Change in Obstruent Laryngeal Specifications in English: Historical and Theoretical Phonology

Magdalena Jeannette Spaargaren

PhD in Linguistics and English Language
The University of Edinburgh
2009

Declaration

I hereby declare that this thesis is of my own composition, and that it contains no material previously submitted for the award of any other degree. The work reported in this thesis has been executed by myself, except where due acknowledgement is made in the text.

Magdalena Jeannette Spaargaren

Abstract

Two traditions have arisen from an ongoing debate concerning cross-linguistic laryngeal representations in series of obstruents. The first, 'traditional' approach assumes universally identical laryngeal representations: /p, t, k/ are unspecified and /b, d, g/ carry |voice|. The second, Laryngeal Realism (LR), assumes underlyingly different representations between languages: 'aspiration languages' have unspecified /b, d, g/, and /p, t, k/ specified for |spread|. 'Voice languages' have unspecified /p, t, k/, and /b, d, g/ specified for |voice|. In this thesis, I use historical data in order to determine which of these two traditions is correct.

Chapter 1 introduces the thesis subject and places it in the broader context of representational models of theoretical phonology and general historical linguistics. In chapter 2, I discuss the discrepancy between traditional laryngeal features and their cross-linguistic implementation, the basis of the debate outlined above. The two traditions are then discussed in detail. It is shown that evidence for LR is drawn from surface facts in aspiration- and voice languages such as respective presence or absence of aspiration of /p, t, k/, respective absence or presence of voicing in /b, d, g/ and asymmetry in assimilation processes in favour of one of the features. Present-Day English (PDE) is best described in LR when these criteria are taken into account, e.g., [p^{h}]*in,* [b̥]*in*, and invariable assimilation to 'voicelessness', e.g., *cats* /t+z/→[ts], *sacked* /k+d/→[kt].

In the following chapters, I present data from historical laryngeal modifications in English which have never been considered together in this respect before. In Chapter 3, I present new evidence that the laryngeal situation just described for Present-Day English dates back to the very beginning of its recorded history. This is shown in the fact that all laryngeal assimilation throughout the history of English is exclusively assimilation to 'voicelessness' or |spread| - as in pre-Old English [pd] > [pt] *cēpte* 'kept', [td] > [*tt*] *mētte* 'met', [kd] > [kt] *īecte* 'increased', [fd] > [*ft*] *pyfte* 'puffed', [sd] > [st] *cyste* 'kissed'. LR can easily capture this asymmetry because |spread| is the only active member in the laryngeal opposition. |voice| is unspecified in English and can therefore never partake in phonological processes.

Chapters 4, 5 and 6 deal with historical English data traditionally interpreted as 'voicings', i.e. addition of |voice|, and 'devoicings', i.e. loss of |voice|. Therefore, these data are potentially problematic for LR in that, according to this framework, |voice| is not specified in English. However, I show that LR can unproblematically deal with these phenomena as laryngeal lenition, removal of |spread|, and fortition, addition of |spread|. In fact, some of the lenition processes provide extra back up for LR. Processes in word-initial position, e.g., dialectal [v]*ather*, and final position, e.g., *i*[z], *knowle*[dʒ], are highly marked when viewed as 'voicings'. However, when viewed as simple lenitions, as in LR, they are natural processes, which are predicted to be found in languages.

Therefore, I show in this thesis that all available data from English historical laryngeal modification support LR, and that LR in its turn sheds an interesting new light on the data. It is superior to traditional accounts in that it can account for otherwise puzzling phenomena such as asymmetric assimilation and initial and final 'voicings'.

Acknowledgements

First and foremost, I would like to thank my supervisors, Patrick Honeybone and Linda van Bergen for their time, guidance and support. I consider it a privilege to have had the opportunity to work with both of them. Patrick's encouraging and critical comments on the various drafts of this dissertation provided a constant source of motivation and inspiration because of his extensive knowledge of phonological theory, historical phonology and the literature in both fields. Linda's widespread knowledge of historical data and the means to gather and investigate them proved invaluable in the investigation of the data in this thesis in general, and the Old English assimilation data in chapter 3 in particular. I am also very grateful to my examiners, Heinz Giegerich and Colin Ewen, for their suggestions for improvements and comments on the first submitted version of this thesis.

I would also like to thank the audiences at the *Directions in English Language Studies* conference (Manchester, 2006), the *Linguistics and English Language Postgraduate Conference* (Edinburgh, 2007), *The Second Newcastle Postgraduate Conference in Theoretical and Applied Linguistics* (Newcastle, 2007), *The 5th Old World Conference in Phonology* (Toulouse, 2008) and an anonymous reviewer for the *Newcastle Working Papers in Linguistics* 14 (2008) for their critical comments and suggestions on some of the material in this thesis, presented at these conferences and in this journal.

Needless to say, all remaining errors in this thesis are my own.

On a personal note, I am extremely grateful to my mother and father, who never stopped encouraging me and believing in me. Without, their support this project would not have been possible. Last but not least, I would like to thank my other relatives and my friends, both in Edinburgh and Leiden, for their support and for always bringing joy and comfort when the going got tough.

List of abbreviations

A&I:	Avery & Isardi
AF:	Anglo French
AN:	Anglo Norman
att.:	attestation
C11:	C11 Database
DOE:	Dictionary of Old English corpus
F:	French
FLA:	First Language Acquisition
Goth:	Gothic
Gr:	Greek
GT:	Glottal Tension
GW:	Glottal Width
H&L:	Horn & Lehnert
I&S:	Iverson & Salmons
IPA:	International Phonetic Alphabet
K&G:	Kehrein & Golston
L:	Latin
LR:	Laryngeal Realism
lWS:	late West Saxon
M&I:	Mester & Itó
ME:	Middle English
MF:	Middle French
ModE:	Modern English
msec:	milliseconds
N:	Noun
NED:	New (Oxford) English Dictionary
obs:	obsolete
OE:	Old English
OED:	Oxford English Dictionary
OF:	Old French
OHG:	Old High German
ON:	Old Norse
p.c.:	personal communication
PDE:	Present-Day English
PDF:	Present-Day French
PLD:	Primary Linguistic Data
Pol. Party:	Political Party
RP:	Received Pronunciation
SGP:	Standard Generative Phonology
sv:	spontaneous voicing
UG:	Universal Grammar
V:	Verb
var:	variation
vl asp:	voiceless aspirated
vl unasp:	voiceless unaspirated
VOT:	Voice Onset Time
W&M:	Wetzels & Mascaró
WS:	Oxford Wordsmith Tools 4.0

1 Introduction

1.1 Research questions and aims

The research presented in this thesis is based on an ongoing debate between theoretical phonologists with regard to the nature of laryngeal phonological features. The debate is about the discrepancy between the use of phonological features, e.g., [+/-voice] and their various cross-linguistic phonetic implementations. Two schools of thought have arisen over the years; the first 'traditional' one assumes that phonological features are largely the same cross-linguistically and implementational differences are phonetic. The second tradition argues that implementational differences are encoded in the phonology and that different languages have different phonological specifications. A detailed discussion of the debate and its basis is presented in chapter 2.

In this thesis, I investigate which of these two traditions is correct by applying historical laryngeal modification data from English to the second tradition. This is because only the second tradition makes predictions about what processes are possible in languages. It is investigated whether the processes found in the data comply with these predictions. Therefore, I will conduct theoretical historical phonological research which gives rise to the following research questions: (i) how can historical data help to investigate and test current theoretical frameworks? (ii) how can current theoretical frameworks contribute to a better understanding of historical data?

One reason for this investigation is, as pointed out above, that it contributes to a fundamental debate in recent phonological research about how to represent laryngeal contrasts phonologically. In addition, I aim to show the importance of the use of historical data for phonological research. Moreover, my thesis offers an explanation for various historical processes in English, which have never been brought together in this light before. The introductory chapter places my research in its broader context of (theoretical) historical phonology and offers a detailed explanation of my general assumptions. In section 1.2 the status of historical data and theoretical historical phonology is discussed. 1.2.1 presents four different viewpoints on the importance of historical data in modern phonological research, while 1.2.2 looks more closely at the sub-discipline of theoretical historical phonology and discusses its main objectives. Section 1.3 presents an overview of the key assumptions made in this thesis. It is

shown that it has to be assumed that theoretical historical phonology can be done. The preliminaries for its existence are explored by looking at the locus of linguistic change. Phonological representations are assumed to consist of clear underlying and surface representations, which are interesting and worthwhile to investigate. Lastly, phonological segments are assumed to consist of distinctive privative features, which contain 'phonetic' information. Finally, section 1.4 presents an outline of the structure of the thesis.

1.2 Historical data and theoretical phonology

1.2.1 The status of historical data in theoretical phonology

McMahon (2000: 1) highlights four 20th century viewpoints on the status of historical evidence in phonology. The first, Standard Generative Phonology (SGP) (e.g., Chomsky & Halle 1968), treats historical evidence as 'external'. It is not part of the synchronic grammar of speakers, and is therefore irrelevant to current phonological research. Labov (1978: 277), who represents the second viewpoint, accepts that "recent linguistics has been dominated by the drive for an autonomous discipline based on purely internal argument", but argues that "the most notorious mysteries of linguistic change remain untouched by such abstract operations and become even more obscure". McMahon indicates that he "…pleads for a rapprochement of synchronic and diachronic study, showing that advances in phonetics and sociolinguistics, which have illuminated many aspects of change in progress, can equally explain completed changes…". Labov (1978: 281) reformulates this as "…the forces which operated to produce historical record are the same as those which can be seen operating today". He argues that cooperation between phonetics, sociolinguistics, dialectology and formal model-building with historical linguistics provides the most promising approach towards the understanding of the linguistic past. In order to do this, the present has to be as fully understood as possible. McMahon (2000: 2) notes that Labov argues that "only when we are thoroughly at home in that everyday world, can we expect to be at home in the past" (1978: 308). McMahon points out that the belief that the present can enlighten the past was already advocated in Weinreich, Labov & Herzog (1968: 100), who emphasise 'orderly heterogeneity' in language as "…a reaction to over-idealisation of the synchronic system and the exclusion of crucial variation data".

Thirdly, the Prague School of Linguistics also favoured combining synchronic and diachronic approaches (e.g., Vachek 1966, 1976, 1983). McMahon (2000: 2) points out that "Vachek uses the term 'external evidence' (1972) to refer solely to the rôle of language contact and sociocultural factors in language change…". Although, Vachek accepts that certain changes are caused by external factors, he still argues that the strongest explanations are offered by the language's own structure, i.e. internal factors. He argues that synchrony is never truly static. Vachek (1966: 27) argues that "any language system has, besides its solid central core, its periphery, which need not be in complete accordance with the laws and tendencies governing its central core". Elements in the periphery leave or enter the system and can shed a light on trends and changes in it which would otherwise be missed or remain unexplained. In other words, McMahon (2000: 3) points out that in a dynamic approach like Vachek's "…the synchronically peripheral status of certain elements allows us to understand and perhaps predict diachronic developments, while the changes which have produced this peripherality can in turn explain irregularities in the synchronic pattern". Vachek sees the two as mutually informing.

McMahon (2003: 3) notes that the fourth viewpoint on the status of historical evidence is Bailey's (1982) 'time based' or 'developmental linguistics'. Bailey (1982: 154) argues that "…any step towards getting rid of the compartmentalization of linguistics into disparate and incompatible synchronic, diachronic, and comparative or dialectal pursuits must…be welcomed". He "…proposes polylectal systems sensitive to diachronic data" (McMahon 2003: 3). Bailey (1996: 378) believes that "…deep explanation and prediction are possible only by investigating and understanding how structures and other phenomena have developed into what they have become". Therefore, in his view the influence of diachronic on synchronic analysis is one-way: he discards synchronic analysis. Bailey (1982: 152) argues that "…historical linguists are fundamentally misguided in adopting synchronic frameworks and notions for diachronic work: in doing so, they are guilty of analyzing out the variation and dynamism central to language change" (McMahon 2000: 3).

McMahon's own viewpoint is closest to that of Vachek. She argues that

> "…if we are really to integrate synchrony and diachrony, the connection should cut both ways. That is, the linguistic past should be able to help us understand and model the linguistic present: since historical changes have repercussions on systems, an analysis of a synchronic system might sometimes benefit from a knowledge of its development" (McMahon 2000: 4).

Phenomena that are hard to explain synchronically, might be explainable in the light of history. However, additionally, if a current framework can explain sound change, this will add to the credibility of the framework. It will also, as McMahon (2000: 4, 6) points out, "…crucially model the transition from sound change to phonological rule without simply collapsing the two categories". The point McMahon argues, that historical data can be used to test current frameworks, is crucial for the research questions asked above.

In fact, McMahon (2000: 6) stresses the importance of historical data for theoretical frameworks by arguing that a sound explanatory theory amongst others "…must consistently account for, and be supported by, external evidence, including diachronic data." She points out that this is in line with Churma's (1985: 106) view that "'external'…data…must be brought to bear on phonological issues, unless we are willing to adopt a 'hocus pocus' approach…to linguistic analyses, whereby the only real basis for choice among analyses is an essentially esthetic one". McMahon (2000: 6) argues that "The over-reliance of SGP on purely internal evidence reduces the scope for its validation, and detracts from its psychological reality…". Mohanan (1986: 185) argues that "linguistic theory…is committed to accounting for evidence from all sources. The greater the range of evidence types that a theory is capable of handling satisfactorily, the greater the likelihood of its being a 'true' theory". The research questions proposed in 1.1 show that I test the hypothesis made by McMahon above for the two laryngeal traditions. I investigate whether historical data can indeed validate one of the two traditions, and what these current ideas can tell us about the data. These issues are set out in chapter 2.

1.2.2 Theoretical historical phonology

Honeybone (2008a: 2) points out that some linguists argue that strictly speaking phonological change does not exist. A much discussed distinction is that between (i) purely phonologically conditioned change, i.e. 'normal' phonological change or 'sound change', and (ii) non-phonologically conditioned change in phonological forms, e.g., analogy or borrowing. Because changes of type (i) are "phonologically driven or conditioned changes, they…often look like synchronic phonological processes, with a phonologically determined structural description: these are *conditioned* changes" (2008a: 2). However, change can also be spontaneous, i.e. not caused by environmental factors.

According to Honeybone (2008a: 4), it is helpful to distinguish between 'phonological history', which is part of the study of specific languages and also referred to as 'philology', and 'historical phonology', which is part of the study of general linguistics. The former concentrates on questions concerning the time and place at which a change took place, how far a change spread though the speech community, what its phonological patterning was and whether it was spontaneous or conditioned. Finally, it considers what types of evidence are available to historical phonologists and phonological historians. Historical phonology proper also concentrates on phonological patterning and spontaneity or conditioning of changes. In addition, it investigates whether types of changes are common, can be patterned differently and whether they are predictable. It asks the question what common changes actually are, and whether there are possible or impossible changes. This thesis does a bit of both. All data are initially described philologically according to standard handbooks on the phonological history of English (e.g., Campbell 1959, Luick 1964 and Hogg 1992). Where possible, a detailed discussion of the date, place, extent, patterning and conditioning of the processes is presented. After this, the data are reanalysed in a historical phonological way: they are used to test the predictions and assumptions of the second tradition regarding laryngeal specifications.

McMahon (1994: 44-45) and Honeybone (2008a: 4) argue that the question of why a change happened at precisely a particular time and place, the issue of how a change might start, is perhaps unanswerable for historical phonologists. Weinreich, Labov & Herzog (1968) call this the "actuation problem". McMahon (1994: 45) argues that failure to solve this problem may be due to inadequacies in historical phonological theories, but may also be "…symptomatic of the inexplicable nature of linguistic change". Honeybone notes that in order to tackle the actuation problem, precise predictions would be necessary as to when particular changes will occur. He argues that historical phonology cannot do this but can engage in some sort of prediction.

McMahon (1994: 45) and Honeybone (2008a: 4) point out that Lass (1980: 42) argues that "explanations of sound changes in the strict sense do not exist". Lass (1980: 9) assumes that only Deductive-Nomological explanation is real explanation. He argues that

> "The 'best' explanation is 'X, because it couldn't have been otherwise (because Y)'…The explanation type that seems to come closest is the …'Hempel-Oppenheim' or 'Deductive-Nomological' schema, which characterizes the physical sciences. It is based on deductive inference and, as its name implies, 'laws', and is 'ideal' in the sense that a well-formed explanation has the form of a deduction, and is in principle equivalent to a prediction."

This statement has triggered many responses. Aitchison (1987: 12) for example argues that

> "…the exact relationship between prediction and explanation is obscure, partly because of the vagueness of the terms 'predict' and 'explain'. Each of them is used to cover several different levels. Prediction can involve weak prediction (something is likely to happen), strong prediction (something will happen, though exactly when and where is unclear), and absolute prediction (something will happen, and the time and place can be specified in advance)".

This view is shared by Ohala (1987), who argues that explanation in historical phonology should be deductive-probabilistic, i.e., able to account for what is likely, not what is necessary. Honeybone (2008a: 5) points out that historical phonology often makes predictions about what is likely to happen in terms of change in any particular phonological system. He argues that it is not testable whether this is all historical phonology. He claims that the opinion of many historical linguists is that historical phonology should also aim to predict what cannot occur. In other words, "given a particular phonological system, only changes of type x should be possible…certain types of changes should be impossible, creating in-principle testable hypotheses". Honeybone (2008a: 5) claims that "much theoretical historical phonology aims to derive such predictions either from primitives of the phonological theory adopted, or from general principles of change".

This thesis does both. The underlying features adopted in the second tradition predict what changes are possible in English, e.g., assimilation to what is traditionally called 'voicelessness', and which changes are not possible, e.g., assimilation to voiced obstruents. However, certain historical occurrences of alleged voicings are looked at in terms of general markedness principles. Finally, Honeybone points out that "historical phonology sometimes engages in 'backwards-looking' prediction: changes that we know have happened can be reviewed to see if we would have predicted them (or, at least, if we would not have predicted that they should not occur) in the light of a theoretical position". This is also done in this thesis. I bring already documented

laryngeal modifications together and test them against the hypotheses of the second tradition. As this section has shown, theoretical historical phonology can be defined as a discipline that "mixes 'traditional' knowledge and thinking about phonological change…with work on phonological theory" Honeybone (2008a: 6).

Honeybone (2007: 1) points out that Newmeyer (1986) identifies three different orientations to the study of languages: (i) The humanistic approach, which focuses on poetics and stylistics. It involves the linguistic analysis of literary texts, and the study of the figurative, aesthetic and creative use of language in literature. (ii) The sociological approach, which studies language variation. It involves the ethnography of speaking, national language planning, pragmatics, discourse analysis, and the use of language in its interpersonal context. Finally, (iii) there is the autonomous approach, which investigates the properties of language which "exist apart from either the beliefs and values of the individual speakers of a language or the nature of society in which the language is spoken" (Honeybone 2007: 1). Chomsky (1965: 4) notes that the Standard Generative approach to linguistics distinguishes between "the speaker-hearer's knowledge of a language", which is equal to 'competence' or 'I-language' and, as Honeybone points out, is studied in Newmeyer's autonomous orientation. Then there is "the actual use of language in concrete situations", which equals 'performance' or 'E-language' and can be studied in Newmeyer's humanistic and sociological orientations.

Although Honeybone (2007: 2) argues that the social and humanistic aspects are important in order to create a full picture of language change, he focuses on the 'autonomous orientation'. I do the same in this thesis. Honeybone (2007: 2) argues that this focus on the structural mind-internal aspects of language and the way in which they interact with linguistic change, "…that is on syntax and phonology, as constrained by (universal?) principles of the possible nature, number and organization of autonomous linguistic entities" constitutes an investigation in theoretical historical linguistics, "…along the lines that 'the theoretical phonologist or syntactician … can often learn a great deal from work on change' (Loudon 2003), as discussed in detail in the previous section.

1.3 Key assumptions

In order to answer the research questions above, I make a number of key assumptions: (i) theoretical historical phonology can be done. (ii) as also followed in Spaargaren & Honeybone (2006) and Spaargaren (2008), I assume that phonological units have clear underlying representations (or 'inputs') and surface forms (or 'outputs'), and that these underlying representations are interesting and worthwhile to investigate. (iii) Relatedly, I assume that phonological segments are made up of distinctive privative features which carry information classified as 'phonetic' in certain views. The issues of privativity and phonetic information in phonological features are taken up in more detail in the following chapter.

According to Honeybone (2007: 6), the possibility that theoretical historical phonology can be done depends very much on where the locus of linguistic change is assumed to be. This in itself is closely related to aspects of First Language Acquisition (FLA), and the role it plays in the generative model of language: where does I-language come from and how does it develop in the mind? Lightfoot's (1979, 1991, 1999) position on FLA in syntax is partly based on general work on the topic. Diagrammatically, his view on acquisition can be expressed as in (1) where S_0 represents the initial state, PLD are the Primary Linguistic Data and S_s represents the 'adult', 'steady state' grammar:

(1) $S_0 + PLD = S_s$

Honeybone points out that this can be further spelt out as in (2), in which $S_s(1)$ is the adult grammar, which is the source of the PLD. From this source FLA leads to the development of $S_s(2)$, a new adult grammar.

(2) $S_s(1) \rightarrow PLD \twoheadrightarrow FLA \rightarrow S_s(2)$

Honeybone argues that Ss(1) and Ss(2) are typically the same. If they differ linguistic change has taken place.

Honeybone (2007: 6) points out that for Lightfoot S_0 is Universal Grammar (UG) and not a blank slate. UG is composed of parameterised principles. A set of parameter settings, Ss, is acquired according to the PLD. He points out that the grammar that

provides the input (Honeybone's Ss(1) or G1 for Lightfoot) must allow for surface phrase orders which could be interpreted as being derived from a different underlying phrase order, another grammar (G2 for Lightfoot). Otherwise change cannot occur. The surface phrase orders are governed by chance or sociolinguistic reasons. FLA, then, consists of a reanalysis of the PLD that children are presented with as being derived from G2. Therefore, they acquire G2.

Honeybone (2007: 7) asks whether change occurs in 'stable' non-initial language states, i.e. in what he calls 'steady-staters' ("…a member of the relevant speech community who already has an established grammar of some sort"), or in first language acquisition, i.e. 'acquirers' (those who do "…not yet have a 'firm' linguistic system (grammar))", or in both. He discusses two points of view, which he labels 'acquisitionism' and 'anti-acquisitionism', and which give rise to three possible positions. The first is that "all endogenous change occurs in first language acquirers". In other words, change that is conditioned by language internal factors occurs in children acquiring their first language only. He classifies this position as 'strict acquisitionism'. This position implies a 'fundamental discontinuity' between the pre-change and post-change grammar.[1] The second position advocates that "all endogenous change occurs in adult-steady-staters"; Honeybone labels it 'strong anti-acquisitionism'. The third position, labeled 'soft anti-acquisitionism' by Honeybone, argues that "endogenous change can occur at both loci". Honeybone points out that the second and third positions "…allow for direct relatability of the pre-change to the post-change linguistic state (= 'grammar')".

Acquisitionism, the view favoured by Lightfoot, is the widely adopted view in historical linguistics (e.g., van Kemenade (2007), Yang (2000), Battye & Roberts (1995)). This view has the consequence that, strictly speaking, there is no such thing as language change, because language is defined as 'I-language'. If this is the case, then there can be no situation in which I-language changes once it has reached its Ss mature grammar. Therefore, diachrony is only the succession of different grammars, which makes historical linguistics only the comparison of successive grammars. Honeybone (2007: 8) notes that Reiss (2003: 143) points out that change is simply the comparison between two grammars and that this is not subject matter of linguistic theories: "…language changes cannot be conceived to be part of linguistic theory narrowly defined".

[1] Honeybone (2008: 12) points out that this idea is taken over from theoretical historical syntax.

According to Honeybone (2007: 8), the acquisitionist view is also standardly claimed in recent work on historical phonology. However, this was not the original standard assumption. Early Standard Generative phonologists believed in the possibility of rule-addition by post-FLA steady-staters at the end of the rule component (e.g., Halle (1962)). McMahon (2000: 9) indicates that historical SGP (Halle 1962; Postal 1968; King 1969) holds that when a sound change, once implemented, is inserted as a phonological rule at the end of the native speaker's rule system, then it moves gradually higher in the grammar. This 'rule addition' or 'innovation' is the main mechanism for introducing the results of a change into the synchronic grammar. She claims that SGP is essentially a static model.Honeybone (2007a: 9) points out that the logical implication of the acquisitionist perspective on change is that "theoretical historical phonology cannot really be done". Constraint reranking or rule addition can only be interpreted as "a metaphorical manner of comparing differing synchronic grammars". Therefore, it is impossible to make the assumption that change can be guided or constrained by a language's phonological structure or that predictions can be made about what a possible change is. The only thing historical phonologists can do in an SGP approach to historical phonology is compare pre-change and adult grammars and post-change and child grammars "…and work out the phonetics of confusability that allow children to mistake the output of one grammar as the output of another".

However, Honeybone claims that the view that linguistic change only takes place in acquisition is mistaken. He advocates 'soft-anti-acquisitionism', described above, in which change can occur both in acquirers and steady-staters. He agrees that reanalysis plays a part in change, but he argues that there is another option. He claims that there is a "…long established strand of work in theoretical historical phonology (exemplified early and influentially by Anderson & Jones (1977), and implicit in much other work)…", which acknowledges the direct relevance of diachronic data from attested phonological changes in arguments about one case of phonological theory at least: segmental structure theory. 'Negative' data, i.e. the absolute absence of never-attested changes, has also been argued to offer such evidence, as they can be interpreted to give an insight in what could be impossible changes.

Honeybone (2007: 10) argues that theoretical historical phonology can be argued to explain phonological changes, "…if they, or at least some aspect of their patterning, can be predicted from the subsegmental representations of the pre-change

segments involved". Such predictions could be concerned with, for example, what segment a particular segment might change into, which segment(s) from a particular 'natural class' are most susceptible to change and which environments are most and least conducive to the innovation of change. This can only be done in a model in which change in the so-called 'steady-state' of speakers is possible, i.e., after FLA. Honeybone points out that this view is used a lot in Dependency and Government Phonology approaches "…as evidence for the privative component/element-based approach to segmental structure" (e.g., Anderson & Jones 1977; Jones 1989 and Harris 1994). It is assumed that "….the subsegmental structure of a pre-change segment determines what it changes into".

