

Phonotactically conditioned alternation

Instances from Old High German and Irish English*

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Abstract Part of the High German consonant shift involves the shift of /t/ under certain circumstances to a sound which was orthographically represented as \mathfrak{z} . The circumstances under which it appears are closely examined and the views in the relevant literature on what sound value \mathfrak{z} had are recapitulated. A sound in Irish English which has an identical distribution to \mathfrak{z} and which also derives from /t/ is regarded as being the same as the result of the shift in pre-Old High German, this then being a voiceless apico-alveolar fricative in favour of which various phonological arguments are forwarded. The position of \mathfrak{z} in loanwords and the later development of it and /s/ in German are also considered.

One of the unresolved questions in the early diachronic phonology of German concerns the phonetic nature of the sound represented by the grapheme \mathfrak{z} . It is clear that it was a coronal fricative of some kind and that by the end of the Middle High German period it had fallen together with /s/ (see below). Equally it is certain from comparative evidence that its only source is earlier /t/ whose reflex it represents after the operation of the High German sound shift (HGSS) completed in Upper German by the time of the first attestations of Old High German. For the period from the beginning of the OHG period to the end of MHG, \mathfrak{z} is constantly kept apart from *s*; compare

- (1) a. *wī \mathfrak{z}* 'clever'
b. *wīs* 'manner', 'way'

In view of the merger with *s* the question arises as to what the phonetic character of \mathfrak{z} must have been to have enabled it to have been kept apart from *s* for such a long time. Philologists have tended to postulate maximal differences between \mathfrak{z} and *s* for the period concerned to account for the consistent orthographic distinction. They have been tempted into doing this in my view by a lack of present-day parallels to the OHG/MHG situation and an insufficient consideration of phonetic detail, typical of philologists, which would lead to plausible suggestions for the quality of the sound represented by \mathfrak{z} .

I hope to show by comparing the sound system of present-day Irish English, particularly coronal segments in this dialect, that a modern parallel to the former German phonetic manifestation and distribution of such segments does indeed exist. But first some general remarks on the High German sound shift are called for. The series of changes which is subsumed under this appellation consists of one basic movement in the phonology of pre-OHG voiceless stops, namely fricativization. If one maintains that this is the essence of the shift, then one can account for the appearance of \mathfrak{z} as the reflex of */t/. To explain the remaining reflexes one must bear the phonotactics of the affected segments in mind.

The initial stops which appeared as /pf/, /ts/ and /kx/ occurred before the stress of the word they formed a part of. They therefore occupied from the point of view of

lenition theory² the strongest position in a word. Fricativization was substituted by affrication when a segment was pre-stress, as it is least liable to weakening there. The reduction in articulation which leads to fricatives in poststress intervocalic position is rarely found in initial position unless by means of sandhi, whereby the initial segment of a word is brought into intervocalic position by a preceding word ending in a vowel. This has been the case in the development of the morphological process of lenition in Irish.³ Thus where a language shows a general tendency to voice or fricativize stops, this does not affect initial segments. Instances of this are provided by Danish, Irish, Spanish, etc., where initial (i.e. prestress) stops correspond to intervocalic and/or final fricatives either diachronically or synchronically (Spanish).

Now affricates are also found in two other cases: (i) when the original segment was a geminate, and (ii) when it occurred after a sonorant.

Let me begin with the second case. Here fricativization does not occur (i.e. /t/ → ʒ), as the preceding segment is not a continuant. Where /t/ followed a sonorant it was retained. The preceding sonorant acted as a barrier to lenition as it is phonologically a strong environment.⁴ Phonetically, this is correlated by apico-alveolar contact, which meant that there was a period of closure before /t/ so that its tendency to fricativize was blocked by the immediately preceding segment. With nasals there is of course nasal release and with laterals lateral release; what is important, however, is that at the point of contact for a /t/, the alveolar ridge, there was closure already. The position with /r/ is more difficult. Here there is rapid intermittent closure if the /r/ was trilled. Hence /r/ was phonetically a continuant, but phonologically it has acted in German as a noncontinuant in that the reflex of */t/ after /r/ is /ts/, cf. *Herz* ‘heart’ /herts/ OHG *hërza*. Much has been made however of the form ModHG *Hirsch* ‘hart’ which derives from OHG *hir(u)z*. (Joos 1952: 226; Voyles 1972: 52, fn. 11). The /ʃ/ pronunciation implies that OHG had a fricative and not an affricate after /r/ in this form, which means that here */t/ became ʒ although /r/ usually prevents this fricativization. But the OHG forms show an *u* between /r/ and ʒ which, although subsequently disappearing, would seem to suggest that at the time of the HGSS */t/ was between a vowel and a final word boundary, an environment which induces fricativization. The derivation of *Hirsch* can then be given as follows.

