CG heritage in West Germanic.

[10]For the OE case, see, for example, Hogg (2011, §2.81).

[11]McCully & Hogg (1990), Dresher & Lahiri (1991), and many others, claim that a stressed syllable in OE must contain at least two moras to be stressed, but not three or more.

[12]Syllabifying *wesan* as *wes.an* violates the Onset Maximization Principle (Kahn 1976) in having a consonant-final syllable followed by a vowel-initial one (now /s/ is in the coda, where no voicing is expected). *We.san* would conform to the unmarked syllable type found in all languages, but then /s/ would be relegated to an unstressed syllable (where voicing may not be the expected outcome). *We.san* also violates the observation that stressed syllables of OE must be at least bi-moraic either by 'nature' or by coda-capture. Somehow, words like *wesan* cannot be syllabified satisfactorily to derive [z], which may simply show that syllabification is not the right tool to crack this problem.

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(7) Common Germanic heritage in the (labial) obstruents of West Germanic

Position	Obstruents			
	f	v/β	p	b
V__V	Y	Y	Y	N
__#	Y	Y	Y	N
#__	Y	N	Y	Y
N__	Y	N	Y	Y
In gemination	Y	N	Y	Y

(7) shows the distribution of the labial obstruents with Y showing possible and N showing impossible instances. As can be seen, and as traditionally assumed, [b] and [v/β] are the allophones of the same phoneme (/b/ in all likelihood): wherever [b] is found [v/β] cannot (word-initially and after a nasal, the stop allophone is found, elsewhere the continuant). The West Germanic innovations are shown in (8).

(8) West Germanic innovations
1. ð > d
2. z > r

(9) Proto-West Germanic intervocalic contrasts for the fricatives
[f] – [v], [θ] – [ð], [s] – [z], [x] – [ɣ]

(10) West Germanic intervocalic contrasts for the fricatives after the changes in (8)
[f] – [v], [θ] – □, [s] – □, [x] – [ɣ]

Change 1. in (8) increased the number of occurrences of /d/ in the language (previously found word-initially and after a nasal). It did not result in a new phoneme, as Ringe & Taylor (2014, 42) say: "In PWGmc the non-coronal voiced obstruents continued to exhibit [the continuant-stop] allophony, but *d [meaning /d/ which is [ð] intervocalically and word-finally] became a stop in all positions," an example for which is **dēðiz* 'deed' (OE *dǣd*). Change 2. in (8) merged all instances of /z/ with an already existing /r/ (**maize-* > OE *māra* 'more', **gaiza-* > OE *gār* 'spear'). Whatever phoneme one reconstructs on structuralist grounds to underlie the stop ~ continuant alternation of [d] and [ð], the fact remains that (phonetically) now [d] is found in those positions in which it did not occur previously (or alternatively, [ð] was removed from positons in which it stood originally in contrast with [θ]): **dauθu-* (OE *dēaþ*) vs. **dau*[d]*a-* (OE *dēad*). /z/ and /r/ had been phonemes since Germanic times, but this change deleted all phonetic instances of [z] which could earlier be contrasted with [s] in similar environments: **kuzun* (OE *curon* 'they chose') vs **nusō* (OE *nosu* 'nose', cf. Hogg 2011, §3.10, note 2). For a speaker acquiring a form of post-West Germanic (leading towards OE), crucial contrasts in the fricatives are lost. There is no change disturbing the distribution of [f] and [v] yet, nor is there a

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change affecting the distribution of [x] and [ɣ]. As we can see, in proto-West Germanic there was no regularity comparable to the intervocalic voicing of OE: intervocalically [f] was contrasted with [v], [θ] with [ð], [s] with [z] and [x] with [ɣ]. The laryngeal differences (whatever they were) could be cued phonetically in non-initial positions in proto-West Germanic. After the change in (8), (10) ensues in (later) West Germanic, showing 'unpaired' [s] and [θ].

OE had its own innovations (see (11) below). One of these was the debuccalisation of [x] to [h] in onset position, followed by the loss of [h] in intersonorant position after a stressed vowel (see (12) below). Word-finally and before obstruents (including itself) [x] was retained, as in *hēah* 'high', *niht* 'night', *hweohhol* 'wheel'. The distribution of the fricatives can be seen in (13) following the early OE innovations in (11).

(11) Pre-/Early-OE innovations
1. x > h
(except before obstruents (including geminates) and word-finally, cf. Hogg 2011, §7.47)
2. h > ∅ (Son__Son, after a stressed vowel)

One argument for claiming that debuccalisation in (11) happened earlier than intervocalic voicing is the absence of intersonorant [ɣ] from */x/ (e.g. **slaxan* > ***slaɣan/?sleaɣan*, for *slēan* 'slay', a form consistent with debuccalisation and loss of /x/).

(12) Examples for (11)
**slaxan* > **slahan* > OE *slēan* 'slay', **swerxa* > **swerha* > OE *swēora* 'neck', **seolxes* > **seolhes* > *sēoles*, **xēaxre* > **hēahre* > *hēare* 'G/DSgF', **xēaxne* > **hēahne* > *hēane* 'ASgMasc' vs **baxǒfōjan* > *behōfian* 'have use for' (/h/ was before a stressed vowel)

(13) Distribution of the fricatives after the changes in (11) (intervocalic and word-final oppositions shaded for identical places of articulation)

/f/	#**f**	V**f**V	V**ff**V	V**f**#
/v/β/		V**v**V		V**v**#
/θ/	#**θ**	V**θ**V	V**θθ**V	v**θ**#
/s/	#**s**	V**s**V	V**ss**V	V**s**#
/(ʃ)ʃ/	#**ʃ**		V**ʃʃ**V	V**ʃ(ʃ)**#
/x/			V**xx**V	V**x**#
/ɣ/		V**ɣ**V		V**ɣ**#
/h/	#**h**			

The distribution in (13) shows that intervocalically the following singleton fricatives remain phonetically: [f v/β s θ ɣ]. The coronal ones have no voiced congeners, out of the two non-coronals, the velar is always voiced, the labial ones seem to qualify for the only voiceless-voiced pair, although there may have been a difference in the place of articulation (labial vs labio-dental, which would have made this pair rest on a very tenuous difference, a feature soon lost).

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Word-finally only the non-coronals were found in contrastive pairs: [f v/β] and [x ɣ]. That there must have been some difference between the two labials is supported by early spelling practices (Hogg 2011, §2.58; Campbell 1959, 197), which have ⟨b⟩ for [v/β] and ⟨f⟩ for [f]: *scēabas* 'sheaves', *salb* 'ointment', *geab* 'gave', *Albred* 'Alfred', but *wolf* 'wolf', *ofen* 'oven' (in German the historical difference is still seen in *gab* vs *Ofen*). At this early time (before the onset of 'intervocalic voicing'), the labial place of articulation was the only one that had a (phonologically) contrastive pair of fricatives in intervocalic and word-final positions.

A system like this is badly in need of reorganisation. The change occurred in the form of loss of whatever laryngeal feature [v] had to distinguish it from [f]. This brought it in line with the rest of the fricatives: now there was just one neutral/lenis labial fricative (/f/) whose phonetic voicing hinged on the environment: whenever it was next to a sonorant or a lenis stop which itself was in contact with a sonorant or a lenis stop, it was voiced. This loss of phonemic opposition between /f/ and /v/ in favour of a lenis /f/ brought with itself another change: a lenis fricative word-finally (i.e. when not supported by sonorants/lenis stops) could only be rendered phonetically voiceless. Word-final /v/ was lost when intervocalic lenis /f/ was born, and now the only fricative to be brought in line with this massive reorganisation was the velar fricative. It was phonetically devoiced word-finally following its reinterpretation as a lenis fricative /x/, one with a defective distribution though: it was found word finally as a phonetically voiceless [x] (collapsing with the voiceless [x] allophone of the historical /x/ now), and as [ɣ] when surrounded by contunuant sonorants/lenis stops. Word-initially (and word-internally before a stressed vowel), historical **/x/* came to be reinterpreted as [h], phonologically /h/ (its presence was phonologically relevant, cf. *healdan* 'keep' vs *ealdan* 'old ASg').

A new system of lenis fricatives was born, whose phonetic voicing was regulated by the environment. The once contrastive system of fricatives gave way to a system of non-contrastive /f/, /θ/, /s/, /x/, /h/, which may be shown as /f^0/, /$θ^0$/, /s^0/, /x^0/, /h^0/ (cf. Honeybone 2005, 332). The last member of the family was no longer a fricative, it came to be reinterpreted as voicelessness or aspiration (/h^0/). The palatal fricative historically comes from /sk/ and can be assumed to have been a geminate (cf. Hogg 2011, §7.37), which was degeminated word-initially (and probably word-finally, too, after the degemination that affected all the geminates, like *webb* 'web' > *web*, cf. Hogg 2011, §2.53, §7.80). There is certainly no example for (MoE) /ʒ/ from the intervocalic voicing of OE /(ʃ)ʃ/. The system of singleton lenis fricatives resulting from the early reorganisation of inherited OE fricatives can be summarised in (14).

(14) The fricatives of Old English

phonologically	word-initially, word-finally (phonetically)	intervocalically after a stressed vowel (phonetically)	spelling
/f^0/	[f]	[v]	⟨f⟩
/s^0/	[s]	[z]	⟨s⟩
/$θ^0$/	[θ]	[ð]	⟨þ, ð⟩
/x^0/	[x] (word-finally and before obstruental stops)	[ɣ][13]	⟨g, h⟩
/h^0/	[h] (before a stressed vowel; in complementary distribution with [x])		⟨h⟩

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The advantage of a system of fricatives in (14) is that the notion of phonetic voice (or voicelessness) has been disentangled from the notion of phonological unmarkedness of the laryngeal specification for this class of OE obstruents. We can assume that intervocalic voicing as a phonetic process still exists: lenis fricatives were passively voiced between phonetically voiced sounds (as in *wesan*, *wulfas*). Word-final and word-initial devoicing is simply the correlate of the neutral laryngeal specification of these fricatives: they cannot be passively voiced because they are not couched between phonetically voiced sounds (*wæs, wulf*). Some of the allophones in (14) have nothing to do with the historical phoneme (or phonemes) to which they originally belonged in pre-OE: [x], historically viewed, is the word-final allophone of both */x/ and */ɣ/, [h] is the word-initial allophone of */x/, [v] may come from either earlier */f/ or */v, β/, [ɣ] comes from */ɣ/ (but never from */x/ of pre-OE), etc. But this is a welcome step because the OE described here is fundamentally different from its predecessor not yet characterised by the changes in (12), let alone the kind of West Germanic from where it originates. We will discuss the issue of geminate fricatives like ⟨f⟩, ⟨ss⟩, etc., in Section 6. These appear to have been always phonetically voiceless (see Section 5 below).

5. OLD ENGLISH STOPS AS LENES

In Section 2 we saw that there was no voicing assimilation across morphemes (or at least there are no orthographic signs of it) in either direction (recall *lēohtbǣre*/**lēohdbǣre* 'luminous', *scandful*/**scantful* 'disgraceful', *scyldhēta*/**scylthēta* 'deputy'). This may simply have been because in OE obstruental stops were not specified for [+voice] (or [−voice]) laryngeally. This did not preclude them from undergoing phonetic voicing, of course, when couched between sonorants/other lenes (as in *dǣda* 'deed, NAPlFem'). We have also seen that whatever feature it was that differentiated /t/ from /d/, this feature was well-cued phonetically in all positions, making OE not exhibit cases of lenition affecting the stops (the /t/ in *bītaþ* 'bite, Pl', for example, never shows conflation with /d/ in *bīdaþ* 'wait, Pl').

Some further data for the stops is shown in (15). The past tense marker of weak verbs in OE appears as ⟨d⟩ or ⟨t⟩ depending on the environment. When this suffix immediately follows a stem-final lenis fricative, the /d/ is unchanged and appears as ⟨d⟩ (past tense forms like *brōhte*, *þōhte* will be discussed in 7.10).

(15) Past tense marker alternations (I)
*rēafidǣ (or *rēaβidǣ) 'deprive, Pt' > OE (late West Saxon) *berȳ**fd**e* [vd] (*berȳfan* 'inf')
West Saxon *gilīeβidǣ 'believe, Pt' > *gelīe**fd**e* [vd] (*ġelīefan* 'inf')
*kȳθidǣ 'make known, Pt' > OE *cȳ**þd**e* ~ *cy**dd**e* [ðd] ~ [dd] (*cȳþan* 'inf')
*rǣsidǣ 'rush, Pt' > *rǣ**sd**e* [zd] (*rǣsan* 'inf')[14]

[13]The distribution of [ɣ] is a complex issue, but this need not concern this analysis. [ɣ] was palatalised after front vowels (**daɣ* > OE *dæg* [dæj] 'day'). After back vowels word finally, it was devoiced: **plōɣ* > OE *plōg/plōh* 'plough'. Intervocalically, as in *duguþ* 'valour', it may have become a velar approximant, as supported by Middle English developments, which show that it is continued as /w/: *duwþ* (cf. MoE *doughty*).

[14]Examples sourced from Ringe & Taylor (2014, 6.7.2), with the thorn (þ) silently replaced with θ and b with β in phonological derivations in the current discussion.

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xuɣdǣ* 'think, Pt' > *hogd**e* [ɣd] (*hycgan* 'inf')
bruɣdun* 'move fast, PtPl' > *brugd**on* [ɣd] (*bregdan* [jd] 'inf')

After the deletion of **i* after heavy syllables (in Class I weak verbs), **d* came to follow the lenis fricative (*hogde* never contained an **i*, but behaves identically to the rest of the fricatives). The ⟨d⟩ here shows that the preceding lenis fricative was phonetically voiced if the fricative was preceded by a vowel or a sonorant consonant and followed by a lenis stop, followed by a sonorant (similarly to MoE *husband*). All authorities agree on this, although not along identical lines. One can argue that this may simply show the effects of an underlyingly voiced stop on a preceding fricative (OE would at this point behave like a voicing language). We need to broaden the horizon somewhat and look at the data in (16).

(16) Past tense marker alternations (II)
(a) after sonorants
hīeridǣ* 'hear, Pt' > *hīerd**e* [d] (*hīeran* 'inf')
dǣmidǣ* 'judge, Pt' > West Saxon OE *dēmd**e* [d] (*dēman* 'inf')
giernidǣ* 'be eager for, Pt' > *giernd**e* [d] (*giernan* 'inf')
fyllidǣ* 'fill, Pt' > **fylldæ* > *fyld**e* [d] (*fyllan* 'inf')
bīeɣidǣ* 'bend, Pt' > **bīejidǣ* > *bīegd**e* [d] (*bīegean* 'inf')

(b) After (geminated) voiceless stops
mǣtidǣ* 'meet, Pt' > West Saxon OE *mētt**e* [t] (*mēttan* 'inf')
kǣpidǣ* 'keep, Pt' > **kǣpdæ* > West Saxon OE *cēpt**e* [t] (*cēpan* 'inf')
lǣstidǣ* 'follow, Pt' > *lǣst**e* [t] (*lǣstan* 'inf')
dræntʃidǣ* 'make someone drunk, Pt' > **drentʃdǣ* > *drenct**e* [t] (*drencean* 'inf')
**dyppidǣ* 'dip, Pt' > **dyppdæ* > *dypte* [t] (*dyppan* 'inf')
θryttʃidǣ* 'press, Pt' > **θryttʃdæ* > *þryct**e* [t] (*þryccean* 'inf')
blittʃettidǣ* 'glitter, Pt' > **blittʃettdæ* > *bliccett**e* [t] (*bliccettan* 'inf')

(c) After voiced stops[15]
mæŋgidǣ* 'mix, Pt' > **mændʒidǣ* > **mendʒdæ* > *ge-mengd**e* [d] (*ġe-mengean* 'inf')
sændidǣ* 'send, Pt' > **senddæ* > *send**e* [d] (*sendan* 'inf')
kæmbidǣ* 'comb, Pt' > **kembdæ* > *cembd**e* [d] (*cemban* 'inf')
lǣdidǣ* 'lead, Pt' > **lǣddæ* > **lǣdd**e* [d] (*lǣdan* 'inf')

(d) after geminate fricatives
pyffidǣ* 'breathe out, Pt' > **pyffdæ* > *pyft**e* [t] (*pyffan* 'inf')
skæθθidǣ* 'injur, Pt' > **ʃʃeθθidæ* > **ʃʃeθθdæ* > *sceþt**e* [t] (*sceþþan* 'inf')
kyssidǣ* 'kiss, Pt' > **kyssdæ* > *cyst**e* [t] (*cyssan* 'inf')
wȳskidǣ* 'wish, Pt' > **wȳʃʃidǣ* > **wȳʃʃdæ* > **wȳsct**e* [t] (*wȳscean* 'inf')

[15]Note that there do not seem to be examples for geminated stops (*bb, dd, gg*) that are not the result of West Germanic Gemination. Those that are the result of West Germanic gemination cannot be found before the suffix **-id.* In this environment they are found (historically) in OE as /f^0/ (for /bb/ in the rest of the paradigm before vowels), /d/ (for /dd/), /j/ (for /ddʒ/, from /ɣɣj/). There were original Germanic geminates too, but they are found medially on voiceless stops and some of the sonorants: *hoppian* 'hop', *cnotta* 'knot', *steorra* 'star', etc. (cf. Hogg 2011, §4.2).