These approaches require change in steady-staters because if acquisitionism is assumed, then evidence for phonological structure is only provided by the synchronic grammars (pre-change and post-change), and not the comparison between them. Change can only be constrained if segmental representations simply dictate, due to language universal pressures, what kinds of segments can possibly be acquired. Honeybone (2007: 11) points out that

> "the structure of a pre-change segment can only determine the structure of a post-change segment if the former places a direct constraint on the latter**,** and this can only happen if the change occurs in one grammar -in one person- in a 'steady-stater'-after the period of initial acquisition…the comparison between two grammars is only possible if those who innovate a particular change have plausible access to both grammars; this can only arise if endogenous change can occur in so-called steady-staters."

The assumption that a pre-change language-specific structure affects the patterning of a change, the member of a natural class most affected by it, etc., only works in an anti-acquisitionist model.

Honeybone (2007: 12) points out that there is positive evidence in favour of anti-acquisitionism. Acquisitionist approaches face a number of problems, partly connected with FLA in children. He notes that it is sometimes claimed that the phonological processes that are typical of child speech are a key to explaining change. Allegedly, children simply retain the processes of childhood into adulthood. However, types of processes found in children, in fact, often differ in key ways from related processes found in adults. According to Honeybone, this cannot simply be a matter of discontinuous change brought about cross-generationally. He points out that children aim to acquire the patterns that surround them exactly and they are not expected to get

it wrong in an easily observable system like phonology. Adolescents, however, who are past their 'critical period' and have steady-state grammars, frequently change their speech on purpose. In addition, Honeybone points out that people certainly make changes to their phonological system over their lifetime. This is evident from anecdotal reports on change in people's accents and several longitudinal 'real time' case studies of both individuals and populations. These 'lifespan changes' show that change is possible in adults.

Honeybone (2007: 14) takes into consideration that not all change can be of the anti-acquisitionist type because it may involve reanalysis, which is the acquisitionist source of change. People with steady-state grammars are unlikely to change their grammar by mistake (reanalysis) if they do not want to. He claims that "those engaged in FLA, however, lack a grammar against which to check confusables, and are thus those who are open to the type of reanalysis (that is, different analysis) that is crucial on this picture". Therefore, he promotes soft anti-acquisitionism. On this view theoretical historical phonology is possible because changes can take place between two adult grammars, and therefore, lead to two adult grammars with different underlying specifications. This thesis is in line with work in the soft anti-acquisitionist tradition with the primary assumption that theoretical historical phonology is both possible and relevant.

As pointed out above, the do-ability of theoretical historical phonology in terms of soft-anti-acquisitionism and representational models of phonology are linked as these models require the possibility of change taking place in steady-state grammars. Therefore, although this thesis is not set in a particular representational framework, I do follow the principles of representational models, such as those advocated by Dependency Phonology, discussed in more detail in 2.3.2.2.2, and Government Phonology (e.g., Anderson & Jones 1977; Anderson & Ewen 1987; Jones 1989; Kaye, Lowenstam & Vergnaud 1985 and Harris 1994). Therefore, I assume that phonological forms have clear underlying representations and that those representations are interesting and worthwhile to explore.

I assume that underlying forms consist of phonological primitives. Carr, Durand & Ewen (2005: 1) point out that the important question that arises with regard to the structure of phonological representations is how best to view them. The question of whether the primitives of phonological representation are privative or binary is important in representational phonology. As Carr, Durand & Ewen (2005: 2) point out

"…with unary elements underlying privative phonological oppositions, the possibility arises of contrast between the presence and absence of an element, which leads naturally both to underspecification and non-specification in phonological representations".

As briefly pointed out above, a notion related to privativity is the fact that, in frameworks like Government Phonology, processes must have a local source (e.g., Brockhaus 1990 and McMahon 2000: 25). This fact constrains the framework, as features cannot just appear out of nowhere. Therefore, if there is a privative opposition in a language, then the expectation is that processes involving the feature that would be the opposite of the specified feature in a binary approach never occur. For example, if the feature [voice] is not present in the laryngeal phonological opposition of a language, which can be the case as argued in this thesis, the feature cannot be randomly introduced into the system without a local source in order to explain certain processes. Therefore, in such a language a process like voicing, the addition of [voice] in a privative framework, is not expected to be possible.

Carr, Durand & Ewen point out that another big issue in representational models of phonology is whether phonological primitives may be said to have phonetic content. The notions of local source, privativity and phonetic information in phonological features are central to the discussion of the data in this thesis. I investigate these notions by using a model of phonology which assumes privative features with phonetic content. In doing so I contribute to a "long-standing issue which is still at the centre of phonological theory" (Carr, Durand & Ewen 2005: 1).

1.4 The structure of the thesis

Chapter 2 presents a detailed discussion of the discrepancy between traditional laryngeal features and their cross-linguistic implementation. As pointed out in 1.1, this forms the basis of the debate central to this thesis. In section 2.2 data from German and Polish serve to illustrate this discrepancy. Section 2.3 describes several approaches to tackle the observed differences. It addresses the questions of whether phonological features should contain phonetic information or not, and whether features should be binary or privative. Two traditional approaches are discussed first. One is a binary (Keating 1984) and one is a privative [voice] account (Lombardi 1995a). These both assume that phonological features are cross-linguistically largely

stable and implementational discrepancies are phonetic. Then, problems with Lombardi's privative [voice] account taken into consideration.

This is followed by a discussion of an alternative approach: Laryngeal Realism (e.g., Iverson & Salmons 1995, 1999, 2003a,b, 2007, 2008; Honeybone 2002, 2005a). A precedent of this view (Kohler 1984) is discussed first. In Laryngeal Realism phonological features can contain some phonetic information and implementational discrepancies are distinguished phonologically cross-linguistically. The analysis of fricatives in this system and laryngeal specifications in sonorants are then turned to, and this is followed by the discussion of a new development: Dimensional Theory (Avery & Isardi 2001). This framework offers the advantage that it allows for phonetic enhancement of a redundant dimension node in unspecified members of a laryngeal opposition.

In section 2.4 it is shown that Laryngeal Realism seems to work very well for Present-Day English and the framework is formalised. New symbols for segments and laryngeal terminology are introduced to replace the confusing traditional ones. Crucially, section 2.5 links this chapter to the data chapters to follow by asking which of the two traditions is correct: the traditional approach or Laryngeal Realism. This is investigated with the data presented in the following chapters.

Chapter 3 serves to investigate a number of English historical assimilation processes. The first process looked at is that of Pre-Old English laryngeal assimilation. As in all data chapters, the process is first described rather philologically in line with the traditional handbooks on English phonological history. Therefore, traditional terms and symbols are used in these sections to stay true to the original descriptions. This is followed by a detailed further investigation of these data. Then, the process is investigated in Laryngeal Realism and apparent complications with the situation for fricatives are investigated. Two Middle English processes of laryngeal assimilation are discussed in 3.3: assimilation of the 3rd singular, genitive, plural and past-tense suffixes, /s/ and /d/, and possible late Middle English laryngeal assimilation, mostly in syllable medial position. As in the previous section, a philological description of the processes is followed by their reanalysis in Laryngeal Realism. However, it is argued that many instances of the second process do not seem to be assimilations at all. The chapter ends with a conclusion in 3.4 which summarises the main points made in the chapter.

Chapter 4 presents two processes of apparent stress-conditioned voicings in late Middle English and early Modern English. In the former, fricatives voice when they occur in coda position of unstressed words or syllables. Onset cases of this process are only found in unstressed words. In the latter, medial fricatives voice when the main stress does not immediately precede them. Section 4.2 gives a mainly philological description of the processes. This is followed by a reanalysis in Laryngeal Realism and a closer look at the apparent stress-conditioning of these processes in 4.3. Section 4.4 presents the conclusion of this chapter. In chapter 5, I discuss apparently unmotivated morpheme-edge processes. These are southern Middle English word-initial voicing and several processes of final devoicing. In 5.2, I give a philological description of the processes and 5.3 again provides an analysis of the processes in Laryngeal Realism. This leads on to the conclusion in 5.4. Chapter 6 presents the general conclusions to the research conducted in this thesis. A summary of the main assumptions and predictions made in this thesis is given in section 6.1. Section 6.2 answers the research questions asked in this chapter, and brings all the data together. Section 6.3 focuses on the implications of Laryngeal Realism for the locus of linguistic change, also discussed in this section. Finally avenues for future research and the final conclusion are presented in 6.4.

2 Laryngeal specifications: |spread| versus |voice|

2.1 Introduction

The previous chapter briefly discussed the fact that two traditions have arisen from an ongoing debate concerning the phonological representation of cross-linguistic laryngeal features. One tradition assumes that underlying laryngeal specifications are largely the same cross-linguistically, and the other assumes that they differ between languages. This chapter serves to provide a detailed description of the basis of this debate. It is concerned with a generally acknowledged discrepancy between the use of phonological features, e.g., [+/-voice], and the variety of physical events they relate to cross-linguistically.

In section 2.2 the distinct differences between languages in the surface representations of phonological laryngeal features are discussed. It is shown in section 2.2.1 that the implementation of the series which are traditionally indicated with the symbols /b, d, g/ and /p, t, k/ and referred to as the 'voiced' and 'voiceless' stops respectively, differs in languages like Polish and French on the one hand and English and German on the other. The 'voiced' stops of English and German normally surface as voiceless in initial and final position and are only fully voiced in inter-sonorant context. Those of French and Polish on the other hand are fully voiced in all positions. The 'voiceless' stops of English and German are characterised by surface aspiration, mostly in foot-initial position, which is absent from the 'voiceless' stops of Polish and French. In addition, it is shown in section 2.2.2 that French and Polish exhibit bi-directional laryngeal assimilation, i.e. assimilation to both 'voicedness' and 'voicelessness', whereas assimilation in English and German is uni-directional in favour of 'voicelessness'.

The focus of section 2.3 is on earlier and more recent literature on the phonological formalisation of these cross-linguistic discrepancies in surface representations. The two phonological traditions concerning underlying laryngeal features are presented starting with, what will be referred to in this thesis as, the 'standard', 'traditional' or 'unmarked' assumption in 2.3.1. This tradition assumes that phonological features are largely identical cross-linguistically and that different surface representation facts are phonetic. It is exemplified with important works by Keating (1984) and Lombardi (1995a). In 2.3.1.1 Keating's proposal for a cross-linguistically identical binary

phonological feature [+/-voice] is outlined. She proposes phonetic categories to deal with the cross-linguistic implementation differences. Lombardi, discussed in 2.3.1.2, proposes a privative feature [voice] as the underlyingly distinctive feature. Lombardi's privative [voice] encounters a number of problems which are outlined in 2.3.1.3: it cannot explain the surface facts and the uni-directionality of assimilation in languages like English and German. The section finishes with an alternative approach presented by Wetzels & Mascaró (2001) who propose binary [+/-voice].

The second tradition is discussed in 2.3.2. In this tradition, it is assumed that cross-linguistic implementation differences are, in fact, phonological. Section 2.3.2.1 sets the scene for this approach by showing that the idea that a feature representing 'voicing' is not sufficient to account for cross-linguistic laryngeal contrasts. Two accounts by early phoneticians Sweet (1877) and Sievers (1901) are presented. The latter argues that some languages have a laryngeal distinction between the features 'fortis' and 'lenis' instead of 'voiced' and 'voiceless'. In 2.3.2.2 two phonological accounts which advocate some incorporation of features traditionally viewed as phonetic into the phonology are presented. Kohler (1984) argues for the binary feature [fortis], instead of the confusing binary feature [voice], in order to specify cross-linguistic laryngeal distinctions. Dependency Phonology (e.g. Anderson & Ewen 1987) argues that the laryngeal phonology of some languages requires a unary feature |O| in order to indicate glottal opening.

A more recent approach, first advocated by Iverson & Salmons (1995, 1999, 2003) is outlined in 2.3.2.3. It is shown that Iverson & Salmons argue that there are at least two types of languages with regard to laryngeal phonological features. 'Aspiration languages', like German and English, have a 'voiceless' series which is underlyingly specified for the privative feature [spread glottis]. 'Voice languages', like French and Polish, on the other hand have a 'voiced' series underlyingly specified for the privative feature [voice]. Evidence for this position in the form of obstruent-sonorant devoicing and failure of aspiration is presented. It is argued that this is due to sharing of the [spread glottis] feature in clusters containing an obstruent specified for the feature.

In section 2.3.2.4 arguments are given for the same treatment of fricatives and stops in the second tradition. Section 2.3.2.5 is devoted to a brief discussion of laryngeal representations in sonorants. Finally, a further development within the second tradition is presented in 2.3.2.6: dimensional theory (Avery & Isardi 2001).

This approach replaces the features [spread glottis] and [voice] with the dimensions Glottal Width and Glottal Tension. It opens the door to phonetic enhancement of laryngeally unspecified features with a non-contrastive dimension in the system. Some examples of this process in the form of 'passive voicing' and 'Vaux's Law' are given.

In section 2.4 Present-Day English is described in terms of tradition (ii) and the latter is formalised. It is shown in 2.4.1, that surface facts of Present-Day English can easily be explained in the second tradition. Aspiration follows from a phonological [spread glottis] specification, lack of voicing stems from the absence of an active [voice] specification. Absence of [voice] and constraints imposed by the local source requirement, which prevent this feature from randomly being introduced into specifications, can also explain the asymmetric assimilation facts. Only active [spread glottis] can participate in phonological processes.

It is argued in 2.4.2 that the terms 'voiced' and 'voiceless' and the traditional symbols used to transcribe them are inadequate for use in aspiration languages like English. Following Honeybone (2002, 2005), the feature |spread| is adopted for the marked feature of the opposition in obstruents. The traditional symbols are replaced by /p^h, t^h, k^h/ to transcribe the |spread| series of English, and /p°, t°, k°/ to transcribe the unspecified neutral set. It is also shown that languages can have different specifications in stops and fricatives, and this is argued to be the case for the fricatives and stops of English. Finally, section 2.5 provides the link between this chapter and the following three chapters.

2.2 The basis of the debate

2.2.1 Phonological specifications versus surface implementations

The discrepancy between underlying laryngeal specifications and their surface implementation is noted by, for example, Keating (1984: 287) and Iverson & Salmons (I&S) (1995: 381-382). Keating (1984: 287) points out that, traditionally, the symbols [b, d, g] refer to [+voice] stops in which voicing is simultaneous with the closure, and the symbols [p, t, k] represent [-voice] unaspirated stops. She notes that this use is adequate in the description of languages like Polish and French. However, for languages like English and German their use is more problematic.

Biedrzycki (1974: 40) and Keating (1984: 301) point out that Polish voiced obstruents are fully voiced in initial and medial position only. They undergo laryngeal neutralisation, which is optional before a sonorant-initial word in standard Polish, and exclusively takes place before a voiced obstruent in Northern dialects (Biedrzycki 1974: 103). Examples of surface realisations of Polish voiced obstruent phonemes are given in (1). For example, in the first forms the underlying phoneme **/b/,** indicated in bold, has the phonetic surface representation [b].

(1) *Voiced obstruents in Polish*

a. *Initial voiced obstruents*			b. *Medial voiced obstruents*		
/b/ = [b]					
/baba/	<baba>	'woman'	/ɔ**b**aj/	<obaj>	'both'
/d/ =[d]					
/dama/	<dama>	'lady'	/jɛ**d**ɛn/	<jeden>	'one'
/g/ = [g]					
/gas/	<gaz>	'gas'	/zga**g**a/	<zgaga>	'heartburn'
/v/ = [v]					
/vaš/	<wasz>	'yours'	/pwi**v**atɕ/	<pływać>	'to swim'
/z/ = [z]					
/zaras/	<zaraz>	'right now'	/zara**z**a/	<zaraza>	'plague'
/dz/ = [dz]					
/dzvɔn/	<dzwon>	'bell'	/vɔ**dz**a/	<wodza>	'rein'
/dž/ = [dž]					
/džɛm/	<dżem>	'jam'	/li**dž**ba/	<liczba>	'number'
/dʑ/ = [dʑ]					
/dʑawɔ/	<działo>	'gun'	/jɛ**dʑ**ɛ/	<jedzie>	'riding'

Keating's (1979) acoustic measurement of medial Polish [d] shows that medial [+voice] stops have less measured voicing than initial ones. Voicing is measured in

Voice Onset Time (VOT) values. VOT is the time between the onset of voicing and the release of a stop consonant. When voicing coincides with the release of the closure, the VOT is 0 msec. When the VOT occurs before the release, there is a negative VOT value which 'leads' the release. When the VOT follows the release, the VOT value is positive and is said to 'lag' the release. A positive value to about 20-35 msec is a short lag, higher values are long lags (Keating 1984: 294). Initial [d] has VOT values up to -160 msec, whereas the highest VOT value for medial stops is just below -150 msec. According to Keating (1984: 301), this difference can be attributed to the fact that the duration of the closure is shorter for medial stops than for initial stops. The VOT values for medial [-voice] stops are closely similar to the values for initial stops.

Biedrzycki (1974: 45-46, 49) notes that Polish and French voiced obstruents are very similar. Tranel (1987: 131) and Armstrong (1932: 98) point out that the French voiced obstruents are fully voiced in all positions: e.g., [**b**aʁ**b**ə] <barb> 'beard', [lãː**g**] <langue> 'language', [sabo] <sa**b**ot> 'clog', [**ʒ**amɛ] <jamais> 'never', [**v**wala] <voila> 'there!, right!', [**d**izɥit] <dix-huit> 'eighteen'. The difference between French and Polish is that word-final neutralisation, which takes place in Polish, never takes place in Standard French, e.g., [ʃɛː**z**] *chaise* 'chair'. It is found in some dialects though, e.g., the form [gaʁa**ʃ**] for [gaʁa**ʒ**] <garage> 'garage' is found in Walloon (Tranel 1987: 131).

The surface implementation facts for German and English are quite different. Biedrzycki (1974: 40, 45ff) points out that a German learner of Polish has to intensively practice fully voiced obstruents after a pause. This is because, unlike Polish voiced obstruents, German voiced obstruents have voiceless allophones in that position. For example, German initial /d/ is realised as [d̥] and therefore German learners of Polish tend to pronounce Polish [daχ] (/daχ/) <dach> 'roof' like its German equivalent [d̥aχ] *Dach* 'roof'. Similarly, German /b, g, v, z/ become [b̥, g̊, v̥, z̥] word-initially after a pause as in [b̥lat] <Blatt> 'leaf', which sounds like German [plat] <platt> 'flat' to Polish ears (Biedrzycki 1974: 45). Other examples of voiceless initial obstruents in German are [g̊anz̥] <Gans> 'goose', [v̥iːvoːl] <wiewohl> 'whether, if' and [z̥oːn] <Sohn> 'son'. As can be seen from the penultimate example, /v/ is fully voiced in medial position between voiced sounds. This is the only position in German where fully voiced obstruents occur.

Mobius (2004) presents a detailed study of surface implementation of laryngeal features in German obstruents. He uses the 'Voicing Profile Method' and points out that a Voicing Profile is the "…frame by frame voicing status of speech sound realisations in a speech corpus", which "…serves to establish the frame-by-frame probability of voicing throughout the duration of a speech sound realization. It allows to determine the temporal portion of a consonant that is covered by voicing". The latter is often called 'voicing into closure' for stops. It is intended that the Voicing Profile Method serves as "…a methodology for investigating the discrepancies between the phonemic voicing specification of a speech sound and its phonetic realisation in connected speech". Mobius aims to "…identify and quantify the segmental, prosodic and positional factors that have an influence on consonant voicing" (Mobius 2004: 5-6).

Mobius (2004: 11) argues that in the phonemically voiced stops of German a voicing probability of 100% is never reached, not even at the beginning of the closure phase. He also points out that there is an overall devoicing effect on phonemically voiced stops. This depends on the nature of the adjacent segment to the left: when that segment is a sonorant the voicing probability is higher than when it is a voiceless stop. Mobius (2004: 13, 15) notes that the phonemically voiced fricatives /z/ and /ʒ/ are similar to the German voiced stops in that the voicing probability never reaches 100%. He argues that the type of context affects the voicing probability in fricatives in the same way as it does in stops. Laryngeal specifications in fricatives are discussed in detail in 2.3.2.4.

Textbooks on English phonetics and phonology show that the situation in English is very similar to that of German. For example, Roach (1983: 28) points out that /b, d, g/ in English are sometimes fully voiced, sometimes partly voiced and sometimes voiceless. Roach (1983: 30-31) reveals that voicing usually starts just before the release phase of obstruents and is almost absent in the hold phase of initial stops. Collins & Mees (1996: 132) argue that English stops are subject to initial devoicing. This means that voicing does not begin until the hold stage of the stop as in [b̥]*uy,* [g̊]*ear,* [d̥]*ea*[d̥]. Roach (1983: 31) claims that fully voiced stops sound unnatural to an English ear. He argues that final stops normally have very little voicing, and if there is voicing it will occur at the beginning of the hold phase. Collins & Mees (1996: 132) argue that English final stops undergo final devoicing in the hold and release stages or may be entirely voiceless as in *kno*[b̥], *hu*[g̊], and again [d̥]*ea*[d̥].

Collins & Mees (1996: 50) point out that when the plosive is surrounded by voiced sounds it is fully voiced in, e.g., *sa*[g]*ing, ma*[d]*er.* Roach (1983: 38), Collins & Mees (1996: 121) and O'Connor (1973: 139) argue that English fricatives behave in the same way as the English stops and the German obstruents discussed above. There is normally little or no voicing in initial or final position, e.g., [v̥]*ery*, *lea*[v̥], [z̥]*eal, bu*[z̥], [ð̥]*ere,* but medial fricatives may be voiced when they occur in between voiced sounds, e.g., *ne*[v]*er, la*[z]*y, nei*[ð]*er.*

Presence and absence of aspiration constitutes the main difference between the voiceless stops of languages like English and German and languages like Polish and French respectively. Roach (1983: 30) defines aspiration as an 'audible plosion', a 'burst of noise'. In the post-release phase of the stop there is a period in which air escapes through the vocal cords, which are wide-open for this purpose, and that this produces a sound like /h/. After this period of voicelessness the vocal cords come together and voicing begins. Aspiration fails when the voiceless stops are preceded by /s/ or followed by a liquid, this is discussed more elaborately in section 2.3.2.3.

Presence of aspiration depends on word-position and stress (I&S 1995: 376). Roach (1983: 31) argues that the plosion following the release of stops is very weak and often not audible in final position. O'Connor (1973: 132) points out that /t/ in *site* has minimal aspiration. I&S (1995: 376) indicate that Kingston & Diehl (1994: 431) observe that the glottal opening necessary to produce aspiration is smaller intervocalically than initially. In addition, it is smaller before unstressed than before stressed vowels and this smaller opening leads to shorter voicing lags. This, then, accounts for the occurrence of less aspiration. I&S (1995: 379) indicate that occurrence and strength of aspiration is also stress-dependent in other Germanic languages like German and Danish. When there is main stress there is heavy aspiration, when there is reduced stress there is light aspiration and when there is weak stress there is (nearly) zero aspiration.

Therefore, phonetically, /pV, tV, kV/ are [p^hV, t^hV, k^hV] phonetically in German, as in (2) (data from Biedrzycki (1974: 39)):

(2) /paːr/ [p^haːr] <Paar> 'couple'
/taːl/ [t^haːl] <Tal> 'valley'
/kuːr/ [k^huːr] <Kur> 'cure'

However, in Polish and French there is no aspiration in any position.[2] This is shown in (3) (Biedrzycki 1974: 40) where initial, final and medial examples are given for Polish /p/, an initial example for Polish /t/ and /c/, and the same example for initial and medial /k/.

(3) *Polish voiceless stops*

Initial stops		*Medial stops*	*Final stops*
[**p**ara] <para>	'pair'	[wa**p**a] <łapa> 'paw'	[la**p**] <łap> 'catch'
[**t**ata] <tata>	'dad'		
[**c**inɔ] <kino>	'cinema'		
[**k**alka] <kalka>	'crib'	[kal**k**a] <kalka> 'crib'	

Biedrzycki (1974: 45-417) argues that Polish phonetically unaspirated phonemic voiceless stops compare to French voiceless stops in, e.g., [**t**ɛː**t**] <tête> 'head', [**c**i] <qui> 'who' and [**k**ɔ̃m] <comme> 'how'. Acoustic measurement of Polish voiced and voiceless stops in post-pausal initial position (cf. Keating et. al. 1981) shows that VOT distributions for voiceless stops show a normal distribution in the short-lag region. A small percentage of the voiceless stops only show a long-lag which, according to Keating (1984), is due to the fact that they are followed by a high vowel.[3] The VOT values for voiceless stops are mostly between 0 and 35 msec. Biedrzycki (1974: 40) argues that Polish phonemically voiceless stops before a stressed vowel are similar to German phonemically voiced stops. These, as shown above, have voiceless allophones in voiceless environments and after pauses. He argues that it can be assumed that, phonetically, [b̥, d̥, g̊] are in principle nothing but weak unaspirated [p, t, k].[4]

The phonemic contrast in Polish and French seems to be simple. There is a clear contrast between voiced obstruents, which are always voiced, and voiceless ones, which are always voiceless unaspirated. Keating (1984: 301) concludes from her

[2] Although Biedrzycki (1974: 40) notes that aspiration is not entirely absent in Polish. /c/ shows the strongest tendency towards being aspirated. In addition, 'local aspiration' can occur between voiceless stops with different places of articulation, e.g. [p^{h}tak] <ptak> 'bird', [k^{h}tɔ] <kto> 'that, which, who'. However, Patrick Honeybone (p.c.) points out that this may not be aspiration but just release.

[3] Keating (1984: 301) points out that "(High vowels generally cause higher VOT values, because pressure in the oral cavity behind the constriction is vented more slowly)".