(2)	OHG	<i>hiruz</i>	/hirət̪/	
		<i>hirz</i>	/hirt̪/	(i) by loss of epenthetic vowel
		<i>hirs</i>	/hirs/	(ii) by late MHG collapse of /t̪/ and /s/
		<i>Hirsch</i>	/hɪrʃ/	(iii) by /s/ → /ʃ/ / /r/ ---

As Voyles points out (1972: 52), the form *Arsch* /arʃ/ from earlier /ars/ would justify a generalization of the kind given in (iii).⁵ He might also have added in support of this the Swedish and Norwegian development of /rs/ sequences to /rʃ/ to [rʃ] as in Sw. *kurs* [kørs] ‘course’, Norw. *norsk* [nørʃk] ‘Norwegian’. Thus while /r/ has a greater degree of continuant character than /l/ and /n/, it appears to have been sufficiently consonantal to have been phonologically interpreted as strong, thus inhibiting /t/ → ʒ.

The position with geminates is similar phonologically to that with initial /t/ and sonorant plus /t/ clusters, inasmuch as they were also ‘strong’. By this is meant that geminates, because of their phonological length, can be regarded (phonologically) as two segments of the same type in sequence. In this case only the second developed into a fricative, the first remaining a stop. Phonetically, as the segment is longer in articulation than the corresponding nongeminate, the friction which sets in at the end of the segment remains confined to the release of the stop and does not involve the entire segment, as it

does in intervocalic position. Affrication is then the phonetic reflex of a segment subject to lenition in a phonologically ‘strong’ position.

The upshot of these considerations is that the sound represented by \mathfrak{z} was the same as /t/ in all respects except that it was continuant. Equally the fricative portion of the affricate resulting from /t/ in the complementary position to \mathfrak{z} resembled /t/ in all features bar continuance. As a form of transcription I use the symbol [t̥] to indicate the sound written \mathfrak{z} , as is done in Hickey (1984a, 1984b) for Irish English. The ‘t’ symbolizes that the sound resulted from /t/ (in Irish English, that it is an allophone of /t/, see below) and the diacritic ‘^’ that it shares all features with the symbol it is placed beneath except that it is continuant. At this point it would seem appropriate, particularly in connection with Irish English, to contrast the realization of /t/ as [t̥] and as a tap, as in certain varieties of American English. These two realizations are phonetically quite distinct. The former is a controlled articulatory gesture which moves the apex of the tongue toward the alveolar ridge and holds it there for a duration approximately that of other fricatives. A tap, on the other hand, is a ballistic movement in which the tongue is thrown against the alveolar ridge forming brief contact and falling back because of the inertia following the spasmodic contraction of the front of the tongue. It should be stressed here that [t̥] never involves apico-alveolar closure, however brief, and that it is a controlled movement which is considerably longer than a tap.

The phonetic transcriptions of forms which represent the various positional reflexes of /t/ would be the following:

(3)	$\mathfrak{z}it$	/t̥i:t/	‘time’	(initial)	ModHG	<i>Zeit</i>
	$si\mathfrak{z}zan$	/ˈsitt̥ən/	‘sit’	(geminate)	ModHG	<i>sitzen</i>
	$sal\mathfrak{z}$	/salt̥/	‘salt’	(postsonorant)	ModHG	<i>Salz</i>
	$fa\mathfrak{z}z\bar{o}n$	/ˈfaʔo:n/	‘grasp’	(intervocalic)	ModHG	<i>fassen</i>
	$krei\mathfrak{z}$	/kreiʔ/	‘area’	(postvocalic)	ModHG	<i>Kreis</i>

Before going into further details on this apico-alveolar fricative let me review briefly the views propounded in the chief literature on the subject.

