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Process inhibition in historical phonology

1. Introduction

The 'exceptions' to attested sound changes have long played a role in historical phonology.[1] It is well recognised, for example, that Verner's (1875) seminal study of a certain exception to Grimm's Law was of substantial importance in the development of historical phonology as a discipline. In this paper I argue that the careful consideration of phonologically-based exceptions, at least in certain types of change, can still throw up new insights as regards what is possible in the patterning of phonological processes and their historical innovation. I also show that there is a connection between these patterns of process innovation and the structure of phonological segments. I argue that the study of such exceptions (that is, of those environments where the innovation of a phonological process has been inhibited) should be more systematic and central than it is in much of contemporary historical phonology. To show why, I discuss a novel way of understanding certain patterns of process inhibition in a well-known type of phonological change, which only becomes investigable once this kind of focus is adopted.

The paper is structured as follows: section 1 sets out some key concepts and assumptions which will inform the later discussion of the empirical basis of the paper. In section 2, the focus is directed towards the study of exceptions (or 'process inhibition' as it will be labelled); the notions developed here are applied, in section 3, in the investigation of the patterns of inhibition which can be recognised in certain attested phonological changes. In section 4, generalisations are drawn from this study and a move towards explanation is taken, as I propose a framework through which we can understand the patterns recognised in the types of inhibition discussed. (This makes crucial use of some of the concepts which are introduced in section 1). Section 5 considers whether the type of 'explanation' proposed in section 4 extends insightfully to other types of data, and section 6 concludes.

Three main sets of data are discussed in this paper, in sections 3, 4 and 5. The phonological phenomena involved are intentionally of a similar nature, but we can be quite sure that they were innovated independently, given the considerable chronological and geographical distance between the events. In any case, as will also become apparent in section 5, the similarity among all the data sets is not immediately obvious and only becomes clear when viewed through the theoretical spectacles which are developed in this paper.

The data is discussed under three headings: the 'High German Consonant Shift', **'**Lenition in Liverpool English' and **'**the English ʊ Change.' Some of the data is 'classic' material which has been well discussed elsewhere, but one of the sets – the data from Liverpool English – is largely unknown. Due to constraints of space, philological evidence is only provided in this latter case, given that it is abundantly available elsewhere for the other phenomena, in the sources indicated below. The same constraints also mean that the discussion of the data is quite brief, and they further preclude discussion of other accounts of the phonological phenomena which I address (such discussion can be found in the references provided, especially in Honeybone 2002).

1.1 Preliminary assumptions

In the course of this paper, several theoretical and analytical notions will be addressed and will help inform the discussion. I argue overtly for a particular position on some of the issues involved; at other times, I simply assume certain aspects of analysis as a basic framework for investigation. The notions in question are: (i) that there is a set of non-combinatory phonological processes, which are often described as affecting the 'strength' of segments,

(e.g. consonantal 'lenition' processes), (ii) that geminate consonants often behave unlike their singleton counterparts in the innovation of phonological processes (this is often referred to as 'geminate inalterability'), (iii) that one important type of phonological change is the innovation of synchronic phonological processes (and that the innovation of these processes may be inhibited or promoted by a range of phonological factors), and (iv) that the phonological segments affected by such processes have a melodic structure, and can thus be decomposed into phonological 'features' or 'elements', which may be privative in nature.

I address the notions of inherent phonological strength and lenition in section 2. In section 4, I give a novel explanation for some of the facts which have previously been discussed under the heading of 'geminate inalterability'. I show there how the approach that I adopt can be extended to account for much more than the exceptional behaviour of geminates, so the term 'geminate inalterability' becomes inappropriate as a description for the general phenomenon involved. Because these points are dealt with further below, I do not expand on them here.

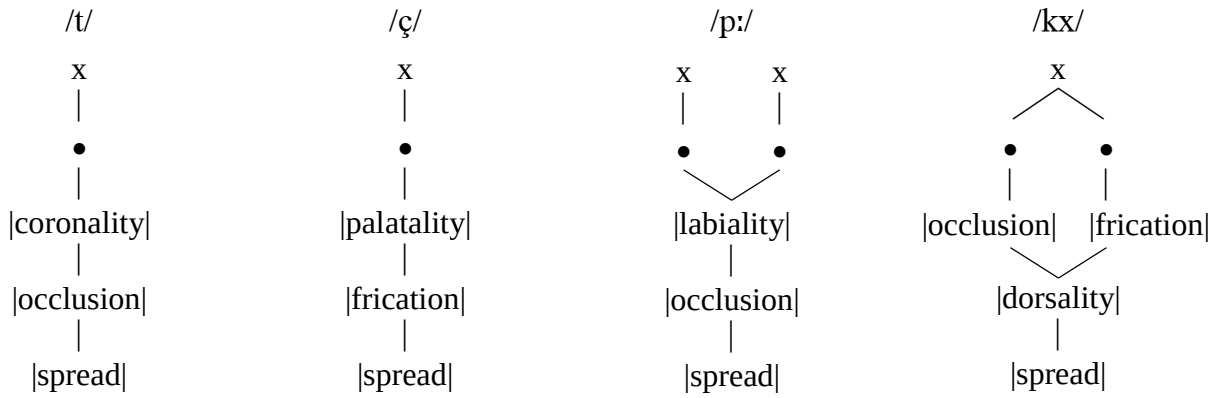
In terms of point (iii), all that need be said is that: (iiia) at least certain types of phonological change are best viewed as the introduction of synchronic phonological processes (and, given what we know about sociolinguistic variation, it is likely that these processes will be variable processes at first), and that: (iiib) such phonological processes affect underlying ('input') segments and derive surface ('output') segments; for the purposes of this paper, it is not important how one is derived from the other, whether this be through phonological rules or through the selection of one output which best corresponds to the input according to a language-specific ranking of constraints. In the terminology of, for example, Ewen & van der Hulst (2001), this paper does not engage with theories of phonological rules, derivations or levels; it does, however, engage with theories of phonological representations.

In terms of such representations, i.e. point (iv), I assume that phonological segments are made up of monovalent autosegmental units. These are often referred to as 'features', but I refer to them below as 'elements', following a tradition which has grown up in Government Phonology and Dependency Phonology (see Anderson & Ewen 1987, Kaye, Lowenstamm & Vegnaud 1985, Harris 1990, 1994, Ewen & van der Hulst 2001). This tradition also shares ideas with many theories of feature geometry (e.g. Sagey 1986, see Honeybone 2002 for further discussion).