[4] The exact original quote is "Im phonetischen Sinne kann man dagegen annehmen, daß [b̥, d̥, g̊] im Prinzip nichts anderes ist als swaches unbehauchtes [p, t, k]" (Biedrzycki 1974: 40).

acoustic measurement data that Polish initial and medial stops are closely similar. [+voice] stops have voicing during closure sometimes through the burst. However, in [-voice] stops voicing always begins after the burst. In initial and medial position the voicing contrast in Polish is an extremely straightforward one of /b, d, g/ and /p, t, k/. The opposition in Polish can be illustrated with following minimal pairs (Biedrzycki 1974: 44, 47). The situation in French is closely similar.

(4) *The voicing opposition in Polish obstruents*

a. *initial obstruents*

/**p**ari/ ~	/**b**ari/	<pary>	'split pair'	~	<bary>	'strong shoulders'
/**t**ari/ ~	/**d**ari/	<tary>	'tare'	~	<dary>	'gifts'
/**k**ura/~	/**g**ura/	<kura>	'hen'	~	<góra>	'upstairs'
/**š**al/ ~	/**ž**al/	<szal>	'shawl'	~	<żal>	'sorrow'

b. *medial obstruents*

/bɔ**c**i/ ~	/bɔ**ɟ**i/	<boki>	'side'	~	<bogi>	'gods'
/kɔ**s**a/~	/kɔ**z**a/	<kosa>	'scythe'	~	<koza>	'goat (fem)'

Mobius (2004: 19) argues that Mandarin Chinese stops are phonemically voiceless and have a contrast defined in terms of aspiration. He argues voicing is more likely in unaspirated sounds than in aspirated ones. He claims that this is "…consistent with the observation that in aspirated stops, vocal fold abduction is required to build up pressure in preparation of the aspiration phase after stop release, thereby effectively preventing vocal fold vibration during the closure phase". Mobius (2004: 20) argues the same with respect to German. He finds that Mandarin [p, t, k], which are phonemically voiceless and unaspirated, and German [b, d, g], phonemically voiced and unaspirated show very similar patterns in their voicing profiles. English voiced and voiceless stops exhibit the same characteristics. According to Keating (1984: 287-288), the difference between /p, t, k/ and /b, d, g/ is generally unclear. Roach (1983: 30) argues that English unaspirated voiceless stops are perceived as members of the /b, d, g/ class, e.g., /p/ in *spit* is perceived as [b̥]. He argues that only voiceless aspirated plosives are heard as members of the /p, t, k/ class.

2.2.2 Laryngeal assimilation

Interestingly, the laryngeal distinction between languages like Polish and French and those like German and English also exhibits itself in laryngeal assimilation facts. Languages like French and Polish display symmetric laryngeal assimilation. There is extensive assimilation of voiceless obstruents to voiced ones, and from voiced obstruents to voiceless ones. Biedrzycki (1974: 83) points out that obstruent clusters in Polish must have the same laryngeal values, e.g., /st/ and /zd/ are possible but */zt/ and */sd/ are ungrammatical. The last obstruent in the cluster determines the voicing value of the whole cluster.[5] Biedrzycki (1974: 73) shows that assimilation to voiced obstruents takes place in a voiceless-voiced obstruent cluster, e.g., /x/ > /ɣ/: /bɔxdan/ > [bɔɣdan] <Bohdan> 'Place Name'. Conversely, assimilation to voiceless obstruents takes place in voiced ~ voiceless obstruent clusters, e.g., [bapka] <babka> 'great aunt', [ftɔrɛk] <wtorek> 'Tuesday'.[6] In addition, Polish liquids and nasals devoice when they are preceded by a voiceless obstruent, e.g., /mɛtr/ > [mɛt̥r] <metr> 'metre'.

Armstrong (1932: 182) and Passy (1913: 93) point out that French laryngeal assimilation is also bi-directional. In both cases assimilation is regressive.[7] Assimilation to voiceless obstruents, which takes place in voiced ~ voiceless obstruent clusters, is generally only partial, e.g., *la têt**e** **d**roite* [tɛtdʁwat] 'the right head', but in quick speech it is often complete. Armstrong (1932: 184) gives the example *chemin **d**e **f**er* 'railway' with medial [d̥f]. He argues that in a fixed expression like the one above, devoicing is often complete, so that /df/ is realised as [tf]. However, when expressions are used less commonly, devoicing is often only partial, e.g., *une fameu**s**e **s**cène* 'a famous scene' with [z̥s]. Passy (1913: 93) argues that the difference between partial and total assimilation lies in whether the assimilation takes place between morphemes or inter-morphemically. In the former case assimilation is never complete, e.g., *je viens **d**e **s**aluer* 'I have just greeted' with

---

[5] Biedrzycki (1974: 83-84) points out that groups with <w> or <rz> are exceptions to this rule in that the first consonant determines the voice quality of the whole cluster. He claims that, historically, this is an example of progressive assimilation which is no longer active in Polish. It is comparatively rare and only occurs in fossilised forms, e.g. <świat> 'world', with /v/ suggested by the spelling, is actually /ɕfjat/, and <krzak> 'bush', with suggested /z/ is /ksak/. /v/ and /z/ only occur after voiced consonants.

[6] Biedrzycki (1974: 87) points out that in the Warsaw dialect devoicing occurs before the ending of the first person plural of the imperative *-my* /-mɨ/. He argues that in this case the last consonant of the stem behaves as if it were word-final, e.g. /b/ in *zróbmy to* '?' [zrupmɨ tɔ] behaves as if it stands before a word-boundary as in *zrób mi to* '?' [zrupm mi tɔ].

[7] However, Passy (1913: 93) notes that assimilation can also be progressive in the /ʃv/ group, e.g. *le cheval* [ləʃ̬val] 'the horse'.

[d̥s] is distinguished from *je viens **t**e **s**aluer* ‘I am going to great you’. Inter-morphemically assimilation is complete, e.g., *observer* [ɔpsɛʁve] ‘observe’. As in Polish, Passy (1913: 93) points out that progressive assimilation to voicelessness takes place in French when the second consonant in a cluster is a liquid or one of the semi-vowels /ɥ,w,j/, e.g., *pied* [pje̯] ‘foot’.

Laryngeal assimilation in English differs from that in French and Polish. Roach (1983: 106) argues that laryngeal assimilation is rare. It only occurs regressively across word-boundaries, and is of only one type. In voiced ~ voiceless obstruent clusters the voiced obstruent assimilates to the voiceless one, e.g., underlying /d/ in *he collecte*[**t**] ***s**tamps, use*[**t**] ***t**o*, and underlying /v/ in *ha*[**f**] ***t**o* (Collins & Mees 1996: 179). Collins and Mees (1996: 179) also give some examples of word-internal assimilations to voicelessness, e.g., underlying /z/ in *new*[sp]*aper,* and underlying /b/ in *a*[ps]*urd, a*[ps]*orb*. They claim that, in these clusters, voiced and voiceless first consonants are generally used in free variation. Collins & Mees (1996: 179) and Roach (1983: 106) note that assimilation from a voiceless to a voiced obstruent, found in French and Polish, never occurs in English. Roach (1983: 106) and Jones (1956: 228) point at mistakes made by French learners of English who pronounce *black dog* as *bla*[gd]*og* instead of *bla*[kd̥]*og* and devoice sequences that should not be devoiced. Jones notes that speakers of French and Dutch, a language with a similar laryngeal phonology and assimilation pattern to Polish and French, tend to always assimilate the first consonant of a sequence to the second with respect to voice.

Roach (1983: 107) and Jones (1956: 225) discuss another case of inter-morphemic assimilation in English. This involves the progressive assimilation of the suffixes -/s/ and -/z/ of the plural, the possessive and the third person singular. They both see this phenomenon as a case of assimilation to ‘voicedness’. They argue that the underlying suffix is -/s/, and that this surfaces as [s] when a voiceless consonant precedes and as [z] when a voiced one does, e.g., *cat*[s], *dog*[z], *jump*[s], *run*[z], *Pat’*[s], *Pam’*[z]. However, for example, I&S (1999) argue that the underlying suffix is -/z/, in which case this is yet another instance of assimilation to voicelessness. The historical background of this phenomenon is discussed in section 3.3.1 and 4.2.1, where it is shown that there is indeed a strong case for underlying /z/. This also goes for the past-tense suffix /d/, which assimilates to the laryngeal value of the preceding stem consonant as well, e.g., *laugh*[t] and *calm*[d].

The last assimilation type pointed out by Roach (1983: 43) and Jones (1956: 220), similar to Polish and French, involves devoicing of nasals and liquids by preceding voiceless consonants, e.g., *play* [pl̥eɪ]. Roach argues that failing aspiration in this context is responsible for this phenomenon in English. He argues that *tray* would be perceived as *dray* by English speakers without sonorant devoicing. I&S (1995) are of the same opinion which is discussed in more detail in section 2.3.2. Therefore, assimilation in English seems to be asymmetric in favour of voicelessness as opposed to symmetric assimilation in languages like French and Polish.

In summary, section 2.2 has made it clear that surface and assimilation facts indicate that two types of languages exist with regard to laryngeal phonology: (i) languages like Polish and French in which traditional voiced obstruents surface as fully voiced in all positions, when the final neutralisation process in Polish is disregarded, and voiceless obstruents surface as simple voiceless unaspirated segments. Extensive bi-directional laryngeal assimilation takes place in these languages. (ii) languages like English and German in which the traditional 'voiced' series surface as voiceless except in inter-sonorant position, and the 'voiceless' series are aspirated in pre-stress initial position. Laryngeal assimilation is rare in these languages and seems to be asymmetrical in favour of voicelessness.

2.3 Laryngeal specifications and implementation: phonetics or phonology?

2.3.1 The traditional approach

2.3.1.1 Identical phonological features: a phonetic explanation

Keating (1984: 288) argues that it is hard to formulate a theoretical framework which can deal with the cross-linguistic implementation discrepancies described above. Keating (1984: 290-291) proposes a model based on binary phonological features which are phonetically implemented as three categories: (i) {voiced}, meaning 'fully voiced', (ii) {vl unasp}, meaning 'voiceless unaspirated', and (iii) {vl asp}, meaning 'voiceless aspirated'. This is a set of fixed universally specified categories. Keating (1984: 290) argues that these categories "…correspond directly to the standard division of the VOT continuum into lead, short-lag, and long-lag values for stops in initial position. However, they should be viewed as more abstract categories which include a number of acoustic correlates and articulatory mechanisms". In Keating's

model there is a clear distinction between phonological and phonetic representations. The phonological feature [voice], whether taken as a binary or unary feature, refers

> "…only to the classificatory value and its values, while {voiced}, {vl unasp} and {vl asp} refer to the major phonetic categories…these categories will be further realized as articulatory and acoustic parameters represented continuously in time. To some extent, these mappings will be part of the definition of the phonetic categories, and therefore universal…" (Keating 1984: 290).

Crucially, Keating (1984: 291) argues that, for example, both English and Polish phonologically contrast [+voice] and [-voice] stops as in (5).[8]

(5) *The laryngeal contrast in, e.g., English and Polish, in a traditional binary framework*

/p, t, k/ : /b, d, g/

[-voice] : [+voice]

The difference between the two types of languages lies in the phonetic categories which implement the phonological contrast on the surface. For example, Polish [+voice] stops are always {voiced} and English ones are sometimes {vl unasp}. Keating (1984: 291) notes that "…the framework allows us to say that the stops of the languages are always the same phonologically, though they may differ phonetically". Therefore, stops are phonologically largely the same cross-linguistically. This viewpoint can be seen as the 'traditional' approach to phonological laryngeal contrasts. Honeybone (2005a: 327) calls it 'tradition (i)' and points out that this view has many proponents e.g., Lombardi (1991, 1995a, 1995b), Hall (2001) who calls this theory the "broad interpretation of the feature [voice]" (2001: 32) and points out that explicit argumentation for this view goes back to Lisker & Abramson (1964). Honeybone (2005a: 328) indicates that most standard descriptions of languages also adopt this view, e.g., Booij (1995) for Dutch, Wiese (1996) for German and Hammond (1999) for English. As seen above, Biedrzycki (1974) adopts this tradition for Polish. Mobius (2004), Roach (1983), Collins & Mees (1996) and O'Connor (1973) take this position for German and English. Honeybone claims that this view can be seen as the 'unmarked', or 'standard' position.

[8] Language specific place of articulation details are disregarded here and the stops are exemplified according to the three cardinal places of articulation.

Keating (1984: 308) argues that, when applied to data, the system recognises three levels of complexity between languages. Languages like Polish and French are least complex. [+voice] is always {voiced} and [-voice] is always {vl unasp}. Languages like English, for speakers who pre-voice obstruents, and German are more complex. In the former [+voice] is {voiced} and [-voice] is either {vl unasp} or {vl asp}, and in the latter [+voice] varies between {voiced} and {vl unasp}, [-voice] is {vl asp}. English without pre-voicing is the most complex system. The phonological [+/-voice] contrast is implemented as {voiced} versus {vl unasp} in certain contexts, and as {vl unasp} versus {vl asp} in others. Keating claims that, whichever pair is chosen, more voiced stops imply [+voice], and the less voiced ones imply [-voice].

Lombardi (1995b: 42-46) also supports a phonological framework which does not incorporate phonetic detail. She argues that a phonological feature system should be able to represent all, and exclusively the phonological contrasts that are found in the world's languages. It should also group sounds into natural classes which are active in phonological rules. The ability to distinguish the different realisations of phonemes in different languages is part of the phonetic system of a language. Such a system will contain properties of sounds that are never used distinctively but will also have to include properties that may be used distinctively in certain languages but not in the language described. Lombardi (1995b: 43) argues that a theory of phonology is not interested in phonetic detail and therefore does not describe any typological differences between languages. For example, implosion can be a characteristic of [+voice] stops in certain languages. Since implosion is never contrastive in, e.g., French, there is no reason to mark voiced plosives for anything other than [+voice]. Therefore, Lombardi (1995b: 43) argues that "A phonetic description of French would describe the difference between the pronunciation of English and French voiced stops, but a phonological description should not".

According to Keating (1984: 292-294), there are three supporting arguments for a phonetics-free phonology. The first of these is vowel duration before word-final voiced and voiceless stops in certain languages. According to Keating, this generalisation would fail if phonetic features were incorporated into the phonology because some languages have lax (or 'lenis') versus tense (or 'fortis') stops and others have voiced versus voiceless ones. This is described in detail in 2.3.2. Keating argues that this generalisation can be captured by stating that vowels are longer before phonologically [+voice] stops. Vowels are not longer before phonetically more voiced

stops. Secondly, Keating (1984: 294) argues that cluster voicing assimilation, discussed in 2.2.2 is a common phonological rule "…which appears to apply generally across phonetic categories". She points out that Polish has regressive voicing assimilation, and a phonetic laryngeal contrast of {voiced} vs. {vl unasp}, whereas Danish, which has the same surface implementations as English and German, has progressive laryngeal assimilation but an aspiration contrast in initial position. Thirdly, Keating maintains that evidence on fundamental frequency after the release of a stop indicates that phonological laryngeal values are more important than phonetic voicing in determining pitch patterns. Keating (1984: 294) argues that therefore "…the distinction between phonological and phonetic features appears not only plausible but necessary, if rules such as those discussed above are to be properly defined across languages".

However, Keating's first argument for a strict distinction between phonetics and phonology can be argued to be weak. Even if it is true that in, for example, both English and French vowels tend to be longer before '[+voice]' stops and shorter before '[-voice]' stops there is a difference in significance of vowel length in both languages. In English vowels are actively shortened before voiceless consonants whereas vowel length remains constant before voiced consonants (cf Collins & Mees 1996: 46). This is important for retaining the contrast between voiced and voiceless consonants finally since both are (nearly) voiceless and (nearly) unaspirated in this position.

In French vowel length does not have that function. Voiced and voiceless final consonants are distinguished by their voicing quality and not so much by the length of the preceding vowel. Tranel (1987: 49) points out that there are specific cases of vowel lengthening in French, most generally lengthening before a voiced consonant.[9] He does not mention any cases of active vowel shortening before voiceless consonants. This distinction calls up the question whether incorporation of certain traditionally phonetic characteristics into phonology may be necessary in these languages. Moreover, as for the second reason given by Keating, it is shown in 2.3.2.3 that cross-linguistically different assimilation facts are actually evidence for the incorporation of traditionally phonetic features into the phonology.

[9]Although Tranel (1987: 49) points out that the vowels [ɑː, øː, oː] can lengthen without the presence of a voiced consonant.

2.3.1.2 Privative [voice]

As pointed out above, Lombardi (1995a) is one of the proponents of tradition (i). However, in contrast to Keating she proposes a privative contrast in line with most recent work on the subject. In this privative framework, voiced obstruents are specified for [voice], in languages like both English and Polish, whereas voiceless obstruents remain unspecified in both types of languages. This is exemplified in (6)

(6) *The laryngeal contrast in, e.g., English and Polish in a traditional privative framework*

/p, t, k/	:	/b, d, g/
/f, s, x/	:	/v, z, ɣ/
non-spec		[voice]

Lombardi argues that only a theory which incorporates privative features can account for cross-linguistically common laryngeal neutralisation facts. Processes like these comprise the loss of all laryngeal contrasts in syllable final position. Lombardi (1995a: 35) claims that this phenomenon is best analysed as delinking of the laryngeal node, which results in laryngeally unspecified segments. Lombardi (1995a: 38) argues that in languages with various systems of laryngeal contrasts, neutralisation always results in a voiceless unglottalised and unaspirated sound. She claims that this, and the fact that all languages have voiceless unaspirated plosives, is evidence that this type of obstruent is the universally most unmarked type of obstruent. This is returned to in 4.3 and 5.2.

Lombardi argues that laryngeal features neutralise as a group and should therefore be grouped together under a single node. This can then be manipulated as a whole. In addition, if neutralisation were a rule which specified the output feature values, like [+voice] → [-voice], any value of any laryngeal feature could be the output, whereas it is always a plain voiceless stop. Lombardi (1995a: 39) points out that only the delinking analysis combined with privative features makes the correct prediction.[10] Lombardi (1995a: 40) argues that

[10] Lombardi (1995a: 40) points out that the alternative for a privative approach is an analysis of underspecification via delinking with later addition of [-voice]. However, this predicts that [-voice] is active in phonological derivations which, she argues, is not the case. In addition, underspecification is not restrictive enough "it does not require that the surface voiceless obstruent be the underlyingly underspecified one".

> "If the features are privative, the negative values of these features are not present because they are non-existent, and this explains both types of markedness facts, in consonant systems and in phonological rules. In consonant systems, voiceless obstruents are the most common cross-linguistically. This makes sense with privative features and some notion of economy in representations, but would be unexpected with underspecification and binary Laryngeal features. And in phonological rules, neutralisation can only be given an explanatory analysis if the features are privative: Only privative features can explain why neutralization always results in plain voiced obstruents".

Lombardi (1995a: 56) argues that her analysis makes the correct groupings of segments for phonological rules, which in her view is a requirement for a good phonological system. She claims that this in particular is evidence for the privativity of phonological features.

Lombardi (1995a: 40-42) discusses Polish laryngeal assimilation, which challenges a privative [voice] analysis. As described in 2.2.2, the laryngeal value of a cluster depends on that of the final consonant. She points out that this process is usually described as the spreading of [+voice] in a case like *pro*[s]*ic* 'request (V)' → *pro*[zb]*a* 'request (N)'. Spreading of [-voice] is held responsible for assimilation to voicelessness as in za[b]*a* → *za*[pk]*a* 'small frog'. Lombardi argues that a theory using privative [voice] can account for these processes as a combination of two independently motivated phonological processes: (i) neutralisation (delinking) and (ii) spreading. In the case of *pro*[zb]*a* neutralisation does not apply because /s/ is not underlyingly unspecified laryngeally. The following /b/ spreads its [voice] specification to the unspecified /s/. In *za*[pk]*a* underlying /b/ is syllable final and undergoes general Polish final neutralisation. Spreading does not apply even if [p] is unmarked because /k/ has no specification to spread.[11]

Mester & Itô (M&I) (1989) also make a case for privativity in relation to underspecification. M&I (1989: 277) argue that 'Japanese Compound Voicing' can best be explained by a privative underspecification theory: "A theory of voicing as a privative…feature presents a principled solution and reconciles this case and others like it with Restricted Underspecification".[12] In Japanese 'Rendaku' the initial

[11] Lombardi (1995b: 42) argues that neutralisation is in fact due to the *Laryngeal Constraint*, which says that "…a laryngeal node is only licensed in a consonant if it immediately precedes a [+son] segment in the same syllable". This is consistent with the idea of prosodic licensing, which requires that every phonological unit belongs to some higher unit in the prosodic hierarchy. If no tautosyllabic sonorant consonant follows the 'repair mechanism' of delinking is applied.

[12] M&I (1989: 263) point out that there is a difference between Radical Underspecification and Restricted Underspecification: the first dictates that all predictable features, both redundant and

segment of the second member of a compound is voiced unless there is a voiced obstruent in the same morpheme. In that case voicing is blocked. This is referred to as Lyman's Law. M&I (1989: 277-278) approach Rendaku as "…an autosegmental morpheme consisting of the voicing feature, which is associated to the second compound member…". Lyman's Law deletes the voicing of Rendaku when the specification [+voice] already occurs in the root. M&I's approach crucially relies on the underlying absence of all predictable values of voicing, including the redundant [+voice] for sonorants and the unmarked [-voice] for obstruents. This is a problem for Restricted Underspecification.

However, M&I (1989: 278) point out that [-voice] does not exist in a privative framework and can therefore not exist in representations and create opacity. The same goes for the default [+voice] for sonorants. Therefore, a privative approach can be combined with Restricted Underspecification. Voicelessness carries no mark, not because it is the unmarked value but because the value does not exist. M&I (1989: 80) point out that "…universally privative voicing means that voicelessness will remain phonologically inert and can play no active role in the phonology" and this is "…a good step towards narrowing down the class of possible rules".

2.3.1.3 Problems for privative [voice]

In spite of the advantages, Lombardi's privative framework also encounters a number of serious problems. One of these is pointed out by Jessen (2004) in relation to Lombardi's (1995b) discussion of German syllable-final laryngeal neutralisation. Lombardi argues that underlyingly voiced consonants remain voiced when they are syllable initial, e.g., in the context of a vowel-initial morpheme as in *run*[d]*e* 'round pl.'. However, they become voiceless when they are syllable-final, either word-final as in *run*[t] or when a voiced or voiceless consonant-initial morphemeF is added as in *Run*[tb]*au* 'rotunda' or *Run*[ts]*äule* 'cylinder'. According to Lombardi, this follows from a Laryngeal Constraint which forbids laryngeal specifications when an obstruent is not followed by a [+son] segment in the same syllable. In the latter case, the violation of the Laryngeal Constraint will be repaired by delinking the laryngeal

---

unmarked are left unspecified. This results in minimisation of the specification in the underlying structure. Restricted Underspecification requires that only redundant features are underspecified, thereby positing a fundamental phonological distinction between features which function contrastively and those which do not.

specification [voice]. This, importantly, shows that Lombardi claims that German has a Ø/[voice] laryngeal contrast, otherwise neutralisation could not be delinking of [voice].

Jessen (2004: 27) does not agree with this analysis of German and bases this on the observation, partly already outlined in 2.2.1, that German 'voiced' plosives are often voiceless in initial and post-voiceless position. Jessen adds that experimental literature shows that this can even be the case in inter-sonorant position. He claims that there are two inter-sonorant contexts: (i) word-medial position and (ii) word-initial intervocalic position. Jessen points out that studies investigating the production of voicing in intervocalic stops in German show that the assumption that /b, d, g/ are always voiced there is false. Therefore, he claims that the presence versus absence of voicing has no influence on the perception of the laryngeal contrast whatsoever. Jessen (2004: 28) argues that if German distinguished voiced and voiceless segments speakers would be expected to make a greater effort to voice /b, d, g/ in these positions. Jessen (2004: 33-36) points out that experimental evidence shows that the perceptual importance of voicing in German is low and vulnerable to quality constraints and individual listener strategies. This makes it unlikely that voicing is used distinctively in the language.

Jessen points out that this is a major problem for the [voice] analysis proposed by Lombardi: if the feature [voice] is the only specified feature in the laryngeal phonology of German, it is expected to be the only significant feature in perceptual distinctions as there is no other distinctive feature. Evidence that [voice] is not important in perceptual distinctions seems to indicate that [voice] is inactive, i.e. not specified. Jessen (2004: 38) argues that if the laryngeal contrast in German was indeed encoded as Ø/[voice], the listener would always have to be prepared to switch to phonetic cues other than voicing in trying to identify the segments, e.g., vowel-length and closure length or top-down processing. In addition, Jessen (2004: 39) points out that experiments suggest that voicing in /b, d, g/ is not produced actively by gestural effort but that it occurs automatically when the right aerodynamic-physiological conditions apply, this so-called 'passive voicing' is turned to in more detail in 2.3.2.6.

Jessen's (1998) experiment tests the perceptual contribution of aspiration in German. He shows that removal of aspiration leads to /t/ being perceived as /d/, whereas removal of voice does not lead to perception of /d/ as /t/ with the same

frequency. This is very much in line with the observations made by Biedrzycki outlined in 2.2.1. He argues that all this evidence leads to the conclusion that in production and perception the /p, t, k/ – /b, d, g/ distinction is more reliably based on aspiration versus no aspiration than on 'voicedness' versus voicelessness. This interesting idea and its possible formalisation is explored further in 2.3.2 below.

Roach (1983: 31) and O'Connor (1973: 129) argue a similar case for English. They argue that if voicing is at all present, then it has hardly any perceptual importance in English. Ladefoged (1982: 47-48) also points out that the distinction between the minimal pairs in (7) does not lie in the ones in (7a,b) being voiceless and the ones in (7c) being voiced. He argues that the real difference is that the stops in (7a) are voiceless aspirated, whereas those in (7c) are (partially voiced) unaspirated stops. In spite of their misleading spelling, the stops in (7b) are more like those in (7c) than those in (7a).