The traditional opinion on \mathfrak{z} , found for example in Paul and Stolte (2962: 100ff.) is that \mathfrak{z} represented a dental fricative, while *s* was regarded as a (pre-)palatal fricative. More traditionally oriented subsequent work on OHG shows an unreflecting adoption of this view. Keller (1978: 172) maintains ‘the new sound ... $\mathfrak{z}\mathfrak{z}$... was probably a dental fricative in opposition to the more palatal or more *sh*-like /s:ss/. Sonderegger (1979: 128) is similarly imprecise in assuming simply that \mathfrak{z} was a dental /s/ without further specification. Penzl deals with \mathfrak{z} and *s* in several places (Penzl 1971 has comments on six OHG texts but little illumination of the problem. Penzl 1970 and 1973 are repetitions of the standard wisdom on the topic). Penzl (1968: 344f.) is the most comprehensive statement on the issue, which approvingly mentions the standpoint of Joos, who interprets \mathfrak{z} as a lamino-alveolar fricative and *s* as an apico-alveolar fricative on the grounds of diverse evidence.⁶

With regard to the quality of \mathfrak{z} and *s* in the MHG period it should be remarked that, while the appeal to the distinction fortis ≠ lenis is perhaps useful in accounting for the later voice distinction, this factor is independent of the configuration of the tongue during the constriction (i.e. apical or laminal) and appeals to it to explain the difference between \mathfrak{z} and *s* are of little or no value. Just such an appeal is made in Voyles (1972) in

an article whose promising title⁷ is misleading and in which he maintains that ʒ and s were distinguished by stridency and ‘perhaps also in the feature of tenseness’ (1972: 51). To deal first with stridency. This is problematic as it does not, in contradistinction to various articulatory parameters, have a sharp dividing line between those segments which have a negative value for it and those which have a positive one. Neither Jakobson nor Halle (1956: 42) nor Chomsky and Halle (1968: 329) offer any guidelines for determining which of two given sounds is to be regarded as strident. The only clue in either the 1956 or the 1968 versions of distinctive features as to the articulatory correlates of stridency is the reference to a rougher surface among strident elements. Now while that might be acceptable when separating bilabial and labio-dental fricatives (the latter being strident as the upper teeth represent a ‘rougher surface’ than the upper lip), it is unclear how one is to use such a clue when looking at the articulation of apical and laminal segments. One element mentioned in Chomsky and Halle (1968: 329) might be of help here: Chomsky and Halle maintain ‘an angle of incidence closer to ninety degrees will ... contribute to greater stridency’. If this is so then apico-alveolar segments could be termed strident, which would leave one the possibility of arbitrarily assigning lamino-alveolar segments a minus value for this feature. This would mean that ʒ would be labelled [+strident] as opposed to Voyle’s [–strident] value for it (1972: 51). But the point may be irrelevant, as Voyle seems blissfully unaware of the difficulties involved in the use of the term ‘strident’. Nor does he offer any phonetic correlates for his term [tense]. If he means increased supraglottal pressure behind the oral constriction, then his combination of the features [–strident] and [+tense] for ʒ is untenable. Furthermore, to say, when dealing with the merger of the sounds represented by ʒ and s , that ‘the change of ʒ to s represents a shift only in the feature stridency: [–strident] ʒ became [+strident] s ’ is an uninterpretable statement devoid of any explanatory value. Additional statements such as ‘the difference between / ʒ / [sic!] and / ð / (later / d /) was in the features of tenseness and voicedness: / ʒ / was [+tense] and [–voiced] while / ð / seems to have been from the earliest attested OHG times [–tense] and [+voiced]’ (1972: 51) display a similar vacuity.