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Now we must examine the distribution of the past tense suffix. In (15), we see that the past tense suffix is realised as [d] ⟨d⟩ after lenis fricatives. After sonorants (16a) it is also [d] ⟨d⟩, not surprisingly. In (16b), after (geminated) voiceless stops it appears as [t] ⟨t⟩. In (16c), after voiced stops it is found as [d] ⟨d⟩. After geminate fricatives (16d) it is found as [t] ⟨t⟩. Generally, one can say the past tense suffix in this class of verbs shows a simple alternation of voiced/voiceless depending on the last sound of the verbal stem (if it is voiceless, the suffix is [t], if it is voiced, the suffix appears as [d]). From this should follow what traditional wisdom has always argued for: the stops of OE ought to be distinguished with the feature [voice], /ʃ/, for example, being [−voice], /b/ being [+voice]. This seems a straightforward enough distribution, but some doubt must be cast on whether this is the right description. We have already seen that the fricatives are best analysed as lenes. Can the same be done for the stops? The answer is yes, and such an analysis was attempted earlier for Old High German by Moulton (1972, 1.2.7), Penzl (1968a, 147), Goblirsch (1997, 136). Penzl (1971, 150–152) reconstructs a fortis/lenis opposition for Common Germanic.

The expectations in a voicing language is that the feature [voice] should be able to spread regressively onto obstruents (similarly to Hungarian or Serbo-Croatian) given that this is a distinguishing (marked) feature of these consonants. This is, however, not what we see for OE: the past tense suffix [d] is unable to spread voice backwards, which would mean that it had no such laryngeal feature to spread. If, for the sake of argument, we take OE to be a voicing language, the following pattern should emerge instead (see (17) below).

(17) Old English as a voicing language
(a) = (16b) After (geminated) voiceless stops
mētidǣ* > ***mēdd**e* [d] (for *mēt**t**e*)
kǣpidǣ* > ***cēbd**e*/*cēf**d**e* [d] (for *cēp**t**e*)
θryttʃidǣ* > ***þrycgd**e* [d] (for *þryc**t**e*)

(b) = (16c) After (geminated) voiced stops
kembidǣ* > (**)*cembd**e*

(c) = (16d) After geminate fricatives
kyssidǣ* > ***cysd**e* [d] (for *cys**t**e*)
pyffidǣ* > ***pybd**e*/*pyf**d**e* [d] (for *pyf**t**e*)

(d) = (15)
kȳθidǣ* ‘make known, Pt’ > (**)*cȳþd**e* ~ *cyd**d**e* (*cȳþan* ‘inf’)
rādǣsidǣ* ‘rush, Pt’ > (**)*rāds**e* (*rādsan* ‘inf’)
xuɣdǣ* ‘think, Pt’ > (**)*hogd**e* (*hycgan* ‘inf’)

In this type of alternative OE, the past tense suffix spreads its voice feature regressively, leading to unattested forms in (17a) and (17c). In contrast to these, (17b) would not disclose the active laryngeal feature of this alternative OE (we would expect *cembde* for both this type of OE, and the one attested). We also have to conclude that only looking at the behaviour of the fricatives in contact with the past tense suffix (in (15)) would not disclose what type of language OE was. In this alternative (voicing) OE, the past tense suffix /d/ would be expected to voice the fricatives, leading to identical results with those observed for attested OE ((17d) = (15)). On balance, we have to conclude that OE voiced stops were *phonetically* voiced (in the right environment), but

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phonologically not marked for any laryngeal feature. In other words, they were lenis: /b^0/, /d^0/, dʒ^0/, /g^0/. When preceded by a sonorant/vowel (or lenis fricative) and followed by a sonorant/vowel, they were passively voiced (*rǣsde*, *cȳþde, cem(b)de*, *gemengde, iernde)*. Of course, the lenis fricative was also passively voiced under the same circumstances (*rǣsde*, *cȳþde*).

In OE it is the voiceless stops and (geminate) fricatives that devoice the past tense suffix (*cēpte*, *pyfte*), rather than the past tense suffix that voices the fricatives regressively. Now that OE has proved not to be a voiced language, but one that has lenis stops and fricatives, a new feature must be invoked to explain *cēpte* and *pyfte*. In MoE this is conveniently the feature of aspiration, which resides in the marked members of the obstruents (Honeybone 2005; Szigetvári 2020). We may assume this feature was present in what is thought of traditionally as voiceless stops of OE, making OE an aspirating language phonologically: /p^h/, /t^h/, /tʃ^h/ (or /c^h/) and /k^h/. This feature now distinguishes the first stop of *cnāwan* 'know' (/k^h/) from *gnagan* 'gnaw' (/g^0/). The feature of aspiration is used here as a phonologically distinguishing feature, which may not always have been present phonetically (it may have had other phonetic correlates, like pre-glottalisation, etc). How the feature of aspiration was actually realised phonetically is something that will have to remain a matter of conjecture. There are no proprioceptive descriptions dating from this period, either native or non-native. We know of no OE orthoepist who has an axe to grind with any other scribe or scriptorium over issues pertaining to pronunciation or how pronunciation appears in spelling. Even granting all this, OE stops were distinguished by a laryngeal feature, one which can't have been the feature of [voice], but rather the feature of aspiration, shown as 'h' here.

The presence of the feature of aspiration as an underlying distinguishing feature of stops can also be seen at work in the impossibility of these aspirated stops being passively voiced. This is just a reformulation of the fact that OE shows no signs of 'intervocalic lenition' of the stops: the distinction between *bīdan* and *bītan* is never lost, the two stops never merge.[16] The salience of this position is maintained by the presence of 'h' in /t^h/ in *bītan*. One could argue that this is still the case in MoE, seeing the feature of 'h' at work in *biding* vs *biting*. What the phonetic correlates are of this 'h' is yet another (complex) matter: pre-fortis clipping, pre-glottalisation, etc. that help preserve the opposition between the phonetically voiceless lenis and fortis consonants (Jansen 2004). The categories of /d^0/ and /t^h/ have not been (generally) merged in this language, neither have those of /b^0/-/p^h/ or /g^0/-/k^h/.

If we accept that OE was an aspirating language distinguishing phonologically aspirated stops from lenis/neutral ones, the question of why there is no voicing assimilation in the oft-cited forms *swicdōm*, *lēohtbǣre* and *scandful* receives a straightforward explanation: the lenis stops have no [voice] feature to spread. The question of why devoicing of ⟨b⟩ and ⟨d⟩ is not shown in *sibsum* and *rǣdfæst* can now be attempted from a totally new perspective: /b^0/ and /d^0/ were considered phonetically different enough to preclude them from being categorically merged with /p^h/ and /t^h/ (***sipsum*, ***rǣtfæst*). After all, /b^0/ and /d^0/ are followed by another lenis consonant, followed by a vowel. What the pronunciation of ⟨bs⟩ /b^{0}s^0/ and ⟨df⟩ /d^{0}f^0/ was ([bz], [dv], [bs], [df], [b̥s], [b̥z̥] or anything else that an analyst feels captures the phonetic reality of the two lenes in this 'across the word' environment) is impossible to determine from

[16]Note, however, the rather modern t/d-flapping in General American, which merges /t^h/ and /d/ into [ɾ], making *atom* and *Adam* homophonous.

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MoE (but cf. MoE *wisdom*, which has two passively voiced lenis obstruents probably continued from OE times).

The question of what went on phonetically (and phonologically) in *cēpte* and *cyste* can be answered in two ways: either the 'h' feature of /p^h/ and /f^h/ spread onto the lenis /d^0/ making it a fortis /t^h/ (which would qualify this process as an assimilatory one) or /d^0/ could not be phonetically passively voiced (cf. Cyran 2014, 203) after a fortis consonant (this would make 'h' a feature unable to spread). The fact that /d^0/ in *cēpte* sounded phonetically as [t] (whatever the exact phonetic correlates were) does not mean we have to analyse it as /t^h/ (= 'h + d^0').

Obviously, OE scribes were not phonologists. They followed their ears when they spelt the phonetic realisation of /k^hēp$^h d^0$e/ as ⟨cēpte⟩. They were trained in a certain tradition (ultimately based on Latin) to record such changes in pronunciation in a manner reflecting the processes of OE phonology mapped onto OE phonetics. As a matter of fact, we will argue that having two fortis consonants one after the other (as in *cēpte*) is impossible in OE. This is a similar stance taken for MoE by Szigetvári (2020), who argues that there can be no two immediately adjacent fortis consonants in a morpheme (what's more, this feature does not necessarily spread, as in *Leipzig* [pz], see below).[17] Following his line of argumentation and the notation adopted here, *description* [pʃ] is not /$p^h ʃ^h$/ phonologically (or /p$ʃ^h$/ sharing the same fortis feature), but /$b^0 ʃ^h$/, with a lenis /b^0/, disclosed in *describe*), showing that (despite spelling) ⟨p⟩ is /b^0/ with phonetic cues that disclose its phonological characteristics as a lenis consonant. We have to conclude that *description* is a Latinate way of representing what could more appropriately be spelt *describtion* in an aspirating language like MoE. Along these lines, we might suppose that OE scribes were in two minds trying to spell [kēpte] as either ⟨cēpde⟩ or ⟨cēpte⟩, with the latter spelling bolstered by a Latinate continental and Irish spelling tradition, ultimately gaining the upper hand.[18] Either way, the phonological reality was /kēp$^h d^0$e/.

Szigetvári (2020) argues, *pace* Harris (1994, 137), that we cannot see the effects of spreading of fortisness in MoE past tense, third person singular (and similar formations) involving the /d^0/ (D for Szigetvári) and /z^0/ (Z for Szigetvári) suffixes (in *wiped* 'Pt', *wipes* '3SgPres', *wipes* 'Pl (of the noun *wipe*)') because this spread is not categorically found morpheme-internally (as in *Leipzig* [pz]/(**)[ps] /$p^h z^0$/), but it is across strong morpheme boundaries (*#wipe#s#*), and even across word boundaries (*Depp's a pirate* from *Depp is*), making this a very odd assimilation that does not operate morpheme-internally. A phonetically voiceless obstruent in an aspirating language, he concludes, is not necessarily fortis. Accordingly, there is no reason to suppose the fricatives have different laryngeal specifications in *Leipzig* and *wipes*, they are both /z^0/ (/lajpz^{0}ig/, /wajpz^0/). The one in *wipes* undergoes phonetic devoicing to [s] morpheme-finally (*#wipe#s#*). Similarly, *wiped* would be /wajp$^h d^0$/ [wajpt] for our purposes in MoE. OE *cēpte* and *mētte* are similar: /kēp$^h d^0$e/, /mēt$^h d^0$e/. Find a summary of what we have found so far in (18).

[17] One reviewer objected that *Leipzig* has [ts] in it. This is certainly true for someone familiar with the German pronunciation of the word. The point of the matter is that ⟨pz⟩ in *Leipzig* does not have to be [ps]. An informal search of YouGlish (https://youglish.com/) for *Leipzig* shows that [pz] *is* a possible rendition of this cluster in both British and American English. This piece of data is used by Szigetvári (2020), *pace* Harris, to argue that the feature 'H' of /p^h/ does not necessarily spread to /z^0/ making it [s].

[18] Note, however, that spellings such as *gegrippde* 'he gripped', *slēpde* 'he slept', *slēpdon* 'they slept', ć: *genēoclećde* 'he approached', *ræfsde* 'he seized' (Hogg 2011, §7.90) could also be found, showing that such a tradition could equally well have evolved (possibly even for monomorphemic geminates like *sitdan* for *sittan*).

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(18) The system of Old English singleton stops and fricatives

laryngeal specification/type of obstruent	stop	fricative
lenis/neutral	b^0 d^0 $dʒ^0$ (or $ɟ^0$) g^0	f^0 $θ^0$ s^0 x^0 h^0
fortis/marked[19]	p^h t^h $tʃ^h$ (c^h) k^h	

Note that the use of symbols to represent the laryngeal characteristics of these obstruents is somewhat unbalanced (using f^0 instead of v^0 to make it conform to b^0) may seem at odds with the argumentation, but this is the choice taken here to make sure the underlying representation of these obstruents bears some visual correspondence to OE spelling. This is, of course, merely a 'visual' problem, with the tradition winning out in this case.

6. OLD ENGLISH LENIS AND FORTIS GEMINATES

Old English also had geminate voiced stops. Given that voice does not exist as a laryngeal feature of the obstruents, this translates into geminate lenis stops (as in *habban* 'have', *gebedda* 'bedfellow', *frogga* 'frog'). There is nothing surprising about this given that these clusters were passively voiced between sonorant consonants/vowels. Phonologically, they can be characterised as shown in (19).

(19) Geminate lenis stops in Old English
habban /b^0b^0/, *gebedda* /d^0d^0/, *frogga* /g^0g^0/

These clusters pose no special problems, they are not typologically marked in any way. Melodically they simply show laryngeally unmarked stops interpreted in two skeletal positions.

However, we do run into problems in the analysis of voiceless geminate fricatives (as in *pyffan, cyssan*). In (16d) we saw that the past tense suffix is realised as [t] after voiceless fricatives, suggesting that they were phonetically voiceless. Obviously, we cannot claim that voiceless geminate fricatives were composed of two laryngeally unmarked fricatives, i.e. /ff/ ≠ /f^0f^0/. If a geminate fricative was simply a sequence of two lenis fricatives, we would expect passive voicing to be able to spread across them, similarly to a geminate voiced stop (/b^0b^0/), i.e. we would want to see *pyffan* /pyf^{0}f^{0}an/ as [pyvvan], *cyssan* /kys^{0}s^{0}an/ as [kyzzan], etc. A sequence of these fricatives would imply a phonetically voiced past tense, too: ***pyfde* [pyvde]. This is clearly wrong.

Suppose now that phonetically voiceless geminate fricatives were impervious to passive voicing because they were composed of a fortis fricative followed by a lenis one: ⟨pp⟩ /p^hp^0/.

[19]If aspiration distinguishes /p^h/ from /b^0/ (with neutral /b^0/ not having an active feature to spread), /p^h/ should now have an active laryngeal feature (aspiration) to spread, leading to examples of lenis stops turning into aspirated stops. Although there are no (regular) examples of this in OE (for example, *sæwong tredan* becoming *sæwonc tredan, tīd torn* becoming *tīt torn,* etc.), this is a legitimate expectation (recall that in voicing language the voice feature can and does spread regressively; cf. Vaux (1998) for examples of spread of aspiration in Pali and Julfa Armenian). This question cannot be tackled here, but see Balogné Bérces & Huszthy (2018) for a possible reason involving MoE (a language very similar to OE).

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We have already seen that in a combination of a fortis obstruent followed by a lenis obstruent, passive voicing is barred from occurring throughout the cluster. This is exactly how we analysed past tense forms like *cēpte*, which is /p^{h}d^{0}/ phonologically. We find the same constellation in a phonetically voiceless geminate fricative. In a cluster like /s^{h}s^{0}/ (*cyssan*) it is impossible for the lenis to be anything else but voiceless. If another lenis is added (the past tense), it is also phonetically voiceless (*cyssde* /s^{h}s^{0}d^{0}/ [st]). We will also assume that OE, similarly to MoE (Szigetvári 2020), did not have doubly aspirated/marked consonants (**/p^{h}p^{h}/, **/s^{h}s^{h}/). We will suppose that such marked consonant clusters did not exist in the language (a heritage continued into MoE).