(7)	a.	b.	c.
	pie	s**p**y	**b**uy
	na**p**		na**b**
	tie	s**t**y	**d**ie
	kye	s**k**y	**g**uy
	kna**ck**		na**g**
	ma**t**		ma**d**

Ladefoged (1982: 48) points out the well-known fact that there is no opposition in English between words beginning with /sp/ or /sb/, /st/ or /sd/ and /sk/ or /sg/. In the word-final cases, aspiration is not the most significant aspect in the distinction, as aspiration is weak or absent in final position, but neither is it one of voicing. The final stops in (7a) are definitely voiceless, and those in (7c) are also partially voiceless. The distinction between them is determined by the length of the preceding vowel, also discussed in relation to binary [voice] in 2.3.1.1; the vowels in (7a) are shorter that those in (7c).

I&S (1999) outline a further problem for a privative [voice] approach to laryngeal contrasts. They argue that such a framework cannot deal with certain English assimilation phenomena. Most of these were introduced in 2.2.2. I&S (1999: 142) argue that tautosyllabic monodirectional assimilation in input clusters of the form /k+d/ > [kt], e.g., *walked*, or /t+z/ > [ts], e.g., *cats* is one of these cases. They point

out that assimilation takes place under the condition that "….a voiceless segment must immediately precede the one that devoices, the rule or constraint responsible will have to be able to refer to the phonological property characterising voicelessness". The phenomenon can then be described as the rightward extension of this phonological property from the voiceless stop into the voiced one. I&S (1999: 142) argue that this phenomenon cannot be described in a [voice] analysis because devoicing would be a loss of the [voice] specification and the absence of a feature cannot be referred to in a privative framework.[13] Moreover, the fact that assimilation in English is exclusively to voicelessness cannot be accounted for by a [voice] analysis because it is impossible to formulate a reason why [voice] assimilation is entirely absent from a system which incorporates the feature [voice].

Wetzels & Mascaró (W&M) (2001) also argue that privative [voice] is insufficient. In the context of cross-linguistic voicing assimilation and devoicing, they argue that privative [voice] theories make wrong predictions and cannot account for certain existing systems. W&M (2001: 226) argue that if [voice] were a privative feature, it would be expected that there is no language in which [-voice] is specified or takes part in any phonological processes. However, they claim that languages exist in which [-voice] seems to spread both lexically and post-lexically.

W&M (2001: 227) argue that Yorkshire English exhibits post-lexical assimilation to voicelessness, whereas [voice] does not spread, as shown in (8):

[13] I&S point out that many have argued that "…the apparent assimilation must be attributed to the general limitation on the implementation of syllable structure". They quote Robert Harms who first described this notion: "within a syllable, once voicing ceases it may not begin again". However, I&S point out that it is unclear why the language has not solved this problem by different means such as deletion of either [t] or [z] or schwa epenthesis, many different solutions are possible for the above constraint. In addition, lexically limited but regular alternations such as *describe* > *description* show regressive assimilation to voicelessness: /b+t/ > [pt]. I&S (1999:142) point out that a unary [voice] analysis "…has no recourse to universals of syllabification here…". Therefore, "If [voice] is assumed to be the privative laryngeal feature for English with "universal" tautosyllabic devoicing invoked to accommodate words like *cats*, then it is difficult to see what might account for heterosyllabic assimilatory devoicing in that occurs in *description*…".

(8) *Yorkshire English assimilation to voicelessness*

bed-time	be[tt]ime	
frogspawn	fro[ks]pawn	
a big piece	a bi[kp]iece	
white book	whi[tb]ook	(*whi[db]ook)

Similarly, W&M (2001:227-228) argue that obligatory word-internal regressive devoicing in clusters occurs in Parisian French, whereas regressive voicing is only optional, as in (9a,b):

(9) a. *obligatory regressive devoicing*

distin[kt]if	<distinctif>	'distinctive'	(cp. distin[g]uer)
su[pt]ropical	<subtropical>	'subtropical'	(cp .su[b]alpin)

b. *optional regressive voicing*

ane[g/kd]ote	<anecdote>	'anecdote'
a[g/kd]uc	<aqueduct>	'aqueduct'

W&M argue that a binary [voice] value, in which [+voice] is marked and [-voice] is unmarked, could provide an adequate analysis for these data. They argue that the process in (8) must be due to spread of [-voice]. The cases in (9) are explained as the obligatory presence in the grammar of the unmarked [-voice] feature to the left. Regressive spread of marked [+voice] is optional.

W&M (2001: 231-235) argue that evidence for lexical spread of [-voice] is also presented by Dutch obstruent-final clusters and the past tense form of verbs. In Dutch there is a discrepancy in voice effects between stop-final and fricative-final clusters. Fricative-final clusters are all voiceless, which is due to regressive spread of [-voice], and stop-final clusters are voiced or voiceless depending on the voicing value of the last obstruent in the cluster. /d/ in the past tense suffix -/də/ is either voiced or voiceless depending on the voicing value of the preceding consonant. When the latter is voiceless, then it progressively spreads its [-voice] value to the following /d/, as in (10):

(10) *Infinitive*	*2/3 sg. pr. ind.*	*Imp sg/pl(n)*	*Past part.*	
ma/k/+en	maak[k+t]	maa[k+t]e(n)	ge+maa[k+t]e	‘make’
ha/l/+en	haal+[t]	haal+[d]e(n)	ge+haal[l+d]e	‘get’
bo/f/+en	bo[f+t]	bo[f+t]e(n)	ge+bo[f+t]e	‘be lucky’
be/v/+en	bee[f+t]	bee[v+d]e(n)	ge+bee[v+d]e	‘tremble’

However, I&S (2003b: 3) point out that a privative analysis has the advantage over a binary approach in that it adheres to the fundamental principles of science, namely parsimony and simplicity by virtue of merely incorporating the presence and not the absence of negative valued features. They present privative analyses of these phenomena in Dutch which are discussed in more detail in 2.3.2.6.

2.3.2 Incorporating phonetics into phonology: Laryngeal Realism

2.3.2.1 Early accounts of cross-linguistic insufficiency of [voice]

As pointed out in the previous section, Jessen (2004) argues that the surface facts of German suggest that certain languages maintain a contrast between aspirated and non-aspirated voiceless stops. This would mean that privative [voice] would have to be complemented with at least one other feature in order to account for aspiration. This fact is widely recognised and several features have been proposed, e.g., |spread| (Honeybone 2005a), [aspiration] (Lombardi (1991), ‘Glotal Width’ (Avery & Isardi 2001), discussed in more detail in 2.3.2.6, [tense] (Jessen 1998), **H** (Harris 1994), and ‘Wide Glottal Aperture’ (Browman & Goldstein 1989, 1992).

In fact, the view that voice and voicelessness are not necessarily the only important aspects in the production of obstruents but that another characteristic can play a part in their production too was already discussed by early phoneticians, at least as early as the 1870s. Therefore, calling the approach in 2.3.1 ‘traditional’ does not do justice to the fact that the certain aspects of the position described in this section are by no means recent. The position described in 2.3.1 is referred to as the ‘traditional’ approach because it is the most widely used framework concerning laryngeal oppositions. The view put forward in this section is that a relevant aspect in the laryngeal phonology of obstruents is the state of the glottis. This differs from the interpretation of early phoneticians, who ascribed the relevant aspect to a more general category of ‘force of articulation’.

Sweet (1877: 77) postulates that a certain compression of the breath behind the closure is present in the production of every stop. When the closure is released an audible 'explosion' occurs. Sweet argues that the force of the glide and, consequently, the audibility of the stop are mainly dependent on the force of this compression. This force is caused by upward pressure of the diaphragm. However, he does not give the force of release of the stop any contrastive importance in languages like English and German. He argues that the force of release is just a secondary aspect, which is caused by the compression with which the stop is formed. He argues that the release can be felt as an independent element in languages like Danish and Irish, where the release is realised as a "*separate* impulse". He argues that in these languages the release has something of the characteristics of the preceding stop, e.g. [k^h] becomes something like [kk^h]. However, as pointed out by Honeybone (2008b), "Sweet does not make much of the STRENGTH of consonants, nor does it discuss a *fortis* ~ *lenis* type opposition, using voiced ~ voiceless, instead".

A famous early reference to force of articulation comes from Winteler (1876: 21), e.g., Honeybone (2008b). Winteler argues that Zurich German lacks voiced obstruents and, therefore, a traditional voiced and voiceless contrast present in other languages and dialects. Instead, he argues, the contrast is determined by articulatory strength as well as duration. He argues that Zurich German contrasts 'weak' voiceless obstruents, which he calls 'lenis' from Latin 'soft', and strong voiceless obstruents, which he calls 'fortis' from Latin 'strong'. Honeybone (2008b) points out that although it is often assumed that Winteler coined these terms, this is not the case. They had been used before by, e.g. Rumpelt (1869). However, in Rumpelt's work they do not seem to have the same meaning as in Winteler's, i.e. as a distinct laryngeal category from voiced and voiceless. This can be seen from the fact that Rumpelt glosses fortis and lenis with the terms 'tenuis' and 'media', the terms classically used for the voiced ~ voiceless distinction. Honeybone argues that the discussions of the properties of fortis and lenis by Winteler and also Sievers, discussed directly below, are the 'locus classicus' of the terms because these discussions persuaded many linguists of their importance.

Sievers (1901: 69-73, 140) argues that strength in speech is largely only important for syllable and word-formation, although strength is characteristic for some speech sounds, e.g. the air-pressure is higher in voiceless sounds than in voiced sounds. He notes that with regard to the relative mass of the air-pressure voiced sounds can be

regarded as lenis, and voiceless sounds can be regarded as fortis. Therefore, like Sweet, Sievers equates articulatory strength with degrees of air-pressure. He does point out that lesser air-pressure in voiced sounds is largely due to the obstruction of the airstream by the vocal cords, so the state of the glottis does play a part in the fortis ~ lenis distinction as well. Duration also plays a part in the distinction in that fortis obstruents tend to have a longer hold phase than lenis ones, but the key distinction in the difference between fortis and lenis is that the former signifies greater air-pressure and the latter weaker air-pressure.

Like Sweet, Sievers argues that in languages which have a distinction between voiced and voiceless sounds, strength of articulation is only a secondary feature and should not be seen as the most important aspect of the distinction. However, he refers to Winteler's research on Zurich German, described above, to point out that in some languages the strength distinction is the only distinction that can be made. In this case, he argues, the terms fortis and lenis must be used when the factual distinction between the sounds must be characterised. Therefore, the view that a classification of cross-linguistic laryngeal contrasts in terms of voiced ~ voiceless only is not sufficient, as is argued in this thesis, has a tradition of its own and does go back a long way.

2.3.2.2 More recent phonological accounts

2.3.2.2.1 Formalisation of [+/- fortis]

Kohler (1984) also advocates the idea that another feature than just [voice] is needed in order to specify laryngeal contrast. He introduces a binary phonological feature [+/- fortis], in the tradition of the force of articulation accounts described above. He argues that the essential differentiating feature in laryngeal contrasts is a power feature realised in articulatory timing and/ or phonatory power or tension. Kohler (1984: 151) argues that he works along the lines of a necessary "…new functional approach to speech and language centring on phonetic structures and processes". Kohler (1984: 152) claims that the fact that laryngeal distinctions have been treated as "…as an atemporal distinction at a static point in a segment chain", e.g., by Keating (1984), is problematic. He argues that adding a level between phonological features and continuous physical implementation, e.g., Keating's phonetic categories, does not solve the problem of the translation (mapping) of "static and discrete elements" onto "dynamic and continuous processes". Instead, the time dimension should be integrated into the phonology. It could then unite various phonetic processes in

morphology, in synchronic variability, in sound change and in typological comparisons.

Kohler points out that the feature [+/-voice] is a constant source of confusion between phonetic and phonological 'voicing'. He wants to avoid this by characterising the laryngeal distinction as 'fortis ~ lenis', described directly above, unless there is actual glottal periodicity. The inadequacy of the traditional features and symbols is discussed in more detail in 2.4.2. He claims that [+/-fortis] is not an abstract feature because different degrees of articulatory power can provide its phonetic base. Kohler (1984: 152-153) argues that there is a two way distinction between /p, t, k/ and /b, d, g/ in that the former are auditorily more salient than the latter, and there is a higher intensity at certain points in the acoustic signal. In fricatives this manifests itself as more energy in frication noise. In stops the energy decay in the formation of the occlusion and the energy build up at the release are more abrupt.

Whereas, early the phoneticians described above focussed mainly on air-pressure with regard to strength of articulation, Kohler (1984: 154-155) points out that the greater power in fortis stops is also manifested in more extensive movements, greater peaks and greater average velocities of the articulators that produce the stricture. Fortis consonants display a quicker and more energetic occlusion and a slow release in non-initial position, and lenis obstruents display the opposite. Kohler (1984: 156) notes that the faster movement in the fortis closure leads to a larger contact area and a higher coarticulatory airflow during the closure. Kohler (1984: 160) claims that laryngeal tension has to be considered a further aspect of the fortis ~ lenis distinction. At the level of the glottis there are two ways of realising the fortis feature: (i) tensing, which according to Kohler happens in Korean and possibly in French, and (ii) a wide glottal opening with its maximum at the moment of release, which leads to a substantial increase in airflow. Therefore, Kohler (1984: 168) concludes that the [+/-fortis] feature is important. It is connected with power in the supra-glottal movements and in the airstream, and with tension, especially in the larynx. It may be associated with an articulatory timing-, which relates to the speed of the stricture formation and release, and a laryngeal power or tension component. The latter is manifested as aspiration, voicing and glottalisation and is language specific.

2.3.2.2.2 Dependency Phonology

One feature based model that was briefly mentioned in 1.3, Dependency Phonology (DP) (e.g., Anderson & Ewen 1987), approaches the question of cross linguistic laryngeal contrast in a very similar way to the one proposed in the remainder of this section. In short, Anderson (no date) points out that, like the model proposed in this thesis, DP focuses on assumptions concerning the representation of phonological phenomena. DP proposes a head/dependency relation in phonological constructions. Each construction has a head, which is either a single segment or a minimal unit. This head is characteristic of the construction. Linguistic objects can be represented on different levels where these different levels display distinct principles of organisation. Within DP it is assumed that there is a lexical level and an utterance level. As shown in 1.3, this is what is assumed in this thesis too. DP analyses minimal sequential units, or segments, into component properties. These are generally known as features or 'components'. Importantly, components are atomic and this means that they are single valued or 'privative'. The representation of minimal sequential units involves the combination of unary features in DP. In this chapter it is shown that the framework presented in this thesis also assumes privativity of features.

With regard to laryngeal features, Anderson & Ewen (1987: 185) assume a physically independent parameter of glottal stricture. They argue that there are three main types of languages for which the degree of opening of the vocal cords seems to be phonologically relevant. First of all, this aspect seems important in languages which display an opposition amongst more than two states of the glottis, e.g., Indonesian has a distinction between voiceless, 'lax' voice and 'tense' voice obstruents. Secondly, it appears to play a role in languages which have a phonological opposition between voiced and voiceless sonorants, e.g. Burmese, which has a distinction between voiced and voiceless laterals and nasals. Finally, and most importantly for the discussion in this thesis, Anderson & Ewen argue that the aspect of glottal opening is important in languages which do not distinguish voiced and voiceless obstruents, but have voiceless obstruents only which are distinguished by means of degree of aspiration.

Anderson & Ewen (1987: 146) propose that features governing voicing and those governing the degree of glottal opening should be assigned to two different sub-gestures within a categorial sub-gesture. They argue that [voice] is a feature of a phonatory sub-gesture and [glottal stricture] belongs to an initiatory sub-gesture. They

argue that this allows capturing the notion of phonological complexity in a natural way in that languages with a two-way opposition require a representation on one of the levels only. For example, languages with a voice ~ voiceless distinction require no representations in the initiatory sub-gesture, whereas languages which have a distinction between different degrees of aspiration require a representation on this level only. Anderson & Ewen (1987: 148) point out that the latter category of languages is represented by for example Icelandic and Korean, but, interestingly, that an analysis of this sort may also be postulated for languages such as English. In what follows in the next section, it is shown that English can indeed be analysed in a similar framework.

Anderson & Ewen (1987: 188) propose the dependency component |O| to account for glottal opening. They argue that this feature corresponds in a way to features like [spread glottis] and [constricted glottis] in that only the degree of glottal opening is characterised, and the state of the vocal cords is left out of account. Anderson & Ewen (1987: 195) argue that there are |O| languages, in other words, languages which use the |O| component distinctively in phonological oppositions as opposed to languages which do not do so. Under the assumptions of the framework presented in this section, languages can also be subdivided into groups with regard to the nature of their laryngeal specifications.

2.3.2.3 'Voice-' and 'aspiration' languages

A more recent phonological model is proposed by I&S (e.g., 1995, 1999, 2003, 2007 and 2008). I&S follow Kohler in "…ascribing the cluster of fortis properties to the basic articulation of most Germanic languages" (I&S 1995: 380). Specifically, the two-way laryngeal contrast among obstruents of most Germanic languages is encoded as a fortis, which I&S interpret to mean [spread glottis], versus lenis, which they interpret to mean [non-spread glottis], distinction. Therefore, unlike Sweet, Sievers and Kohler, they define the fortis ~ lenis distinction as directly correlating to the state of the glottis. Like them, the argue that thaere is more to laryngeal contrast than the 'voiceless' versus 'voiced' distinction, as advocated by tradition (i). I&S (1995: 380) point out that the familiar typological difference between languages like English and French "…is thus made fundamental, a part of the phonological representation itself".

Like Anderson & Ewen, I&S (1995, 1999) argue that languages can be subdivided into different types when it comes to laryngeal specifications. They argue for a

distinction between ‘aspiration languages’, such as English and German, and ‘voice languages’, such as Polish and French. Also like Anderson & Ewen, I&S (1999: 135) assume that the laryngeal opposition in aspiration languages is best captured by a privative feature, which they propose to be [spread glottis]. This marks the traditional ‘voiceless’ series. The ‘voiced’ series are therefore unmarked. In ‘voice languages’ the ‘voiced’ series are marked by a privative feature [voice] and the ‘voiceless’ series are unmarked. Together with a third privative feature [constricted glottis], these features serve to mark all known systems. When a language has no laryngeal contrast, like Hawaiian, it has no laryngeal feature specifications. When a system has a two way contrast, like English or Polish, one feature is specified, and systems which have a three way contrast, like Thai (cf. Maddieson 1984), require two or three specified features. Therefore, crucially, for I&S the difference between languages is encoded phonologically. A representation of the proposed laryngeal contrast in this approach is given in (11a,b):

(11) a. *Laryngeal contrast in ‘voice languages’*

/p, t, k/	:	/b, d, g/
non-spec	:	[voice]

b. *Laryngeal contrast in ‘aspiration languages’*

/b, d, g/	:	/p, t, k/
non-spec	:	[spread glottis]

Honeybone (2002, 2005a) supports this framework, which he calls tradition (ii) or Laryngeal Realism, and refers to the two types of languages as Type A, aspiration, and Type B, voice, languages. He points out that proponents of this view include Hall (2001), who traces this approach back to Jakobson (1949) and calls it the “narrow interpretation of the feature [voice]” (2001: 32), I&S (1995, 1999, 2003, 2007, 2008), Harris (1994), Jessen (1998), Avery & Isardi (2001) and Jessen & Ringen (2002). I&S (2007: 124) point out that Calabrese & Halle (1998) and Hinskens & v.d. Weijer (2003) apply the concept to language change. Kehrein & Golston (2004), discussed below, apply it to language typology, Brown (2004) to psycholinguistics and Kager et. al. (forthcoming) to language acquisition. Honeybone also points out that many ideas in this tradition are foreseen in Anderson & Ewen (1987), as outlined in

2.3.2.2.2. Honeybone (2002) follows the approach for the analysis of certain historical processes. More recently, the approach has been adopted by Beckman, Jessen and Ringen (2005), Beckman & Ringen (2005), Spaargaren & Honeybone (2006), I&S (2007) and Spaargaren (2008). Honeybone's terminology Laryngeal Realism (LR) will be adopted in this thesis.

I&S (2008: 3) point out that the main evidence for their approach emerges from the "…fundamental phonetic patterns of stops…", described in 2.2.1, and the different patterns of assimilation, described in 2.2.2. These patterns are discussed in detail for English in 2.4.1 below. Moreover, I&S (1995) argue that their account of laryngeal representation can unify a number of superficially unrelated phenomena in Germanic. Synchronically, LR provides an explanation of the link between aspiration and sonorant devoicing in English, briefly touched upon in 2.2.1. I&S (1995: 370) point out that, according to Kim (1970), aspiration is "…the automatic, aerodynamic result of a spread glottis configuration in the larynx…". Kim argues that following stop release, some time passes between the adduction of abducted vocal folds until enough adduction for phonation in the following vowel is achieved. During that time, there is no contact between the vocal folds. Air excites the trachea during the period of post release voicelessness and this is perceived as aspiration. Kim (1970: 111) argues that it can safely be assumed that "…aspiration is nothing but a function of the glottal opening at the time of the release", i.e., "if a stop is *n* degree aspirated, it must have an *n* degree glottal opening at the time of release" (I&S 1995: 370).

Kim points out that aspiration lacks in syllable initial clusters of voiceless obstruents in English, e.g., in *spit*, briefly pointed out in 2.2.1. He argues that this is due to the fact that two segments of an /sC/-cluster share a single [spread glottis] feature. When a largely constant duration for [spread glottis] is assumed, the absence of aspiration in /sC/-clusters is reduced to the observation that

> "…the narrowing glottis which characterises the latter portion of the [spread glottis] specification is associated with the stop in the cluster, whereas the presence of aspiration in singleton stops reflects association of a narrowing glottis with the release phase of the stop (equivalently, with the initial portion of the following vowel)" (I&S 1995: 371).

I&S (1995: 373) argue that sharing of [spread glottis] is a consequence of feature spreading.[14] They argue that this view is supported by the phenomenon of English sonorant devoicing. They assume that "…[spread glottis] comes to be shared even with adjacent sonorant consonants, which are not specified one way or the other for this feature to begin with" (I&S 1995: 373). Their interpretation is that aspiration equates with voicelessness in that both are realisations of [spread glottis]. This interpretation enables a unified explanation for the failure of stop aspiration after /s/ and sonorant devoicing after voiceless obstruents.

I&S (1995: 373) argue that a progressive assimilatory rule of sonorant consonant devoicing, which is posited for English in certain proposals, "…does not distinguish voicelessness in initial stops (which otherwise results in aspiration) from its occurrence in clusters (which does not)". They go on to argue that "This empirical difficulty does not arise if voicelessness of the nasals and liquids…is taken to be due to sharing of a [spread glottis] gesture which inheres in voiceless obstruents". In 'voice languages' which lack aspirated stops, [spread glottis] is neither phonologically nor phonetically active in stops. Therefore, sonorants remain voiced when preceded by voiceless obstruents.

However, this is not the case in all voice languages, as shown for French and Polish in 2.2.2. The fact that sonorants do seem to assimilate laryngeally to preceding voiceless stops could be problematic for I&S's suggested laryngeal features because whatever happens to the sonorants, it cannot be assimilation in their view. Voiceless obstruents are unspecified in |voice| languages and can, therefore, not extend any specification into neighbouring sounds. However, in later articles I&S argue that [spread glottis] is actually active phonetically in voiceless fricatives in voice languages, and in 2.3.2.6 it is shown that this apparent problem can be dealt with in terms of phonetic enhancement of phonological features.

I&S (1995, 2008) argue that diachronic evidence for their proposed representation of laryngeal features can be found in the exceptions to the well-documented Proto Indo-European change of Grimm's Law. They point out that spirantisation of Indo-European voiceless stops to Germanic voiceless fricatives failed when a fricative

[14] I&S argue that phonologically the Obligatory Contour Principle (OCP) would force tautomorphemic adjacent identical specifications to reduce to one (presumably shared) specification anyway. Therefore, a morpheme internal sequence of /s/ followed by /p/ could contain only one instance of [spread glottis] by the OCP. However, this can be debated due to uncertainty of accuracy of the OCP in certain cases (Patrick Honeybone: p. c.).

preceded the stops immediately. According to I&S, and most traditional accounts, spirantisation resulted from aspiration but they argue that the shift took place whenever the previous stop was articulated with a spread glottis. They also suppose that obstruent clusters shared a single laryngeal gesture in which the glottis was widest toward the end of the first-, and narrowing to the point of closure in the second obstruent. Therefore, in order for the voiceless stops to spirantise the glottis had to be substantially open; this is the case in singletons and first elements of clusters but not in the second half of a cluster. This, according to I&S, explains the exceptions to Grimm's Law: [spread glottis] did not necessarily lead to aspiration.

I&S (1999) take a slightly different approach to obstruent clusters in English. They point out that in Articulatory Phonology (e.g., Browman & Goldstein 1989, 1992) /s/ and the stop in /s/-stop clusters are seen to act temporally as "…single units under the influence of two oral gestures" (Browman & Goldstein 1992: 228). I&S (1999: 138) adopt this representation of /s/-/stop/ clusters as single units and take them to be organised as a single skeletal element at the CV/x or timing tier and call them 'suffricates'. They argue that "This direct kind of temporal organization accounts at once for the noted tautosyllabic constancy of the [spread glottis] gesture over clusters and singletons, and it also presents a phonetically motivated basis for description of the well-known phonotactic oddities of /s/ in consonant clusters generally" (I&S 1999: 138).

I&S (1999: 139) point out that this view is underlined by Fujimura (1997: 103) who claims that the structure of tautosyllabic /s/-clusters is quite different from that of heterosyllabic ones. Fujimura argues that heterosyllabic clusters contain a spirantised obstruent, whereas tautosyllabic ones consist of a fricative plus a stop.[15] This treatment of syllable-internal /s/-clusters as single units is supported by others as well (e.g., van de Weijer 1996).[16] This analysis is problematic for a unified analysis of /s/-stop clusters and obstruent-sonorant clusters, described above. In the present view,

[15] I&S (1999: 139) explain the difference between the two as follows: "…the /s/ in *sting* is shorter and achieves its maximum turbulence earlier than the /s/ in *slick*, whereas the temporal qualities of /s/ in *silk* are the same as those in *slick*. Fujimura's model expresses this distinction through the attribution of different phonological features, {spirantised} for /st/ versus {fricative} for either /sl/ or /s/ alone".