Vennemann in an article not primarily devoted to the question of the sibilants regards both ʒ and s as having been dorsal (1972: 257) but that one had a greater area of constriction than the other. Now I think that the length of constriction was not relevant with ʒ . An apical fricative has by its nature a shorter constriction than a laminal one. But both were not dorsal in my view. Taking dorsal as a more general term for laminal (covering a greater part of the tongue, starting from immediately behind the apex), I still maintain that both cannot be classified as dorsal, as the essential distinction was between an apical and a nonapical articulation.

The remarks so far have concerned the assumed phonetic character of ʒ as a fricative. I have not speculated on the nature of s nor expressed an opinion on the development of the two fricatives in late MHG. Before doing so I wish to sketch the situation in Irish English. By the term ‘Irish English’ I mean the supraregional standard of the South, i.e. the Republic of Ireland. To talk of such a standard is justified with regard to southern Irish English (see Hickey 1984b: 3.0 for a discussion of the features of this standard) as the varieties of English in the South show little variation among each other in the area of consonants (the only exception here being contact English in the Irish-speaking districts, see Hickey 1984b: 1.0 and 1.2ff.). The phenomenon to be discussed below, the fricativization of alveolar stops in certain phonotactic positions, is a universal feature of Southern Irish English. It has its probable origin in the early varieties of English which were introduced into Ireland (Hickey 1984b: 2.1.2.2 and

2.2.3.1.2) and which have a continuation in the conversative variety of lower-class Dublin English. Thus it is synchronically justified to speak of the fricativization of alveolar stops as being a feature of Dublin English which is present in the supraregional standard of the South (for a full and detailed discussion of this fricativization, see Hickey 1984b: 2.3.2.1.2). In the following the unqualified term ‘Irish English’ refers to the supraregional standard of the Republic of Ireland, to the specific exclusion of the collection of varieties spoken in Northern Ireland and in the country of Donegal (which is politically but not linguistically part of the Republic).

To introduce the section on Irish English, let me begin with a quotation from Penzl (1968: 345):

Das Hauptaugenmerk gegen die Rekonstruktion von ‘apikal’ und ‘präadorsal’ [=my laminal, RH] als relevante Artikulationsopposition besteht wohl darin, daß der Unterschied der Artikulation nur schwer zu hören ist. Sollte die Perzeption der Vergangenheit so ganz anders und besser gewesen sein?

This and similar statements are typical of the refusal to accept that phonetic differences are quite perceptible when they are phonological in a certain language although they are not represented in the language of the observer. Just to take two examples, witness the difficulties non-Russians have in hearing the difference between palatal /tʲ/ and /tʲsʲ/ which is always palatal, as in the words *čina* [tʲsʲinə] ‘seaweed’ and *tina* [tʲinə] ‘rank-GEN’; or that of English speakers to distinguish between dental and alveolar stop articulations in Australian languages, as these are allophonic in most varieties of English (see Dixon 1980: 132ff.).

In Irish English a very slight difference in articulation is perceptually significant because it represents the realization of two different phonemes and is in my view parallel to the situation which obtained in OHG and MHG. The first phoneme involved here is /t/, which in contradistinction to Standard English has a fricative and a stop realization. The first is found in prestress position (word-initial or medial depending on stress placement)

- (4) a. *take* [t̪e:k]
 b. *attack* [ə'tæk]

and in the ‘strong’ positions which have been noted for Pre-OHG /t/, i.e. postsonorant (Hickey 1984a).

- (5) a. *bolt* [bo:lt]
 b. *gaunt* [gɔ:nt]

Two points must be noted in this connection. First, Irish English, like other varieties of English, does not have geminates, so that the case of intervocalic long stops not fricativizing does not apply here. Second, the fricative realization of /t/, which in OHG is not found after /r/ (cf. ModHG *Herz* with /ts/, which cannot be the reflex of a fricative), exists in Irish English.

- (6) a. *party* [pa:ɾi]
 b. *part* [pa:ɾ]

This would seem to be due to the nature of /r/ allophones on OHG and Irish English. As has been suggested above, the trilled [r] was phonologically regarded as representing a strong position in OHG like /l/ and /n/; that is, it did not cause the /t/ after it to undergo the fricative weakening found in intervocalic position. The frictionless continuant [ɹ] which is the normal allophone of /r/ in Irish English does cause this weakening, as the segment before /t/, in those cases where it is [ɹ], does not involve alveolar contact of the tongue and is phonetically a continuant. In view of this phonetic state of affairs, /r/ is treated in Irish English, as opposed to /l/ and /n/, as a continuant phonologically and does not block the fricative realization of /t/ after it.