Key features of this approach are that all elements are privative, and that segments can consist of just one element or can be built up from more than one such element. Furthermore, in principle, the same elements can appear in the representation of both consonants and vowels. The technical details in the description of elements differ somewhat in the various subtraditions within the general approach, but one important area of agreement is that common vowels such as /i, a, u/ contain one key signature element each. I label these elements respectively |palatality|, |openness| and |labiality|. Less frequent vowels are comprised of combinations of these elements, thus /e/ consists of |palatality| and |openness|, and /y/ (the front rounded vowel sometimes transcribed as /ü/) consists of |palatality| and |labiality|.

Further elements are required for consonants, as shown in the relatively self-explanatory representations in (1). These also include root nodes (shown by '•') and a level of quasi-moraic timing slots (shown by 'x') which allow relatively uncontroversially for the insightful representation of geminates and affricates.

(1)



Representations like those in (1) include the elements that will suffice for the segments considered in this paper, although the literature contains a good deal of debate as to what is the correct inventory of elements. The only element which may require some elucidation is |spread|; this is equivalent to [spread glottis] in more standard featural approaches (such as Iverson & Salmons 1995, for example) and to the element H in standard Government Phonology (as in Harris 1994). While some of these ideas are controversial, they are the working assumptions of phonological theory which I adopt.

2. Phonological processes and their inhibition

Given the assumptions set out in section 1.1, it is normal to recognise that phonological processes derive surface segments from underlying segments. It is also typically recognised that phonological processes can be restricted – they typically do not affect every occurrence of an particular underlying segment, but rather only those occurrences of a segment in particular phonological environments.

In diachronic phonology, the focus of attention is naturally directed towards the innovation of such processes. Here too, however, we can choose to focus on the nature of the process involved or on its phonological environment. I describe this as a distinction between a focus on the 'process' proper and a focus on its 'environment', and it can be likened to the distinction between structural change and structural description in the terminology of standard generative phonology.

In what follows, after a brief discussion of the key types of processes which feature in the data to be discussed, I focus on their environments; specifically, I concentrate on the environments where processes were *not* innovated or were restricted in the extent of their innovation. There are other phonological traditions and contemporary models which also adopt this approach, but it is not the way that things are typically done, at least in synchronic phonology. Some recent work has moved to focus equally on where processes do occur and where they do not, and this is briefly discussed in section 2.3, along with a justification for the principal focus which is maintained in this paper. This focus can be summed up in the question: why weren't *all* occurrences of a segment affected when a particular process was innovated?

2.1 Historical phonology and synchronic phonology

It was noted in section 1.1 that at least certain types of phonological change can be seen as the innovation of a synchronic process into the phonology of a language. Once innovated into a language two things can happen to a process: (i) it can remain as part of the language's phonology as an 'active' synchronic process, or (ii) it can be lexicalised into the underlying

representations of a language. When (ii) occurs, importantly, the phonological environment in which the previously synchronic process occurred is fossilised thanks to the 'exceptions' to the segmental change; these exceptions show in which environments the synchronic process did not occur. Thanks to the evidence provided by these fossilised exceptions to changes we can compare synchronic and diachronic phonological events as essentially the 'same kind of thing'.

One example of a synchronic process (in Modern Persian), is discussed in Hayes (1986). Hayes claims that /v/ surfaces as [w] in a synchronic phonological process ('*v*-Weakening') under certain circumstances: "roughly speaking, [w] occurs when it follows a short vowel and is not syllable-initial" (1986:231). He formalises it as a rule of the type /v/ → [w], with a structural description which places /v/ in a coda following a short vowel. An important part of Hayes' paper, however, focuses on the fact that the 'rule' formulation does not show all the cases where the process is inhibited. Forms such as [morovvæt] 'generosity' have [v], not [w], even though the 'first' underlying /v/ is syllable-final and follows a short vowel. This is, Hayes claims, a case of 'geminate inalterability', a notion which we return to below, as promised in section 1.1, although this particular process will not be the focus of investigation.

The key data in this paper are somewhat more complicated than the case of *v*-Weakening, and are thus potentially more interesting. They will provide us with a some clear generalisations about common patterns in exceptions (or 'process inhibition') and are particularly suitable for this purpose as they are all examples of the kinds of processes which can have clear exceptions, i.e. they are unconditioned processes (in other words, they are non-combinatory). The first two key processes discussed here have both been described at one time or another as cases of consonantal lenition.

2.2 What is lenition?

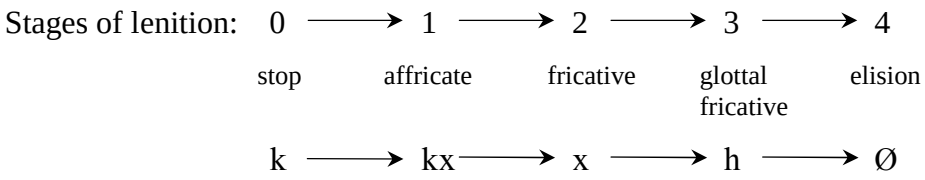
There is a large literature on the topic of lenition, for example, Lass & Anderson (1975), Anderson & Ewen (1987), Bauer (1988), Harris (1990, 1994), Elmedlaoui (1993), Kirchner (1998), Ségéral & Scheer (1999), Holsinger (2000), Honeybone (2001, 2002). The notion has an undeniable, if somewhat uncertain place in the discourse of both synchronic and diachronic phonology.[2] In the body of work on lenition, the term is typically used to group together a number of segmental processes which are usually thought to involve phonological 'weakening'.