[16] Space restrictions inhibit the discussion of further cases of support for this view. I&S (1999: 140) argue that the exceptional position of /s/ in /sC/ clusters with regard to sonority sequencing can be attributed to the unary status of these clusters. Other phonotactic facts of English, such as the ungrammaticality of /sb/ and /zp/ clusters and obligatory initial /s/ in three consonant clusters, can also be captured by the analysis (cf. I&S 1999: 140).

these clusters are different in that the former are actually no clusters but one segment. The latter are clusters of two independent segments which share their laryngeal specification only.

However, I&S provide further support for the above unification account. I&S (1995: 374) claim that aspiration in English occurs in foot-initial position.[17] They note that sonorants are not devoiced in foot internal environments of words like *atlas, apricot, acclimate, acrimony* etc. They argue that the reason for this is that these obstruent-sonorant sequences are not stress-foot initial. According to I&S (1995: 375), this backs up the notion "…that sonorant devoicing and stop aspiration are instantiations of the same phenomenon, the implementation of [spread glottis] in…the onset of a metrically prominent syllable"[18]. I&S (1995: 376) argue that this view renders positing an aspiration rule unnecessary because "…aspiration is merely the phonetic implementation of a [spread glottis] phonological specification". Aspiration inheres in English voiceless obstruents, i.e. [spread glottis] forms part of their basic representation.

As pointed out directly above, I&S (1995: 376) assume that "…[spread glottis] is implemented with fully abducted vocal folds only in foot initial position". A further assumption is that "…vocal fold abduction in syllable onsets is enhanced in relation to metrical prominence". This means that there is great glottal width in the onset of a primary stressed syllable, the glottis is narrower in the onset of a secondarily stressed one, and it is narrowest in the onset of an unstressed syllable. [spread glottis] is expected to be weakly implemented in a syllable coda. I&S (1995: 379) argue that the need or justification in the language for a rule of aspiration can be discarded by positing [spread glottis] as a basic rather than derived property of voiceless obstruents in English. "In short, aspiration is a matter of degree, correlating directly with degree of stress".

---

[17] I&S (1995: 375) describe the familiar notion that "…the metrical foot in English is figured from the right edge of the word, and (usually) consists of a stressed syllable and any following unstressed syllables… The general theory of prosodic phonology requires that all syllables be parsed into metrical constituents, though, even unstressed syllables left stranded by basic footing procedures; hence a single word-initial unstressed syllable, will also be incorporated into a metrical foot, albeit a 'degenerate' one...". Patrick Honeybone (p.c.) points out that there is much disagreement on this principle.

[18] However, others would disagree with the claim that aspiration only takes place in the foot-initial position and claim that word-final aspiration is possible in released plosives (Patrick Honeybone p.c.). I&S (1999: 145) themselves note that Jessen (1998), Kloeke (1982) and many others point out that final voiceless stops can be aspirated in German, especially in emphatic speech.

Kehrein & Golston (K&G) (2004) support the view that clusters have just one laryngeal specification. They argue that a restrictive theory of laryngeal contrasts treats them as properties of syllable margins and nuclei, not as properties of individual consonants and vowels. K&G (2004:326) claim that "…natural languages allow for at most a single unordered set of laryngeal features per margin or nucleus, *whatever* the number of segments in that domain". They argue that only prosodic levels are characterised by laryngeal features, and segments never license laryngeal features on their own. In their analysis a single laryngeal node, phonologically unordered with respect to any speech sounds (root nodes), is dominated by a higher prosodic constituent. Therefore, each onset (or nucleus or coda) has a single set of laryngeal features.

K&G (2004: 328) point out that in more traditional approaches each segment is specified for its own laryngeal features. However, they argue that this makes incorrect predictions about possible contrasts in constituents in different languages. K&G (2004: 330) present the general claim that "…laryngeal contrasts found in languages do not increase with the segmental complexity". They use the features [spread], [constricted], [voice] to represent laryngeal contrasts.[19] K&G (2004: 333) point out that complex margins and nuclei allow the same (sometimes fewer) contrasts as simple margins and nuclei. Therefore, the addition of extra consonants and vowels within a margin or nucleus does give rise to extra laryngeal possibilities. They claim that this strongly suggests that there is a single set of laryngeal features per margin or nucleus, whether that margin or nucleus is simple or complex. K&G (2004: 334) argue that mixed clusters, which would be expected if laryngeals were properties of individual segments, do not occur in any known languages.

Like I&S, K&G point out that laryngeal contrasts in complex margins with a stop and a sonorant behave similarly to obstruent clusters. This provides further support for their claim that there is a single laryngeal specification for clusters and not one specification per consonant. They point out that the phonetic timing of laryngeal features in stop plus sonorant clusters is usually straightforward. Voicing is realised during the stop closure so that distinctive voicing is not masked by redundant voicing

[19] However, K&G (2004: 330) point out that their paper does not deal with what features are used to specify laryngeal contrast but more with how laryngeal contrasts are licensed. They share the view of I&S that laryngeal contrast is best modelled by [voice], [spread] and [constricted]. Other features are non-contrastive: i.e., phonetic.

on sonorants. Aspiration and glottalisation are phased after stop closure which leads to voiceless and creaky voiced sonorants in complex onsets.

K&G (2004: 350) point out that it is important to note that their findings cannot be reduced to purely physiological factors or to a constraint banning laryngeals on adjacent segments because laryngeal contrasts across margins and nuclei are not restricted in parallel ways. This, therefore, "…strongly suggests that onsets, nuclei and codas are phonologically limited to at most one set of laryngeal features, and that these laryngeal features are unordered with respect to supralaryngeal material within the same domain". They claim that the representational solution for this is that laryngeal features are licensed directly by sub-syllabic constituents.

2.3.2.4 Fricatives and Laryngeal Realism

Up to now, the discussion has mainly focussed on stops. The question of whether fricatives can be specified in the same way deserves some attention now. It was shown in 2.2.1 that Mobius (2004) argues that German 'voiced' fricatives display very similar surface characteristics to German 'voiced' stops. Roach (1983), Collins & Mees (1981), and O'Connor (1973) argue the same for English fricatives. Honeybone (2005a: 333) points out that there are two issues with regard to this question. The first of these is "…whether precisely the same set of subsegmental units that occur in plosives can also occur in fricatives (i.e., whether contrasts between two series of fricatives can be made in all of the same ways as can contrasts between two series of stops)". The second issue concerns the question of "…whether a single language always makes the contrast between its series of plosives and fricatives (if it has both) in the same way (which was implicitly assumed in the recognition of type A and type B languages…)".

As to the first question Honeybone assumes the null hypothesis that, essentially, the same laryngeal contrasts are possible in fricatives and plosives. The essential points of this assumption are based on the fact that there is phonetic evidence that fricatives can be characterised by [spread glottis] or [constricted glottis]. The fact that they can be characterised by [voice] is hardly controversial. Honeybone (2005a: 334) points out that there are languages in which fricatives have surface aspiration, e.g., Burmese (Ladefoged & Maddieson 1996: 179), and there are languages with ejective fricatives, e.g., Tlingit and Hausa (Ladefoged & Maddieson 1996: 178-179). However, he does point out that fricatives specified for [spread glottis] do not

necessarily have to have surface aspiration. Although this is not impossible as indicated by Burmese above, which has a contrast [s, s^h, z]. This is because, unlike plosives, fricatives have no clear release phase. There is a possibility to prolong the articulatory gestures so that they are essentially aligned with the laryngeal gestures. Honeybone points out that there is no theoretical reason why LR should not apply in the same way to fricatives as it does to plosives.

Further evidence for the assumption that fricatives and plosives can have the same laryngeal specifications comes from Vaux (1998: 498). He points out that evidence for the assumption can be found in the future prefix {k} in Armenian, which assimilates in voicing and aspiration to a following consonant. When the following consonant is a voiceless aspirate or a voiceless fricative the prefix surfaces as [k^h], e.g., *k-savor-ie-m* → [k^h]*savoriem* 'I will grow accustomed to'. Vaux (1998: 99) points out that the fact that voiceless fricatives cause aspiration on the surface form of the prefix suggests that they are specified for what he refers to as [+spread], as he supposes laryngeal features are binary. The prefix surfaces as unaspirated, even voiced, before voiced fricatives, e.g., *k-zr-a-m* → [gəzə]*ram* 'I will bray'. Vaux argues that this suggests that it is [-spread] and that the laryngeal specification of the fricative is spread to the plosive. Vaux (1998: 500) points out that the same behaviour is attested in Sanskrit. He finds processes in Pali and Thai which back up his case further (Vaux 1998: 503-508). Therefore, it is assumed in this thesis that fricatives and plosives can indeed be characterised the same in LR.

As to the second issue outlined above, Honeybone (2005a: 334) argues that important work shows that languages can use different laryngeal distinctions in plosives and fricatives. Among these are Vaux (1998), Tsuchida, Cohn & Kumada (2000), who argue this for a variety of English they investigate, and I&S (2003, 2008) who argue that Dutch plosives are specified for [voice], due to extensive influence from Romance, but that its fricatives are specified for [spread glottis], which is a legacy specification from Germanic. Beckman & Ringen (2005) argue that German fricatives are specified differently from German stops. The former are specified for [voice] and the latter are specified for [spread glottis]. A detailed discussion of the situation in English is presented in 2.4.1.

2.3.2.5 Laryngeal specifications in sonorants

This thesis follows the common assumption that, unlike obstruents, sonorants are not phonologically specified for laryngeal values. That is, of course, if there is no phonemic contrast in a language between voiced and voiceless sonorants, e.g., /l/ versus /l̥/. In languages like English there is no such contrast, and, therefore, the common assumption is argued to hold in these. Rice (1993: 344) points out that this view goes back to Chomsky & Halle (1968). They propose that there are two features that involve voicing: [voice] and [sonorant]. The former is distinctive for obstruents but redundant for sonorants, and the latter is a necessary part of the underlying representation of sonorants. Piggott (1992) and Rice & Avery (1989) also argue that two types of voicing are used distinctively in phonological systems. These are the laryngeal type of voicing, indicated by the feature [voice], and spontaneous voicing, which is the type of voicing found in sonorants, including vowels. The fact that voicing is redundant in sonorants is supported by underspecification models of phonological representation (e.g., Kiparsky 1982; Archangeli 1984, 1988; Archangeli & Pulleyblank 1986; Steriade 1987; Clements 1988; Avery & Rice 1989; Mester & Itô 1989; Lombardi 1991 and Rice 1993). In these models, redundant features are not permitted to occur in underlying representations.

I&S (2003a: 43) and Iverson & Ahn (2004: 11) also point out that voicing is automatic or 'spontaneous' in sonorants. Voicing is facilitated intrinsically unless the glottis has become widened due to association with a neighbouring [spread glottis] segment. I&S claim that English sonorants undergo 'spontaneous voicing', i.e. "…glottal vibration ensues automatically with sufficient airflow across the vocal folds which are in the neutral state of abduction, as is the case with ordinary sonorants of all types, consonants as well as vowels" (I&S: 2003a: 50).

However, amongst the sonorants, vowels are assumed to be able to carry laryngeal specifications (e.g., Halle & Stevens 1971; Ramers 1994; Yip 1995; Page 1998 and I&S 2003). I&S (1999: 145) point out that in Halle and Stevens' (1971) framework "…voicing is expressed via features that define vocal fold tension; [stiff [vocal folds]] implicates high pitch in vowels and inhibits voicing in consonants and [slack [vocal folds]] implicates low pitch in vowels and facilitates obstruent voicing". These features are predominantly employed with regard to tone languages in which [stiff] represents high pitch in vowels and [slack] represents low pitch in vowels. The interaction of the features in the vowels with laryngeal specifications in following

obstruents provides evidence for the specification of vowels with these features. Page (1998) points out that the connection between vowel pitch and laryngeal specifications in obstruents is clear from studies in tonogenesis. Laryngeal modification can condition tonal development in following vowels. There is a connection between [stiff], manifested as high pitch in the vowel, and following voiceless obstruents, and one between [slack], low pitch in the vowel, and following voiced obstruents. Page points out that when a laryngeal distinction is lost high tones may be developed after historically voiceless obstruents and low tones after historically voiced obstruents.

Page notes that Yip (1995) finds that a vowel which is marked for high pitch may, in fact, promote voicelessness in a following consonant. Yip argues that in East Asian languages the high tone register is marked by the feature [stiff], and the low register is marked by [slack]. This leads to the prediction that when the register of a whole tone spreads, the intervening obstruents should voice. Page points out that this is consistent with findings in phonetic studies of German and English (Kohler 1985 and Castleman & Diehl 1994). These indicate that the fundamental frequency of a stressed vowel affects the perception of voicing in a following obstruent.

Kohler (1985) argues that high fundamental frequency is a perceptual cue for a following fortis, or [spread glottis], stop and low fundamental frequency is a perceptual cue for a following lenis, or neutral, stop in German. Kohler (1985: 31) argues that "the local F0 effect is connected with different degrees of vocal fold tension in the production of the two stop manner classes in German". Castleman & Diehl (1994) discuss the relationship between fundamental frequency and judgements of voicing for intervocalic stops in English. They find that the fundamental frequency of the left vowel has more effect on the perception of voicing in the following consonant than the fundamental frequency of the right vowel. Page (1998: 188) points out that Castleman & Diehl found that a following voiceless obstruent correlates with high fundamental frequency, and low fundamental frequency with a following voiced obstruent. In this thesis, I follow the assumption that vowels can be specified for what I will term |stiff| and |slack|. I follow this assumption because in 4.3.2 I show that the presence of |stiff| in a preceding vowel can play a crucial part in non-tone languages like English as well.

2.3.2.6 Further developments of the theory

I&S (2003a) develop LR further by adopting privative features based on a dimensional framework developed by Avery & Isardi (A&I) (2001). Instead of the three privative laryngeal features, [voice], [spread glottis], and [constricted glottis], this framework centres on three dimensions: Glottal Width (GW), Glottal Tension (GT) and Larynx Height. These dimensions "…implicate phonetically antagonistic yet complementary 'gestures', which are essentially the same entities as the phonological features of conventional theories…" (I&S 2003a: 46). The antagonistic gestures comprising each dimension are [spread (glottis)] and [constricted (glottis)] for GW, [stiff (vocal folds)] and [slack (vocal folds)] for GT, and [raised (larynx)] and [lowered (larynx)] for Larynx Height. The three privative entities above combine in various ways, which are similar to the original framework described above, to define a given system. For example, GW replaces [spread glottis], so in English, fortis plosives are marked by the dimension GW, in Polish on the other hand, voiced plosives are marked by GT which replaces [voice].

Like I&S, A&I (2001: 49) argue that laryngeal contrasts in English are best represented as a privative distinction between one marked feature and one unmarked feature. In their framework this is the GW dimension rather than its embedded feature [spread]. They base their support for privativity on the stability of the phonetic cues for the GW segments as opposed to the unmarked segments. Like I&S, A&I (2001: 50) point out that the unmarked member of a phonological opposition can be recognised by phonological inactivity, especially observable in assimilation. According to A&I, inactivity is also a central cue in acquisition when a child is setting up a system of underlying contrasts. However, they point out that inactivity alone is not sufficient evidence for privative phonological oppositions. The marked member of an opposition should also be relatively tightly distributed around a set of acoustic and auditory cues for the dimensional contrast; it should display 'dimensional invariance'. There will be contexts where the contrast is sharply indicated by the distributional properties of the acoustic and/or articulatory cues for the marked member of the contrast pair. Such cues will be a signal to the contrastive dimension (e.g., as pointed out in 2.2.1, English initial /p/ is consistently marked by aspiration whereas /b/ is sometimes fully voiced, sometimes partially voiced, sometimes voiceless). It is this scattering that must be compared to the invariant cues that signal the marked member of the contrast.

I&S (2003a: 48) point out that a key aspect in A&I's approach is "…phonetic 'enhancement', or over differentiation, of certain distinctions via the provision of a redundant dimension node to the unspecified member in a contrasting- pair". I&A point out that enhancement involves the addition of a dimension node, turning a phonological Ø/X contrast into a phonetic equipollent X/Y contrast. One principle of enhancement is based on Vaux's (1998) findings concerning voiceless fricatives. In A&I's terms enhancement means that the GW dimension, of which [spread] is the default member, is added to laryngeally unmarked fricatives whenever GW is not contrastive in the fricative system of the language. This is formalised in (12):

(12) *Vaux's Law*:
Laryngeally unspecified fricative → [GW]
(in systems contrasting fricatives without reference to [GW])

Implementation of Vaux's law means that voiceless fricatives in [voice] languages are articulated as 'inherently aspirated' (I&S 2003a: 48). I&S (2003a: 48-49) point out that "…voiceless fricatives require a substantial pulmonic airflow in order to maintain their oral turbulence, and this in turn implies an open glottis lest the flow of air be impeded below the level of turbulent frictation". I&S (2003a: 49) point out that in aspiration languages, in which voiceless stops are heavily aspirated and voiced stops are not voiced at all, the GW dimension is contrastive in both the stop and fricative system. Therefore, instead of being derivatively fortis, voiceless fricatives are inherently so and voiced fricatives are lenis and only weakly voiced, as discussed in 2.3.2.4.

The phonetic difference, captured directly by the theory, between the two contrasting systems can then be described as follows: due to presence of GT in voice languages, implicating its default [slack] in obstruents, voiced stops are thoroughly voiced in these languages. Absence of GT in aspiration languages, on the other hand, gives rise to only partially or weakly voiced lenis stops. GW, with its default gesture [spread], gives rise to aspirated stops in aspiration languages, whereas absence of GW in voice languages means that stops are not aspirated but voiceless unaspirated. However, I&S (2003a: 49) argue that due to Vaux's Law voiceless fricatives are phonetically laryngeally largely the same in the two systems by virtue of them being

specified for the GW dimension in association with its default feature [spread]. Without laryngeal enhancement this similarity would not be explicable.

Another case of phonetic laryngeal enhancement is 'passive voicing'. I&S (2003a: 43) argue that in an aspiration language like English, the unaspirated lenis series are superficially voiced. It was shown in 2.3.2.5 that sonorants are spontaneously voiced. Obstruents, on the other hand, are passively voiced. Spontaneous voicing is extended into a laryngeally still unspecified segment from neighbouring segments specified for GT, e.g., even the second consonant in *ba**db**oy* is voiced due to the derived presence of GT in the preceding segment. However, there is no voicing in *be**dp**an* as /p/ is specified for GW. This, then, explains the fact that English and German medial stops are the only instances of the traditional voiced series that can actually be fully voiced. They are phonetically voiced and not phonologically.

I&S (2003a: 52) "…understand passive voicing to consist in a lack of direct articulatory control over voicing, leaching in, as it were, from its presence in a preceding segment endowed with the GT dimension". The result of extension of GT into the phonemically lenis series is voicing because of the default gesture [slack]. However, when the contrary gesture [stiff] is specifically marked then voicing will be inhibited. I&S (2003a: 52) point out that in lexically unmarked sonorants there is no phonemic effect of phonetically stiff vocal folds. Therefore, the attribution of the default [slack] to lenis obstruents is not obstructed. This leads to the /b/ in *rubber* being voiced despite the stress on the preceding vowel. However, this point will be explored further in 4.3.2 where it is argued that the presence of [stiff] in a stressed vowel did play a part in inhibition of a laryngeal modification process in fricatives in early Modern English.

I&S (2003a: 52-53) argue that the best voicing context is intervocalic word-initially voiced obstruents are essentially voiceless. They point out that, although it will be less than in medial cases, some voicing can be acquired by English voiced obstruents in other positions. Even word-final ones can acquire some voicing although they may also be totally voiceless. I&S claim that "All of this variation is consistent with the variable, passive implementation of voicing in English rather than the occurrence of this property as an underlying, contrastive feature in the obstruent system".

I&S (2003b: 7) argue that dimensional theory can deal with most of the phenomena presented by W&M in support of their binary analysis, as discussed in

2.3.1.3. I&S (2003b: 7) argue that Yorkshire assimilation can be best explained as leftward extension of the feature [spread glottis] since English, and, therefore, presumably also the Yorkshire dialect of English, is an aspiration language in which GW is specified. I&S (2003b: 9) argue that the more difficult case of Parisian French, namely apparent assimilation to voicelessness in a voice language, "…can be defined on the [stiff] property that is present phonetically (albeit not phonemically) among voiceless stops in this voice language". Therefore, [stiff] spreads leftward and is absorbed into voiced ([slack]) obstruents. As argued before, I&S (2003b: 10) point out that [stiff] inhibits vocal fold vibration and therefore positing [-voice] is not necessary in Parisian French. However, it seems odd that a phonetic property spreads into a phonologically specified consonant. The phonetic presence of a [stiff] gesture in stops in voice languages can also explain the seemingly strange devoicing of sonorants after stops in French and Polish. Since sonorant consonants are assumed not to be underlyingly specified for laryngeal features, the [stiff] gesture of preceding stops could extend into them and inhibit vocal fold vibration.

I&S explain the discrepancies between Dutch stop- and fricative-final clusters as resulting from a legacy GW specification in Dutch fricatives. They argue that due to contact Dutch stop phonology is Romance-like. However, Dutch has kept the GW specification, inherent in the Germanic parent language, in fricatives. Therefore, this legacy specification is responsible for the voicelessness of Dutch fricative final clusters. The first obstruent in the cluster undergoes final devoicing and fricatives are inherently voiceless. However, Vaux's Law would render Dutch fricatives fortis anyway if the fricative system would be that of a voice language. Therefore, this legacy specification theory does not necessarily hold.

I&S (2003b: 18) point out that the assimilatory behaviour of the Dutch /-də/ suffix can only be explained as an 'ad hoc' morphologically restricted rule of 'Dutch Progressive Assimilation'. This rule "…abandons the Laryngeal articulator of a suffix-initial voiced obstruent in favour of that which occurs in the preceding obstruent" (I&S 2003b: 18). So if GT marks the preceding obstruent, /d/ will be marked as well, but if the preceding obstruent is not marked for GT, then /d/ is implemented as voiceless /t/.

I&S (2003b: 19) argue that

> "…rather than spread features per se, this lexically restricted form of progressive assimilation extends from one segment (as it delinks in the other) the dimensional organising node Laryngeal, an independently necessary constituent in the geometry that, when subordinating glottal tension…represents the marked voiced stop type in Dutch, but when empty represents the unmarked voiceless type".

Therefore, they conclude that the oddness of the /-də/ suffix can be straightforwardly explained with no reference to [-voice] by the spreading and delinking of the Laryngeal articulator. However, their discussion is rather ad hoc, as they point out themselves, and very complex. This is not their most persuasive argument against [-voice], which in this case seems the less complex option.

2.4 Laryngeal Realism applied to Present-Day English, and a formalisation of the framework

2.4.1 Describing Present-Day English in Laryngeal Realism

LR offers an enlightening view on the cross-linguistic laryngeal implementation discrepancies discussed in the beginning of this chapter. The account easily explains the surface facts of German. LR also seems to provide the best analysis for Present-Day English (PDE). This is also shown by Spaargaren & Honeybone (2006) and Spaargaren (2008). As discussed in 2.3.2.3, evidence for LR is mainly drawn from a language's surface and laryngeal assimilation facts. In 2.2.1 it was pointed out that PDE and German exhibit striking similarities when it comes to the surface implementation of laryngeal contrasts. English voiced stops are voiceless in initial and final position, and they are only fully voiced when they occur in inter-sonorant position. In addition, as in the German data in (2), voiceless stops are aspirated in the initial position of a stressed syllable. The surface facts of English are illustrated in (13):

(13) *pin* [pʰɪn]
attack [atʰak]
buy [b̥ai]
sagging [sagɪŋ]
dead [d̥ɛd̥]

These surface facts are easily explained under the assumption that English is an aspiration language in LR. Aspiration can then be explained by the fact that the feature [spread glottis] is present in the underlying representation of the voiceless series. The voicelessness of the traditional voiced series in initial and final position is also straightforwardly explained: these stops are not underlyingly voiced at all but voiceless unaspirated. The fact that they are only fully voiced in inter-sonorant position is due to the phonetic process of 'passive voicing', explained in detail directly above.

Present-Day German can also be assumed to be an aspiration language because it exhibits surface characteristics similar to English. Therefore, it can be argued to have a Ø/[spread glottis] distinction. As briefly hinted at in 2.3.1.2, this can explain the perceptual insignificance of voicing in laryngeal distinctions in German, outlined by Jessen (2004). The feature [voice] is absent from the system of German, and consequently has no perceptual significance. [spread glottis] is the significant specified feature.

The different implementation of the Polish voiceless series can be explained when it is assumed that Polish is a voice language in LR, i.e. that its voiced series is specified for [voice] and its voiceless series is unspecified. Lack of specification accounts for the fact that /p, t, k/ are implemented as neutral unaspirated voiceless stops. The voiced stops are fully voiced in all positions because they are actually specified for the feature [voice]. Biedrzycki's observation, discussed in 2.2.1, that Polish voiceless stops are similar to German voiced stops turns out to be due to the fact that they are actually the same phonologically. In both cases they are implemented as neutral unaspirated voiceless stops because they belong to the unspecified member of the laryngeal opposition in both languages.

This leaves the asymmetric assimilation facts of English, presented in 2.2.2. It turns out that LR can also easily account for these. Asymmetric assimilation in an aspiration language like English is due to the fact that [spread glottis] is the only marked feature in its phonological system. This means that only [spread glottis] can be active in phonological processes. The feature [voice] is absent from the obstruent laryngeal phonology of English and cannot be invoked without a local source to participate in phonological processes. The fact that a framework which incorporates the feature [voice] cannot deal with this asymmetry was already briefly discussed in section 2.3.1.3. If [voice] would be actively specified in English, it would be expected

to take part in phonological processes. The fact that it does not appear to be active in assimilation processes provides crucial evidence for its absence. It is shown in the next chapter that this asymmetry can be argued to have been present throughout the history of English. [voice] assimilation does occur in a voice language like Polish because this feature is specified in its laryngeal phonology and can, therefore, participate in processes.