There is an additional case where Irish English does not allow fricative realization of /t/, namely after fricatives. The reason here is that Irish English does not allow sequences of two fricatives in its phonotactics unless there is a morpheme boundary between them (cf. *twelfth*) or the forms with such sequences are classical loanwords (cf. *sphere*). Thus one has

- (7) a. *fist* [fɪst], *[fɪst̪]
 b. *loft* [lɒft], *[lɒft̪]

The situation in OHG is exactly parallel. Double fricative clusters are impermissible, cf. OHG *dahs*, ModHG *Dachs* /daks/ ‘badger’; OHG *wahsan*, ModHG *wachsen* [vaksən], as can be seen from the modern pronunciations which have retained this restriction. The only exception to this are certain personal names which have final double fricatives (e.g. *Mews* /me:fs/) and classical loanwords which imported not only their accentual system but also their phonotactics into German.

The HGSS did not for this reason⁸ affect /t/ after a fricative, as can be seen from the OHG cognates of the forms in (7).

- (8) a. *fust* [fu:st] ModHG *Faust*
 b. *luft* [lʊft] ModHG *Luft*

Now granting that the weakening of /t/ in Irish English is similar in nature and distribution to OHG, one can consider the status of the fricative allophone [ɹ] relative to the other coronal segments. It contrasts with /l/, /n/, and /r/ where there is quite a difference between the contrasting elements. The affricate [tʃ] also occurs in contrasting forms; this has no variant allophones and is distinguished from [t̪] by its initial closure and the [ʃ] release. The two fricatives which contrast with [t̪] are [s] and [ʃ]. The articulation for all three is different and can be described as follows.

- (9) a. [t̪] apico-alveolar fricative
 b. [s] lamino-alveolar narrow-grooved fricative
 c. [ʃ] alveolo-palatal broad-grooved fricative

A set of minimal forms for all four coronal obstruents is given in (10).

- (10) a. *putsch* [putʃ]
 b. *put* [put̪]
 c. *push* [puʃ]
 d. *puss* [pus]

The crucial forms are (10b-d). Form (10c) is distinct from that in (10b) in that the constriction for the fricative is quite long, extending from the apex of the tongue back along the blade, and on the passive articulator from the alveolar ridge back up toward the hard palate. The groove formed is fairly broad compared with /s/. For [t̪] there is no arching of the tongue (and no attendant lip rounding), so that only the apex is brought up toward the alveolar ridge near enough to cause friction with the escaping air flow. The form in (10d) is distinct from that in (10b) in that only the blade is used for constriction. The apex of the tongue lies behind the lower teeth. The length of constriction is quite long, not quite as long as for [ʃ] but nonetheless quite different from the pointed apical constriction for [t̪]. Note that there are no retroflex articulations in Irish English.

From the above it will have been seen that Irish English has three fricatives very close to each other in terms of place of articulation but that all three are kept quite distinct. This is favored by the fact that slight differences in articulation in the alveolar region are easily perceptible. If one produces for example [t̪], [t], and [t̪] one after the other, then the difference is audibly quite clear (dental, alveolar, retroflex) and is in fact used in some Dravidian languages, for example (Andronov 1970: 35).

The reason for these remarks is that Germanic philologists have been reluctant to accept that the sound represented by *s* was not simply /s/ as found in the present-day language but must have been [ʃ]-like. This is assumed because a maximal difference between the sound of *ʒ* and *s* is posited, if not in full, in part at least, due to a misguided attitude toward the situation of the OHG sibilants such as that reflected in the quotation from Penzl above.

The evidence from Irish English shows that a contrast between an apico-alveolar fricative and a lamino-alveolar fricative is quite easy to maintain, and the comparison of the source and distribution of both Irish English [t̪] and OHG *ʒ* would suggest assigning the enigmatic grapheme the sound value of the (present-day) apico-alveolar fricative.