To the extent that these processes can be grouped together as weakenings, the implication is that there are relationships between the types of phonological segments which can be characterised in terms of their relative (segmental) strength. One frequently cited definition of segmental strength (in terms of its opposite, 'weakness') is Vennemann's personal communication to Hyman[3] (1975:169): "a segment X is said to be weaker than a segment Y if Y goes through an X stage on its way to zero." In the lenition literature, 'strength' has also been tied in with several other phonological concepts. Some possible correlates of strength are sonority, openness or the degree of resistance in the vocal tract, perceptual salience, syllable sequencing and segmental complexity. Constraints of space preclude a detailed engagement with this notion of inherent phonological strength here, and it is important in this paper only to the extent that it is often implicated in the construction of segmental strength hierarchies, which double as over-arching lenition 'trajectories' or 'scales.' These are intended to indicate what is considered to count as lenition, in that 'stronger' segments lenite along the trajectory to become 'weaker' segments. On such trajectories, the logical conclusion of lenition is typically taken to be elision. It should perhaps be noted here that I introduce, in section 4, a separate notion of 'positional strength' which is not connected with this idea of inherent strength.

It will be clear that this approach defines lenition in terms of the segmental processes involved, rather than in terms of its environment. In keeping with the comments at the start of

section 2, I do not focus here on the actual processes involved nor on what causes them. I simply describe them here and then proceed to consider their interaction with phonological environment. A lenition trajectory (in part distilled from Lass 1984) is given in (2). This shows lenition as a series of stages, where any progression along the scale counts as a case of lenition. The segments involved are exemplified at the velar place of articulation.

(2)



As mentioned above, the focus here is not placed on the 'cause' of lenition, but rather on its patterning. The initiating impulses which leads to the innovation of these processes have been debated at some length in the lenition literature, with many arguing that the roots of the processes lie in sub-phonemic phonetic variation, and others that more abstract phonological principles are at work. In this paper, these points must be put aside, due to constraints of space (but see Honeybone 2002 for a discussion which assumes a mix of these two types of account).

Effects of and on the place of articulation of a segment are not typically considered to be relevant to lenition (apart perhaps from debuccalisation to [h], which can be seen as the loss of place, as in, for example Harris 1990). As will become apparent in the next and subsequent sections, lenition processes are inhibited in similar ways, although each lenition can have some individual characteristics.

2.3 Lenition inhibition

At several points already in this paper, attention has been drawn to the coming focus on the patterns that can be observed in the inhibition of phonological processes when they are innovated into a linguistic system. There are, however, in principle two ways of viewing the interaction between phonological processes and phonological environments: it might be that processes are favoured in certain characteristic promoting environments (a focus on this might be described as the study of 'process promotion') or it might be that processes are characteristically disfavoured in particular environments (this is the study of 'process inhibition').

It will be clear that these are two sides to the same coin, and if one set of environments can be adequately described for a particular process, the other does not need to be defined. Much previous work focuses on the study of process promotion; for example, work on lenition often deals with the idea of lenition promotion, and seeks to describe 'lenition environments' or 'weakening environments' (for example in Bauer 1988) or 'preferred weakening environments'.

However, things can be seen the other way around. It seems to be unavoidably the case that one absolute linguistic universal is that linguistic systems change over time; in terms of phonology, this means that new processes are introduced. It is thus arguably surprising, once a process is introduced, that it does not occur across the board.

Lenition processes are indeed common. They are arguably simply some of the ways in which segments can change spontaneously in historical phonology. If such processes are so common as to be also almost expected, then the interesting type of phonological environment becomes those which inhibit these processes. This is the study of process inhibition. It opens up a prospectively fruitful perspective - the consideration of which prosodic and melodic factors

prevent the onset of a process. Once a full description of these environments is given, then the notion 'promoting environment' does not need to be defined.

This basic idea, which is the approach to be developed here, is not intended to exclude the possibility that certain processes are best described in terms of their promoting environments (some clearly are best described in this way, assimilations, for example). Some recent work (for example, Macken & Salmons 1997 and Holsinger 2000, building on such work as Vennemann 1988) develops a position, which is largely compatible with that discussed here, which integrates both promoting and inhibiting environments into one picture (in this work, these environments are captured by metrical templates, which find an echo here in the environmental discussion in section 2.3.1). While certain processes are best described in terms of their promotion, I argue here, however, that the key types of processes discussed are best understood in connection with their inhibition.[4]

2.3.1 Inhibition and 'phonological environments'

If processes are inhibited in particular phonological environments, then it becomes important to consider which kind of environmental factors might be relevant. As is well known, the notion 'phonological environment' varies along a number of parameters; potentially relevant here are both prosodic (or 'suprasegmental') factors and melodic (or 'segmental') factors. In what follows, I consider factors of both these types in connection with their ability to inhibit lenition processes. I include as prosodic factors the relationship of a segment to (i) to syllable boundaries, (ii) to word boundaries, and (iii) to stressed vowels. As melodic factors, I include the nature (in terms of place, manner etc.) of the segment(s) which (i) precede the segment in question, and (ii) follow the segment in question.

It will be helpful to recognise the environments given in (3), which are partly constructed following Ségéral & Scheer (1999). These environments are not intended to be exhaustive and it is recognised that some overlap with each other, but they represent a useful initial simplification. The environments are glossed in (3), although different theories of phonology will formalise them differently.

(3)

A [__#] - 'word-final'
B [__c] - 'coda' or 'pre-consonantal'
C [v__v] - 'intervocalic' or 'medial'
C1 [v́__(v)] - 'foot-internal'
C2 [(v)__v́] - 'pre-stress' or 'foot-initial'
D [c__] - 'post-consonantal'
E [#__] - 'word-initial'

# = word boundary
c = any consonant
v = any vowel
v́ = any stressed vowel

Many of these environments are quite straightforward: A, C1, C2 and E are characterised by prosodic concerns, and B and D are those where melodic effects might be expected to play a role. In fact, it is chiefly environment D which will be considered in this connection. The recognition of prosodic factors, especially those above the level of the syllable, as in the C environments, echoes some of the crucial points made in Macken & Salmons (1997) and Holsinger (2000), who show that this type of environmental factor can play an important role in historical phonology.

3. Case studies: lenitions and their inhibition

In this section, I describe two sets of processes of the type discussed in section 2.2 in some detail. Constraints of space will prevent the consideration of further examples (although

section 5 considers some additional relevant data). One of the sets of data discussed in this section is well-known and has been considered many times before. I try here to propose a novel perspective on the data. The other set of data is less well-known but is remarkably similar in some ways to the first data set discussed, and I propose a similar interpretation.