The supposition that OE had a fortis fricative is unusual in a language in which the usual claim is that fricatives are not distinctive, but the same argument can be levelled against all traditional approaches that simply assert that geminate fricatives were voiceless in environments in which voicing could otherwise be expected: in *cyssan* the fricatives (or at least the first one) is right-adjacent to a stressed vowel, so voicing could be expected.

The next question is whether we can gather further data for the claim that OE had fortis fricatives (albeit always as the first member of a cluster). What we see in forms like *pyfte*, *cyste*, etc. can be termed degemination, not only on account of the spelling (usually) having a single fricative and a ⟨t⟩, but also as genuine examples of degemination leaving behind a fortis fricative, which is now in contact with the lenis stop, making it phonetically voiceless. In *pyfte*, therefore, we have /f^{h}d^{0}/ [ft]. One could say that all such instances show lexicalisation of the past tense forms (*pyfte* would in this case be like *hæft* 'prison'). But lexicalisation happens haphazardly to individual lexical items, so we could expect there to be at least some past tense formations with geminate fricatives that show voicing (*pyfte* being found as *pyfde*), but this is never the case. This probably shows that *pyfte* is the result of an active phonological process, probably post-lexical degemination, the phonetic correlate of which is [ft]. Of course, we can also claim that the cluster /f^{h}f^{0}d/ would also necessarily be interpreted as [ft] phonetically (the second, lenis half of the fricative and the lenis /d^{0}/ are not couched between voiced sounds, and the loss of the second/lenis 'f' is simply a low-level phonetic regularity: [fft] > [ft]).

The other piece of evidence comes from Middle English where the OE geminates are continued as voiceless fricatives, establishing these as phonemic: *cyssan* > *kiss*, *lǣssa* > *less*, *hlihhan* > *laugh* (/f/ or altogether lost), etc. One of the interesting facts about degemination happening in Middle English is the absence of compensatory lengthening (words like *kiss, bed, sit,* etc. never show a long vowel). Following a suggestion made by de Chene & Anderson (1979, 2.32) we suggest that this degemination involved the loss of the second (lenis) member of the cluster, leaving a fortis fricative behind and no compensatory lengthening given the fact that such consonants were lost in unstressed syllables (or word-finally): *cyssan* /k^{h}ys^{h}s^{0}an/ > *kissen* /k^{h}is^{h}ən/, **/k^{h}is^{h}ən/. The same process of degemination affected the OE lenis geminate stops with no compensatory lengthening either, leaving behind a lenis stop: *frogga* > /f^{0}rog^{0}g^{0}a/ > *froge* /f^{0}rog^{0}ə/, later /f^{0}rog^{0}/.

It can be objected that melodically fully interpreted second members of such clusters were deleted in a phonologically strong position (cf. Scheer 2004): following a consonant, preceding a vowel (*sitten* /t^{h}**d^{0}**V/). The solution, however, hinges on the representation of geminates. It can be argued that geminates like [tt], [ss] in OE were made up of a fully specified first member (/t^{h}/, /s^{h}/) followed by another consonantal position, which copied the melody of the preceding

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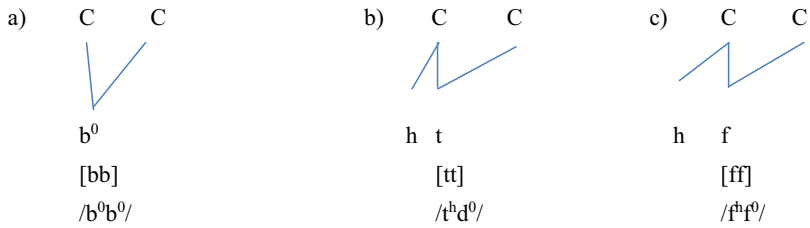
consonant (save the feature of 'h'), making the second member of clusters like [t**t**], [s**s**] phonologically underspecified. 'Lenis' means the absence of a laryngeally specified 'h' feature on a consonantal position (/t^{h}**d^{0}**/), see (20). The feature of aspiration links independently to the first C-slot.

(20) An OE geminate



A similar structure to the voiceless geminate fricatives could be seen for OE geminate fortis stops in (20b) (*sittan* /t^{h}d^{0}/, which behave in the same way: their degemination in Middle English leaves behind a fortis stop with no compensatory lengthening (*sittan* /t^{h}d^{0}/ > *sitten* /t^{h}/> *sit* /t^{h}/) another). Similar structures should behave similarly: absence of voicing affecting both the fortis geminate fricatives and stops in OE also supports their identical structure: *sittan* [tt], *pyffan* [ff]. There is no passive voicing affecting the phonetically voiceless geminates, just as there is no passive voicing affecting the singleton fortis stops: e.g. *gerypon* 'reap, PtPl' (***gerybon**), *sæten* 'sit, PtPl' (***sæden**), *mēćes* 'sword, GSg' (***mēcges**), *blacum* 'black, DatPl' (***blagum**). Put simply, fortis obstruents cannot be passively voiced in intersonorant position. The feature 'h', as we saw earlier, was not given up in weak positions, ensuring that these two classes are still distinguished in OE in non-initial positions, too.

We find justification for the proposed structure of the geminate fricatives and geminate voiceless stops in Iverson & Salmons' (1995) work. Their claim is that the phonetic implementation of the phonological feature [spread glottis] takes longer than one segment to allow the vocal folds to reconfigure for voicing, which explains why there is no aspiration after s+stop clusters (as in *spin*, *stick*, *skill*). It explains why [p] in *spin*, for example, can only be lenis (/b/) (despite what ⟨p⟩ suggests). If it was fortis, there would be aspiration after it (***[sp^{h}in]**), hence *spin* can only be /s^{h}b^{0}/.[20] The same structure is assumed for OE geminate fricatives and voiceless geminate stops (the phonetically bisegmental feature of [spread glottis] also explains what is usually assumed for OE h+sonorant clusters, namely that they had a phonetically devoiced sonorant in them, which was probably also true for s+sonorant clusters: e.g. *hlinc* 'ridge', *hnæpp* 'bowl', *hrægl* 'dress', *hwæt* 'what', *slitt* 'fine', etc.).

[20]The [spread] gesture in Icelandic, for example (cf. Árnason 2011), is phonetically implemented as pre-aspiration in stressed syllables following a short vowel (superimposed on whatever sonorant is found before the fortis stop): *erpur* [ɛr̥ pʏr] 'ears', *elta* [ɛl̥ ta] 'chase', *glampa* [klam̥ pa] 'stare', *uppá* [ʏhpau] 'high', etc. There is no phonological evidence that this was possible in OE (although (pre)aspiration as an ancient Germanic feature seems to explain some of the facts from Old Norse, such as the reanalysis of nasal+fortis stop clusters into pre-aspirated stops: *þǫkk*, cf. English *thank*, German *Dank*).

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Middle English degemination is not the only process that deleted the second member of geminate consonant clusters. There is a similar process of deletion of post-consonantal pre-vocalic sonorants (see (21) below).

(21) Loss of post-consonantal pre-vocalic sonorants[21]
(a) loss of /j/
Middle English /nātju(:)r/ > Early Modern English /nə̄tər/ 'nature' (rhyming with *later* in dialectal English; MoE *nature* shows learned reborrowing from French, see Jespersen (1961, 3.819, 11.43, 9.333), *figure* (with Southern Standard British English /figə/ showing the Early Modern English continuation vs American /figjər/ with a 'reformed' pronunciation[22]), etc.

(b) loss of /w/ and /h/
*gun**w**ale* /gənəl/, *bisc**u**it* /biskit/, *boats**w**ain* /bəwsən/, *War**w**ick* /worik/, *Aln**w**ick* /anik/, *Green**w**ich* /grenitʃ, grinitʃ/, *South**w**ark* /səðək/, *mid**w**ifery* /mid(w)ifrij/ (Knowles 1845; Onions et al. 1966), *hussy* (from *housewife*, traditionally) /həzij/ (reformed /həsij/, based on the orthographic geminate <ss>), *for**h**ead* /forəd/, *Buckingham* /bəkiŋəm/ (in Southern Standard British English at least), etc.

(c) loss of lenis obstruents in geminates in Middle English
OE *frog**g**a* /g^{0}g^0/ > *frog*, *sit**t**an* /t^{h}d^0/ > *sit*, *cys**s**an* /s^{h}s^0/ > *kiss,* etc.

(d) melodically divergent (non-geminate) clusters
*waist**c**oat* /weskət/, *break**f**ast* /brekfəst/, *Mon**d**ay* /məndij/, *Tues**d**ay* /tʃuwzdij/, *wil**d**erness* /wildənəs/, *Whit**s**un* /witsən/, etc.

All the words in (21) contained an etymological /j/, /w/ or /h/.[23] It seems the most sonorous of the sonorant consonants were lost. Traditional sounding (non-reformed or reborrowed) pronunciations, as in *Barrac**l**ough* /bárəkləf/, *Cholmonde**l**ey* /tʃəmlij/, *midwife**r**y* /mid(w)ifrij/, *mid**r**iff* /midrif/, *chest**n**ut* /tʃesnət/, *Christ**m**as* /krisməs/, *ha'pe**nn**y* /hejpnij/, *Peterbo**r**ough* /pijtəbrə/, etc., show that less sonorant consonants were not lost in this environment. To this list can be added the loss of underspecified lenis obstruents (21c), which would simply mean the deletion of a 'C' position with no compensatory lengthening. The loss of the second members of phonetically voiceless geminates led to the creation of new (non-initial) voiceless stops and, more importantly, a steppingstone for the future development of the laryngeal system of MoE, a class of non-initial phonetically voiceless singleton aspirated fricatives (*offer*, *offing*, *sith/sithens* (< *siþþan* 'since', from **sīþ þan* 'after that'), *kiss, fish*). If the obstruent was not just a consonantal place onto which melody was copied from the preceding obstruent, but was a melodically fully

[21]This loss is quite different to the one that affected the sonorants pre-consonantally: [ɬ] was vocalised (*milk* [iu]) or lost before non-coronals (*talk, half*), in some accents of English, /r/ was lost in coda position (*farm*, *far*), OE /j/ and /w/ were 'absorbed' into long monophthongs (OE *tig(e)l* [ij], *mīn* [i:] > *tile*, *mine*; *fugol* [uɣ] > [uw], *cū* [u:] > *fowl, cow*).

[22]Reformed pronunciation (the opposite of traditional pronunciation) means here a modern (historically unexpected) pronunciation of a word based on its orthography rather than its continuation from Middle or Early Modern English: unstressed ⟨ure⟩ is expected to be /ər/, just like unstressed ⟨ur⟩, which can never be /jər/ (cf. *lemur*, *femur*).

[23]Recall that we analysed [h] as a lenis placeless consonant (/h^0/).

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specified obstruent, deletion did not happen (21d): in *waistcoat* /k/ was not deleted because it is not the second half of a geminate.

Lastly, except for some of the original Germanic geminates, OE geminates originate in West Germanic gemination (Hogg 2011, §4.11), e.g. **kunjō* > *cynn* 'kin', **framjan* > *fremman* 'perform', **setjan* > *sittan* 'sit', **wadjōjan* > *weddian* 'wed', **hyɣjan* > *hycgan* 'think'. Whatever the steps were from West Germanic to OE, historically every second member of a geminate originates in a sonorant (and perhaps even the Common Germanic geminates have a similar origin). We give a summary of the obstruental system of OE in (22). Fortis geminate obstruents are classified based on the first member of the geminate.

(22) The obstruents of Old English

	singleton		geminate	
lenis	stops	fricatives	stops	fricatives
	b^0 ⟨b⟩, d^0 ⟨d⟩, $d(d)ʒ^0$ ⟨cg, gg⟩, g^0 ⟨g⟩	f^0 ⟨f⟩, s^0 ⟨s⟩, $θ^0$ ⟨ð, þ⟩, x^0 ⟨h, g⟩ h^0 ⟨h⟩	b^0b^0 ⟨bb⟩, d^0d^0 ⟨dd⟩, etc.	—
fortis	p^h ⟨p⟩, t^h ⟨t⟩, $tʃ^h$ ⟨ć⟩, k^h ⟨c⟩	—	p^hp^0 ⟨pp⟩, t^ht^0 ⟨tt⟩, etc.	f^hf^0⟨ff⟩, s^hs^0 ⟨ss⟩, etc.

7. SOME OF THE (MORE) CONTENTIOUS ISSUES OF OE FRICATIVE VOICING

7.1. The phonemic fricatives of Old English

Although is it commonly asserted that in post-early OE fricatives were not distinctive, some (e.g. Bammesberger 1988) claimed that the distinction (of voicing) was phonemicized already in OE. Fulk (2001, Section 5) summarising his findings contends that "contrary to the prescription of most grammars, some word internal fricatives were voiceless in Old English even between voiced sounds." Fulk (2001) discusses the complexities of phonemic voiceless fricatives in OE, and comes to the conclusion that Luick (1914–40, §639.2) was right after all, when he tied the voicing of fricatives not only to a stressed syllable but also to a fully voiced environment, voiced here primarily meaning voiced by virtue of sonorants/vowels, although this was never explicitly stated, nor was it explicitly mentioned whether the position of the sonorants mattered with respect to the fricatives. Is voicing expected in both (hypothetical) [hylves] and [hyvles], and furthermore are all fricatives equally susceptible to voicing in identical environments?

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The following words seem particularly problematic as they contain post-sonorant fricatives that used to be preceded by an unstressed vowel (or have disputed etymology): *furze, Thames, cleanse* (in which the voicing remains "truly problematic", Fulk 2001, 68), and a few others that can be explained away. Monomorphemic *adze* is also problematic because /s^0/, too, used to be preceded by an unstressed vowel (but then *wīsdom* is not, as there never was an unstressed vowel between the two lenes).[24] Some of the problems must be addressed next.

We have already seen (Section 3) that the notion of the syllable does not satisfactorily explain why /f^0/ is voiced in *wulfas*, as the stressed vowel does not have to capture two codas (/lf^0/) to make the stressed syllable heavy, and since voicing in this type of undisputed words was an OE phonetic reality, there is no other alternative but capture two codas just to satisfy the original observation that /f^0/ is voiced in this environment. The problem does not reside in relying on a stressed vowel, the problem lies in the formulation of syllables (and their boundaries) to explain OE voicing. Whether the notion of syllables adds anything to our understanding of OE fricative voicing has to be answered in the negative.

Almost all traditional textbooks on OE simply assert that voiced fricatives are found between voiced sounds (Wright & Wright 1925; Moore & Knot 1955, see also Wełna 1998, for a summary of the environments we find in various accounts for OE fricative voicing). Pope (1981) formally acknowledges this fact by making a standardised (non-OE) distinction between ⟨ð⟩ and ⟨þ⟩, with 'eth' showing the phonetically voiced values couched between voiced sounds, and the 'thorn' showing the voiceless values: *duguðe, hæleða, earfoðu*, but *þynćean* 'seem', *pæþ* 'path', etc. Of course, the same principles are not applied to the rest of the fricatives, as this would visually impart a very different kind of OE with non-existing graphemes: ⟨nevne⟩ for ⟨nefne⟩ 'unless', ⟨bizgu⟩ for ⟨bisgu⟩ 'occupation', a change in spelling practices that will happen only after 1066, at least for ⟨f⟩ and ⟨v⟩.