As briefly discussed in 2.3.2.3, the situation of PDE fricatives is discussed by Roach (1983: 38) and O'Connor (1973: 131). They argue that the 'fortis ~ lenis distinction' also holds for fricatives. Although fortis fricatives are not aspirated, they are articulated with greater force and the friction noise is louder than that of lenis fricatives. Moreover, they have a shortening effect on the preceding vowel, as in the distinction *ice ~ eyes.* In addition, as pointed out before, lenis fricatives have little or no voicing in initial and final position. They may be voiced when they occur in between sonorants only. Therefore, on LR assumptions, English surface facts for fricatives seem to support the assumption that they are indeed specified for [spread glottis]. Moreover, apart from surface facts, assimilation facts in PDE also seem to support the notion that fricatives carry the [spread glottis] specification. For example, the fricative in *laugh* causes assimilation of the suffix /d/ in *laughe*[t]. Similarly, it causes assimilation of the 3rd singular suffix /z/ in *laugh*[s], and the final fricative in *Geoff* causes assimilation of the possessive suffix in *Geoff'*[s].

Finally, in relation to German, I&S (1999:144) point out that the problematic German final neutralisation, discussed in 2.3.2.3, can be dealt with in their framework as 'final fortition'. They argue that this involves the addition of a [spread glottis] specification to a laryngeally unspecified segment. They distinguish this phenomenon from a seemingly similar one in voice languages: 'final devoicing', the removal of the feature [voice]. This is discussed in more detail in chapter 6 where it is indicated that final fortition does not constitute the strongest evidence for I&S's point of view.

2.4.2 Formalising Laryngeal Realism

Traditional terminology and symbols have been used throughout this chapter. In a traditional framework, the segments /p, t, k/ are classified as 'voiceless', and the segments /b, d, g/ are classified as 'voiced'. However, as pointed out before, the traditional terminology does not seem to be adequate in languages like English and German because the laryngeal distinction in these languages has been shown to be

between aspirated and non-aspirated voiceless stops. Even if /p, t, k/ are definitely voiceless, this is not the characteristic that defines them. /b, d, g/ are hardly ever voiced, and when they are this is phonetic rather than phonological, as argued in section 2.3.2.6. As pointed out in 2.3.2.2.1, Kohler (1984) argues that the traditional phonological features are confusing. Roach (1983: 31) and O'Connor (1973: 129) back this up and say that calling English /b, d, g/ 'voiced' is misleading because of the perceptual unimportance of voicing in these segments, discussed in 2.3.1.3.

Therefore, the use of the same representations and terminology for the obstruents of an aspiration language, like English, and a voice language, like Polish, is inadequate. In the latter the contrast voiced ~ voiceless does seem appropriate: /p, t, k/ are plain voiceless and /b, d, g/ are always phonologically voiced; this is the same for French. Therefore, a different terminology is necessary for the segments in English. As shown in 2.3.2.2.1, Kohler (1984) argues that the laryngeal contrast in English and German should be represented by a feature [+/-fortis]. Roach (1983) and Collins & Mees (1996) also argue that referring to the distinction in English as 'fortis ~ lenis' rather than 'voiced ~ voiceless' may be more accurate. This thesis follows Honeybone (2002, 2005a) in referring to the distinctive laryngeal features as |spread| and |voice|, thus emphasising the state of the glottis as, in the previous sections, that has been shown to be the most significant feature in cross-linguistic laryngeal distinctions. Therefore the traditional 'voiceless' series of English are referred to as |spread| and the traditional 'voiced' series as 'neutral' or 'unspecified'.

According to Honeybone (2005a: 331),

> "If [LR] is accepted, then the segments that are standardly used in segmental descriptions are confused; this is because the 'standard approach' is essentially that of tradition (i)…In the view of [LR], therefore, the sets of symbols /p, t, k/ and /b, d, g/ have been used in such standard practice to describe what are, in fact, two types of phonological object each (thus the two types of symbols have been used to transcribe three different types of phonological objects in all)".

Honeybone (2005a: 332) points out that if LR is assumed to be right, then there is a need for unambiguous symbols. This means that it is necessary to make a distinction between symbols to describe the two different types of languages, the aspiration or |spread| languages and |voice| languages, as they are henceforth referred to. Honeybone points out that there are not enough base symbols in standard transcription systems like the IPA to transcribe all types of obstruent but that this can be solved by

using diacritics.[20] He proposes the symbols in (14) for stops (fricatives are discussed directly below). These features represent stops in languages like English and Polish at the three canonical places of articulation.

(14)	'neutral', 'voiceless'	'voiceless aspirated'	'voiced'
	non-specified	|spread|	|voice|
	/p˚/	/p^{h}/	/b/
	/t˚/	/t^{h}/	/d/
	/k˚/	/k^{h}/	/g/

Honeybone explains that this representation explicitly marks which segments are underlyingly non-specified with the use of the IPA diacritic '˚'. He argues that this use of the diacritic is reminiscent of the IPA diacritic to represent devoicing but also deliberately different. Honeybone points out that he has extended the general usage of the diacritic [^{h}] to indicate aspiration in stops. There is no implication that phonological processes have applied to these segments, their non-specification and aspiration is part of their basic underlying representation. The symbols also bear no direct implication on surface representations; /p^{h}, t^{h}, k^{h}/ are not always aspirated nor are /b, d, g/ always voiced. Honeybone (2005a: 333) argues that on LR assumptions "…certain types of phonological segment have been represented in the spelling system of languages in more than one way, and conversely one series of letters (e.g., <b, d, g>) has been used to represent more than one kind of phonological segment". He gives the correspondence of letter and symbols for |spread| language English and |voice| language Spanish, which is adapted in (15). The symbols proposed by Honeybone are adopted in this thesis.

(15)	Letters	English	Spanish
	<p>	/p^{h}/	/p˚/
	<t>	/t^{h}/	/t˚/
	<k>	/k^{h}/	/k˚/

[20] Honeybone (2005a: 232) points out that this is already done for |constricted [glottis]| languages in which ejectives are transcribed as /p', t', k'/.

In 2.3.2.4, it was argued that fricatives can be specified in the same way as stops in LR. This means that the traditional features for fricatives also have to be translated into more appropriate symbols, along the lines of the stop symbols in (14). This is done in (16) for fricatives at the three cardinal places of articulation.

(16)	non-specified	|spread|	|voice|
	/f̊, s̊, x˚/	/f^{h}, s^{h}, x^{h}/	/v, z, ɣ/

In 2.3.2.3 it was pointed out that languages can have different laryngeal specifications for fricatives and plosives. This calls up the question of how English fricatives are specified in LR. Are they specified in the same way as plosives, i.e. are they specified for |spread|, or are they specified differently? The opinions on this matter differ. A&I (2001: 51) exemplify the supposedly equal laryngeal status of English stops and fricatives with a study of /s/ and /z/, which they take to be representative for other fricatives of English as well. /s/ has a higher airflow than /z/. A&I argue that this is best explained by a larger glottal opening, which is also confirmed from trans-illumination studies. /s/ shows dimensional invariance in that it is always realised as voiceless. This indicates that it is underlyingly specified for gestures that can be used contrastively when they function as heads. They follow Dresher & van der Hulst (1999) in arguing that all segments have a head. These heads are "…locus of the greatest constriction in the segment…" and they can have a greater structure than dependents, so heads have more dependents and fewer specifications. GW with its default feature |spread| is assumed to function as head in /s/.

However, Honeybone (2004b: 11-13) argues that |spread| is phonologically specified in English fricatives, along with a phonological specification |voice|. Honeybone (2004b: 11) argues that non-South-Western varieties of Old English and Middle English had one series of fricatives as pointed out in (17) below. A detailed description of the fricative situation in Old English is given in the following chapter while chapter 5 offers a detailed description of the southern Middle English data. The system in (17) formed the basis of the dialects of the Midlands and the North and also of RP.

(17) *Fricatives in non-South-Western varieties of Old English and Middle English*

f^h

θ^h

s^h

$\int^h$

However, Honeybone (2004b: 11) points out that minimal pairs like ***f**at ~ **v**at, **th**igh ~ **th**y, **s**aid ~ **z**ed,* and *me**sh**er ~ mea**s**ure* show that this system underwent a considerable change. He notes that it has to be determined whether the system changed to (18a), (18b) or (18c) below.

(18) a.	f^h :	f°	b.	f° :	v	c.	f^h :	v
	θ^h :	θ°		θ° :	ð		θ^h :	ð
	s^h :	s°		s° :	z		s^h :	z
	$\int^h$:	$\int^\circ$		$\int^\circ$:	ʒ		$\int^h$:	ʒ

According to Honeybone (2004b: 13) (18c) is the best representation of the current laryngeal contrast in English fricatives. He argues this case by presenting and reinterpreting experimental data from Jansen (2004). In his experimental study, Jansen recorded four native speakers of British English. The two males and two females were aged between 24 and 35 at the time of the recording and lived in or near to London. The results were analysed instrumentally. The focus of the experiment was on alveolars and was conducted in order to consider the way in which /t, d, s, z/ pattern in postlexical regressive assimilation. Honeybone (2004b: 12) argues that this is clearly "non-categorical assimilation" but provides evidence for the active laryngeal specifications of the segments involved.

Honeybone (2004b: 12) points out that the stimuli for the experiment consisted of postlexical consonant clusters across word boundaries. The clusters were embedded in carrier phrases. The first word ended in a velar stop preceded by a long central mid open vowel. The first segment of the second word was /t, d, s, z, r/. For the purposes here, /s/ and /z/ are most interesting. The location of the clusters was the boundary of noun + noun constructions, and these were embedded within a carrier phrase (*How does…translate?*) so that the nuclear stress was attracted to the second noun.

Honeybone gives two examples: (i) "*How does patchwork duvet translate?*" and (ii) "*How does Hamburg Diary translate?*" A total of 720 utterances were recorded and 425 were useable for segmentation and measuring using *Praat*.

Honeybone (2004b: 12-13) points out that the results which stand out for the purposes here are the results for the clusters /gs/, /kz/, /kd/, and /gt/. In /gs/, /g/ has closure voicing of 26 ms and release voicing of 0 ms. Therefore, /g/ loses voicing due to the following /s/ compared to other clusters with /g/: /gd/ (closure 33 ms, release 11 ms), /gz/ (closure 43 ms, release 13 ms), /gr/ (closure 36 ms, release 7 ms). This means that /s/ is active in 'devoicing' and is characterised by |spread| in terms of LR. In /kz/ clusters, /k/ has 41ms voicing during its closure and 9ms during its release. This means that /k/ acquires some voicing from the following /z/ compared to other clusters with /k/: /kt/ (closure 21ms, release 1ms), /kd/ (closure 23ms, release 2ms), /ks/ (closure 21ms, release 0ms), /kr/ (closure 22ms, release 0ms). This is evidence that /z/ is active in voicing and, therefore, has to be specified for |voice| in LR. In /kd/ clusters there is no significant effect, which means that /d/ is not active in either voicing or devoicing, and this indicates that it is unspecified laryngeally. Like in /gs/ clusters, /g/ loses voicing in /gt/ clusters (Closure 24ms, Release 1ms) compared to the other /g/ clusters outlined above. This means that, as expected, /t/ is active in 'devoicing' and is therefore specified for |spread|. Honeybone (2004b: 13) concludes that if these data are interpreted correctly, this means that the laryngeal situation of obstruents in (RP-like) English is like (19):

(19) *The laryngeal specifications of English obstruents*

a. *Fricatives*	b. *Plosives*
f^h : v	p^h : p°
θ^h : ð	t^h : t°
s^h : z	k^h : k°
$ʃ^h$: ʒ	

According to Honeybone (2004b: 13), this situation is practically predicted by a combination of the Old English and Middle English fricative system shown in (17) and the attested historical origin of the second (voiced) series of fricatives. A combination of factors introduced the contrast in the course of Middle English. One crucial factor was the impact on English of Norman French after the Norman

Conquest of 1066. Many scholars, e.g., Lass (1992), explain that this event led to the importation of many French words with initial /z/ and, especially, /v/, e.g., *veal, victory, very* (and *serve, save*), *zeal, zodiac* (and *use, desire*). French is typically described as a |voice| language and this vast amount of borrowing opened the potential for a laryngeal contrast between two series of fricatives. This system was then generalised and extended to other pairs by other processes to fill the gaps in the new series of fricatives. Therefore, the specification in the PDE |spread| series /f^{h}, θ^{h}, s^{h}, ʃ^{h}/ is inherited from non-South-Western varieties of Old English, and the specification in the PDE |voice| series /v, ð, z, ʒ/ is inherited from Norman French. This, according to Honeybone, provides evidence for the fact that "…where a language has a contrast between two series of both plosives and fricatives, their laryngeal states can be characterised in different ways".

2.5 Which tradition is correct?

As discussed in chapter 1, the next chapters serve to test whether the standard position, which argues that phonological features are largely identical cross-linguistically, or LR, which argues that different languages have different underlying laryngeal features, is correct. It has been shown in this chapter that PDE laryngeal surface and assimilation facts support an analysis of the language as an aspiration language in LR. In the next chapters the framework will be tested with historical data from English, representing to my knowledge all laryngeal modifications recorded in the standard handbooks on the history of the language. It will be tested whether these back up an analysis of English within the standard position or LR. At the same time, as outlined in chapter 1, it is tested whether a current theoretical framework like LR can provide a better understanding of historical data.

The next chapter deals with historical English assimilation data. As pointed out several times before, uni-directionality of assimilation in favour of |spread| provides crucial evidence for the exclusive active specification of that feature within the phonological system of a language. In other words, in LR it is expected that all cases of assimilation in a |spread| language like English are of one type: assimilation to |spread|. Therefore, assimilation to |voice| is expected not to occur since the feature is unspecified and therefore inactive. Should evidence for assimilation to |voice| be found, this would be a major problem for the framework.

The main aim of the next chapter is to test whether historical assimilations in English provide back-up for LR. It is shown that this is indeed the case. All recorded assimilations in English are of the type described for the Present-Day language in 2.4.1. In fact, a crucial process of Old English laryngeal assimilation suggests that the language has been an aspiration language in LR since at least its earliest recorded history. It is also shown that LR can offer an elegant explanation for these data as extension of the |spread| gesture form |spread| consonants and can thereby adequately explain the asymmetry observed in favour of |spread| in the historical assimilations. In addition, it can explain certain exceptions to the Old English process.

However, the data in chapters 4, 5 and 6 present some potentially challenging data for the framework. Chapters 4 and 5 deal with traditionally suggested fricative 'voicings' in the history of English, whereas traditionally suggested 'devoicings', mainly of fricatives, in its history are discussed in chapter 7. Both 'voicing' and 'devoicing' are not expected to take place in a |spread| language like English in which the feature |voice| is not specified in LR. This is because 'voicing' would involve the addition and 'devoicing' the removal of the feature |voice|. And due to the local source constraint |voice| cannot just be introduced at random into feature specifications. Therefore, if these data are indeed explained as 'voicings' and 'devoicings', this poses a major problem for the framework and the analysis of English as an aspiration language within it.

However, it is shown in chapter 4, which deals with stress-conditioned 'voicings', that one of these processes actually provides crucial back-up for LR. This is the seemingly bizarre process of final 'voicing' in late Middle English, a highly marked and cross-linguistically unattested change. It would be baffling to explain it as such in English. However, within LR this seemingly unnatural and complex change can be explained as loss of the feature |spread| and therefore cross-linguistically common coda lenition. It is shown that LR can unify all apparent 'voicing' processes in English as neutralisation of the laryngeal contrast in fricatives in medial and final position in the standard language and as complete neutralisation in the South-Western dialects as shown in Chapter 5. In chapter 5 it is also investigated whether potentially problematic 'devoicing' data could be captured by LR and it is shown that this can indeed be done when the process is reanalysed as final fortition. This reanalysis is not so advantageous though as it involves the seemingly random introduction of a feature to an underlying specification, which is forbidden by the local source constraint.

However, it is shown that a process like 'final fortition' is not entirely random and some justifications for it can be found.

As stated in chapter 1, all data sections starts with a non-theoretical, philological, description of the data according to the leading handbooks on English historical phonology. These sections are not used to make any theoretical statements. I have, therefore, decided to stay as close to the original descriptions of these data as possible by using traditional terminology, albeit in single quotation marks, e.g., '*voicing'*, and symbols in these descriptive sections. LR terminology and symbols, as introduced in the previous section, are adopted in the theoretical reanalysis of each process.

3 English historical assimilations

3.1 Introduction

This chapter provides a description and analysis of English historical laryngeal assimilation data. The previous chapter showed that laryngeal assimilation provides crucial evidence for LR. It was argued that in a |spread| language, in which |spread| is the only phonologically actively specified feature, assimilation is expected to be unidirectional to that feature. |voice| is unspecified and cannot randomly be introduced in representations without a local source. The result is that it is expected not to participate in phonological processes like assimilation in a |spread| language. It was shown that exclusive assimilation to |spread| in PDE provides crucial evidence for the analysis of the language as a |spread| language in LR. This calls up the question of how far back this pattern can be traced in the history of English. The aim of this chapter is to provide evidence, with historical assimilation data, that this situation has held throughout the history of the language. In doing so new evidence for LR is presented, and in turn the framework provides new analyses for these data.

The first process to be introduced in section 3.2 is Pre-Old English laryngeal assimilation,[21] which affected newly formed consonant clusters after processes like vowel syncope and compounding, e.g., *mette* 'met' (<*metde*). In section 3.2.1 the focus will be on a descriptive account of this well-documented process according to the traditional handbooks. It is shown that, crucially, all laryngeal assimilation seems to have been in the direction of the |spread| feature. Then, in 3.2.2 a new investigation of the data is described. This investigation was conducted to test whether there are orthographical indications of unexpected assimilation to |voice|. It is argued that this investigation was necessary because these data are important for two reasons. If all data indicate that Pre-Old English assimilation was asymmetric in favour of |spread|, then these data (i) provide evidence for LR, and (ii) provide evidence for the antiquity of the PDE laryngeal situation. This would fit in well with the predictions and assumptions of LR, and, therefore, with what I&S's school of thought and Honeybone (2002) have argued for Germanic. The methodology adopted in conducting this research and the electronic corpora used for extending and testing the data set are discussed in detail. This is followed by a discussion of a small number of possible

[21] Pre-Old English is the period before the first written records.

counter-examples to the claim that all assimilation is to |spread| in a |spread| language. These are shown to be unproblematic.

Section 3.2.3 provides an analysis of pre-Old English laryngeal assimilation in LR. The process is argued to result from extension of the |spread| feature from the laryngeally specified consonant in the cluster to the unspecified one. It is argued that LR provides a better analysis for the observed asymmetry than a framework which incorporates some kind of |voice| feature. This is because, as pointed out in chapter 2, such an analysis could not possibly explain why an active |voice| feature would never participate in processes like assimilation, as active features are expected to do. This is followed by a discussion of the situation of fricatives in Old English. These are argued to be underlyingly specified for |spread|, and to lose that specification in inter-sonorant position. However, |spread| also seems to be lost in forms like *cydde*, derived from *cyðde*, where it does not occur in inter-sonorant position. Therefore, the fricative is expected to be specified for |spread|, and so to cause laryngeal assimilation in the stop, which it does not. However, this problem is explained as probably being due to a more general pattern of paradigm uniformity.

Section 3.3 is devoted to a discussion of two later possible laryngeal assimilation processes. Section 3.3.1 describes Middle English laryngeal assimilation in the past-tense and plural suffixes, as in *books* [s^{h}] versus *spoons* [s$^{\circ}$]. This assimilation is still present in PDE, as described in 2.4.1. Firstly, the process is described according to the standard descriptions in the handbooks, and it is shown that this 14th or 15th century process is traditionally argued to involve assimilation of the 'voiced' suffix to the 'voiceless' stem consonant. The process exhibited considerable variation in orthoepic evidence, e.g., <birds> for expected <birdz>, and Lass (1992) argues that this could be due to misperception of laryngeal features by the orthoepist.

Then, a reanalysis of the process in LR is offered. It is shown that this process involves assimilation of the neutral suffix to the |spread| specification in the stem consonant. Again, it is argued that this process is captured much better in LR than in a theory which incorporates the feature |voice|. Such a theory could not explain why the stem consonant never assimilated to the consonant of the suffix. This process shows that the PDE pattern observed in the past tense and plural suffixes, described in 2.4, has probably been around since Middle English.

Section 3.3.2 discusses a process described in the handbooks as late Middle English or early Modern English assimilation. This process could be problematic for

LR because certain cases could point at assimilation to |voice|, e.g., *cubbard* for *cupboard.* However, it will be argued that most of the 'assimilations' can be shown to be simple cases of inter-sonorant loss of |spread|, a predicted and common process in |spread| languages, or loss of consonants in intervocalic clusters. Section 3.4 presents the conclusion to this chapter.

3.2 Pre-Old English laryngeal assimilation

3.2.1 The process according to the handbooks

As pointed out in 2.5, traditional terms and symbols are used in this section in order to stay as close as possible to the handbook descriptions. According to Luick (1964: 854, 858), a process of syncope of /æ/, /i/ and /u/ after long vowels took place in Pre-Old English (OE), e.g., *þeodnes* (< **þeodænæs*). Luick (1964: 854) points out that the change continued to take place in OE after short vowels. This process brought groups of consonants together that did not normally form clusters. This is because they are very similar articulatorily and require very precise articulation in order to remain distinct, e.g., /t/ and /d/ in *metde* 'met'. Luick (1964: 854) shows that these newly formed clusters underwent various further developments in different dialects. The first type of development they could undergo was the assimilation of one of the consonants in the cluster to the other, and subsequent full or partial gemination. This turned them into already existing clusters. A second option was dissimilation. Thirdly, if the cluster consisted of three consonants, apocope of the medial consonant in the cluster could occur. Finally, clusters could undergo no change whatsoever.

As pointed out in the 3.1, the focus of this section is on the first type of development, assimilation, as it can provide crucial evidence for LR. Assimilation of newly formed clusters is widely described in the handbooks on English historical phonology, e.g., Sievers (1899), Bülbring (1902), Cook (1903), Sweet (1924), Flom (1930), Brook (1955), Campbell (1959), Brunner (1960), Wardale (1960), Quirk & Wrenn (1963), Luick (1964), Pinsker (1976), and Hogg (1992). Pinsker (1976: 79) argues that the change took place from the 8th to the 11th century. However, Luick (1964: 858) claims that most assimilations discussed below date from pre-OE as they were recorded from the very start in OE manuscripts. Luick (1964: 858) and Hogg (1992: 299) indicate that the patterns exhibited by the assimilation process seem to be conditioned by laryngeal values in the consonants of the cluster. Assimilation, both

progressive and, more frequently, regressive, took place only when these differed. The reason that these data are important is the general observation in the handbooks that assimilation appears to have exclusively taken place to what is traditionally called 'voicelessness'. For example, orthographically, assimilation in a <td> cluster always seems to result in a <tt> cluster, and never in a <dd> cluster. If this is the case, then English can be argued to have been a |spread| language in LR from its very beginning. This is discussed in more detail in sections 3.2.2 and 3.2.3.

Hogg (1992: 299) and Campbell (1959: 193) indicate that laryngeal assimilations involving the fricatives /f, s, θ/ are not orthographically represented. In addition, Hogg argues that a certain sound may have undergone 'voicing' before syncope and then 'devoicing' after syncope: e.g., West Saxon *drifst* from **drifest* > **drifest* (<f> is [v] due to inter-sonorant 'voicing' of the fricative) > **drifst* (syncope, <f> is still [v]) > *drifst* (laryngeal assimilation, <f> is [f]). However, fricatives are not interpreted in any tradition to have been underlyingly 'voiced' in OE. They were 'voiceless' and only 'voiced' in inter-sonorant position. Therefore, it could be argued that when /ə/ syncopated, the 'voicing' trigger for /f/ was removed and that it is, therefore, expected to surface as 'voiceless' (Patrick Honeybone: p.c.).

Stops were contrastively specified for laryngeal features in the orthography, and orthographic change can show laryngeal change, e.g., <milds> 'mercy' becomes <milts>. Therefore, laryngeal assimilation can be visible in consonant clusters containing stops, for example, in clusters like <ds>, <ngs>, and <ngþ>, which became <ts> in the first case and <ncs> in the other two, due to place assimilation from /θ/ to /s/ in the last case. The change was also represented orthographically in the fricative /ɣ/, spelled <g>, which changed to /x/, spelled <h> (Luick 1964: 858, Hogg 1992: 299, Campbell 1959: 193). Hogg argues that these kinds of examples show that the assimilation was a real change. Therefore, it is plausible that the same process affected the fricatives /f, s, θ/.

Luick (1964: 855) and Hogg (1992: 300) show that progressive assimilation to 'voicelessness' occurred in clusters of a 'voiceless' obstruent followed by /d/. In this context /d/ became 'voiceless' /t/, as shown in (1 a-f).[22] All examples in (1a-f) involve instances of the past-tense inflectional ending.[23] This ending underwent a similar process in the 14th and 15th centuries, which is discussed in detail in 3.2.1. Hogg

[22] C1 is the first consonant of the cluster and C2 is the second consonant of the cluster.

[23] Sievers (1899: 116) gives one case of progressive assimilation outside the past-tense inflectional ending, namely, assimilation of /g/ to /k/: *cræftca, cræfca* 'strong' (<*cræftiga*).

(1992: 300) notes that these examples are numerous and regular. Reconstructed forms, indicated in brackets after the PDE gloss of the word, were only provided for some of the words in the handbooks. Therefore, they are not indicated for every single form in (1) either.

(1) *C1= 'voiceless' obstruent, C2=/d*: */d/ > /t/*

a. /pd/ > /pt/

cēpte	'kept'	(<*kōpida)
ypte	'opened'	
slæpte	'slept'	

b. /td/ > /tt/

mētte	'met'	(<*mōtida)
grētte	'greeted'	
sette	'set'	(<*set(e)de)

c. /kd/ > /kt/

īecte	'increased'	
drencte	'drank'	(<*dronkida)
wyscte	'wished'	
scencte	'poured out'	

d. /fd/ > /ft/

pyfte	'puffed'

e. /sd/ > /st/

cyste	'kissed'	(<*kussida)

f. /xd/ > /xt/

līhte	'shone'

According to Sievers (1899: 108), [s] in <cyste> (<cyssan) quite probably contrasted with [z] in <liesde> and <ræsde> from *liesan* and *ræsan*. If /s/ had been 'voiceless' in the latter two, then /d/ would have assimilated to it to give *<lieste> and *<ræste>. The difference between these two types of forms is discussed in more detail in 2.3.2.4.