3.1 The High German Consonant Shift

One of the best known features of the historical phonology of High German dialects is the process which affected the |spread| stops of Germanic (which I represent here as /p, t, k/) to derive affricates and fricatives (see, for example, Braune 1891, Keller 1978, Vennemann 1984, 1994, Davis, Iverson & Salmons 1999). I refer to this as the High German Consonant Shift (or 'HGCS'). Contemporary surviving traditional dialects show a difference in the extent to which they exhibit the segmental changes which were the result of the lexicalisation of the HGCS phonological processes. This is discussed below, in section 3.1.2.[5]

The basic segmental processes involved are given in (4), some of which is somewhat controversial.[6] In line with the comments in section 2, I do not discuss the segmental processes involved here; rather, I focus on their inhibition.

(4)

Stages in the HGCS:	0	→	1	→	2
	p	→	pf	→	f
	t	→	ts	→	s
	k	→	kx	→	x

Philological evidence for the processes can be found in, for example, Braune (1891) and Paul (1916). The formulation in (4) views the HGCS as a series of 'stages', following an established tradition. Also, the High German reflexes given are from those regions where the orthographic evidence indicates that the processes were innovated at their most extreme. In fact, the precise details of the inhibition of these processes vary according to dialect. I discuss this briefly in section 3.1.2. In doing this, I assume a 'conservative' position, widely accepted in the literature (but argued against by, for example, Vennemann 1994) that the process originated in the South of the High German speech community where it was at its most extreme.

In terms of the environments set out in (3), the main patterns of inhibition in the HGCS can be summarised as follows for the varieties of German which formed the basis of the current standard variety: there was either a relatively uninhibited lenition to fricatives, with the segments going two stages down the trajectory in (2), or there was some inhibition, where the segment went only one stage down the trajectory to affricates, or the was total inhibition, where no lenition occurred.

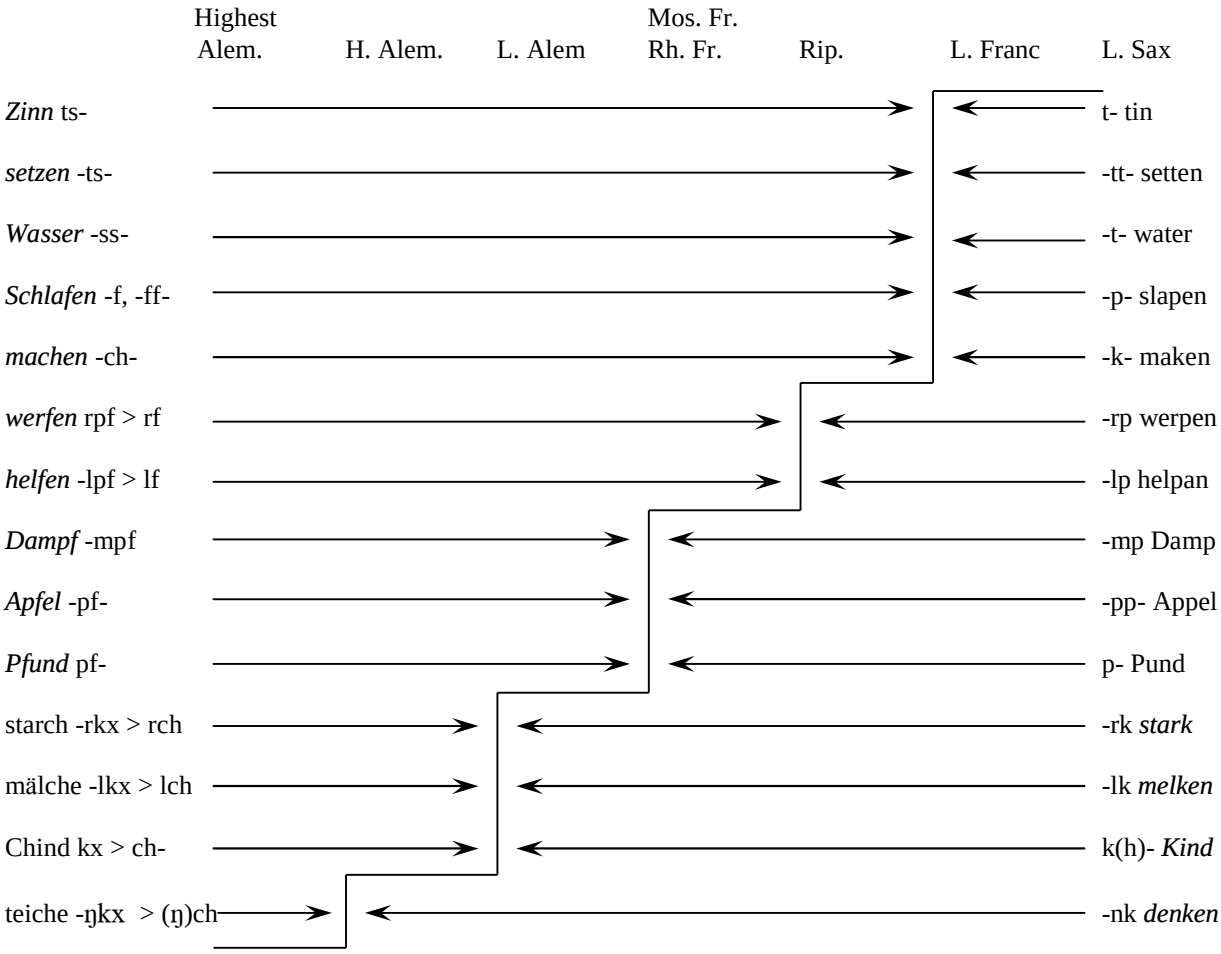
Prosodic and melodic factors determined to what extent the segments proceeded along the trajectory, as given in (2). Lenition of /p, t, k/ to 'stage two' fricatives occurred in environments A [__#] and C [v__v]. It was somewhat inhibited, giving a lenition of /p, t, k/ to 'stage one' affricates, in environment E [#__] and in environment D [c__], where the preceding consonant was /l, m, n, r/ or the first half of a geminate. Lenition was entirely inhibited in special cases of environment D [c__]: for /p, t, k/, this can be seen in the environment [s__], and for /t/, it also involved the environments [p__] and [k__], and a special case of B: [__r].

3.1.2 The HGCS in non-standard dialects

The above discussion of the inhibitory environments is not equally applicable to all varieties of German. In some of the environments from (3), the processes were inhibited quite differently in the various dialects of High German. This can be seen most clearly in environment D [c__].