However, as noted by Fulk (2001), many (dialectal) OE words reliably thought to date back to OE do not show voicing: *filth* < *fylþ(u)* < **fūliθu*, *health* < *hælþ(u)* < **hāliθu*, *armth* 'poverty' < *iermþ(u)* < **earmiθu*, *month* < *mōn(e)þ* (from *mōnaþ*). Many of these appeared endingless (so the fricatives were final, where the voiceless value is expected), so the voiceless feature spread by analogy (Hogg 1992, §7.54), or simply they were devoiced in Middle English. Of course, the problem is a compound one: it rests on the supposition that **/θ/ should have been voiced in pre-historic times when it was intervocalic (**iθu*) and that this voicing should have continued into OE in those forms where /θ/ came to stand (again) between sonorants (*hælþu, hælþum, hælþe*). Once we suppose such fricatives were voiceless, as Luick does, on the basis of pre-historic **/θ/ being in an unstressed syllable (**iθu*), the /θ/ must have become voiced when it found itself in a stressed syllable (as traditional analyses would have it): /hælθ.u/ [hæl**ð**u] (with the dot showing syllable boundaries). This is the crux of the problem. The fact that we have MoE voiceless fricatives here (and similar environments) prompted some analysts to suggest that these fricatives show lexicalised voicelessness (no matter how this is to be represented formally), leading to the claim that OE had both phonemic voiced and voiceless fricatives. Of course, to make this a sound claim we would have to see both voiced and voiceless fricatives in the same environment.

[24]In MoE *wisdom*, if we take it to continue OE *wīsdōm*, the voicing of OE /s^0/ can only come from spontaneous voicing, not the regressive voicing from /d^0/, and certainly not from the position in which /s^0/ was found: it is immediately right-adjacent to a stressed vowel, but it is in the coda (where voicelessness is otherwise expected).

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The same problem is seen in verbs formed with the suffix **isōjan,* where */s/ was in an unstressed syllable, or between unstressed vowels, which amounts to the same claim (although *-*ōjan* must have been stressed in prehistoric times, continued as OE *-ian*, which can be shown to bear secondary stress in metrics): *bletsian, bledsian* 'bless' < **blōdisōjan* 'sprinkle with blood', *miltsian* 'pity' < **mildisōjan*, *gītsian* 'covet' < **gīdisōjan*, etc. If Luick was right, in prehistoric times */s/ was voiceless, in OE it was captured by the stressed vowel (leading to stressed syllables like /milds/ and /jids/, if we are to follow the traditional argumentation), but (based on the evidence from spelling) it was voiceless, nevertheless. Now we understand why Fulk says that the /z/ in MoE *cleanse* (< *clǣnsian* < **klǣnisōjan*) is a mystery. Note that the argumentation rests on the assumption that /d/ in *bledsian* and /n/ in *clǣnsian* should behave in the same way, being voiced and thus allowing */s/ to be [z] in OE. A similar situation is encountered in *nigoþa* 'ninth' and *seofoþa* 'seventh' (and similar formations) that show (judging by MoE) that the ordinal 'th' never survives voiced (given its position in the OE words).

Luick argues that the voicing of fricatives (as a rule) came historically earlier than the deletion of the unstressed high vowels (*/i/ and */u/), so forms like **lǣfidæ* were voiced to **lǣvidæ*, followed by the deletion of */i/: OE *lǣfde* [lǣvde]. If this voicing happened after the loss of */i/, we would expect devoicing in **lǣfidæ* > **lǣfdæ* > **lǣftæ* > OE ** *lǣfte*. However, it seems indubitable that fricatives were always voiced in this environment. Brunner (1965, §§200 Anm, 203 Anm) rejects Luick's explanation and dating of the two rules on grounds of the many exceptions. Brunner argues that the voicing and deletion of */i/ should be ordered the other way around. In his interpretation, the voicing of ⟨f⟩ in /lǣfde/ may be analogical, based on infinitive *lǣfan*, where the voicing is expected between the two vowels (although it is not exactly clear how this environment is any different from the one in the *lǣfde* given the traditional assumptions claiming that voicing happened in fully voiced environments, cf. *wīsdōm*[25]).[26] If we accept this, then *cleanse* is regular, showing OE [z] between two voiced sounds. Regarding the past tense formations, it also follows from Brunner's analysis that the distribution of the voiced and voiceless fricatives was no longer allophonic with [v] being copied from an environment in which it is not justified historically, leading to phonemic /f/ and /v/, for example

[25]Of course, one can ask the question of why an allophonic rule needs to be given a formal status in the form of a historical rule. Allophones are predictable, unless their conditioning environment disappears (as it happened in Middle English when word-final schwa was ubiquitously deleted, as in the infinitive *-e(n)*, leaving behind a voiced fricative, as in *bathe*), or we have undisputed phonological arguments that there was a reinterpretation of their status (minimal or near minimal pairs that are continued differently in a subsequent period). This rule would be very similar to one describing the distribution of OE aspirated vs non-aspirated fortis stops (*pyffan* [p^h] vs *ūp* 'up' [p]). The answer is because the difference between [p^h] vs [p] never signalled a phonemic opposition, as opposed to an alleged difference between [s] and [z], but then one must ask the question of what phonological (as opposed to merely orthographic) arguments can be drawn from OE itself, or whether one simply wants to see OE from the perspective of MoE and assume a difference in MoE necessarily relates to a difference in OE. In MoE /s/ and /z/, for example, are both allowed after a nasal: *pensive* vs *cleansing*, indicating a phonemic status of the two after /n/. Encountering a /z/ after /n/ in *cleanse* (vs *pensive*) says more about MoE than it does about OE.

[26]Note that /lǣfde/ (*lǣfan* 'inf') is now identical to /pyfde/ (*pyffan* 'inf'), where devoicing happens regularly (*pyfte*). If the distinction between *lǣfde* and *pyfte* is claimed to be maintained based on the infinitive ([v] vs [ff]), for example, then this analogy working from the infinitive (or any other form where the fricative was between two vowels) to the past was exceptionless in OE, no form ever showing any deviation from the expected in the past. This would be a very peculiar case of analogy then affecting every lexical item exactly as the historical facts demand it (in this scenario); see also Fulk's (2001, 60) criticism.

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(cf. Bammesberger 1988, 121). This means that the allophonic rule regulating the phonetic interpretation of the two is synchronically dead (for some stage of recorded OE), resulting in a new set of contrasts (secondary split).

Before we continue to analyse OE, Fulk (2001, 61) must be quoted in full: "The view that voiced and voiceless fricatives were in allophonic relation is almost certainly wrong. Bammesberger has demonstrated this convincingly, calling attention to abstract feminine nouns like *iermþ(u)* and ordinals like *nigoþa* as evidence. If these words are assumed to contain voiceless fricatives, the distribution of voiced and voiceless varieties cannot be determined on a purely phonological basis, and thus voiced and voiceless fricatives cannot have been allophones in Old English." This hinges on three premises:

(i) the supposition that stressed and unstressed vowels were equally good at licensing (phonetic?) voicing in the fricatives,
(ii) the minimally different environments can be 'tested' for contrastive behaviour at the same (or relatively close) diachronic point of OE and
(iii) the environment following a sonorant consonant/consonants (*iermþV-)* and/or the non-immediate proximity of a stressed vowel was strong enough to result in the voicing of the fricatives.

We will analyse these questions in the following sections, but the answer to all three will be 'no'.

7.2. Whatever happened in unstressed syllables of Old English?

OE, like all the Germanic languages, compared to Western and Common Germanic, abounds in vocalic contrasts lost in unstressed syllables. A system of short, long (and diphthongal) and 'overlong' (trimoraic) vowels is lost by the earliest of OE times in a sequence of changes that can best be described as VV > V, V> ∅. The unstressed vowels that remain are /i, e, a, u/ and /iː, æː, uː, oː/ at the beginning of OE. Later, due to pre-OE and later OE changes, further contrasts are lost in a series of interlinked changes. **/i/* and **/u/* in open syllables are lost after heavy syllables (*wudu* 'wood', *wine* 'friend' < **wudu*, **wini*, vs *lār* 'teaching', *fēt* 'feet' < **lāru*, **fēti*). What remains in unstressed syllables are essentially /i, ə, u/o, ɑ/ɒ/. The conditions are complex and not directly relevant here (cf. Hogg 2011, Chapter 6). The loss of contrast in unstressed syllables did not involve the loss of contrast in obstruental stops (lenis stops were still distinguished from fortis stops, as we have seen earlier). The same cannot be said about the fricatives in unstressed syllables. As there is no contrast between singleton lenis and fortis fricatives in stressed syllables (i.e. phonologically strong positions), it does not come as a surprise that no contrast can be found in unstressed (prosodically recessive) syllables. What the actual pronunciation of the fricative was in a word like *duguþe* we will never know, but (as most analysts agree) there was no voicing here. Recast in our terms, we can say that fricatives were not passively voiced in unstressed syllables even though they *were* between spontaneously voiced sonorants/vowels. After all, theoretically no contrast would ever have been possible in such syllables given that no such contrast existed in stressed syllables ([wulfas] was not contrasted with [wulvas], at least not so after the collapse of pre-OE oppositions, as described here). This is an implication: if a contrast is not possible in a strong position, no contrast is likely to exist in a weak position. Even if speakers of OE had a passively voiced

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coronal fricative in words like *duguþe*, it would have been allophonic, non-contrastive, non-salient, falling below the threshold of a speaker's phonemic awareness. In other words, it did not 'matter' if *duguþe* was [dúɣuθə] or [dúɣuðə] phonetically. It was /d^0úx^0u$θ^0$ə/ phonologically with 3 lenis obstruents, with one of the fricatives being passively voiced or perhaps a velar approximant (/x^0/ or /ɯ/ ⟨g⟩), and one that may have been phonetically voiceless (and continued as such into ME and MoE, as in *month, health*).

This may seem slightly reminiscent of some lexical items of MoE where either the voiceless or the voiced affricate is allowed in unstressed syllables: *spinach*, *ostrich*, *Norwich* with either [tʃ] or [dʒ]. This is a lexical matter, *knowledge* does not seem to be affected (although it is also attested as ME *knowleche*, cf. Jespersen 1961, 6.8). OE was different, the choice between a voiced or a voiceless fricative being phonemically uninteresting to a speaker of OE. All in all, the prosodic weakness of vowels brought with itself the phonetic voicelessness of (otherwise phonologically neutral, non-distinctive) fricatives, something that did not affect the stops as these were phonologically (and phonetically) distinctive in the language (and also in unstressed syllables).

7.3. Finding minimally different environments for voicing in the fricatives

If phonetically voiceless fricatives are expected in unstressed syllables in OE, one cannot expect to find an emerging opposition between voiced and voiceless fricatives in that environment, so we can conclude that the phonetically voiced vs voiceless fricatives are still in complementary distribution. There is no change in their phonological status. No environment can be found where they would be different, and this difference mirrored by a phonological development.

That fricatives were immediately voiced when they came to stand next to a stressed vowel (after the deletion of an unstressed vowel) seems plausible. One of the often-presented examples involves the suffix *-*isō* where /s^0/ is expected to be phonetically voiceless, as in (23a). After the deletion of */i/, /s^0/ came to stand (almost) next to a stressed vowel, as in *clǣnsian*. As discussed earlier, Luick postulated that /s^0/ was [s] because the rule of fricative voicing did not apply in unstressed syllables and by the time it came to be next to (or inside?) a stressed syllable, the voicing rule had already stopped working, so we expect [klǣnsijan], rather than [klǣnzijan] (cf., however, Ringe & Taylor 2014, 263), and so forth for the rest of the words in (23a). The fact that we have *cleanse* with /z/ today has been presented as a problem (for Luick, but not Bammeserger, as discussed above, or Ringe & Taylor, who say that there is no evidence to be sure about the late OE pronunciation, which might have involved voicing of the fricative after syncope because these fricatives now followed a stressed syllable).

Words that always had lenis fricatives in a stressed syllable (23b) would never be analysed as having anything else but a phonetically voiced fricative (this conviction, as well as the interpretation of the data, is shared by all). Whether the fricatives in (23c) were voiced in unstressed syllables is also contested, as we have seen: Fulk agrees with Luick, as do Ringe & Taylor, that they were voiceless, but Pope (1981) would have them all voiced whenever they occurred in fully voiced environments. We have analysed them as phonetically voiceless because of the prosodically weak position in which they are found (phonologically they are still lenis).

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No objections have been raised against voiced fricatives that came to stand immediately next to a stressed vowel after deletion of the unstressed vowel (23d). This reallocation from an unstressed to a stressed syllable indicates that the 'voicing rule' of OE was still active after the deletion of the vowel that separated the fricative from the stressed vowel, as seen in **tigiθōn*, **hligisōn*[27] > *tīðа* [ð], *hlīsa* [z]. No phonological arguments can be found for the (supposed) difference between *tīða* and *hliðum* 'slope, DatPl' (in the latter example the /θ^0/ was next to a stressed vowel since Germanic times).[28] The words in (23e) are interesting as they present a complex problem and will be tackled in Section 7.7.

(23) Examples with fricatives in pre-Old English unstressed syllables
(a) nasals/lateral/rhotic+/s^0/, /θ^0/ in Old English
**klānisōjan* > *clǣnsian* (with a long vowel, Ringe & Taylor 2014, 263), *clænsian* 'cleanse' (with a short vowel, Ringe & Taylor 2014, 283), **hlǣnisōjan* > *hlǣnsian* 'make lean', **ferrisōjan* > *firsian* 'go beyond', **grimmisōjan* > *grimsian* 'rage', **diurisōjan* > *diersian* 'extol', **hwinisōjan* > *hwinsian* 'whine', **hālsōjan/hālisōjan* > *hālsian/hǣlsian* 'prognosticate', **mǣriθō* > *mǣrþu/mǣrþ* 'fame', **mānōθ/mānōθV-* > *mōnaþ/mōnþV-* 'month', etc.

(b) /s^0/, /θ^0/, /x^0/ in stressed syllables in Old English
**drūsōjan* > *drūsian* 'drowse', **lausjan* > *līesan* 'set free', **leusan* > *for-lēosan* 'lose', **fraisōjan* > *frāsian* 'ask', **niuhsjan* > *nēosan* 'seek out', **hriuwisōjan* > *hrēowsian* 'regret', **maiθma-* > *māðm* 'valuable object', **aiθum* > *āþum* 'son-in-law', **daugul* > *dēagul* 'hidden, secret', **fleugan* > *flēogan* 'fly', etc.

(c) /s^0/, /θ^0/ in unstressed syllables in Old English
**agisōjan* > *egesian* 'terrify', **tamisōjan* > *temesian/temsian* 'sift', **aβisōjan* > *efesian/efsian* 'clip (hair)', **agisō* > *egesa/egsa* 'terror', **arβaiθæ* > *earfoþe* 'hard work, Dat', etc.

(d) **/s^0/, /θ^0/ in unstressed syllables in pre-Old English, later next to a stressed vowel in Old English
**hligisōn* > *hlīsa* 'fame', **sigiþiz* > *sigþe/sīþe* 'scythe', **agiþā* > *egeþe/egþe* 'rake, harrow', **tigiθōjan* > *tīðian* 'tend', **tigiθōn* > *tīða* 'receiver', **teoɣoθōjan* > *teogoþian/ tēoþian* '(give as) tithe', etc.

(e) stop+/s^0/ in Old English
**rīkisōjan* > *rīcsian* 'rule', **gīdisōjan* > *gītsian* 'covet', **blōdisōjan* > *bletsian/bledsian* 'bless', etc.

[27]The loss of /x^0/ (in earlier accounts /ɣ/) is due to palatalisation, the later contracted vowel by the smoothing of /i(:)j(i)/ to /ij/ (**igila-* > *īl* 'hedgehog', cf. Hogg 2011, §7.70–71).

[28]Nor would one want to claim that *līþe* 'lithe' had a different fricative from *tīða* and *hliðum* just because it derives from **linþī* (with loss of /n/ in pre-OE). No claim has so far been made that these words were treated differently by (any stage) of OE. The fact that words like *līþe* are not viewed as phonologically interesting is probably because (according to standard assumptions) the /θ^0/ was always in a stressed syllable, as opposed to *tīða* where the place of the fricative in the stressed syllable is only 'secondary'. Note that the only surviving OE words from those in (23d) are *scythe* and *tithe* (but they are, quite expectedly, found with /ð/).

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Now if the problem does not reside in fricatives being (or eventually coming to stand) immediately next to a stressed vowel (as in *sīþe*), but it does seem to hinge on fricatives not being immediately next to a vowel (i.e. being separated from it by a nasal, as in *clǣnsian*), the shortcoming of the syllable-based accounts is obvious: the fricatives in words like *clǣnsian* are not inside a stressed syllable, we might argue. Of course, words like *wulfas* [wulvas] are still unaccounted for, where everyone would like to see a voiced fricative.