For the determination of the phonetic value of *ʒ*, that of *s* is of only indirect relevance. It is not so when comparing the treatment of loanwords in OHG nor when viewing the further development of /s/ in late MHG. As is often remarked, Slovene /ʃ/ was rendered by OHG *s* and not *ʒ* in a set of manuscripts known as the Freising documents (Sonderegger 1974: 44f.). Now the /ʃ/ sound was a palatal fricative which was formed with extended constriction behind the alveolar ridge. As OHG had only an apical fricative and a laminal one, it is understandable that the latter with its more distributed⁹ constriction would be chosen to represent Slovene /ʃ/.

The later development of [t̪] and /s/ in MHG requires some comment. For one thing /s/ developed in initial position before a stop or sonorant to /ʃ/. If one assumes that /s/ had a distributed articulation (see Vennemann 1972: 257), then change into /ʃ/ is only a matter of fricative groove width. An alteration from narrow to broad groove would have meant phonologically the adoption of the /ʃ/ sound from earlier /sk/.¹⁰ To judge by the orthography this would seem to have developed from /sx/¹¹ (the realization in present-day Dutch), which being an impermissible double fricative sequence developed into /ʃʲ/ through an intermediary stage /sʲç/ and later depalatalized to /ʃ/. This depalatalization may have been considerably later; in fact, in the standard it is not complete (or has been reintroduced according to the interpretation of the phonetic facts), as [ʃ] appears as [ʃʲ] before /l/, which is slightly palatalized in present-day German.

- (11) a. *Stein* [ʃtaen] ‘stone’
 b. *schlecht* [ʃlɛçt] ‘bad’

The second matter deserving of attention is the development of /s/ to /z/ in certain environments. This development shows the effect of assimilation and syllable structure on the voiced or voiceless realization of the fricatives. The first regularity in this realization is that final /s/ is always [s] irrespective of preceding segments. Equally, initial /s/ before vowels is voiced. Just as *Auslautverhärtung* represents a type of assimilation to the (potential) pause following the word, the realization of initial /s/ as [z], which later became characteristic of central and northern dialects (including the present-day standard), is a type of assimilation to the voice of the following vowel (albeit a relatively rare direction for initial assimilation). This need be of no further concern here. There remain, then, the following three cases:

- (12) a. (i) realization of /s/ before and after sonorants
 b. (ii) realization of /s/ before and after obstruents
 c. (iii) realization of /s/ in intervocalic position

(i) shows two situations: /s/ → [z] after sonorants as an absolute assimilation rule down to the present-day language (cf. *die Häuse* /hɛlʒə/ ‘the throats’) and /s/ → [s] before sonorants. The sequence /s/ plus sonorant is very rare in native¹² German words and is only found among personal names, cf. *Vasmer* /fasmɛr/, and before the agentive suffix /-lɔr/ as in *Drechsler* ‘turner’. In this case it is not possible to decide whether there is an automatic realization rule with devoicing before sonorants because German devoices all obstruents before sonorants and because such sequences only occur at the center of disyllabic sequences. The devoicing may then be due to morphemic segmentation with *Auslautverhärtung* at the end of the first supposed morpheme, cf. *Wagner* /va:k#nɛr/, *Steglitz* /ʃte:k#lɪts/.¹³ The case of *Osnabrück* /ɔsnabryk/ may be revealing. It has voiceless /s/ despite the fact that a morphemic segmentation of *Osna* as /ɔs#na/ is impermissible in German because no morpheme can consist of an open short-vowel syllable (i.e. */na/).¹⁴

(ii) in (12) is of little interest as /s/ only occurs before voiceless consonants in monomorphemic forms, cf. *Last* /last/ OHG (*h*)*last*, and after voiced consonants it is always either the final segment, in which case it is voiceless by *Auslautverhärtung*, or the preceding voiced consonant is morpheme-final (and so devoiced) while /s/ is morpheme-initial. Here there is no voice to be assimilated. Examples for this are not found in OHG as the proliferation of final vowels invalidates forms which would otherwise have served as illustrations (cf. OHG *truobisal*, ModHG *Trübsal* ‘depression’).