Keller (1978) provides a perceptive summary. He recognises three key HGCS 'contexts': stops in context 1 are in the environments which were identified as completely inhibitory in the last section; this context inhibits the processes in all dialects. Context 3 is defined as "medially and finally after vowels" (Keller 1978:169); lenition to stage two fricatives occurred in "all Upper German and central German dialects in context 3" (1978:171). Context 2 is "initially, after liquids, and nasals, ... in gemination" (1978:169), and it is here that the greatest differences can be found. Keller presents the inhibitory effects of various environments in the various dialects[7] in tabular form, reproduced below as (5).

(5)



The differences among the patterns shown here in the various High German dialects show that we cannot hope for an exhaustive and completely predictive theory of inhibition. As I will argue in section 4 (and thus do not discuss it here), however, there are certain clear generalisations which crop up consistently, both in terms of the innovation of the HGCS in the various dialects shown here in (5), and also in other cases of lenition from other languages. I turn now to one such case.

3.2 Lenition in Liverpool English

The variety of English spoken in Liverpool, England, is quite well known within the British Isles, but is not so well recognised outside of Britain. The variety is notable for several reasons, but has not been subject to a great deal of investigation (some of the few exceptions to this are Knowles 1974, Sangster 2001 and Honeybone 2001).

Some of the most salient characteristics of the variety are its patterns of plosive lenition. It seems likely that these were innovated into the variety of English spoken in the city in the nineteenth century (see Knowles 1974 and Hickey 1996). Certain important characteristics of the lenition processes are that (i) they affect several of the underlying stops in the system, but are probably most salient in /t, k/, and perhaps /d/, (ii) they are synchronically active variable processes, (iii) they involve affrications and spirantisations, and (iv), like the HGCS, can best be understood as involving stages of lenition, thus 'stage two' lenition to fricatives is frequent in certain environments (where affrication is also an option), 'stage one' lenition to affricates is frequent elsewhere (where frication is not a possibility), and in certain other environments no lenition seems to be possible. In other words, the processes are inhibited differently, according to the different prosodic and melodic environments in which a segment occurs.

In what follows, I focus on the lenition of /t/ and /k/. The processes involved can be summarised as in (6), where the 'stageist' understanding of lenition is overt. The transcription [θ̲] in (6) represents a slit coronal voiceless fricative, the precise phonetic nature of which need not detain us here (but see Pandeli et al. 1997 and Hickey 1984 for a detailed description of the articulation involved, and Honeybone 2002 for a discussion of the implications of this).

(6)

0	→	1	→	2	→	3	→	4
t	→	tθ̲/ts	→	θ̲/s	→	h	→	Ø
k	→	kx	→	x				

Lenition to [h] and total elision are possible in a very few highly restricted environments for /t/ and are included on the trajectory in (6) for completeness, but I do not deal with this below. Rather, I concentrate on the most common and characteristic lenitions, which involve the realisation of underlying stops as affricates and fricatives in line with (6). Given that the processes involved are not well-known, some evidence is given in (7). The evidence consists of a list of words from Liverpool English which illustrate the most lenition possible for the set of environments from (3), with some expansion. The data is largely taken from Honeybone (2001).

(7)

A [__#]	*alright*	[θ̲]	*book*	[x]	
B [__c]	---		*respect*	[x]	
			basicly	[x]	‘basically’
C1 [v́__(v)]	*city*	[θ̲]	*crackers*	[x]	‘mad’
C2 [(v)__v́]	*attack*	[tθ̲]	*okay*	[kx]	
D [c__]	*fifteen*	[t]			
	respect	[t]			
[s__]	*station*	[t]	*scally*	[k]	a derogatory term
[l__]	*adult*	[tθ̲]	*welcome*	[x]	
[N__]	*moment*	[tθ̲]	*inconvenience*	[kx]	
E [#__]	*taken*	[tθ̲]	*come*	[kx]	

A summary of the prosodic and melodic inhibition of the processes, in terms of the environments from (3) is given in (8).

(8)

A [__#]	lenition is possible to a fricative for both /t/ and /k/
B [__c]	lenition is possible to a fricative for /k/; the segment /t/ hardly occurs in this environment due to phonotactic constraints
C1 [v́__(v)]	lenition is possible to a fricative for both /t/ and /k/
C2 [(v)__v́]	lenition is possible to an affricate for both /t/ and /k/; it is possible that lenition to a fricative is also possible here for /k/
D [c__]	the degree of lenition varies according to the melodic content of ‘c’; see the discussion below
E [#__]	lenition is possible to an affricate for both /t/ and /k/

Environment D [c__] requires special comment, as indicated in (8). The generalisations are slightly different for the two underlying segments involved. In the environment [s__], there is typically no lenition at all for either segment, thus there is total inhibition in this environment. In the environment following a homorganic nasal (which I symbolise henceforth as [N__]), only lenition to ‘stage one’ affricates occurs, to the exclusion of fricatives, for both /t/ and for /k/. The environment [l__] allows lenition to ‘stage two’ fricatives for /k/, whereas for /t/ this further stage of lenition in inhibited and only ‘stage one’ affricates occur. Finally, it seems further that [f__] and [k__] inhibit lenition for /t/.

While the whole situation is quite complex, certain generalisations in the inhibition of these processes can be recognised. There are also certain clear similarities to those generalisations which were recognised in the inhibition of the HGCS. I turn to these similarities in the next section.

4. Lenition inhibition revisited: can we explain why processes are inhibited?

There are certain observational generalisations which can be made about precisely which prosodic and melodic environments inhibit the innovation of phonological processes. In this section, I draw out some of these generalisations for both prosodic and melodic process inhibition; I then move to focus on only one of these types − those of a melodic nature. I propose a novel way of understanding the melodic inhibition of lenition processes. As we will see, this has connections with the study of 'geminate inalterability' but is unlike previous proposals in this regard in certain keys ways. Importantly, we will see that the mechanisms involved are not, in fact, restricted to geminate consonants and, while they provide strength to a segment, so that a process may be inhibited, this does not always result in total inalterability. In this way, we will see that what has previously been labelled 'geminate inalterability' is in fact part of a more general phenomenon.