Discounting post-nasal fricatives for the time being, we have not been able to find a minimally contrastive environment for a stressed *vowel+fricative sequence* (i.e. *sīþe* = *tīða*). To continue this line of reasoning, we will not be able to find a minimally contrastive environment for *nasal+fricative* sequences either, but now for a completely different reason, as such sequences were lost: in OE, Old Saxon and Old Frisian, nasals were deleted before fricatives, followed by compensatory lengthening: **fimf* > *fīf* 'five', **līnθī* > *līðe* 'lithe', **munθ* > *mūð* 'mouth', **gans* > *gōs* 'goose', **sanθ* > *sōð* 'true', etc. There were no *nasal+voiced fricative* sequences (in these the voiced fricatives are found as stops, as in *bindan* < IE **bhendh-*). So strictly speaking, there is no comparable word to *clǣnsian* (words like **gans-* having been lost earlier) to test the behaviour of fricatives that came to stand next to a nasal (and a stressed vowel) in comparatively recent times.

The environment for testing /lθ/ (as in *hǣlð-*) that arises by vowel loss, compared to historically older */lθ/ is also missing. In West Germanic, */lθ/ sequences were voiced and occluded in an environment identical to later OE (phonetic) voicing (*/lθV/): *fealdan* 'fold', *wilde* 'wild', *wuldor* 'glory', *seld* 'dwelling place', and *feld* 'field', *beald* 'bold', etc. with the stop extended from the oblique cases (Hogg 2011, §4.18). Again, having a sound historical comparison between *hǣlðe* (with a secondary /lθ/ sequence) and original /lθ/ is impossible. It seems there was no such occlusion in /rθ/ sequences in West Germanic or pre-OE, so this is the only environment where one could potentially find a difference in treatment between original /rθ/ (**werþai* > *weorþe* 'it may become') and newly formed /rθ/ sequences via syncopation (*mǣrþu* 'fame'). It may well be that this environment does not lead to fricative voicing (the fricative is not immediately next to a stressed vowel). Note also that West Germanic */rð/ was also eliminated (found as OE /rd/): **swerða-* > *sweord* 'sword', **wurðun-* > *wurdon* 'became, Pl', etc.[29]

The */rz/ sequence was also eliminated before OE times (West Germanic */z/ > */r/): **irzijaz* > *ierre* 'mistaken, wrong', **θurzi-* > *þyrre*, 'dry, dried up', **warza* > *wearr* 'callous', etc. It seems we do have original pre-OE /rs/ clusters surviving in OE, as in **wirsizo* > *wierse* 'worse' (although here forms with */rz/ must also be posited to explain the superlative *wierrest,* cf. Ringe & Taylor 2014, 85), but we also have formations like **diurisōjan* > *diersian* with secondary /rs/ clusters (see short summary in (24)).

[29] Jones (1922, §284) discusses the distribution of the vocing of /θ/ to /ð/ in the plural. He finds that it is always /θ/ after (what used to be) /r/ in Received Pronunciation: *births*, *hearths* with /θs/, which may lend further support to the analysis developed here.

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(24) nasal/r/l+voiced/voiceless fricatives in West Germanic and Old English

early West Germanic	later West Germanic	Old English
VNFricV Fric = f, s, θ[30]	VNFricV	V̄FricV
VNVFricV	VNVFricV	VNFricV (secondary clusters with no loss of nasal: VnsV, VnfV)
VrsV	VrsV	VrsV
VrVsV	VrVsV	VrsV (secondary upon loss of vowel)
VrzV	VrrV	VrrV
VrθV	VrθV	VrθV
VrVθV	VrVθV	VrθV (secondary upon loss of vowel)
VrðV	VrdV	VrdV
VrɣV	VrɣV	VrɣV[back]
VrxV	VrxV	(> VrhV >) V̄rV
VlɣV	VlɣV	VlɣV[back]
VlxV	VlxV	(> VlhV >) V̄lV
VlðV	VldV	VldV
VlsV[31]	VlsV	VlsV

As can be seen in (24), OE has no 'inherited' voiced fricatives after a stressed vowel preceded by a nasal or rhotic (no [VnzV], [VrzV], [VrðV], [VlðV], [VlzV]). The only (restricted) environment where such a fricative could be expected was the /VrɣV[back]/ or /VlɣV[back]/ environment (e.g. *burga*, *burgum* 'town, GPl, DPl', also (probably) in forms where the back vowel was neutralised: *burgen* 'guard, PPpl' < **burɣan*, *folgian* < **fulɣōjan* 'follow', etc.).[32] The fact that /VrɣV[back]/ or /VlɣV[back]/ had [ɣ] is also supported by late-OE and ME developments and their MoE continuations like *follow, borrow, sorrow*.

As can be seen, there were no stressed **VSonFric[voiced]V** clusters to form the basis of new voiced ones that had meanwhile arisen through syncopation. And perhaps original ones (as in *horses* 'horse, DSg', *teorses* 'peg; penis, GSg'), too, failed to partake in the supposed voicing: the fricative in a cluster like /Vrs^{0}V/ simply continued West Germanic phonetic voicelessness,

[30]Nasal+x sequences were already eliminated in Germanic (*/h/ was lost in pre-OE after the */x/ > */h/ change): **faŋxan-* > *fōn* 'seize', **taŋxu* > *tōh* 'tough'.

[31]In Kroonen (2013) **halsa* 'neck' (OE *hæls*) and **hajlsōjan* (OE *hālsian* 'exorcise') are the only Germanic stems having /ls/, and none is on record having /lz/. There were others in OE, of course, that arose through derivation: e.g. *cnyllsian* 'toll a bell'.

[32]When followed by a front vowel, historical */ɣ/ was palatalised to /j/ in OE.

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i.e. [VrsV]. After all, the fricatives were not in a stressed syllable in OE (and those who adhere to a syllable-based account would also find it difficult to argue for syllabifications like *hors.es*). The fricatives were in a voiced environment, no doubt, but there were also sonorants blocking direct contact with the stressed vowel). It seems a historical 'catalyst' was needed for voicing to be extended to **VSonFri$_{[voiceless]}$V** clusters.

7.4. Inherited SonFric$_{[voiced]}$ sequences

The only fricatives left uninfluenced by West Germanic and pre-OE changes were the non-coronal fricatives, */β/ and */f/, which eventually fell together in OE /f^0/. As we have seen, pre-OE */x/ was debuccalised and lost. Pre-OE */ɣ/ is found as /ɣ^0/ in OE. Phonetically, it is found as [ɣ] after r/l preceded by a back vowel (in palatalised environments it is found as OE /j/). The data in (25) shows pre-OE */β/ and */f/ after r/l (the only environment where they could be found following a sonorant), as well as */ɣ/ in the same environment.

(25) r/l+β/f/ɣ

**xarβist* > *hærfest* 'harvest', **xwarβijana* > *hwierfan* 'turn (it)', **kerβan* > *ċeorfan* 'carve', **arβaiθœ* > *earfoþe* 'hard work, Dat', **arβija* > *ierfe* 'inheritance'; **θurfan* > *þurfan* 'be wanton'; **berɣan* > *beorgan* 'keep safe', **surɣōm* > *sorgum* 'sorrow, DPl', **tarɣōn* > *targe* 'edge';

delβan* > (be)*delfan* 'bury, delve', **siluβra* > **siluβr*, **siluβræs* > early West Saxon *siolfor*, *siolufres*, Mercian *seolfur*, *seolfres* 'silver', **liβru* > *lifer*, *lifre* (obl) 'liver', **hwalβa* > *hwealf* 'vaulted', **alβī* > West Saxon *ielfe* 'elf, Pl' (also in *Ælfrēd*, which shows an Anglian form with ⟨æ⟩); **kalβi* > *cealf, cealfes* (obl) 'calf', **twalif*/twaliβ* > **twælifi*/**twæliβi* > **twelifi*/**tweliβi* > *twelf* 'twelve' **wulfaz*/**wulfōs* > *wulf*/*wulfas* 'wolf', *cul(u)fre* (from Latin *columba*) 'dove'; **dulɣa-* > *dolges* 'wound, GSg', **fulɣōjan* > *folgian* 'follow', etc.

An informal search of Kroonen (2013) and Ringe & Taylor (2014) revealed that examples involving *r/lβ are more numerous than those containing pre-OE *r/lf. Forms in (25) that survive into Middle English show ⟨v⟩, an indication (for the first time) that they continue the OE voicing pattern (*erve/yrve* 'inheritance', *culver* 'dove', *thurven* 'be necessary', *wolves* 'wolves'). Of course, all of them also have forms with ⟨f⟩, which may be seen as a continuation of OE spelling practices.

It should come as no surprise that in a system that shows the collapse of a once-distinctive system of voiced and voiceless fricatives, the reorganization of what remains of the fricatives into a system containing lenis fricatives only, as well as the collapse of the place distinctions in the labial series in favour of labio-dental /f^0/, there is a strong motivation for the inherited (prevalent) [l/rv]/[l/rβ] pattern to remain phonetically voiced (there is, after all, no constraint barring a voiced lenis consonant after l/r, be it a stop or a fricative): *melda* 'reporter', *scealga* 'roach', *hierdan* 'harden', *sarga* 'trumpet'. The (historical) absence of OE l/r+labial stop ([lb], [rb]) clusters is neatly filled in by historical [lβ], [rβ] clusters. The instability of [lf], [rf] clusters (as opposed to [lβ], [rβ] clusters) can be explained by the very tenuous difference between the labial and labio-dental places of articulation, a difference which proved impossible to maintain in the long run, leading to the merger of the two fricatives in /f^0/. We might also speculate on why [lβ] and [rβ] were not drawn into the pool of existing [lf] and [rf] clusters, leaving them phonetically voiceless (*wulfas*

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**[wulfas]). This is probably because [lβ] and [rβ] represented the (inherited) majority pattern. This also goes to show that inherited patterns were important catalysts for new patterns to develop. In the case of [ls], [rs] clusters there was no such drive (there being no [lz], [rz] clusters to compete with), leaving [s] phonetically voiceless. Still, for a speaker of OE the appearance of [s] in this post-sonorant consonant environment would not disturb the allophonic distribution of [s] and [z] (there being no [z] after such sonorant consonants to create a potential opposition).

In other words, words like [wulfas] were drawn into the majority pattern and became [wulvas]. From this point onward, the distinction between pre-OE */β/ and */f/ is lost, both merge into /f^0/, whose pronunciation is regulated by the well-known allophonic rules (*wulf* is now phonologically /wulf^0/). This is why all the traditionally quoted (unproblematic) examples (working backwards from MoE) involving voicing in a post-sonorant environment in OE come from the labial series. Especially interesting is the post-lateral alternation seen in *wulf-wulfas* in OE, surviving as a morphophonological alternation in MoE (in addition to a few others like *elf-elves*, which historically contains pre-OE */β/, cf. the original distinction seen in German *Alb-traum/Alptraum* 'nightmare' vs *Wolf*).

There is also **anafalt* > *anfealt* 'anvil', a word which obviously shows post-nasal voicing upon syncopation, but whether /v/ in MoE shows phonetic voicing of OE /f^0/ when it came to stand (immediately) next to a stressed vowel or whether it is the result of a later process is difficult to demonstrate. Middle English shows a variety of forms showing both ⟨f⟩ and ⟨v⟩: *anvelt*, *anevelt*, *andvelde*, *anvilt*, *anvilde*, *anvil*, *an(e)felt*, *-feld(e)*, *anfeeld*, *andefeld*, *unfelde* (sourced from Middle English Dictionary/MED).[33] Proving either [f] or [v] in these would require a phonologically argued piece of reasoning (and not merely orthography): a process interacting with another process that left its imprint in the language. One such proof (or its absence) should be briefly discussed: epenthetic homorganic stops appearing in nasal + voiceless fricative sequences not followed by a stressed vowel. The intrusive stop always has the same place of articulation as the nasal, and appears even in homorganic clusters (cf. Szigetvári 2020, 2023), as found in MoE *en^{t}fant*, *warm^{p}th*, *sym^{p}phony* (but *symphónic*), *Gim^{p}son* (*Gimsónian*), *prin^{t}ce* (*princéss*), *cen^{t}sure*, *mon^{t}th*, etc. There are no recorded examples like *antfil* or *antphil*, which would suggest both [t] and [f] in the predecessor of MoE *anvil*. There is *andvelde* though, but here epenthetic ⟨d⟩ is unexpected (or perhaps it shows a dialectal feature of the language where such consonants can also appear before a lenis fricative).[34] Absence of examples like *antfil* offers no decisive proof for a Middle English pervasive post-nasal [v], but it may be indicative of a pronunciation not always faithfully recorded by ME orthography (⟨f⟩ may have been used for [v], cf. MoE *of*, or perhaps even the other way around). One may object that *infant* is also never found as *intfant*, which seems to be true, but still there is an epenthetic [t] (at least for some speakers in MoE).[35] The absence of ⟨ntf⟩ may even have something to do with the fact that ⟨ntf⟩ only appears at the

[33] https://quod.lib.umich.edu/m/med/

[34] Note, however, that *andvelde* with regular loss of post-nasal lenis stops before lenis fricatives would straightforwardly produce *anvil* (disregarding now the word-final epenthetic /d/): cf. *Windsor* /nz/, *ambsace* /mz/, *anxiety* /ŋz/ (presupposing /ŋgz/).

[35] (Spelt) Epenthetic consonants are not a rarity in English: *thimble* (< *ðȳmel*), *spindle* (< *spinel*), *thunder* (< *ðunor*), *embren* 'bucket' (German *Eimer*), *shamble(s)* (< *scamol*), etc. Perhaps the appearance of the intrusive stops in spelling was bolstered by original native clusters: *-mbr-* (*timbran* 'construct'), *-mbl-* (*simble* 'always'), *-ndl-* (*trend(e)le-* 'sphere'), etc., something missing for *-ntf-*.

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junction of analyseable morphemes (*eventful*, *resentful*, etc.) or imply ⟨ntf⟩ shows an unusual combination of letters (there being no comparable original native clusters for the same consonants). Interestingly, Middle English has no comparable rule to Anglo-Frisian nasal deletion before voiceless fricatives (cf. *goose* vs German *Gans*): loss of nasal would straightforwardly indicate [f] (there are a few isolated examples though for loss of /n/ before /s/, as in *Harry* vs *Henry*). The MoE word may also continue a pronunciation based on the spelling, which may have recorded a ⟨v⟩ accidentally used for [f]. Or, simply, there was dialectal variation in Middle English: there are similar examples involving /f/ and /v/, as in *fox* vs *vixen*, *phial* (also recorded as *fial* in Middle English) vs *vial*, etc. The usual caveat applies: comparing the phonologies of OE to Middle English may give us a skewed picture of what may have been possible either phonetically or phonologically in either OE or Middle English (OE and Middle English are two different languages, after all).

No form with /ð/ can be demonstrated for *month*, for obvious orthographic reasons. Admittedly, here the fricative is word-final, although a modern alternation like *month* ~ *months* /mənθ/ ~ /mənðz/ does not defy imagination (similarly to *path* ~ *paths* /paːθ/ ~ /paːðz/, or older (or recessive) *youth* ~ *youths* /juwθ/ ~ /juwðz/, *bath* ~ *baths* /baːθ/ ~ /baːðz/, *oath* ~ *oaths* /əwθ/ ~ /əwðz/, cf. Jones 1922, §284). There in no record of epenthetic /t/ either, but that is also for orthographic reasons (**⟨montth⟩ would be highly unlikely ever to have been recorded as such).