Sievers (1899: 104) notes that a development similar to the examples in (1) took place in compounds, as shown in (2):

(2) *Progressive assimilation of /d/ to /t/ in compounds*

mētsceat	'reward, money'	(<mēd-)
mettrum, metrum	'infirm'	(<med+trum)
antsacodon	'adversary'	(<and-)
gesuntfulness	'health'	(<gesund-)

Flom (1930: 37) also gives *gesynto* 'health' (<*gesyndþo*, cp. OHG *gasuntida*). Luick (1964: 855, 858) points out that there is no real evidence of assimilation in /θd/ clusters, for which /θt/ or /tt/ would be the expected outcome.

Hogg (1992: 300) and Campbell (1959: 323) indicate that <d> spellings are rare and most often found in the Lindisfarne Gospels: e.g., *gegrippde* 'he gripped', *slepde, slepdon* 'he, they slept', *geneolecde* 'he approached'. The last form is especially frequent alongside occasional *geneolecte.* Hogg also gives some rare examples from outside the Lindisfarne Gospels; he notes *hyspdun* 'they mocked', also noted by Campbell (1959: 323), and *ræfsde* 'he seized'. The fact that spellings were practically restricted to one manuscript could indicate that /d/ pronunciations were also rare and possibly restricted to a limited number of dialects of OE. This would then show that the process was generally widespread for the past-tense suffix forms.

Cases of regressive assimilation are more numerous. In (3) assimilation of /g/ to the following /t/ can be observed (Luick 1964: 855 and Hogg 1959: 299).

(3) *C1=/g/, C2=/t/: C1>/k/*

lencten	'spring'	(< *langitīn)

Assimilation of various 'voiced' consonants to a following /s/ is illustrated in (4a-d). The dental fricative /θ/, surfacing as [ð] in inter-sonorant position, also underwent

place and manner assimilation to the following alveolar stop (Luick 1964: 855-856; Sievers 1899: 104, 116 and Campbell 1959: 322-323). As can be seen, assimilation is especially common in second person singular forms. In examples (4,c,d) phonetic brackets have been used to indicate [ɣ]. This is because this sound was not phonemic in OE but only occurred in predictable inter-sonorant position, as described before.

(4) *C1= 'voiced', C2=s*: *C1* > *'voiceless' and dental fricatives* > *alveolar stops.*

a. /ds(t)/ > /ts/

blētsian	'bless'	(<blōdisōjan > blēdsian)
miltsian	'pity(V)'	(mildsian)
milts	'pity (N)'	
gitsian	'covet'	(cp. Goth gaidw 'want')
etsīth	'a looking again'	
bintst	'you bind'	
stentst	'you stand'	
lætst	'you lead'	
fētst	'you feed'	
bīts(t)	'you wait'	
fints(t)	'you find'	
sents(t)	'you send'	
bits(t)	'you ask'	
ræts(t)	'you give advice'	
wielts(t)	'you dispense'	

b. /gs/ >/ks/[24]

ancsum	‘worried, closed’
geancsumian	‘vex’
anxumnysse	‘anxiety’
brincst	‘bring’
(gebrincst, brincð)	
Hencstes	Proper Name (beside Hengestes)

c. [ɣ]/st/ > /xst/ (>st)

līhst	‘you bend’
sprenst	‘you break’
līhst	‘you lie’
stīhð	‘you climb’

d. [ɣ]/f/ > /xf/

sorhful	‘sorrowful’
hohful	‘covered’

Luick and Sievers (1899: 104) point out that the change was not always represented in the spelling and that there are etymological writings: *blēdsian*, *bloedsia*, *mildsian*, *findst*, *finds* etc. In addition, Quirk and Wrenn (1963: 138), Campbell (1959: 323) and Wardale (1960: 60) point out that the process did not take place regularly in all dialects. Anglian tended to retain unsyncopated forms of the pre-OE endings <–is> and <–iþ>. These became <–es> and <–eþ> in historical times. The process was also not always rendered in the orthography regularly. Sievers notes that the pronunciation of /n/ plus velar plosive clusters in assimilation contexts was probably /ŋk/ even if they were written <ng>. <ancsum> is infrequent alongside usual etymological <angsum> and <brincst>, <gebrincst> and <brincð> are rare next to forms with <ng>. The frequency of <ng> spellings could indicate that the pronunciation was also /ŋg/. However, Sievers argues that the pronunciation as /ŋk/ appears from the occasional substitution of <ng> for original /ŋk/ in e.g., *dringð*

[24] Luick (1964: 859) points out that this only happened to guttural /g/, Palatal /g/ was unaffected and remained 'voiced'.

'drinks' and *ðingþ* 'seems'. The fact that spellings with <c> are found indicates that the dominance of <ng> spellings does not disprove that the process took place in these forms. The process can be argued to have taken place and to have been noticeable enough to have been represented in the spelling sometimes.

Another case of regressive assimilation presented in the handbooks involves assimilation of a 'voiced' first consonant to a following /θ/ as shown in (5a-d) (Luick 1964: 856-857; Flom 1930: 37; Campbell 1959: 323 and Hogg 1992: 299). As pointed out above, /θ/ assimilates in place and manner to a preceding alveolar stop.

(5) *C1= 'voiced'*, *C2= /θ/*: *C1 > 'voiceless'*

a. /dθ/ > /tt/

ofermēttu	'over courage'	(<*ofermēdþu <*ofermōdiþu)
gesyntu	'health'	(<*gesundþu< *gesundiþu)[25]
bitt	'he waits'	(<*bidiþ)
fint	'he finds'	(<*findiþ)
sent	'he sends'	(<*sendiþ)
rit	'he rides'	(< ridþ < *rideþ)
mitty	'during'	(next to *mid þy*)
lāttēow	'leader'	

b. /gθ/ > /kθ/

lencþ(u)	'length'	(<*langiþo)
strencþ(u)	'strength'	(<*strangiþō)
brincþ	'he brings'	(<*bringiþ)

c. [ɣ]/θ/ > /xθ/

bīhð	'he bends'	(<bīegan)
giohð	'youth'	(<geoguð)

d. /ngθ/ > /nkθ/

glencð	'he adorns'	(<glengan)

[25] Quite probably in the unsyncopated ancestor form the fricative was still voiced; it occurred in a position in which fricatives voiced, namely between sonorants. However, it can be assumed that after syncope the fricative lost its voicing due to not being in this position anymore.

Campbell (1959: 323) points out that "Analogical modification of these processes is frequent…". Etymological *lādtēow* (< *lādþēow*) for *lāttēow* occurs, but the latter is more frequent. An <ng> spelling also occurs in the first two forms in (5b) under the influence of *long* and *strong*. Also *brincþ* is usually written *bringþ* due to the other forms.

Full assimilation of segments, which led to gemination, took place in restricted circumstances (Luick 1964, Hogg 1992, Quirk & Wrenn 1963). Interestingly, these cases generally look like assimilation to |voice|. As pointed out several times before, according to LR, this would not be possible in an aspiration language like English, in which all assimilation is predicted to be to |spread|. Consequently, occurrence of assimilation to |voice| would pose problems for the framework. The first set of cases presented is generally described as assimilation of a 'voiceless' fricative to a following nasal or liquid. Hogg (1992: 300-301) points out that full assimilation was generally rare. Assimilation was almost entirely restricted to /f/ although occasionally /s, x/ and the plosive /p/ were also affected. He notes that labials only display a partial shift in that they do not entirely assimilate in place of articulation: assimilation always results in /m/, so /fn/ becomes /mn/. Data are given in (6). The geminates in the first two forms have simplified to single consonants (Luick 1964: 857-858).

(6) *Complete assimilation.*

ūre	'our'	(<ūsre)
īren	'iron'	(<īsren)
wimmon	'wife'	(<wīfmon)
hlammæs	'1st of August'	(<hlæfmæsse)
emn	'even'	
hremn	'raven'	
stemn	'voice'	
nemne	'unless'.	
wæmm	'wapon'[26]	

Luick (1964: 858) argues that a similar case of full assimilation took place in some forms of *hēah* 'high'. /h/ assimilated to the directly adjacent nasal or liquid as in

[26] This example obviously also shows place assimilation of /n/ to /m/, even though Hogg does not explicitly mention it.

hēahne > lWS *hēanne*, *hēahra* > lWS *hēarra*, *hēahre* > lWS *hēarre*, and *hīehra* > lWS *hīerra* 'higher'. Luick points out that the original forms *hēane, hēara, hēare, hīera* still existed next to the new forms. Luick claims that similar developments failed for other adjectives ending in /x, f, s/. He argues that such forms were used less frequently, and consequently, analogical pressure of the other cases was stronger.

However, there are some problems with these data. First of all, it is unclear whether they constitute assimilation at all. Hogg (1992: 301), Quick & Wrenn (1963: 143) and Patrick Honeybone (p.c.) point out that the latter development is most probably not assimilation but a special instance of loss of /h/ between a vowel and a resonant with compensatory lengthening of the resonant. Secondly, the interpretation of the laryngeal state of the fricatives in most handbooks seems to be fundamentally flawed. Although most handbooks argue that these cases consist of the assimilation of 'voiceless' fricatives to nasals and liquids, it was discussed briefly at the beginning of this section that 'voiceless' fricatives were 'voiced' in exactly the environment that is discussed here: between sonorants. It is, therefore, very doubtful that these fricatives were 'voiceless' at all.

Most importantly, even if these cases could be argued to be assimilation to |voice| in any way, they would still be irrelevant to the discussion here. As pointed out before, this thesis is concerned with the laryngeal specification in obstruents in English. It was argued in 2.3.2.5 that sonorants in English are not distinctively specified for |voice|, so assimilation of the fricative to the feature seems impossible. However, even if sonorants were specified for |voice|, and, therefore, there was evidence for |voice| assimilation of the fricatives, there would not be a problem for LR. In this thesis, the underlying specifications of obstruents are looked at. Therefore, the data above are entirely unproblematic. If evidence of assimilation of a fricative to a following 'voiced' obstruent was found, this would be problematic because obstruents are not expected to be specified for |voice| in LR.

However, although the above cases are not problematic for the framework, Hogg (1992: 302) notes a few further cases of full assimilation and, crucially, one of these may actually constitute assimilation to a |voice| specification in an obstruent. The first two cases are unproblematic as in both cases assimilation ntakes place to expected 'voicelessness'. Full assimilation can occur in a sequence of an alveolar stop and fricative. They develop as geminate /tt/. This assimilation takes place frequently and regularly, and is shown in certain examples above. Secondly, the sequences /θs/ and

/sr/ both turn into the geminate cluster /ss/, e.g., *cwist* (<*cwiþst*) 'thou sayest' and *læssa* 'less'.

However, it is the third instance pointed out by Hogg (1992: 284), Campbell (1959: 194) and Brook (1955: 32, 72) which possibly poses a challenge for LR. Hogg points out that in late texts reverse assimilation of the cluster <ðd> to <dd> can be found, e.g., frequent *cydde* 'he declared' which occurs far more often in Ælfrician and contemporary texts than the usual earlier form *cyþde*. Campbell notes that the change can be found in late West Saxon and late Northumbrian, e.g., in the Rushworth Gospels. Brook argues that generally stems in <þ> show assimilation of <þd> > <dd> in the past tense. The spelling *cydde* could indicate assimilation to a |voice| specification in the suffix obstruent /d/ of what is expected to be a 'voiceless' /θ/. /θ/ is expected to be 'voiceless' because it is not in inter-sonorant position. This case will be returned to in detail in section 3.2.3.2 where other possible counter-examples to LR are discussed.

3.2.2 Testing the data

3.2.2.1 Reasons for testing

As pointed out in 3.1, the data presented in 3.2.1 are important for two main reasons. Firstly, if all laryngeal assimilation in (pre-) OE indeed exclusively took place to what is traditionally called 'voicelessness', or |spread| in LR, then these data provide crucial evidence for an analysis of English as an aspiration language in this framework. In chapter 2 it was explained that this situation is predicted for the laryngeal phonology of English under LR because |spread| is the only active feature in the obstruent laryngeal phonology of English. Therefore, only this feature can actively spread to neighbouring segments in assimilation processes. |voice| is unspecified and cannot be randomly introduced in feature specifications due to the local source constraint, hence the asymmetry.

The second reason why these data prove to be crucial for the arguments presented in this thesis, if their interpretation proves to be correct, is that they provide evidence that |spread| has been the active feature in the obstruent laryngeal phonology of English since at least its first attestations. Therefore, these crucial data merit a detailed investigation beyond the handbook descriptions.

3.2.2.2 Methodology

Before checking, I needed to gain a more complete overview of the data than the one gained from a preliminary search for data and descriptions in the most prominent handbooks on OE phonology (e.g., Luick 1964 and Hogg 1992). Therefore, as for all the other data presented in this thesis, I first conducted an extensive search for back-up material in a large number of handbooks and journal articles, which gave me as full a picture as possible of the different data and descriptions offered within these resources. This search resulted in the data set and descriptions provided in section 3.2.1.

In order to check the data further, I had to make a decision between two possible lines of investigation that could be adopted. The first option was to conduct a search for counter-examples to the assumption in LR that all laryngeal assimilation in a |spread| language is to |spread|. In other words, I could search for cases where assimilation to |voice| is evident, e.g., double 'voiced spellings' like <dd> for original <td> or <dt>. The second option was to look at the frequency of the spellings showing assimilation, e.g., <tt>, and comparing their frequency to the frequency of spellings indicating exceptions to the process, e.g., <td> or <dt>.

I decided that the first option is essential to the argument presented here. Obviously, if cases indicating assimilation to |voice| were to be found in significant numbers this would present a major problem for the claims made by LR. English cannot have an active |voice| specification in the privative framework adopted in this thesis. The second option would be interesting but not essential. Such an investigation would certainly shed more light on the frequency of the process. Therefore, it could indicate how regular and established the process was in OE. Many exceptions could point at the fact that the process was not fully established. However, infrequency or failure of the process in certain cases would not shed light on the occurrence or non-occurrence of the process in general or whether reverse assimilation to |voice| took place or not. It is already known that there were exceptions to the process. They have been noted in the handbooks and often explained as etymological spellings. Moreover, the very fact that there are spellings in which laryngeal assimilation is apparent means that something did happen phonologically. Failure of assimilation does not mean that |spread| was not specified in the phonology of English. In other words, all such an investigation would show is that the process did take place but that there were exceptions in recording it in the spelling. This would be worth doing, but,

due to time constraints, I focussed on the option that is more important for the claims made in this thesis: checking for the occurrence of spellings that possibly show reverse assimilation to |voice|.

A consequence of this line of investigation is that the data set to be examined had to be restricted to double stop clusters. As mentioned in 3.2.1, stops were marked for laryngeal values orthographically, and therefore only they can reliably show possible laryngeal assimilation to |voice| in clusters. Stop-fricative clusters cannot provide this evidence because laryngeal distinctions were not orthographically indicated in fricatives. Therefore, it cannot be seen whether they assimilated to |voice| or not. The only clusters containing a fricative that I included in the investigation were clusters containing <h>: /x/, which might indicate assimilation to |voice| when spelled <g>: [ɣ]. Therefore, there is a chance that clusters containing the velar fricative could also indicate |voice| assimilation orthographically, and so clusters containing it need to be taken into account.

In order to search for possible counterexamples to the process of exclusive assimilation to |spread|, I used the *C11 database*, provided by the centre for Anglo-Saxon Studies at the University of Manchester (http://www.arts.manchester.ac.uk/mancass/C11database/, accessed 09/01/08) and the *Dictionary of Old English Corpus* or *Toronto Corpus*. According to the website of the project, the C11 database (C11) consists of "An Inventory of Scripts and Spellings in Eleventh-Century English" and "The manuscript catalogue contains details of more than 250 eleventh century manuscripts in English in 47 major collections worldwide". On the website of the *Dictionary of Old English* corpus (DOE) (http://www.doe.utoronto.ca/about.html, accessed 09/01/08), it is pointed out that this computerised corpus forms the basis of the Dictionary of Old English, "…which defines the vocabulary of the first centuries (600-1500 A.D.) of the English language". The computerised corpus contains at least one copy of each surviving OE text, comprising prose, poetry, glosses to Latin texts and inscriptions originally written on parchment, carved in stone and inscribed in jewellery. I used both these corpora because they complemented each other. C11 is still being completed, and, therefore, does not contain every text yet. It does contain instances from multiple manuscripts of each form which currently occurs in the database. DOE contains one copy of every text written in OE but consists of a much more limited number of manuscript entries for each form, which means that it contains less variants of each

form. Therefore, DOE contains more forms and C11 provides more extended lists of variants for each form it contains.

Before starting the proper investigation of forms, I had to extend the data set. Even after the extensive search of the handbooks, I still had only a limited number of examples with medial stop-stop clusters. I used the data found in the handbooks to establish the types of medial clusters to be looked for. That yielded the following list of clusters: <-pb->, <-pd->, <-pg->, <-tb->, -<-td->, <-tg->, <-cb->, <-cd->, <-cg->, <-bp->, <-bt->, <-bc->, <-dp->, <-dt->, <-dc->, <-gt->, <-gc->, <-hb->, <-hd->, <-hg->, <-ncb->, <-ncd->, <-ncg->, <-ngp->, <-ngt->, <-ngc->. I then used the software programme *Oxford Wordsmith Tools 4.0* (WS) to search the DOE for more possible data forms with these medial clusters.

WS "is an integrated suite of programs for looking at how words behave in texts" (http://lexically.net/downloads/version4/html/index.html, accessed 15/01/08). For my research, I used the 'wordlist' and 'concord' tools provided in WS. Wordlist automatically generates alphabetical and frequency based wordlists based on one or more plain text files (ASCII or ANSI). The programme can also be used to generate an index (http://www.lexically.net/downloads/version4/html/index.html, accessed 15/01/08). Concord generates concordance lists, which are generally used to see words in context (http://www.lexically.net/downloads/version4/html/index.html, accessed 15/01/08).

I mainly looked for compounds because in these forms there is a significant possibility that stops with different laryngeal values will come together. For compounds containing <g>, I paid attention to forms in which /g/ could have undergone palatalisation to /j/ in the context of front vowels. Such forms would not provide good data because only the laryngeal specifications of obstruents is investigated and /j/ is a sonorant.

I then used the wordlist tool to create an index of the words in all texts in the DOE corpus, and then the concord tool to make a concordance of this index in plain-text. The reason for the use of concord is that the programme allows searches for medial clusters. When, for example, the sequence *bp* is inserted in the search box, then concord will look for all entries of the sequence <bp> in medial position, in a given text. The asterisks mean that the sequence can be followed or preceded by any segment, hence assuring that only words with medial <bp> sequences show up. The search with concord rendered a large number of forms and greatly extended the data

set. I used Clark Hall (2004) to establish the meanings of the forms. I gathered the new data and created an alphabetical table containing all newly found forms and the forms already found in the preliminary searches of the handbooks. I then made a list of possible spelling variants in the stressed vowels and some consonants. This had to be done in order to be able to search for every possible occurrence of a word when looking for possible assimilations to |voice|. I searched for possible spelling variants using C11 and Clark Hall (2004). This led to the compilation of a full data list complete with spelling variations, which can be seen in appendix I.

The next step was a search of C11 and a search of the DOE in WS. Within C11 I used the "Search Items for Words or Stems" function, and within this function I entered words in their dictionary forms. The C11 corpus then came up with a list of results showing all spelling variants of a particular word. Therefore, it was not necessary to actively search for forms with assimilation to either |voice| or |spread| because if such forms existed, C11 would automatically show them. It would also automatically show forms with spelling variations in the stressed vowels, and certain consonantal spelling variations. I looked for the derivational forms showing assimilation in, e.g., *mette* 'met', and if the search gave no results for the derivational forms I looked up the underived forms, e.g., *metan* 'to meet', and possible unassimilated forms, e.g., *metde* in order to make sure that the assimilated variants did not come up under different entries.

Many forms did not come up in a search of C11 when I looked for their dictionary forms. This is indicated by '*C11' in appendix I. In those cases I did look for forms which possibly showed assimilation to |voice| and entered the form with possible spelling variants of the vowels. For example, for *acbeara* 'oak grove' I entered the dictionary entry *acbeara*, but when that rendered no results I entered *acbear**o**, a**gb**eara,* and *a**gb**ear**o***. A full overview of the forms that I looked up can be found in appendix I. As can be seen from appendix I, all words for which the dictionary form did not occur in the corpus, also do not show up under a spelling indicating assimilation to |voice|.

In order to search the DOE, I made an index of all DOE files in WS. I then looked up words alphabetically. Contrary to my search of C11, this time I was not looking for dictionary forms but specifically for forms with assimilation to |voice|. I also checked all possible spelling variants, e.g., for the form *campdom* 'military service, warfare' I checked whether there were words beginning with *cambd-, cembd-, cæmbd-, kambd-,*

kembd-, kæmbd- , again, see appendix I for a full list. I also checked shorter forms of the words, e.g., *wog*, in the case of *wohbogen* 'bent, crooked', *wohdæd* 'wrong deed, sin, temptation, seduction'*, wohdom* 'unjust judgement'*, wohgod* 'false god, idol' in case the forms would come up in the concord.

I looked for two sorts of possible counter-examples to the claim that all assimilation in OE was to |spread|. I obviously looked for forms which contained a double 'voiced' spelling. I found none of those in DOE but two in C11, which will be considered in detail below. Secondly, I looked for forms which could possibly have simplified geminates or forms in which one of the consonants in the cluster may have been lost, and in which the remaining consonant appeared to be voiced. For example, *mede* could be a form of *mette* 'met' in which the medial cluster had previously been voiced with following degemination. Similarly, *abrodene* and *abrodone* could be forms of *ætbregdan* 'to take away, carry', in which laryngeal modification of /t/ took place and the consequent /d/ was lost. In order to know whether these forms constituted possible counter-examples, I first had to verify whether they were actually forms of the same lexeme as the original forms. Therefore, I checked the meaning of each possible counter-example in context with WS concord.

3.2.2.3 Results

Appendix I shows the results of the search. The first column shows that a total of 120 forms with relevant medial clusters were investigated. Of these, 71 forms did not occur in their dictionary form in C11. As pointed out above, this is indicated by '*C11' in the fourth column. I also pointed out above that within C11 I searched for the original or dictionary forms. If such a form occurred, then C11 would automatically render a list of all spelling variants of the form in question. However, as briefly pointed out above, in the *C11 cases I also looked for possible variants that the form could be listed under, these possible variants are shown in the third column in appendix I and mainly involve alternate spellings for the stressed vowels. In some cases alternate spellings for consonants are also considered. For example, it can be seen from forms 95 to 115 in appendix I, that I consider possible <uu> or <u> spellings for <w>. However, nonetheless none of them occurred in the database. All of the 120 forms in appendix I occurred in DOE, as can be seen from the fifth column in appendix I. Possible counter-examples to the claim that all assimilation in OE was

to |spread| are indicated in bold in the fourth and fifth column of appendix I. When no possible counter-examples were found, this is indicated by a '0'.

I found practically no problematic forms in the corpora. However, there were some instances of possible simplified clusters or geminates. I pointed out above that these forms, in which the orthography now indicates a single consonant which might be specified for |voice|, e.g., *mede*, could be the result of cluster simplification in *medde*, which could indicate assimilation to |voice| in *metde* 'met'. In other words, if they can be shown to be variants of the lexemes searched for in the corpora, which apparently have a single non-|spread| consonant in the orthography, then they could be the result of assimilation to |voice| in the cluster followed by simplification. As shown in table 1 below, five of these occurred, most of which were found in DOE.

Possible counter-example	Supposed original form	Attested in
a. <abrodene> b. <abrodone>	<ætbroden>	a. in C11 & DOE b. in C11
a. <mugwyrt> b. <mugwurt> c. <mugwert> d. <mugvyrt>	<mucgwyrt> <mugcwyrt>	DOE (all forms)
<rædingum>	<rædincgum>	DOE
<mede>	<mette>	DOE
<hade>	<hatte>	DOE

Table 1: possible counter-examples in forms which could have simplified clusters or geminates.

In the case of *abrodene* / *abrodone* a number of example sentences from C11 below show that the meaning of the form can be seen to be ambiguous between *ætbregdan* 'to take away/carry' and *a* 'forth/away' +*bregdan* 'to move quickly' as can be seen in the following example sentences:

(7) a. …heo sculan beon of godes yrre **abrodene**…
…they shall be from God's anger carried/moved away…'
'**…***they shall be carried/moved away from God's anger…*'

b. …ac þurh cristes tocyme we wurdon **abrodene**…
…but through Christ's coming we became carried/moved away'
'**…***but through the coming of Christ we were carried/moved away…*'

Due to the similarity in meaning of the two lexemes it is difficult to see whether the forms belong to the one or the other. If they belong to *a+bregdan* then obviously there has been no assimilation to |voice| and removal of the alveolar plosive because it was not there in the first place. If the forms belong to *ætbregdan* on the other hand, then laryngeal modification of /t/ may have occurred followed by loss of the resulting /d/. However, equally plausible and simpler would be simple loss of /t/ without previous laryngeal modification in these cases. Therefore, even if the words would be simplified forms of *ætbregdan*, no evidence exists for a /db/ state preceding loss of the alveolar segment.

The cluster simplification theory, both with laryngeally modified and unmodified /t/, seems unlikely as whole. The handbooks (e.g., Campbell 1959, Hogg 1992) make no mention of a process of cluster simplification in non-geminate double consonant clusters in OE. Simplification is common in triple consonant clusters and geminates. A cluster simplification account would have been more plausible if it would have been a regular process in the phonology of OE. Therefore, it seems unlikely that any simplification took place in this form, and it seems plausible that *abrodene* and *abrodone* are actually variants of *abregdan* and not of *ætbregdan.* For these reasons these forms will not be considered counter-examples to the claim that all assimilation in OE was to |spread|.