The account of process inhibition developed here is not able to predict absolutely where process inhibition will occur, but this seems to be the right result, given that there are few absolutes in historical phonology. The proposal is predictive, however, even if it is not absolutely predictive, as it makes clear claims about what is a possible pattern in melodic process inhibition.

The prosodic generalisations are as follows. Environment E [#__] and C2 [(v)__ v́] can be inhibitory, and it is possible that the prosodic interpretation of D [c__] (when it stands for an onset) can be inhibitory, too. These environments were inhibitory in both Liverpool English and the HGCS in that 'stage two' spirantisation was inhibited, although 'stage one' affrication was not; for certain segments in certain varieties, E was entirely inhibitory in the HGCS, as can be seen from (5): neither /p/ nor /k/ affricated at all in E in Mosel Franconian, Rhine Franconian, Ripuarian and Low Franconian, and, even in Low Alemannic, /k/ did not affricate in E. As can be seen in (7) and (8), environment C2 seems to be inhibitory in Liverpool English in the same way, although this was not the case in the HGCS.

It is possible that the onset nature of D [c__] played a role in some of the dialectal inhibitions for the HGCS, as illustrated in (5). In Ripuarian, for example, the lenition of /k/ and /p/ was inhibited generally in D [c__] (where the consonant was /r, l/ or a nasal or the 'first half' of a geminate); this may also be the case for Low Alemannic /k/.

The melodic generalisations typically apply to environment D [c__]. They are that full geminates can be inhibitory, as can [S__] and [N__]. Geminates were partially inhibitory in the HGCS, because they only allowed stage one affrication (i.e. they inhibited the innovation of stage two fricatives). There is an inhibitory effect when the 'c' involved in environment D is a segment which is homorganic to the following segment (for example in clusters involving nasals). The environment [N__] is inhibitory in Liverpool English, as discussed in section 3.2, and it can be seen to be particularly inhibitory in some of the High German dialects in (5); in Mosel Franconian and Rhine Franconian, environment D [c__] was only inhibitory (for /k/ and /p/) where the 'c' was a homorganic nasal or the first half of a geminate. In High Alemannic, lenition of /k/ was only totally inhibited when preceded by a homorganic nasal. In Liverpool English homorganicity has another effect: for /t/, the environment [l__] only allows affrication, whereas both affrication and spirantisation can occur to /k/ in [l__].

Finally, we can note that the environment [S__] was inhibitory in the HGCS and in Liverpool English. There may also be other effects, but I set these aside here, in part because the generalisations are not so clear. In the next section, I proceed to analyse the generalisations discussed here in greater detail and to move towards a deeper understanding of the inhibition involved.

4.1 The prosodic inhibition of process innovation

It is clear from the generalisations discussed above that 'initial' environments are prosodically inhibitory to lenition. Word-initial, foot-initial and perhaps also syllable-initial (i.e. onset) environments have the potential to inhibit the innovation of a phonological process. I simply note these facts here and move on, however, because, as was noted above, my main aim in this paper is to investigate and account for the less well recognised effects of melodic inhibition, which I turn to in the next section. For this reason, I do not investigate the prosodic facts in detail beyond this initial recognition of shared initialness.

It is worth noting, however, that several theoretical proposals have been made to account for these effects (indeed, on the whole, prosodic inhibition is better understood than melodic inhibition, which is one reason why my focus is on the latter). Two key types of proposal have been made in this regard: that abstract prosodic licensing is responsible for this type of prosodic inhibition (as proposed by Harris 1994, for example), or that the effects are a facet of the greater prosodic prominence (and hence salience) which initial segments have over medial or final prosodic positions.[8]

4.2 The melodic inhibition of process innovation

I turn now to the factors which are relevant to melodic process inhibition. Many of these are little investigated and understood, but, as we will see, the potential that the generalisations recognised here have for our understanding of historical phonology is great. It will be argued that they reveal interesting facts concerning the nature of the phonological interaction between adjacent segments.

It is clear that geminacy provides the two halves of a geminate with the ability to inhibit the innovation of processes. As has been noted above, this has been tied in with other factors in the literature on 'geminate inalterability' (e.g., Hayes 1986, Kirchner 1998). However, I argue here that previous approaches to this observation misplace the locus of explanation and miss the potential generalisability of the situation.

After discussing cases like *v*-Weakening in Persian (briefly mentioned here in section 2.1), Hayes (1986) proposes that the fact that geminates do not tend to undergo lenition processes is due to a 'Linking Constraint' which relies on the existence of the association lines which link elements (which are 'features' for Hayes) to root notes, and hence to skeletal slots, as in the representation for geminates given in (1).

The 'Linking Constraint' is formulated as a constraint on rules and has the effect that rules (such as spirantisation rules) which are formulated to affect singleton segments do not also affect any part of a geminate, even though the structural description of a rule might include the first half of a geminate. As Elmedlaoui (1993) explains, however, such accounts face a substantial problem – they "all share tacitly ... the assumption that a given spirantisation rule restricted so as to apply only to geminates should not be less natural than one which is restricted so as to apply to just simplex segments" (1993:134). Both kinds of rule are equally conceivable on Hayes proposals, and are tacitly predicted to be equally likely to take place. However, there seem to be no known cases of lenition processes which only affect geminates to the exclusion of singletons, so this prediction is not borne out. We might also note that geminacy does not always provide for total inalterability. In the HGCS, geminates lenited one stage down the lenition trajectory, rather than a possible two stages, so there was some inhibition involved, but nonetheless a phonological process was innovated which clearly altered the geminates involved.

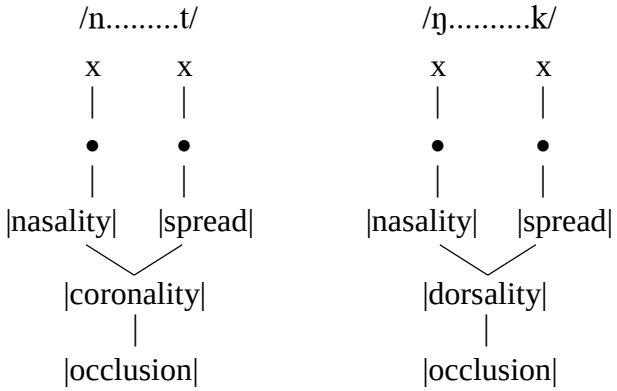
While Hayes' approach seems to be broadly on the right lines, I argue that it situates the source of the inhibitory potential of geminates in the wrong place. I propose that it is the sharing of subsegmental material that gives a segment the 'strength' to resist the introduction of processes. Where adjacent segments share elemental material, this locks them into a word's

phonological structure. It is thus this positional strength-through-sharing which can partially or fully inhibit a lenition process from affecting the segment, rather than an unmotivated condition on rules.