If the analysis is right in assuming that /lβ/ was a catalyst for the prolonged (and extended) voicing of both /lβ/ and /lf/ clusters into OE, the remaining clusters (/ns/, /rθ/, /rs/, /lθ/, /ls/, let alone clusters like /ms/ and /mθ/, as in *glimsian* and *iermþu*) had no such pattern to follow, hence finding them as voiceless should not be out of the ordinary. Perhaps there were dialectal differences, too, in the phonetic voicing of these clusters. This is something that will have to remain a conjecture. ModE does show instances of /ð/ after (historical) /r/ (as in *burthen, northern, farthing, worthy, earthen* (also with /θ/) and some fanciful reformations like *swarthy*, cf. German *schwarz*), but whether these show OE voicing (in any of its dialects) or a Middle English,[36] or even later lenition (affecting /θ/) can probably not be established with certainty. There is also *furze* (< *fyrs*), a word of unknown etymology, which may continue a ME plural form (*firsen/firses*), showing passive voicing of the fricative. It also seems MoE has no surviving examples of /lð/ at all. There may have been variations in the degree of phonetic voicing of fricatives in /rθ^0/ or /lθ^0/ clusters, and later some of these pronunciations were phonemicized or lost (haphazardly from the point of view of MoE). We would do well to accept that not every pattern can be recovered in a dead language working back from a language which can hardly be called its direct 'undiluted' descendant.

What supports the analysis of /lf^0/ clusters as having been phonetically voiced because they continue a pre-OE voiced pattern ([lβ]) is markedness: coronals like /s/ have been claimed to be especially susceptible to phonological processes (cf. T.A. Hall 1997), but here we might just see /s^0/ not undergoing (phonetic) voicing in an environment where /f^0/, a non-coronal, does.[37] If this is

[36]MoE shows similar (historical) alternations in words that entered Middle English (from French): *scarf* ~ *scarves*, *abuse* (N) ~ *abuse* (V) (which is identical to inherited OE *house* (N) ~ *house* (V)), etc., showing that there also existed Middle English voicing (of the fricatives), which may be structurally identical to OE voicing, but may also be a new process, wider in its scope (extended to words like *burthen* or *anvil*).

[37]Modern standard German shows that at least in some West Germanic dialects /f/ was not voiced intervocalically (*Ofen* 'oven') but /s/ was (*Hase* 'hare'). There is written evidence from Middle High German that /f/ may have been voiced (*ofen* appearing as *oven* contrasted with the intervocalic voiceless geminate in *offen*, cf. Penzl 1968b, 346).

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true, the claim that OE fricatives are phonetically voiced in the **ÝSonFricV** environment can no longer be upheld: it is /f^0/ that continued to be (regularly) voiced after /l/ (and /r/) because of a continued pre-historic pattern, which was not the case with the rest of the clusters discussed here.

The pre-OE clusters of l/r+ɣ continued into OE as [r/lɣ] when preceded by a back vowel and followed by a back vowel or and original back vowel (*dolges* < **dulgas*). The voiceless pre-OE */x/ was lost before the supposed voicing rule could draw it into this possible pattern (*mēares*/ ***marges* < **mearxas*), which was continued into recorded OE.

7.5. The ÝFricV/Son environment

If the fricative was in a **ÝFric(V)/Son(V)** sequence, the MoE reflexes unfailingly show voiced fricatives irrespective of what the sonorant consonant was (see (26)). Most of these words had fricatives next to sonorants in oblique forms after syncopation of the vowel between the fricative and the sonorant (e.g. *ōþer* ~ *ōþres, ōþra,* etc.). If sonorants had had any blocking effect on voicing in *ōþres*, for example, one would like to encounter MoE voiceless fricatives in this environment obeying some regularity. That regularity may also be called syllable-final devoicing (*ōþ.res* with [θ], as opposed to *ōþer* with [ð]). For historical reasons, the only fricative which could possibly show such a process (in writing) is /x^0/, which could appear as either ⟨h⟩ or ⟨g⟩ in any of the phonologically weak positions: *dahum/dagum* 'day, DPl', *heretoga/heretoha* 'chieftain', *fuhlas/fuglas* 'birds', *āhnian/āgnian* 'own', *plōg/plōh* 'plough', etc. This is, however, due to graphemic interchangeability (Fulk 2002, 94): there was no phonological opposition between [x] and [ɣ] either intervocalically or word-finally. In phonologically strong positions (e.g. before a stressed vowel) ⟨g⟩ and ⟨h⟩ are never interchangeable (*gān* 'go' is never ***hān*, and *hālgian* 'hallow' is never ***gālgian*, for example). If we can see no sign for syllable-final devoicing for the velar fricative (cf. Wetzels & Mascaró 2001), it goes to show that fricatives are expected to surface as voiced in the ÝFricSonV environment.[38]

(26) Fricatives in ÝFric(V)/Son(V)
**ufna* > *ofen* 'oven', **nefan* > *nefa* 'nephew' (Middle English *neve*); **sufan* > *swefan* (with a change in vocalic grade) 'sleep' (ME *sweve*), *wīfmann/wimman* (presupposing [wivman] 'woman'; *nefne* > (presupposing [nevne]) *nemne* 'unless', **anθeraz* > *ōþer* 'other', **feθro* > *feþer* 'feather', **brōθer* > *brōþer* 'brother', **baθōjan* > *baþian* 'bathe', **faθmaz* > *fæþm* 'embrace, fathom', **weθru* > *weþer* 'yearling, wether'; **haslaz* > *hæsel/hæsl* 'hazel', **mēslō* > *masele* 'measles', **taisilo* > *tǣsel* 'large thistle', **hūsla* > *hūsl* 'housel', etc. There are also some more recent (late ME) examples: *bedlam* < *Bethlehem* (presupposing [beðləm])

Whatever the conditions were in general on the voicing of OE fricatives, it seems that no fricative was voiceless in the **ÝFricV** or **ÝFricSon** environment and /f^0/ was voiced in **ÝlfºV**

[38] Fulk (2002), in a traditional framework using 'voiceless/voiced', establishes beyond reasonable doubt that fricatives at the end of the first elements of compounds are (postlexically) voiced when followed by a voiced (here: lenis) sound, meaning that the 'rule' should read ÝFric(#)SonV.

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and **V́rf^{0}V**, and there may have also have been (variable and/or dialectal) voicing in the rest of the clusters (some inherited, some new with no existing synchronic pattern to conform to and some new but coming to resemble old patterns of sonorant consonant+fricative sequences). We must conclude that only those pre-OE voiceless fricatives were voiced that were immediately to the right of a stressed vowel with no intervening sonorant[39] (of course, the fricative had to be followed by a vowel or a sonorant for passive voicing to be possible). It seems the OE fricative voicing rule is more complex than traditionally thought.

We can now answer the question of whether OE (hypothetical) [hylves] and [hyvles] would both qualify for well-formed OE words. The answer is not just a simple 'yes': both [hyvles] and [hylves] are expected, but for different reasons. [hyvles] is perfectly regular in showing expected passive voicing of the fricative /f^0/ (it is immediately to the left of a stressed vowel), while [hylves] is only possible because [lv] continues a pre-OE pattern of voicing, which was pervasive enough to draw in the pre-OE [lf] clusters as well. Hypothetical [hyzles] is also perfectly regular with a passively voiced /s^0/, but [hylzes], [hylðes], [hyrzes], [hyrðes] or [hynzes] are unexpected because pre-OE had no historical **/lz/*, **/rz/*, etc., clusters to form the basis of new voiced ones that came into existence upon vowel deletion. Words like [hyzes], [hyðes], etc., indubitably had phonetically voiced fricatives. We can see that all the fricatives were voiced here irrespective of their place of articulation (markedness playing no role here).

7.6. The V́StopFricV environment

It is now time to look at another contentious environment, the one involving obstruental stops and fricatives (examples from (23e) repeated as (27) below).

(27) Stop+/s^0/ in Old English
**rīkisōjan* > *rīcsian/rīxian* 'rule', **gīdisōjan* > *gītsian* 'covet', **blōdisōjan* > *bletsian/bledsian* 'bless', etc.

Rīcsian shows the phonetic sequence of [ks], the lenis fricatives cannot be phonetically voiced if it is not immediately next to a stressed vowel. What's more, it is preceded by a fortis stop. In this environment lenis consonants cannot be phonetically voiced.

Words like *gītsian* and *bletsian/bledsian* may be interpreted in a number of ways. We may say ⟨ds⟩ shows exactly what is supposed to show: it is [dz] phonetically, /d^{0}s^0/ phonologically. After all, the traditional accounts would agree that the fricative is in a voiced environment now, flanked by two phonetically voiced segments. What ⟨ts⟩ shows is more complex: although *bletsian* with /d^{0}s^0/ appears to be the mirror image of /s^{0}d^0/ (as in *rǣsde*), where [zd] is beyond question, it does not mean that the two should behave identically (phonetically). Old English has no original /s^{0}d^0/ or /d^{0}s^0/ clusters (original /zd/ clusters having become /rd^0/ or showing loss of

[39]Cf. Cho (1990, 152) who discusses examples of (de)voicing found in Coeur d'Alene and Gilyak: a voiced obstruent in clusters can only hold onto its voicing if it is closer to a syllabic nucleus: /-vf/ (but not /-fv/), /-g^{w}t/ (but not /-tg^w/). English *width*, *hundredth* /dθ/ (as opposed to *earthed* /θd/, phonetically [θt]) look similar, claimed by Cho.

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/z/, as in **huzda* > *hord* 'treasure', **mizdō* > *mēd* 'reward'). A cluster like [zd] would immediately signal a morphologically complex (past tense) formation.

There is also the question of whether *rīcsian,* for example, is mono-morphemic or not. If *rīcsian* was reanalysed as mono-morphemic, we would expect shortening due to the cluster (*ricsian*). The same goes for *bletsian/bledsian,* where both Hogg (2011) and Ringe & Taylor (2014) indicate a short vowel despite the etymology of the word (the stem being *blōd*). MoE has a short vowel, but this may be the result of later processes. In similar examples (with a nasal as the first member) Ringe & Taylor (2014) opt for both a short and a long vowel (and haphazardly so): *clǣnsian/clænsian*. MoE seems to follow the short-vowelled reflex, but we cannot be sure it is the direct continuation of *clænsian*. All in all, no phonological arguments are given for *clǣnsian* containing a long vowel. OE did have ⟨ē⟩ before nasal+velar stop (but these only appeared in the VI/VII class of strong verbs): e.g. *fēng, hēng* 'seize, hang, PtSg', otherwise there were no long vowels before nasal+obstruent clusters.[40] A form like *clǣnsian* would not have found an inherited pattern to conform to. What's more, arguments for having a long vowel in *fēng* are mostly etymological (and certainly correct, otherwise *fēng* would be *fing*), but whether ⟨ē⟩ was still part of the system before this nasal+stop cluster when etymologically late forms like *clǣnsian* came about is questionable.[41]

If there were no mono-morphemic /d^0s^0/ clusters, speakers looked for the nearest repair mechanism, which involved changing the cluster to [ts] phonetically. The question is, of course, how significant an improvement this was over [dz]. The grapheme ⟨z⟩ was occasionally used instead of ⟨ts⟩ (cf. Hogg 2011, §2.65, fn 1), as in *bezt* 'best' or *milze* for *milts(e)* 'mercy' (< **mildisi* 'mildness'). Hogg suggests that this grapheme may stand for a single unit, a further affricate, but there are arguments against this: frequent examples of metathesis across the various dialects, such as *bæstere*, for *bæzere* 'Baptist'. In late texts the French ⟨c⟩ can be found for /ts/ (cf. Campbell 1959, §53). Metathesis is not found for /tʃ/ or /dʒ/ (**⟨sct⟩ and **⟨scd⟩, respectively), suggesting that these are a single unit. Metathesis for etymological [sk] > [ks], [sp] > [ps], [st] > [ts] > [st] is also found: *waxan/wascan* 'wash', *axan/ascan* 'ashes', *flascan/flaxan* 'flasks', *fiscas/ficsas/fixas* 'fish', *muxle* 'muscle' (from Lat *musculus*), *æpse* 'aspen', *cops* 'fetter', *hæpse* 'hasp', *wlips* 'lisping', *thrūstfell* 'leprosy' (cf. Gothic *þrūtsfell*), and the above-mentioned *bæstere*, etc. These examples are frequent for late West Saxon (cf. Hogg 2011, §7.96).

If the two halves of s+stop sequences were unordered with respect to each other, a word like *gītsian* and *blētsian* may (at least occasionally) have had an identical cluster with *forcostian* 'tempt', *giestian* 'be a stranger', *lustian* 'delight in', *miltsian* with *heolstor* 'hiding place', *dylsta* 'filth', *forcwolstan* 'swallow', *rīcsian* with *miscian* (also *mixian*) 'apportion', *āscian* 'ask', *fiscian* 'fish', etc. That *gītsian* is not found as *gīstian* may have something to do with its etymological stem (*gīd* 'joy') and the relationship between the two that was transparent enough synchronically for no scribe to invert the two letters (the same goes for *miltsian* and *mild*, *rīcsian* and *rīce* 'kingdom', *bledsian* and *blōd* 'blood'/*blēdan* 'bleed', if the semantic relationship between the two was still

[40]For historical reason, as discussed earlier, there cannot be nasal+fric clusters, only nasal+stop sequences, but these regularly have a short vowel before them (*windan, climban, singan*).

[41]That the formation is late is also shown by the pre-nasal vowel, which should be ⟨a⟩ or ⟨o⟩ (if it was short). If the vowel remained long, no changes are expected before a nasal (cf. Hogg 2011, §5.79 (1)), similarly to *ǣnig* 'any'. The syllable, however, is closed, so shortening of the original long vowel would not be out of the ordinary (the MoE vowel is also short, after all), similarly to *bremblas/brǽmblas* < **brāmblas* 'brambles'.

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transparent with *bledsian* meaning 'sprinkle with blood').[42] This says little about the actual pronunciation, which may well have shown metathesis. A word like *miscian* had no stem like *misc* or *mix* to be compared to, so it could indiscriminately appear as either *miscian* or *mixian*. Even if it had a stem like *misc*, it could also be either *misc* or *mix*.

MoE *adze* (< OE *adesa*) is odd even if we suppose it survives from an OE syncopated by-form *adsa,* which should behave like *gītsian,* but then no comparable OE word survives into MoE with this sequence ([ts]), so little can be said about what the development of such a sequence should show in MoE. If the metathesised form had survived, we would expect to see *yist/yast*, if the non-metathesised, we should have *yis/yas* (supposing that late OE/early ME [ts] was conflated with Old French [ts], continued as [s] in ME). OE *milts/milds* (< **mildisi*) 'mercy' is found as ME *milce* (alongside Old French *plæce* 'place', *palendse* 'palace' with ⟨ds⟩ [ts], cf. Campbell 1959, §53). In other words, the syncopated OE form is unlikely to have produced *adze* or, even less likely, *atch* (which is probably an anglicised form of French *hache*, cf. Liberman 1993, 167). We have *adys* (sg)/*adsis* (pl) spellings from the 15th century (Fulk 2001, 64), and *addice* from early Modern English (Ringe & Taylor 2014, 263). It is possible that *adze* survives from ME *adsis* (pl) that replaced *adys* (sg), showing ME passive voicing of the two lenis consonants. Similar problems arise in the case of OE *Temes*, *Temese* 'Thames'.

7.7. Other examples of voicelessness

Other frequently quoted examples for voicelessness come from the assimilation of the 2nd/3rd person singular present indicative verbal endings **-isi* and **-iþi*, see (28) below.

(28) Assimilation of **-isi* and **-iθi* (examples from Ringe & Taylor 2014)
PGmc **snīθisi* 'you cut', **snīθiθi* '(s)he cuts' > **snīθsi*, **snīθθi* > **snīssi*, **snīθθi* > **snīs*, **snīθθ* > *snīst* (after the enclitic **θu* 'thou' was reanalysed as part of the suffix), *snīþ*; **hilpisi* 'you help' > **hilpsi* > **hilps* > *hilpst*, **hilpiθi* > **hilpþi* > *hilpþ*; **bīdisi* 'you stay', **bīdiθi* '(s)he stays' > *bītst/bīst*, *bītt/bīt*; **bītisi* 'you bite', **bītiθi* '(s)he bites' > *bītst/bīst*, *bītt/bīt*; **biddisi* 'you ask', **biddiθi* '(s)he asks' > *bitst/bist, bitt/bit*; **drīβisi* 'you drive', **drīβiθi* '(s)he drives' > *drīfst, drīfþ/drīft,* etc.