The phonotactic position of real interest for the /s/ to [z] development is that under (iii) in (12). Working back from ModHG one can see that there is a phonotactic regularity in the intervocalic distribution of /s/ and /z/. There are no instances of /z/ after a short vowel in ModHG.¹⁵ In fact, all of the instances of voiced obstruents after short vowels, as Kohler (1977: 189) points out, are either foreign (*schmuggeln* ‘to smuggle’) or dialectal (mostly Low German) (*Ebbe* ‘low tide’). Thus /s/ can only contrast after long vowels or diphthongs, as in the famous example, *reißen* ≠ *reisen*.

Now looking at MHG one sees that /s/ remains [s] (after the development of [z]) when it was in final position or a geminate (see Penzl 1968: 348). The geminate was found, however, only after short vowels, so that with the loss of phonological length and

the rise of voicing as a distinguishing characteristic of short [s] as opposed to long [s:] in intervocalic environment, the original syllable structure condition which specified VCC or VVC¹⁶ as a nonfinal syllabic structure was replaced by VC[-voice] and VVC[+voice], where the C stands first and foremost but not entirely for /s/ or /z/. This would then explain why *s* is found as [s] in forms like *küssen* ‘to kiss’ (with short vowel and voiceless fricative) and as [z] in words like *lesen* ‘to read’ (with long vowel and voiced fricative). The rise of /z/ as a phoneme is then to be seen in direct relationship to the loss of phonological length with voiceless fricatives.

The question which remains is why [ʃ], ʒ which merged with [s], did not share its distribution along the voice parameter. In all cases ʒ resulted in [s] even in the intervocalic position after long vowels, a fact which led to the contrast embodied in the *reißen* ≠ *reisen* pair. The answer involves details of relative chronology which are not known. But by postulating that the substitution of voice for length as the relevant phonological factor had largely taken place before the change in articulation which led to [ʃ] becoming [s], then one could account for the occurrence of [s] < [ʃ] after long vowels. At the time of the shift from apico-alveolar to lamino-alveolar articulation for ʒ, forms like *rīzan* would have had [s] to begin with. After all, there was a distributional link between the voiceless affricate [tʃ] and the fricative [ʃ], so that the shift of [ʃ] to [s] (and, as is known, that of [tʃ] to [ts]) had no effect on the voicelessness of the segment. In words such as *gaʒza* ‘way’ the voiceless fricative accorded with the demands of syllable structure anyway, as the preceding vowel was short. In forms such as *ēzan*, ‘eat’, *lāzan*, ‘let’ this was not the case, and the long vowel was subsequently shortened leading to the acceptable structures *essen* /ɛsən/ and *lassen* /lasən/. In very few forms such as *muoʒa* ‘idleness’, ‘ease’ ModHG *Muße*, the result of the change in articulation was in conflict with syllable structure and not altered by shortening.¹⁷ The alternative of voicing did not seem to have been possible, as it would have meant post factum altering a feature of the segment for a small number of tokens in which it occurred.

Notes

- * My thanks go to Wolfgang Wurzel who was kind enough to read a previous version of this article and to give me the benefit of his particular knowledge of German. Needless to say he is to be firmly dissociated from the shortcomings of this study.
- 1. I am not regarding the fortition of /ð/ to /d/ as part of the High German sound shift as Vennemann (1972: 246) does, for example.
- 2. The details of this theory are outlined in Hickey (forthcoming: I.5).
- 3. See Hickey (forthcoming: I.4) for a description of the genesis of this mutation.
- 4. I am well aware of the scepticism with which many phonologists and most phoneticians regard the term ‘strength’. Nonetheless I believe it has validity where it is correlated by definite facts on the phonetic level of articulation. I see phonological strength much as do Lass and Anderson (1975: 162f.): ‘We ... now identify strength in a segment or a sequence as ability to resist a preferred lenition in a given context. So that if an environment promotes weakening, geminates and clusters will resist.’ The preferred lenition here is the fricativization of /t/; the resistance to it is manifested by affricativization occurring instead.