The notion of 'strength' developed here is very different to the type of segmental strength which was mentioned in section 2.2. It is not an inherent property of segments, but is derived from the interaction between segments. The strength that can be gained by a segment in this way through the sharing of individual elements percolates up to become a property of the whole segment and this accounts for the fact that the lenition process is partially or fully inhibited from affecting the segment in question. This avoids Elmedlaoui's problem - it predicts that there should be no processes which only affect geminates (or other types of consonant cluster, as we shall see directly) but do not affect singletons, and this seems to be the right prediction to make.

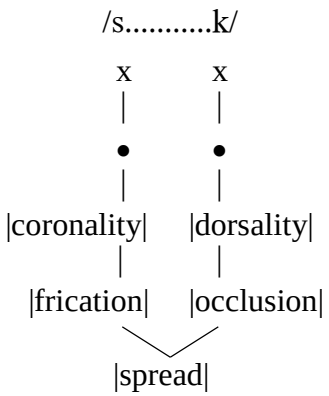
This approach is easily extendable to account for other cases of melodic process-inhibition. The other environments which are identified as inhibitory in the preceding section are also straightforwardly characterisable as those where elements are shared. The environment [N__] is a clear case of this, as shown in (9); such clusters are, in fact, often referred to as 'partial geminates'.

(9)



The proposal also accounts for the case of [l__] in Liverpool English (where /lt/ was inhibitory, but /lk/ was not) because /l/ and /t/ share |coronality|, while /l/ and /k/ do not. In addition to this, if certain independently proposed assumptions about the phonology of Germanic languages are accepted, then this proposal can be extended to account for the [s__] environment, which was inhibitory in both the HGCS and Liverpool English. If we assume, following Iverson & Salmons (1995), that stops such as /p, t, k/ are characterised by the element |spread|,[9] we can extend the key proposal here (that element-sharing gives a segment strength) to account for the exceptional behaviour of segments in the [s__] environment. The relevant representations for this are shown in (10), which follows Iverson & Salmons (1995) in representing the two segments as sharing a laryngeal element. I argue that the two segments form a kind of 'partial laryngeal geminate', parallel to the 'partial place geminates' of (9).

(10)



The proposal contained in this section is an attempt to account for some of the recurring patterns which are found in melodic process inhibition. It naturally copes with the data which it was designed to account for, but it would be far more persuasive if it could be seen to apply equally well to unrelated data of a very different kind. I turn to such data in the next section.

5. Back-up and extension

In order for the proposal that 'sharing gives strength' to be compelling, the mechanism will need to extend 'explanatorily' beyond the precise kinds of facts that it was designed to account for. This would naturally include other cases of consonantal lenition processes. More impressive would be if it could be seen to apply to segments and processes which are not obviously so similar. Rather than focusing on further similar examples of lenition, I turn now to a very different type of phenomena, the 'English ʊ Change'.

5.2 The 'English ʊ Change'

The claim made in section 4.2 is that adjacent segments can be made 'stronger' through the sharing of elements. If the approach is generally applicable to adjacent segments, then we might predict that it can be extended to account for interactions in consonant-vowel sequences. In this section, I consider some data which shows that this is, indeed, the case. This can only be expected if vowels and consonants are assumed to be made up of the same elements, which might then be shared between them. As explained in section 1.1, this is precisely what is assumed in element-based approaches to segmental structure.

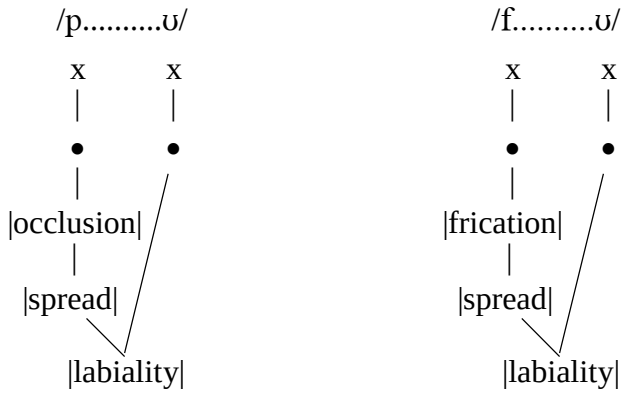
To investigate element-sharing between vowels and consonants, a process is required which affects vowels and is in some way analogous to the type of lenition processes discussed above. The process which I call here 'the English ʊ Change' fulfils these criteria perfectly. This process is well-known in the anglicist tradition. It involved the unrounding and lowering/centring of the vowel /ʊ/ to give [ʌ] (see, for example, Luick 1914-1940 and Dobson 1968). Once lexicalised, this process gave rise to the contrast between /ʊ/ and /ʌ/ which exists in many varieties of English. It is analogous to consonantal lenition processes because it was an unconditioned, non-combinatory change.

The process was quite general. As Dobson explains "M[iddle] E[nglish] *ŭ* was originally the high-back rounded vowel [ʊ]. In Pres[ent-Day] E[nglish] in most words it has been unrounded and lowered to [ʌ], but in some words [ʊ] is retained because of labial and other influences" (Dobson 1968: 585). This quotation also indicates the few environments in which the process was inhibited. One crucial aspect of the commonest inhibiting environment was

that the preceding (or sometimes following) segment contained the element |labiality|. The process thus occurred in words such as *cut, love, suck* but not in *put, full, wood.*

We can understand these exceptions in the same way as those discussed for purely consonantal interactions in sections 3 and 4 above, if we assume such representations as those in (11).

(11)



The ʊ → ʌ process was inhibited precisely where the vowel was adjacent to a labial consonant. As explained in section 1.1, /ʊ/ is considered to consist of the element |labiality|; this is also, naturally, a part of the make-up of labial consonants, and this allows for the elemental sharing of the types shown in (11).