What interests us here is the changes in phonetic voicing: a pre-OE form like **drīβθi* may have been [drīvði] phonetically in pre-OE just a moment before the vowel was lost to apocopation, similarly to recorded *lǣfde*, as both lenis obstruents were intervocalic. Considering *lǣfde* now, if it had been possible historically to have it as */lǣfd/ with the two obstruents word-finally, it would certainly have been written as *lǣft,* pronounced [ft] (phonologically /f^{0}d^0/) in OE given that lenis obstruents would have been devoiced word-finally without necessarily losing their phonological features. *Drīfþ* and *drift* both show the effects of word-final (phonetic) devoicing.

As we have seen earlier, word-final devoicing in OE stops is not typical (*bād* 'stay, PtSg' is not normally found as *bāt*). We do, however, see it in forms like *bītt* (< *bīdiθi*) showing what an

[42]Note that it is only *bledsian* that is given with a short vowel in the standard literature, and this is probably because the sematic relationship between the verb and its stem, *blōd*, was lost. Of course, the (loss of) length shows a modern interpretation of what may have happened phonologically after the loss of semantic compositionality, something that may coincide with what took place in OE, but this is a conjecture at this point. The question of the length of the vowel in *bletsian* is usually left unresolved. In J.R.C. Hall (1894, 51) it is given as *bl(ē, later e)tsian* (sic!).

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OE scribe must have perceived as a voiceless lenis /d^0/, which they spelt ⟨t⟩. This spelling shows that probably all phonetic cues (the length of the vowel, absence of glottalization, etc.) were lost for the identification of /d^0/ as a lenis stop: what was possible word-finally in *bād* was no longer possible for a lenis stop followed by a lenis fricative: /d^{0}θ^0/ [tθ] (later [tt] by an independent process, still later [t] by the general loss of word-final geminates, seen also in *bedd* > *bed* 'bed', *webb* > *web* 'net', *mann* > *man* 'man', *feorr* > *feor* 'far', for example). It might be objected, still at a time when word-final geminates were allowed, that a form like *bedd* should be found as ***bett* (> *bet*). The difference between /d^{0}d^0/ and /d^{0}θ^0/ can be sought in the melody licensed by the two clusters: in /d^{0}d^0/ there is just a single /d^0/, which is interpreted in two positions (making it a geminate), whereas /d^{0}θ^0/ has two independent consonants with their own melody, defining independently a lenis stop and a lenis fricative. It seems that it was only before such melodically complex clusters word-finally that devoicing is evidenced in OE: /d^{0}θ^0/ [tθ]. Compare this to a very similar form *cȳðde/cȳdde* where there is no devoicing, given that the lenis cluster is intervocalic (⟨dd⟩ attesting to voicing beyond doubt).

Later assimilation in [tθ] to [tt] still does not reveal much about the underlying identity of the cluster. Later still, [tt] is found as [t], rather than [d], showing that there must have been a change in the laryngeal specification of the dental stop. As there is still no general word-final devoicing and *bīt* does not 'resurface' as *bīd,* word-final degemination reveals that *bīt* has a word-final /t^h/ now, making this form a lexicalised one, one which has lost its connection to the rest of the forms having /d^0/ (*bīdan*, *bīdaþ*, *bād*, *bidon*, etc.): *bīt* 'waits' and *bīt* 'bites' sound homophonous. This is one of the rare examples of a change in the laryngeal specifications of an obstruental stop in OE: from /d^0/ to /t^h/, restricted to this very special word-final position when two lenis obstruents surface as phonetically voiceless. It is only here that we see word-final phonetic devoicing of /d^0/ making its way into the underlying representation of /b^{0}īt^h/ ⟨bīt⟩ for 3SgPresIndic.[43] Additionally, we have no reason to believe that similar processes were not at work in word-final lenis fricative+fricative clusters, seen in *drīfþ* [fθ] /f^{0}θ^0/, *drīfst* [f^{0}s^0] (from *drīfan* 'drive'). Here, of course, spelling will never reveal what went on phonetically in such clusters. For some unexpected examples see 7.9 below.

The examples in (29) are usually invoked when the need arises to show that /θ/ was voiceless in unstressed syllables and remained such (i.e. it was phonologised as voiceless) even when it came into contact with a stressed vowel.

(29) Voiceless [θ] ([t])
oβærmōdiθu* > **oβærmǣdiθu* > **oβærmǣtθu* > **oβærmǣttu* > **ofermett*, analogical: *ofermettu* 'arrogance' (Anglian poetic: *ofermēdu*); pre-OE **weorþæmundiθu* > **weorθæmyndiθu* > **weorθmyntθu* > **weorθmynttu* > *weorþmynt* 'honour'; **gasundiθu* > **gæsyndiθu* > **gæsyntθu* >gæsynttu* > **gesynt*, analogical: *gesyntu* 'health' (derivations from Ringe & Taylor 2014, 297)

[43]This is reminiscent to what Szigetvári (2020) asserts (from a MoE perspective) about the diachronic changes affecting the laryngeal specifications of stops: there are very few of them and even those that are often cited as examples are suspect: e.g. *wept* from *weep* + *d* is better analysed as hiding a (phonetically voiceless) lenis stop for the past tense suffix (/wep^{h}d^0/), which happens to be spelt with <t> (cf. also section 7.10). One 'legitimate' example for a fortis stop becoming a lenis is found in monomorphemic *mistake* /sd^0/ [st], for the earlier sequence of /s/ and /t^h/ straddling a word boundary (*#mis#take#*), cf. *#mis#time#* [mist^{h}ajm] with /s^h/#/t^h/, a fortis-fortis sequence which is disallowed mono-morphemically. Examples for the lenis > fortis change are to be found in past tense forms following a sonorant, as in *spelt*, *dreamt*, *pent (up)*, etc.

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The words in (29) were (initially stressed) compounds originally, and not many like them are on record. A sequence like **dθu* (after syncopation) may reasonably be expected to have been voiced ([dð]) in pre-OE (similarly to *cwǣðde*). The reason for its voicelessness may be manifold. One of these is the difference between primary and secondary stressed syllables (*ófermèttu*), where a secondary stressed syllables is expected to be able to cue fewer phonetic features than a primary stressed one, leading to phonetic neutralisation: a 'long' lenis cluster [dð] is phonetically [tθ] in a non-primary stressed syllable (followed by assimilation to [tt]). This does not necessarily mean that [dð] is not /d^{0}θ^0/ (it is just not perceived as voiced after a vowel which has no primary stress).

Anglian-poetic *ofermēdu* ⟨d⟩ may show a different solution to having a /d^{0}θ^0/ cluster after a non-primary stressed vowel: [dð] > [dd] > [d]. This degemination results in a single intervocalic stop: *ofermēdu*. Singleton lenis stops are not devoiced in OE (even in prosodically recessive syllables). The general OE form (at least in Ringe & Taylor's derivation) with a final *-u* shows analogy to other members of this abstract feminine class of nouns: it may simply be that *-u* was added to *ofermett* after it was too late for the cluster to be phonetically voiced because by now the syllable had lost its prosodic prominence (in other words, ⟨tt⟩ shows the result of the same phonological processes seen in **bīdθ* > *bītt*). In *gesýntu* we can see some justification for a previous assumption: there was no voicing of fricatives after nasals (even when these were close to a stressed syllable): **-syndiθu* > **-syndθu* (phonetically: [VntθV], from where we have [VnθV] (or [VnttV] with 'post-nasal hardening') > [VntV], rather than [VndθV] > [VndðV] > [VndV]). Of course, if *gesyntu* is analogical and late, the cluster is not even couched in a sonorant environment ([Vntθ]). This environment is again identical to the one seen in *bītt* (< *bīdiθ*). In *wéorþmynt*, historical /d^{0}θ^0/ was in the second half of a compound, and consequently not preceded by a primary stressed vowel. What's more, the cluster is word-final, where nothing but a phonetically voiceless pronunciation can be expected. The fact that *weorþmynt* does not show a 'retrieved' voiced stop in the oblique cases (e.g. ***weorþmynde*) follows from the position in which the original fricative was found (after a non-primary stressed vowel). A singleton stops would not be found devoiced in this environment.

Another example that shows that obstruental clusters involving a stop were more prone to devoicing than single stops comes, for example, from *strencþ(u)* (< **straŋgiθu*) 'strength', which also occurs as *strengþ*. Whether ⟨c⟩ is [k] or [tʃ] (for either /g^0/ or /dʒ^0/) is immaterial, what we can see is a devoiced stop. OE /g^0/ and /dʒ^0/ outside an obstruent cluster are not found voiceless: *feng* [ndʒ] 'grasp' (< **faŋgi*), not encountered as *fenc* [ntʃ], *efenlang* [ŋg] (< **lang*) 'equally long', not *efenlanc* [ŋk]. It seems stops were not generally (perceived as phonetically) devoiced word-finally, but they were when part of a cluster containing a fricative, not followed by a vowel (cf. *bītt* < **bīdθ*). When the cluster was followed and preceded by a sonorant, there was no devoicing following a stressed vowel (*cȳðde*/*cȳdde*), but there was devoicing when the cluster was preceded by a non-primary stressed vowel (as in *ofermettu*, unless the *-u* was added after destressing affected the second part of the compound).[44] In all these positions the cluster was not supported by phonetically salient features for the speakers to identify them as phonetically voiced (*bītt, ofermettu*). Another subclass of (allegedly phonemically) voiceless fricatives come from examples in (30).

[44]That the *-u* is late and analogical is shown by the heavy syllable before it (pre-OE **u/i* were regularly deleted after heavy syllables in pre-OE).

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(30) Metathesis and degemination
cræsse > *cærse/cerse* 'watercress', **gras*, **grasu* > **græs*, **græsu* > *græs*, *grasu* and *gærs* 'grass', **wirsiran* > **werzran* > **wierzza* > **wierssa* > *wierse* 'worse' (Fulk 2001, 70), etc.

Ringe & Taylor (2014, 263) say: "To the extent that such forms were still derivable from underlying forms with /ss/, or with /s/ or /θ/ between unstressed vowels, no underlying contrast need have existed; but when any such derivation became opaque, the contrast should have been projected into underlying forms as well." Ringe & Taylor repeatedly suggest that OE had developed (marginally) contrasting voiced and voiceless fricatives. Contained in this is the assumption that r+fricative sequences in words like *cerse* [rs] could be in contrast with original/historical [rz] sequences (as in *teorses* 'penis, GSg'), which in this account must have had [rz] for the contrast to be salient in the first place (and phonologically provable over such a distance in time). Whether this was possible, marginal or impossible remains conjectural. We have suggested here that even words like *teorses* (with Germanic **rs*) had phonetic [rs] (given that there were no inherited [rz] clusters in OE to form the basis of new voiced post-rhotic [z]'s). OE *wierse* in Fulk's reconstruction, too, involves post-consonantal degemination (although here there is no metathesis) and no voiceless [s].

7.8. Loss of /h/ as an indicator of fricative voicing

A litmus test for fricative voicing, at least in some analyses (e.g. Suzuki 1994), is the voicing (and disappearance) of pre-OE (*/x^0/ >) /h^0/ when couched between sonorants. If followed by an obstruent, it was retained: **turhta-* > *torht* 'splendid'. Although the effects are very similar, the parallels are not perfect.

Pre-OE **/x^0/*, as discussed earlier, was debuccalized to /h^0/ whenever both preceded and followed by a sonorant. This [h] is lost before both inflectional and derivational suffixes. Debuccalisation must have occurred before the general voicing of fricatives, or otherwise **/x/* would have become OE /ɣ/, as in hypothetical ***seogan/segan* 'see' (for recorded *sēon* < **seoxan*). Word-final **/x^0/* is [x] (as in *feoh* 'possession', but *fēos* 'GSg' < **feoxæs*, *fēo* 'possessions' < **feoxu*). [h] was lost between sonorants, mono-morphemically, as well as at the juncture of inflection and derivational suffixes, see (31) for examples involving *wōh* 'crooked, perverse', and many more.

(31) Loss of **[h]* in pre-Old English
(a) **/VhV/Son/* before suffixes: *wōne* 'AccSgMasc, adj', *wōre* 'G/DSgFem, adj', *wōnes* 'GSgMasc, adj', *wōra* 'GPl, adj', *wōs* 'wrong, GSg', *wōm* 'DPl', *wōnes(s)* 'vileness', *wōlic* 'perversely', *wōdom* 'unjust judgement' (loss before a lenis stop), all from **wōh-** < **wōx-*, etc.[45]

[45]Admittedly, the difference between some of the oblique forms of *plōg/plōh* 'plough' and *wōg/wōh,* as seen in *plōges* vs *wōs*, can no longer be explained with phonology after the debuccalisation of **/x/*, loss of **/h/*, and final devoicing of **/ɣ/*. *Wōg* ~ *wōs* and similar examples must be analysed as examples of morphologically conditioned lexical alternations.

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(b) *VhSonV, *VSonhV in stems: **swexra* > **sweoxr* > **sweohr* > *swehor*, *swēor* 'father-in-law', **taxra-* > *tēar* 'tear', **tuŋxjan* > *ge-tȳwan* (with loss of nasal and yod) 'press', **laixni-* > *lǣn* 'loan', **marx*, **marxas* > *mearh* 'steed', *mēares* 'Pl', **furxno-* > *forn(e)* 'trout', **furxum* > *fūrum* 'fir, DPl', etc.

If we were to follow the parallels of [h]-loss, we would have to assume that every fricative was voiced whenever it was between sonorants (including at least one example with a lenis stop in (31a), *wōdom*, paralleling derived *wīsdom* 'wisdom' [zd] and (originally compound, later analogically reinterpreted) *līflād* 'livelihood' [vl], cf. Fulk 2002, 6.3). As we have seen, however, the situation is more complex than this: post-sonorant fricatives other than [h] (as in *clǣnsian, iermðu*) do not appear to have been voiced, or at least there is no incontestable phonological proof for their having been voiced. The [h] (similarly to MoE) can hardly be called a fricative (there is no frication during its production), its place of articulation (in all likelihood) was glottal, hence we can think of it as aspiration (or simply voicelessness), similarly to MoE. It is thus strikingly different to the rest of the fricatives that licensed a supra-glottal place of articulation. The fact that [h] was lost both before and after a sonorant can be explained as a reaction to the absence of word-internal pre- or post-aspirated sonorants in this language: **mearhas*, **sweohr* > *mēares, swēor* (the usual assumption being that the loss of [h] was reinterpreted as compensatory lengthening of the preceding short vowel); for a different reaction of such aspirated/devoiced sonorants resulting in loss in Scandinavian, cf. Page (1997), as seen in English *ankle* vs Icelandic *ökkla* /œk^{h}la/ [œhkla] < */œŋ̊kla/ < */œŋk^{h}la/. It is also possible (as suggested by one of the reviewers) that /h^{0}/ in pre-OE, after becoming glottal (< */x/), was passively voiced in intersonorant position (similarly to all the lenis fricatives): this [ɦ] (perhaps a pharyngeal glide) must then have been merged with the short vowles, which were ultimately reinterpreted as long vowels (*mēares*).

7.9. Word-final (phonetically) voiced lenis clusters

We have seen that there is no word-final devoicing of singleton lenis stops (or lenis geminates) in OE. There is, however, devoicing of lenis stop+fricative clusters (as it transpires from spelling) in *bītt* < **bīdθ* /d^{0}θ^{0}/. There are, however, a number of unexpected clusters of the reverse order, shown in (32), coming from past participles of a recessive (third) class of weak verbs containing 3 relevant examples only.

(32) Unexpected word-final voiced lenis fricative+stop clusters
hogd (past participle of *hycgan/hogian* 'think'), *hæfd* (*habban* 'have'), *lifd* (*libban* 'live')[46]

One of the curiosities of this class is that there is no thematic vowel between the verbal stem and the suffixal ⟨d⟩. The origins of this are irrelevant here, but the clusters that arose this

[46]The fourth verb of this class (*sægd*, from *secgan* 'say') has /j/ from the palatalisation of the velar voiced fricative, displaying thus [jd].