5. There are in fact, as Wurzel points out (personal communication), a large number of other instances of /-rʃ/ in German, not only such standard words as *Barsch* ‘bass (fish)’ but also colloquial pronunciations in Middle German such as *Forst* /fɔʁʃt/ ‘forest’, *erst* /ɛʁʃt/ ‘first’ and of course with the ubiquitous *Wurst* /vʊʁʃt/ ‘sausage’.
6. My standpoint is diametrically opposed to that found in Joos (1952: 224ff.), who assumes that \mathfrak{z} represented a laminal narrow-grooved fricative in view of the position in present-day German and on the grounds of a putative contrast with an apico-alveolar fricative [s] (his [s̠], where he unfortunately uses the IPA symbol for retroflexion), which he takes to have been represented by *s*. Although I believe the stage of affairs to have been just the reverse, I regard Joos’s article as the most illuminating on the subject, as he laudably pays attention to the difference between apical and laminal articulations. I hold his position to be misguided because his assumption that \mathfrak{z} was a lamino-alveolar fricative, i.e. IPA [s], is based on the belief that *s* represented an apico-alveolar fricative, which he sees as the only possibility for explaining (i) its later development into [ʃ] in certain positions and (ii) the appearance of [ʃ] for [s] in English loanwords from French, which he takes as having had an identical /s/ phoneme to that of German *s*.
7. ‘The phonetic quality of OHG *z*’. There is precious little phonetics in this article and the distinction between \mathfrak{z} and *s* which is offered in terms of stridency is not given a phonetic motivation. Voyles (1974) simply repeats the position adopted in the earlier article (1974: 86). Voyles (1976: 53) uses the term ‘strident’ again but with even less explication; Voyles also introduces a type of transcription, /z/, by which I take it he does not intend a palatalized voiced alveolar fricative (the IPA interpretation).
8. The ‘reason’ here is the phonotactic restriction on double fricative sequences which held (and still does hold) for German and which blocks fricativization of /t/. I grant that this imploes that sound change (here: lenition) is bound in its domain by the phonological conditions (here: phonotactics) of the language which embodies it. Of course the phonotactics of the language could also change, but that would be an independent matter.
9. I am deliberately using this term in the generative phonological sense (Chomsky and Halle 1968: 312ff.) as I think it captures quite successfully the difference between [t̠] and [s]. Vennemann has already suggested (1972: 257) that [+distributed] was a feature characteristic of OHG *s* and that this played a role in the ‘[s]-like quality and the dorsality of its reflexes’.
10. An assumption supported by the orthography which has *sch* as both the representation of prevocalic [ʃ] and presonorant [ʃ] (but not prestop [ʃ]). See Wurzel (1970: 226ff.) for a similar view concerning the underlying form of [ʃ] in present-day German.
11. Again this is suggested by the orthography *sch*, i.e. *s* = [s] and *ch* = [x], see Paul and Stolte (1962: 102) for a similar opinion.
12. I specify native here, as loanwords do have such sequences, cf. *Kosmos* /ˈkɔsmɔs/ ‘cosmos’.
13. This view is supported by voicing before sonorants when speakers syllabify before the obstruents, e.g. *Wagner* /vaʒnɛr/, although this is considerably rarer.
14. Languages seem to have (near) absolute rules for the realization of /s/ before and after sonorants. English always voices before (cf. *Hasley* (/hæzli/)) and nearly always devoices

after a sonorant (cf. *consist* [kən'sɪst], with a very few exceptions in place names such as *Kensington* ['kɛnzɪŋtən]).

15. Exceptions to this are instances of phonesthetically voiced intervocalic /s/ as in *vermasseln* /fɛrmazl̩/ 'to bungle' (cf. also *nuscheln* /nuʒl̩/ 'to mumble').
16. This is a very common type of syllable structure found in several languages such as Italian, Swedish, etc.
17. If one speculates on this form (and similar forms such as *buoza* ModHG *Buße* 'repentance') one might think that *muoza* did not undergo shortening like, say, *ēzan* as it was a diphthong. Neat as such an attempted explanation might be, it does not account for the unshortened long monophthong in *rīzan*.

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