This process, while somewhat different from the cases of consonantal lenition discussed above, is nonetheless another clear case of melodic process inhibition, where the sharing of elements between adjacent segments serves to inhibit the innovation of a phonological process. Furthermore, it exhibits precisely the type of consonant-vowel interaction which was seen to be predicted by the model at the start of this section.[10]

6. Conclusion

A key assumption in this paper has been that phonological processes can be inhibited in certain prosodic and melodic configurations when they are innovated into a language. I have argued that certain types of inhibiting environments can be seen to have been active in various, independently innovated phonological phenomena, and that we can and should generalise about these and seek to explain them.

In the several sections of this paper, I first described a set of observably inhibiting environments, and then focused on the notion of melodic process inhibition, proposing that the sharing of autosegmental phonological elements can give a segment 'positional strength', which enable it to resist or impede the introduction of a process where two segments are bound together through element sharing and hence fixed into the phonological structure of the word. This fixing is the source of the strength which has the effect that non-combinatory processes, such as lenition and vowel decomposition, can be inhibited from affecting the segment concerned. This is, I argue, a step in the direction of understanding process inhibition. If correct, it also provides corroborating evidence for the model of segmental structure adopted here. I believe that the merits of the approach explained here show that the notion of process inhibition deserves further study and, ideally, integration into a model which accounts for both where processes can be innovated and where they cannot.

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NOTES

[1] I would like to thank the audience at the Melbourne ICHL in 2001, and the reviewer of this manuscript, for both their encouraging and their cautionary comments, which, I hope, have helped considerably to tighten up the argumentation. Where certain controversial assumptions remain here, they are certainly not to be blamed.

[2] Analysts differ at times as to which types of phonological processes are to be counted as cases of lenition and which as cases of its opposite: fortition. For the purposes of this paper, it is not, in fact, of real importance whether the processes discussed are cases of lenition or of fortition. What is truly important is that they represent unconditioned processes which can be placed on a type of trajectory, as explained below, in (2). I proceed in the assumption that the processes are lenitions, however, following one tradition of scholarship.

[3] While similar (and first-hand) definitions can be found elsewhere in the lenition literature, this short quotation has taken root in citing traditions and is very frequently found in initial definitions on lenition. This point is discussed further in Honeybone (2002); in this paper, I simply follow tradition in repeating it.

[4] The approach developed by Macken & Salmons (1997) and Holsinger (2000) focuses on 'strengthening' or 'fortition' as well as lenition, and in some respects that approach and the one developed here diverge at this point, not on the existence of cases of strengthening, but principally in terms of the status of affrication as a type of phonological process. The points made in footnote 2 are relevant here, and the argumentation for the position adopted in this paper can be found in Honeybone (2002).

[5] This process is sometimes considered in connection with another which affected the other stops inherited from Germanic (/b, d, g/). This is, however, generally recognised to be a separate process from that which I discuss here under the heading 'HGCS' and is typically thought to be both "later and more geographically restricted" (Davis, Iverson and Salmons 1999: 192). As in other recent work (e.g., Vennemann 1984), I focus only on the affrico-spirantisation of the HGCS.

[6] The formulation of the HGCS in (4) makes use of at least one simplifying and one controversial assumption. While both invite further comment, space need not and cannot be devoted to such discussion here, as neither point negates the discussion of the environment of the processes which is to come (both are discussed in detail in Honeybone 2002). The simplifying assumption is that the reflexes of Germanic /t/, which are symbolised in (3) by 'ʒ', are simply a type of coronal fricative. These segments were voiceless (i.e. characterised by the element |spread|) and their place of articulation can be characterised by the element |coronality|. The controversial assumption is that the fricatives produced by the HGCS were not (at least, at first) geminates. There is good evidence that the fricative products of the HGCS were geminates at some point in the history of German, and Davis, Iverson & Salmons (1999) make this an important part of their analysis, but, I argue in Honeybone 2002, that there is also good reason to believe that the most phonologically natural and parsimonious account of the HGCS involves first a process of the type given in (4) and only later an unconnected gemination of (only some of) the resultant fricatives. The data from Liverpool English which is to be discussed in section 3.2 provides further evidence for the position that I adopt here: as we will see, there are remarkable and substantial non-trivial similarities between the HGCS and this data but there is absolutely no evidence of geminacy in the derived fricatives in Liverpool English. This shows that gemination and spirantisation of this type are, at least in principle, separable. A further simplification in (4) is that is does not show that the original plosives were, in fact, aspirated; this is a common assumption about the HGCS which I share but leave out of the formalisation in (4) for the sake of simplicity.

[7] To expand Keller's abbreviations for the dialects concerned: Highest Alem. = Highest Alemannic; H. Alem. = High Alemannic; L. Alem = Low Alemannic; Mos. Fr. = Mosel Franconian; Rh. Fr. = Rhine Franconian; Rip. = Ripuarian; L. Franc. = Low Franconian; L. Sax = Low Saxon. The italicised example words are contemporary standard German, the others are dialectal.

[8] It is also worth noting here, as a reviewer points out, that initial environments, such as E [#__] have elsewhere been argued to be ***the*** classic fortition/strengthening environments. This observation is not incompatible with the model and mechanisms developed here, to the extent that the notion of strengthening can be reconciled with the notion of positional strength which is proposed here.

[9] Iverson & Salmons (1995) assume that the reason why such clusters as /st/ lack appreciable phonetic aspiration in the stop release phase is that there is only one |spread| specification in the cluster, which is shared autosegmentally between the fricative and the following stop; the glottal spreading gesture involved thus occurs

only once. This means that, by the time that the stop cluster is finished phonetically, the glottal gesture is already over and the phonetic effect of this is that there is little or no aspiration.

[10] While all sources agree that labiality is the principal inhibiting factor here, Dobson (1968), among others, points out that certain other melodic factors contributed in a few cases to the inhibition of the ʊ change. Thus, at times, the preceding labial consonants "require to be assisted by" (Dobson 1968:720) following consonants such as /ʃ/ or /l/. Interestingly, both of these segments can be seen to have properties in common with /ʊ/ (e.g. labial activity in the case of /ʃ/ and velar activity in the case of coda /l/). Also, such previous analyses have often recognised the role that sharing of labiality played in the inhibition of this process, often in a pre-theoretical way. This is a factor in favour of the notion which is formalised in this paper (that element sharing powers melodically driven process inhibition) as it shows that it has a history in the discipline, as many allegedly novel proposals do.