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way show that these formations cannot be ancient, or otherwise they would be found with ⟨ht⟩ [xt] and ⟨ft⟩ [ft] in OE, appearing as *hæft* and *hoht* (similarly to ancient *sōht* from *sēćean* < **sōk-*, and many others), see Hogg (2011, §6.124).[47] According to Prokosch (1939, §67), these forms may have been formed on analogy with the preterit-present verbs like *monde* (itself a synonym of *hogde*), *scolde*. Given the constraints on what may have been phonetically possible in OE, it seems unlikely that *hogd* had [ɣd] or that *hæfd* had [vd] phonetically. The only clusters that were found voiced word-finally are the voiced geminates (in a geminate, however, there is just one melodic bundle), and even these were more characteristic of early OE before word-final degemination. The clusters in *hogd* and *lifd* appear to be bookish spellings, pronounced with [xt] and [ft]. Of course, when found intervocalically, the clusters were phonetically [ɣd] and [vd], as in *hogde* '3SgPt', *lifde*, *hæfde* (similarly to *hēafdu* 'heads'). Pre-OE clusters like [zd] or [ðd] do not exist, as these were lost to the West Germanic change of *z > *r, *ð > *d (as in **gazdjōn* > *gierde* 'yard, stick', cf. German *Gerte*).

7.10. Another occurrence of Old English fortis fricatives?

As discussed in Section 6, we have evidence for OE fortis fricatives. These were found in voiceless geminates, as in ⟨ss⟩ [ss], which we analysed as /$s^{h}s^{0}$/. The question arises whether voiceless geminates were the only structures in which fortis fricatives were found. If the constraint that disallowed two contiguous fortis consonants worked not only in fortis obstruent clusters like [ss] /$s^{h}s^{0}$/ and [tt] /$t^{h}d^{0}$/, but also in s+stop clusters, we arrive at structures like: [sp] /$s^{h}b^{0}$/, [st] /$s^{h}d^{0}$/, [sk] /$s^{h}g^{0}$/ (similarly to what was proposed for MoE by Szigetvári 2020). This structure explains why these can never be phonetically voiced, even when found between sonorants: *nest*, *nestes* 'nest, NSg, GSg', rather than ***nesdes*, *wæsp/wæps*, *wæspa/wæpsa* 'wasp, NSg, NPl' (***wæsba/wæbsa*), *frosc/frox*, *froscas/froxas* 'frog, NSg, NAPl' (***frosga/frogsa*).[48] The behaviour of these clusters is paralleled by the phonetically voiceless geminates, which are also never found voiced: *sittan*/***siddan*, *cyssan* **[zz], *bucca*/***bugga* 'buck', etc. Compare these to *hēafdu* [vd] /$f^{0}d^{0}$/, *rǣsde* with [zd] /$s^{0}d^{0}$/, *cȳðde* [ðd] /$θ^{0}d^{0}$/, *hogde* [ɣd] /$x^{0}d^{0}$/ with lenis clusters showing passive voicing. Following this line of reasoning and assuming similar clusters had similar structures, the same sequence of fortis+lenis consonants must be assumed in other fricative+stop clusters, like *hæft* 'bond' /$f^{h}d^{0}$/ and *niht* /$x^{h}d^{0}$/ 'night'. These, too, never show passive voicing, as expected: ***hæfdes,* ***nihdum/nigdum*.

One reviewer speculated on how the past tense formations seen in *brōhte* (cf. *bringan* 'bring'), *þōhte* (cf. *þenćean* 'think'), *þūhte* (cf. *þynćean* 'seem'), etc. are to be analysed. The question can be addressed from the point of view of OE (a synchronic approach) and

[47]We can also see that formations like *rǣsde* [z] and *cȳðde* [ð] are also relatively late formations (coming into existence after lenis fricatives were established in OE), otherwise they would show the change of *z > *r, and *ð > *d.

[48]On grounds of their phonetic behaviour, Stahlke (2003, 202) claims that word-final /sp, st, sk/ clusters are composed of a fortis /s/ and a lenis /b̥ d̥ g̊/: the lenis stops show partial voicing when they are followed by a sonorant in the next word (*wisp of smoke* [wɪsb̥bəsmoʔk̚]), something a fortis consonant never does. Twaddell (1935) also suggests that s+plosive clusters involve lenis stops. Davidsen-Nielsen (1969) argues for these extensively, similarly to Szigetvári (2020) based on phonotactic constraints.

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Germanic (a diachronic approach). As far as OE goes, the cluster seen in ⟨ht⟩ lends itself easily to being analysed as /x^hd^0/. The past tense formations must be lexicalised in OE: it would be difficult to argue for a synchronic derivation of ⟨ht⟩ /x^hd^0/ based on the past tense morpheme /d^0/ and the verbal stems ending in /g/ (*bring-*), /$tʃ^h$/ (*þenć-*, *þynć-*) or perhaps (more abstractly) in /k^h/ (/$θ^haŋk^h$/, which would also have to contain the historically umlauted vowel /e/ from */a/, something not found in any of the forms of the verbs. If anything, forms like ***bringde*, ***þenćte*, ***þynćte* (all containing /d^0/) would be expected (if these verbs were first class weak verbs with a heavy stem). If we want to derive *brōhte*, *þōhte* and *þūhte*, the derivation must be historical (in other words, these formations are synchronically unanalysable into verbal stem + suffix). These past tense formations are phonologically identical to monomorphemic words like *niht-*.[49]

We can speculate on why fortis fricatives are only found in clusters. They are probably remnants of an earlier stage of pre-OE or West Germanic with a binary system of oppositions in the fricatives, which remained unchanged in the stops (*sittan* /t^hd^0/ vs *biddan* /d^0d^0/), an opposition that was lost in the fricatives (recall the West Germanic changes discussed earlier: z > r, ð > d, as well as the absence of voiced geminate fricatives). OE lost the opposition between fortis and lenis fricatives, but not the fortis fricatives, at least not in clusters. Taking this analysis further still, there is nothing that does not suggest that word-initial s+stop clusters also showed a sequence of a fortis fricative followed by a lenis stop (a structure that remained unchanged into MoE, cf. Szigetvári (2020) for modern English): *standan* /s^hd^0/ 'remain', *spillan* /s^hb^0/ 'destroy', *scortian* /s^hg^0/ 'become short' (before it was palatalised to /$ʃ^hʃ^0$/).[50] We have to agree with Penzl (1968a, 147), who discusses Old High German on similar grounds, that the orthographic representation of these fortis+lenis clusters (⟨sp, st, sc⟩) is based on their phonetic quality, not their

[49]The question of how these formations are to be analysed in terms of Common Germanic phonology is not relevant at this point, although a new analysis may be needed if Germanic proves to be a fortis-lens language, too. Verbs like *brōhte* belong to a subclass of weak verbs ending in a velar consonant (a velar ɬ/k/x/g, cf. Hogg 1992, §6.100) and no *-*i-* before the past tense suffix. In this subclass Hogg (and many others) stipulate that the past tense cannot have originated in a periphrastic construction involving the etymon of *do* (that is, a Common Germanic *ð) because it is "difficult to explain why there is devoicing in *bohte* and similar forms" (§6.100, n. 3), so these must be reconstructed with Proto-Indo-European */t/, Germanic */θ/, followed by at least two other rules in West Germanic. The supposition here is that past tense */ð/, (in Gothic and Old Norse, as well) must have been a phonologically voiced (marked) sound capable of spreading this feature onto the preceding /x/, a process not on record. The conclusion that inevitably follows is that the past tense suffix must have been a voiceless */θ/. In our account, at least some of the forms can receive an alternative explanation: Germanic (*/k^h/ >) */x^h/ + */$ð^0$/ sequences found as OE/Gothic/Old Norse [xt] <ht> may simply show the phonetic effect of devoicing a lenis dental fricative (hardened into a phonetically voiceless lenis /d^0/ [t] after a fricative, as expected). Bammesberger (1986, 69) regards these verbs to represent an ancient category of primary verbs with non-derived stems (an OE past tense *þōhte* is derived from Germanic **θaŋkt-*, not **θaŋk* (+ whatever the weak past tense suffix was)). **θaŋkt* is thus indetical to Proto-Germanic **nakt-*, later **naxt-* 'night' (or perhaps more accurately */nax^hd^0/). Admittedly, *bohte*, *brōhte* (originating in Germanic */g, ɣ/) are more problematic and may be analysed differently, something we do not attempt here.

[50]This analysis is not found in Stahlke (2003, 2009), who asserts on grounds of phonetics that because onset /sp, st, sk/ clusters do not show partial voicing (see previous footnote) of /p t k/ before sonorants ([spɑt], not [sb̥ɒt] for *spot*), these clusters must be analysed as having a fortis stop (preceded by a fortis /s/). This may be true phonetically, but onset and coda clusters do not sit in the same structural position phonologically, one is in onset, the other in word-final coda (hence different phonetic behaviour may well be expected). Stahlke goes on to posit 4 types of obstruents phonetically, but these naturally must fall into only two categories phonologically (lenis and fortis, cf. Szigetvári 2020).

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phonologically distinctive lenis characteristics, so graphic conflation with (fortis) /p^h, t^h, k^h/ is simply unavoidable.[51]

8. TOWARDS A CONCLUSION

We have tried to reanalyse OE along the lines of laryngeal oppositions rooted in lenis (neutral) vs fortis (marked): OE stops are divided into lenis /b^0 d^0 g^0/ and fortis /p^h t^h k^h/. Similarly to MoE, the lenis stops of OE must have been either phonetically voiceless or voiced depending on the environment. The phonological oppositions between the two classes were not neutralised in the weak positions (word-finally or intervocalically).

The West Germanic opposition in the fricatives collapsed for the coronal fricatives and coupled with the early OE changes (the debuccalisation of */x/ > */h/ and subsequent loss of */h/) a new system ultimately developed that had a neutral series of fricatives only (/f^0 θ^0 s^0 x^0 h^0/). These could be phonetically voiced or voiceless depending on the environment.

One of the moot questions has always been the voicing of fricatives in unstressed syllables. Evidence points to these fricatives being voiceless in such a position. The syllable as a theoretical construct is of no use in the explanation of (phonetic) voicing. The question of whether there was voicing in sonorant+fricative sequences seems to have depended on whether OE had inherited such sequences of voiced fricatives after sonorants to act as a catalyst for further cases to be drawn in (found for the labial/velar fricatives in [lv/ɣ] and [rv/ɣ] clusters, but not the rest of the fricatives, which can only be explained as a historical coincidence).

Cases of devoicing (as traditionally understood) were analysed as examples of devoicing in clusters, found in the phonologically weak positions (word-finally, and in unstressed syllables). One of the interesting consequences of the analysis was that fortis fricatives also existed in the language, but were only found as the first member of geminate fricatives (/s^hs^0/ ⟨ss⟩), s+stop clusters (/s^hb^0/ ⟨sp⟩) and *ft/ht*-clusters (/f^hd^0/, /x^hd^0/). The answer to whether OE had phonologically distinctive fortis fricatives is yes, it did, but only in clusters (as possible remnants of an earlier opposition of pre-OE or West Germanic). It was only in Middle English that a system of oppositions resembling that of West Germanic was to develop again (continued into MoE), based on the proposed structure of OE geminate fricatives. By way of summary, see (33), which shows the OE obstruents with their phonetic rendition, the 'rule' for passive voicing of the fricatives (34) and a summary of the environments in which the obstruental stops were in contrast (35). We have to agree with Fulk (2001) and Minkova (2011), on slightly different grounds though, that OE had no demonstrable cases of contrastive fricatives during its 500-year history. If there is a rule, there can be no contrast.

[51] We have no evidence from English for what may become of /s^hp^0/, for example, if /s/ is deleted. In Pali (compared to Sanskrit, cf. Vaux 1998), the stop inherits the [spread] feature of the original /s/: Sanskrit *sparʃa-* vs Pali *p^hassa-* 'touch'. In English, the [p] in [sp] would be expected to surface as (lenis) [b] after deleting [s]. However, an interesting example of a similar process to Pali is provided by words from Greek having word-initial ⟨x⟩ [ks] (e.g. *xeno-*) in English. These are borrowed with [z]. If we suppose ⟨x⟩ is analysed by speakers as /k^hs^0/, a fortis-lenis cluster, the deletion of /k^h/, leaves behind /s^0/, which is interepreted phonetically as [z]. Of course, examples with ⟨ps⟩ (e.g. *psychology*) seem to contradict this, but then the solution applied to an offending cluster also depends on the time of borrowing: /p^hs^0/, upon deleting /p/, is found as /s^h/ [s] (here remedying the cluster meant bequeathing /s/ the feature of 'h').

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(33) Old English (fricative) voicing

Phonetic form (some hypothetical forms)	Possible	Reason
[t^hylvə] /t^hylf^{0}ə/, [t^hyrvə] /t^0yrf^{0}ə/	yes	[lv]/[rv] continues a pre-OE pattern
[t^hylfə] /t^hylf^{0}ə/, [t^hyrfə] /t^hyrf^{0}ə/	no	pre-OE [lf]/[rf] clusters appear voiced on the model of pre-OE [lv]/[rv] clusters
[t^hynsə] /t^hyns^{0}ə/	yes	no pre-OE [nz] pattern to conform to
[t^hynzə] /t^hyns^{0}ə/	no	no pre-OE [nz] pattern to conform to
[t^hylsə] /t^hyls^{0}ə/, [t^hyrsə] /t^hyrs^{0}ə/, [t^hylθə] /t^hylθ^{0}ə/	yes	no pre-OE [lz], etc. pattern to conform to
[t^hylzə] /t^hyls^{0}ə/, [t^hyrzə] /t^hyrs^{0}ə/, [t^hylðə] /t^hylθ^{0}ə/, etc.	no	no pre-OE [lz], etc. pattern to conform to
[t^hyzlə] /t^hys^{0}lə/, [t^hyðrə] /t^hyθ^{0}rə/, [t^hyzə] /t^hys^{0}ə/	yes	all fricatives voiced after a stressed vowel followed by a vowel/sonorant
[hoɣoθə] /h^{0}ox^{0}oθ^{0}ə/	yes	fricatives after a stressed vowel are passively voiced, those preceded by an unstressed vowel are voiceless (even if intervocalic)
[vazən] /f^{0}as^{0}ən/	no	word-initial/final fricatives cannot be passively voiced
[zazəɣ] /s^{0}as^{0}əx^0/	no	word-initial/final fricatives cannot be passively voiced
[hovod] /h^{0}of^{0}od^0/	yes	word-initial fricative voiceless (= aspiration), intervocalic fricative voiced, word-final stops not merged word-finally ([hovod] vs [hovot] remain)
[byssa] /b^{0}ys^{h}s^{0}a/	yes	geminate fricatives composed of a fortis fricative followed by a lenis fricative
[həstə] /h^{0}əs^{h}d^{0}ə/	yes	s+stop clusters composed of a fortis fricative + a lenis stop
[izzə] /iz^{0}z^{0}ə/	no	no voiced geminate fricatives
[ittə] /it^{h}d^{0}ə/	yes	voiceless geminate stops composed of a fortis stop + a lenis stop
[iddə] /id^{0}d^{0}ə/	yes	voiced geminate stops composed of a single consonantal melodic bundle spread across two positions

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(34) OE fricative voicing
- a. Affecting all the OE singleton fricatives (/f^0 θ^0 s^0 x^0 (h^0)/)
  ÝFricV, **ÝFricSon(V)** (passively voiced)
- b. (analogical) Post-sonorant (post-r/l) (passive) voicing affecting OE /f^0/ [v] and /x^0/ [ɣ]
  Ýrv/ɣV, **Ýlv/ɣV**
- c. Post-tonic intersonorant fricatives
  $\mathbf{V_{[unstressed]}}$**FricSon(V)** (no proof for phonetic contrast for voiceless vs voiced fricatives)
- d. Geminate fricatives
  Phonetically voiceless in all positions (no contrast with phonetically voiced geminate fricatives)
  Phonologically composed of a fortis+lenis fricative (e.g. [ss] /s^hs^0/)

(35) Maintanance of phonological contrast in OE obstruental stops
- a. (generally) Singleton lenis and fortis stops contrastive in both and weak phonological positions
- b. (generally) Geminate lenis stops in contrast with geminate fortis stops
- c. Fortis geminate stops composed of a fortis+lenis stop (e.g. [tt] /t^hd^0/)
- d. Phonological contrast of fortis vs lenis (probably) carried phonetically by aspiration (before a stressed vowel) (and its absence) vs a combination of other phonetic cues following a stressed vowel (and their absence) (similarly to the modern standard reference accents)

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