The rest of the forms to consider in table 1 consist of cases where possible laryngeal assimilation to |voice| could have given rise to voiced geminates. These then later underwent degemination and left simple voiced obstruents, as in the *metde* example above. Degemination was a regular process in OE (e.g., Campbell 1959: 183-184 and Hogg 1992: 293-296), and so would have been more plausible than the possible simplification of the non-geminate clusters above. None of these forms turns

out to be a counter-example to exclusive OE assimilation to |spread| on closer examination, though. The forms concerning *mucgwyrt* / *mugcwyrt* do not appear to be relevant. The orthographical cluster <cg> / <gc> does not represent a laryngeally distinct cluster but initially /k̟k̟/ and later /tʃ˚/ (e.g., Campbell 1959: 21 and Wardale 1960: 8). It is also part of the stem, rendered *micg* or *mycg* in Clark-Hall (2004), the ancestor of PDE *midge*. Therefore, laryngeal modifications, if any, took place in the original stem and not because two consonants were brought together due to compounding or syncope, i.e. the word is *mucg* + *wyrt* and not *mug*+*cwyrt* or *muc* + *gwyrt*.

Laryngeal modification of an obstruent by /w/ is irrelevant because it is a sonorant, and therefore spontaneously voiced anyway. Germanic cognates also seem to evidence a laryngeally neutral final consonant although there are some which seem to have /k^{h}/. The *Oxford English Dictionary* (OED) argues that the *midge* is cognate with Middle Dutch *mugghe*, (rare) *mucke*, probably from several different Germanic bases, Old Saxon *muggia*, Old High German *mucca*, *muck*, *mugga*, Norwegian *mugg*, *myg*, Old Swedish *myg*, neuter, *mugga*, *mygga*, Danish *myg*, and Old Icelandic *mý*, Norwegian (Nynorsk) *my*.[27] Therefore, *mucgwyrt* / *mugcwyrt* cannot be considered a counter-example to LR. The form *rædingum* is rendered as the normal spelling in Clark-Hall (2004). Therefore, the form *rædincgum* is the extraordinary one. The forms could represent a spelling or editing mistake, but whatever it represents no laryngeal modification of /k/ by a voiced /g/ has taken place.

The remaining forms in table 1, *mede* and *hade* can be discarded simply because they belong to different lexemes than their supposed original forms. Linda van Bergen (p.c.) points out that *mede* is a noun, which could be either a form of *med* 'reward, pay, price' or the noun *mede* 'consent, goodwill, pleasure'. In the contexts in which I found the word, it always had one of these two meanings. Therefore, the forms that I found cannot be the voiced degeminated form of *mette.* Similarly, *hade* is not a spelling variant of *hatte* but corresponds to the PDE suffix *-hood* as in *neighbourhood.*

Therefore, the forms above are disregarded as possible counter-examples to the claim that all assimilation was exclusively to |spread| in Old English. This moves the investigation to a search for spellings which seem to indicate clusters specified for |voice|. It was pointed out above that clusters with, e.g., <dd> for original <td> or

[27](http://dictionary.oed.com/cgi/entry/00309185?single=1&query_type=word&queryword=midge&first=1&max_to_show=10, accessed 01/02/08).

<dt> could indicate assimilation to |voice|. Finding spellings like these could obviously present potentially serious problems for LR. It can be seen from appendix I that my search of the databases yielded just two forms which could indicate a voiced intermediate cluster.[28] These are *go**dg**undlice* and *go**dg**undra*, which both belong to the original lexeme *go**dc**und* 'religious, sacred, heaven-sent'. The <dg> spelling could indicate that assimilation of original /k/ to /g/ took place. This then would be assimilation to the feature |voice|. Both forms occur in C11 but neither can be found in DOE. This is expected, as it was pointed out above that DOE contains in most cases just one version of each text, whereas multiple versions of texts are included in C11.

However, the fact that these forms occur does not necessarily make them real counter-examples to the asymmetric assimilation to |spread| claim. In order to determine whether they were real counter-examples, they had to be investigated further. The first obvious step was to check what manuscript they occurred in. Details of the forms in C11 showed that both forms occurred in Ælfric's First Series of Homilies Catholic Homilies in Cambridge Corpus Christi College 198. *Godgundlice* appears in Innocents and *godgundra* in Epiphany. The examples can be seen in context in (8) (punctuation taken from Clemoes (1997: 221, 236)):

(8) Eornostlice ne breac se arleasa herodes his cynerices mid langsumere gesundfulnesse; ac buton yldinge him becom seo **godgundlice** wracu ðe hine mid mænigfealdre yrmðe fordyde.

Nu cweðað stunte men þæt hi be gewyrde libban sceolan; swilce god hi neadige to yfeldædum; ac we willað þyssera stuntera mannum ydele leasunge adwescan mid deopnysse **godgundra** gewrite;

The next step in the further investigation of these forms consisted of finding out whether they were written by the same scribe because the forms occurred in the same manuscript. If this were the case, then this particular form of the word would be limited to just one scribe. Ker (1957: 76, 82) provides detailed information on Cambridge Corpus Christi College 198 and the scribes who worked on it. He points

[28] The term 'voiced' is used again because, obviously, if assimilation to |voice| can be argued to have taken place in these clusters, then that term is justified because the cluster would carry the specification |voice| and, therefore, be voiced.

out that the part of it relevant to this investigation is the oldest part of the manuscript and was written in the early 11th century by four principal scribes. The catalogue in Ker (1957: 77) indicates that Innocents comprises folios 21 to 27 and Epiphany folios 34 to 43. Ker (1957: 82) points out that scribe (i) wrote folios 1 to 23, and scribe (ii) folios 24 to 87. Therefore, there is obviously a change of hands in folio 24. Since *Epiphany* comprises folios 34 to 43, this means that *godgundra* was certainly written by scribe (ii). However, the fact that the hand change between scribe (i) and scribe (ii) occurs on folio 24, almost right in the middle of Innocents, makes it difficult to determine what scribe wrote *godgundlice*. If this form occurs before folio 24 it was obviously written by scribe (i) and this would mean that the form was written by two different scribes. However, if the change occurs on or after folio 24 then scribe (ii) produced the form and the two forms would have been produced by the same scribe.

In order to investigate this further, I first checked an edited edition of Innocents by Clemoes (1997: 217-223) to see if the form occurred at the beginning or at the end of the text. Namely, if it occurred at the beginning, then it would have almost certainly have occurred before folio 24 and, therefore, it would have been written by scribe (i). If it would have occurred very close to the end of the text, then it would have almost certainly occurred after folio 24 and it would have been written by scribe (ii). However, it turned out that the form occurred very close to the centre of the text, in lines 124-125 out of 185 lines, and this made it impossible to argue with certainty whether the form occurred before or after the hand change. Therefore, I had to check the actual manuscript on microfilm to see on which folio the form occurred. This check revealed that the form occurs on folio 25, i.e. after the hand-change, so I can now argue with certainty that both forms were produced by the same scribe.

This is important in the assessment of the validity of these possible counter-examples because the feature can now be shown to be unique to this particular scribe. In other words, it is an idiosyncrasy of one scribe who could have had an odd linguistic history and it stands against every single other possible spelling in all the forms that I investigated. In addition, the forms are also unique to this particular manuscript and this particular lexeme. Together with the substantial evidence that assimilation to |voice| did not take place in all other data in appendix I, and the evidence for assimilation to |spread| presented in 3.2.1, it can be concluded that these forms do not present any problems for the assumption of LR that all assimilation in English is to |spread|.

A final possible counter-example, mentioned in the handbooks, was briefly discussed in 3.2.1. This is the form *cydde* 'made known'. In 3.2.1 it was pointed out that this form replaced earlier *cyðde*. Like the forms above, this form could indicate assimilation to |voice| and potentially pose problems for the assumption that all assimilation in English is to |spread|. Namely, this spelling could indicate that the fricative acquired a |voice| specification from the stop in the past tense suffix. The handbooks unanimously argue that the cluster in the original form *cyðde* was what they call 'voiced' (e.g., Luick 1964: 855, Campbell 1959: 20). Campbell (1959: 179) argues that there was no more distinction between 'voiced' and 'voiceless' fricatives between vowels by the time of syncope of /i/, a point which will be discussed in more detail below. He claims this can be seen in the past tenses of weak Class I verbs such as *cyðde* and also *ræsde* 'rushed'. Campbell (1959: 179) and Hogg (1992: 84) claim that if the spirants had been voiced in West Germanic they would have become /r/ and /d/. They must have 'voiced' before syncope of /i/, or the forms would have been **ræste, *cyþte*.

This last point is important because it shows that indeed these fricatives were presumably not specified for |spread| in a LR analysis. This is unlike their counterparts *pyfte* and *cyste*, presented in 3.2.1, in which assimilation to |spread| from the stem fricative to the stop of the suffix did occur. However, that does not mean that *cydde* provides a real counter-example to LR. It seems that what happened was not the extension of a laryngeal feature, |voice| in this case, from the stop of the suffix to the fricative of the stem because they already had the same laryngeal value. This value would be neutral in LR; both consonants were unspecified for laryngeal features. The assimilation that takes place is merely one of place and manner.

However, even if this is again not an instance of assimilation to |voice|, this form remains problematic. Namely, it is unclear why the fricative in *cyðde* is not specified for |spread|, whereas those in *pyfte, cyste* and *lihte* apparently are. This is proved by the fact that they trigger laryngeal assimilation of the following neutral stop. It was already pointed out above that *ræsde* behaves in the same way as *cyðde*, and therefore it is not the only possible counter-example. Section 3.2.3.2 will investigate this matter further and present an analysis of this seeming discrepancy. For now, it seems sufficient to note that *cyðde*, like all other possible counter-examples presented in this section, does not pose problems for LR. Therefore, the conclusion of the investigation of the data must be that all OE laryngeal assimilation was to |spread|, without

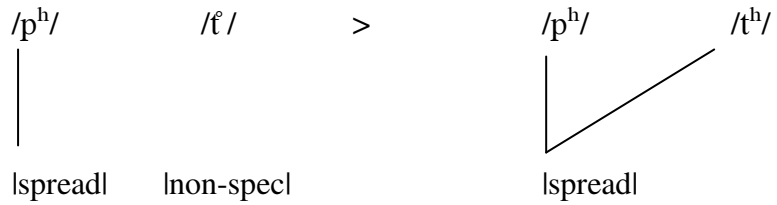
exceptions, exactly as is predicted by LR for an aspiration language. Therefore, it indeed seems that English has been an aspiration language since its very earliest attestations.

3.2.3 An analysis in Laryngeal Realism

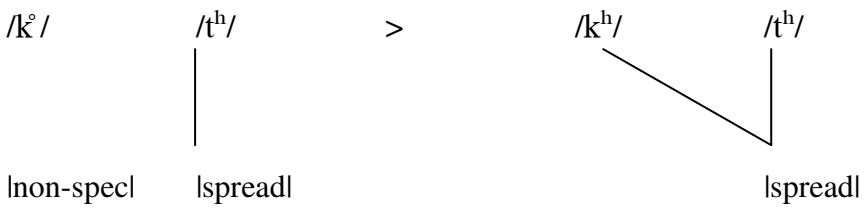
3.2.3.1 An analysis of stops

LR provides a straightforward analysis for the stop cluster data presented in 3.2.1 and appendix I. Since neutral stops are not specified for any laryngeal features, the |spread| specification can and does extend from the specification of the specified stop into the specification of the neighbouring neutral stop. This is illustrated in (9a) for regressive assimilation and in (9b) for progressive assimilation:

(9)a. *cē**pt**e* 'kept', original /p^h/ + /t̬/.



b. *len**ct**en* 'spring', original /k̬/ + /t^h/.



This analysis shows that |spread| is the only active feature in the laryngeal phonology of OE. The fact that forms like **cēbde* are never reliably found means that the feature |voice| is not active, and therefore, not specified. Assimilation processes, like all phonological processes, need a local source. If there is no feature |voice| in the underlying specification of English obstruents, then there is no local source for assimilation to |voice| as the feature cannot just be invoked out of nowhere. Therefore, an analysis in LR can capture the asymmetry of the process in favour of the feature |spread|. As pointed out in 2.3.1.3 and 2.4.1, an analysis which incorporates some kind

of |voice| feature cannot account for this. In fact, in such an analysis it would be impossible to explain why assimilation to 'voicing' never takes place. Therefore, LR not only provides an elegant analysis for these data but also a better one than a |voice| analysis.

A LR analysis of laryngeal assimilation also offers interesting evidence for the occurrence of phonological change in post-acquisition grammars, discussed in chapter 1. Acquirers do not yet have a phonological system. Therefore, they cannot know which features are specified in the language and which are not. There is in principle no reason why acquirers would not posit an underlying |voice| feature and consequent assimilation to |voice|. Speakers with a developed system do know that |spread| is the underlying, active feature in the phonology of English. They can therefore modify processes like assimilation to occur only to this feature. The child, then, at some point in the acquisition comes to realise that |spread| is the specified member of the opposition due to its activity in processes like these. It also comes to realise that |voice| is unspecified because of the inactivity of the feature.

3.2.3.2 The situation of fricatives in Old English

Presenting an analysis for fricatives provides somewhat more of a challenge. It was briefly pointed out in 3.2.2.3 that fricatives in forms like *cyðde* and *ræsde* do not trigger laryngeal assimilation of the neutral stop of the past tense suffix. Moreover, a search of weak Class I verbs in the handbooks (e.g., Blakely 1964; Brook 1955; Campbell 1959; Cook 1903; Lehnert 1955; Quirk & Wrenn 1963 and Wardale 1960) shows that there were more verbs with stem final fricatives which show the same behaviour. In the class of *cyðan* there are at least two more verbs *cwiðan* 'to lament' and *hyðan* 'to plunder' in which the dental fricative assimilated in place to the alveolar stop of the past tense suffix. In addition, there are a number of verbs with other stem final fricatives which have <d> in the past tense forms, like *ræsde.* A number of these are represented in (10) including the forms already discussed above. As pointed out in section 3.2.2.3, it is unclear why these fricatives behaved differently and, therefore, were apparently specified differently laryngeally, than other fricatives in similar positions like *pyfte* and *cyste*.

(10) *Verbs with stem final fricatives which do not cause assimilation to* |*spread*|

alie(y)san	'to set free'
gelie(y)fan	'to believe'
læfan	'to leave'
ræsan	'to rush'
cyðan	'to make known'
cwiðan	'to lament'
hyðan	'to plunder'
dræfan	'to drive out'
aliefan	'allow'

In order to tackle this mystery a clear overview of the laryngeal situation of fricatives in OE is needed. The view of the handbooks (e.g., Campbell 1959: 179-180; Wardale 1960: 53; Luick 1964: 844 and Hogg 1992: 282-283) is that a pre-historic general Germanic process of fricative 'voicing' in inter-sonorant syllable onset position took place.[29] This was already briefly hinted at in 3.2.1. They argue that the change affected /f/, /θ/ and /s/. /x/ had previously changed to /h/ in inter-sonorant position and, therefore, remained unaffected. Luick (1964: 845) also describes this allophonic alternation as a 'second fricative voicing' after the well-known Verner's Law, briefly described in the next chapter. He says that evidence for this can be found in the further developments of the fricatives and, importantly, the OE phenomena such as preterites like *getwæfde* 'separated', *līesde* 'loosened', and *cyðde* 'made known'. Like Hogg, discussed in 3.2.2.3, he argues that these forms indicate 'voiced' fricatives in the preterites of *twæfan, liesan* and *cyðan* because 'voiceless' sounds would cause laryngeal assimilation of the following consonant, as in *cyste* and *pyfte*.

Some examples of the process are given in (11) with the traditional representation of the pronunciation of the fricative.[30]

[29] Luick (1964: 848) points out that the process also took place in Old Frisian, Old Saxon and Old High German. Old Norse had the change in at least /f/ and /θ/, and the latter seems to have started voicing in the 6th century in North Germanic dialects. The first occurrence in the spelling of the development in /f/ was not until the 9th century in these dialects. The process was completed by 750 AD in Old High German. Luick argues that therefore the change must have spread through Germanic from North to South.

[30] As pointed out before, OE orthography did not have the means to distinguish between laryngeally neutral fricatives and fricatives specified for |spread|. Luick (1964: 844) points out that this orthographical situation remained until the adoption of French orthographical practices introduced: <u> (= [v]) for <f>. <z> generally occurred only rarely. Hogg (1992: 283) points out that in the very

(11) gere**f**a [v] ‘count, sheriff’
o**f**en [v] ‘oven’
ræ**s**an [z] ‘rush’
we**s**an [z] ‘to be’
ba**ð**ian [ð] ‘bathe’
clæ**ð**ian [ð] ‘clothe’

Luick (1964: 848) and Hogg (1992: 282) agree that the process can be explained as ‘inter-sonorant voicing’. It becomes clear from the analysis in the handbooks that ‘voiced’ fricatives were mere allophones of the ‘voiceless’ fricatives in a predictable inter-sonorant environment. Fricatives in OE were ‘voiceless’ in all other environments. However, in LR such a ‘voicing’ analysis in an aspiration language like English does not work. The feature |voice| is not specified in the obstruent laryngeal phonology of English, and can therefore not be added to the underlying specification of an obstruent without a local source. For that reason, a formalisation in LR of the laryngeal situation of fricatives in OE needs to be given.

In LR the above explanation by Luick and Hogg is interpreted to mean that all OE fricatives were distinctively specified for |spread|. The laryngeal modification in inter-sonorant position then can be analysed as the loss of that |spread| specification. In other words, no ‘voicing’, i.e. the addition of |voice|, takes place. The process implies no more than the loss of the |spread| specification. According to, e.g., Harris (1994), this process of feature loss can be interpreted as lenition. It gives rise to laryngeally neutral fricatives in inter-sonorant position, a prime lenition site. It will be shown in chapter 4 and 5 that additional so-called ‘voicing’ processes in the history of English are characterised in the same way.

It is assumed that, just like in PDE, inter-sonorant fricatives in OE could be fully voiced. However, instead of this being a result of active voicing, this can be seen as a result of passive voicing. As discussed in 2.3.2.6, this involves the extension of the vocal fold vibration of spontaneously voiced segments into a laryngeally unspecified segment. Spontaneous voicing would not be able to passively voice obstruents

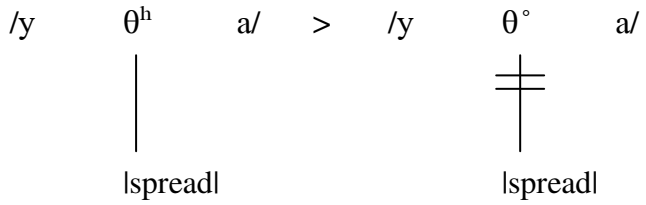
---

earliest texts scribes seem to be able to partly distinguish between labio-dental fricative [v], an allophone of /f/, and bilabial [β], an allophone of /b/. <f> is used for [v], e.g., *cefr* ‘beetle’, *hofr* ‘hump’, and <b> is used for [β], e.g., *halbae* ‘halves’, *sceabas* ‘sheaves’. Hogg does mention that a there already was a strong tendency to use <f> everywhere and substitution of <b> for <f> is much rarer.

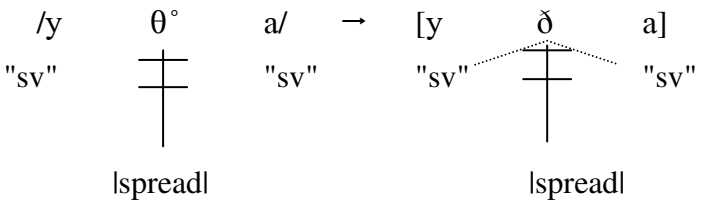
specified for |spread| because the active specification and consequent open glottis would prevent vibration of the vocal cords. However, when the medial fricatives lost their |spread| specification, they became susceptible to passive voicing from the adjacent spontaneously voiced sonorants. Laryngeal neutralisation and possible passive voicing are illustrated in (12a,b) for *cyðan*. (12a) represents neutralisation through delinking of the laryngeal node, and in (12b) the dotted line represents the spread on the surface of spontaneous voicing ("sv") into the now laryngeally unspecified obstruent.

(12) *cyðan* 'make known'

a. *neutralisation*



b. *passive voicing*



A preliminary formalisation of the laryngeal situation of OE fricatives is given in (13a,b)

(13) *OE medial laryngeal neutralisation, version (I)*

(a) OE fricatives were specified for |spread|.

(b) Inter-sonorant medial fricatives lost |spread|.

However, crucially for the analysis of the discrepancy between forms like *cydde* and *cyste*, Luick (1964: 845) notes an exception to the rule in (13b). Namely, geminate voiceless fricatives of all origins were not affected by the process. He argues

that this included geminate /$h^{h}h^{h}$/ in, e.g., *hliehhan* ‘laugh’ and *cohhettan* ‘cough’. When studying the infinitives of verbs which have a <–de> preterite in (10), and those that have a <–te> preterite, it can be seen that the latter either have geminate consonants in the stem, as in *pyffan* and *cyssan*, or that the stem consonants consists of a cluster of |spread| stops, as in *lihtan.*

It seems that the uninflected form played a part in the discrepancy between the otherwise similar forms, i.e. it seems that paradigm uniformity is at play here. Medial geminate |spread| fricatives and |spread| clusters did not lose their |spread| specification. This seems to equally apply to their reflexes in the preterite. However, if the preterite was derived from a form with an original single fricative, then loss of spread did occur. Therefore, the rule in (13b) seems to have to be extended to include these exceptions. There needs to be an additional rule which specifies that medial fricatives also lost their |spread| specification in non-inter-sonorant position when the stem consonant was an original single consonant. A new preliminary rule is set up in (14a,b)

(14) *OE medial laryngeal neutralisation, version (II)*

a. OE fricatives were specified for |spread|.
b. Medial fricatives lost |spread|, even in non-inter-sonorant position, iff their original stem consonant was a single consonant.

However, (14) does not capture the fact that there are forms which conform to this rule but nonetheless seem to have kept their |spread| specification, as indicated by their ability to devoice adjacent neutral stops. These forms are repeated from section 3.2.1 in (15a,b), this time with LR symbols.

(15) a. /t˚/ + /s^{h}/

mētsceat	‘reward, money’
antsacodon	‘adversary’
blētsian	‘bless’
miltsian	‘a looking again’

b. /t˚/ + /f^{h}/

gesuntfulness	‘healthfullness’

c. /t˚/ + /θʰ/

ofermēttu	‘over courage’
gesyntu	‘health’
mitty	‘during’
lāttēow	‘leader’

d. /k̊/ + /sʰ/

ancsum	‘worried, closed’
geancsumian	‘vex’
anxumnysse	‘anxiety’
brincst	‘bring’
(gebrincst, brincð)	
Hencstes	Proper Name

e. /k̊/ + /θʰ/

lencþ(u)	‘length’
strencþ(u)	‘strength’

f. /x̊/ + /fʰ/

sorhful	‘sorrowful’
hohful	‘covered’

As can be seen, these forms are very similar to *cyðde.* They occur in non-inter-sonorant position and are not in a cluster with |spread| obstruents. Nonetheless, they seem to keep their |spread| specification. At first glance, this seems difficult to explain. These cases could be instances of syllable final fortition of the preceding neutral stops. This would involve the addition of a |spread| gesture in syllable final position and is discussed in more detail in chapter 5. This would mean that all these data are not actual instances of assimilation and, in fact, all regressive assimilation data could then be classified as such.

However, as will be discussed in more detail in chapter 5, Bülbring (1902: 218), Brunner (1960: 375), Luick (1964: 865), and Hogg (1992: 287) point out that what they call ‘devoicing’ of final stops in OE was quite a restricted process. It occurred far

less often than devoicing of fricatives. It also mainly took place in word-final position, although Hogg gives some medial examples. Moreover, the handbooks argue that if it took place in medial position then it only occurred before a 'voiceless' consonant, and it only seems to have taken place in unstressed syllables. Therefore, there is no indication that final fortition of stops was a widespread development in OE. It became far more common in ME.

Moreover, there is a crucial difference between these non-inter-sonorant medial forms and forms like *cyðde*, namely their prosodic environment. In *cyðde* the fricative occupies the coda position in the syllable, whereas in the forms in (15) it occupies the onset. Codas are generally viewed as 'weak' prosodic positions. Harris (1994: 67-77), for example, observes that coda consonants are subject to phonotactic restrictions that do not apply to onsets. He states that in PDE in medial coda-onset clusters (i) nasal consonants cannot support a place contrast of their own, e.g., *pamper* but not **panper,* (ii) a coronal plosive cannot occur in coda position, e.g., *chapter* but not **chatper,*[31] (iii) a coda stop is only possible after a short vowel, e.g., /æptə/ but not */eyptə/, and, finally, (iv) a coda obstruent in VC rhymes is not distinctively specified for laryngeal features. The fact that coda position appears to be weak would render it a prime site for consonantal lenition. Processes taking place in coda position, such as wide-spread post-vocalic /l/ vocalisation, provide evidence for this point. Onsets are stronger than codas in that they enjoy more distributional freedom. Therefore, a process of lenition in onset position would be much less expected,[32] and it can be argued that the |spread| specification in the fricatives in (15) is therefore less likely to be lost than in coda position.

It seems that the specification in (14b) is not detailed enough, as it fails to incorporate the importance of prosody in cases of medial non-inter-sonorant loss of |spread|. The final version of the rule of OE laryngeal neutralisation is presented in (16), in which prosodic facts have been incorporated.

[31] Although forms like *bletsian* seem to contradict this for OE.
[32] However, it is shown in chapter 5 that laryngeal neutralization in onsets does take place in Middle English, and is therefore not entirely impossible.

(16) *OE medial laryngeal neutralisation, final version.*

a. OE fricatives were specified for |spread|.
b. Inter-sonorant medial fricatives lost |spread|.
c. Non-inter-sonorant medial fricatives lost |spread| iff they occurred in coda position and their stem consonant was a single consonant.

The final fricative data presented in 3.2.1, e.g., forms like *milts* 'pity', *brincþ* 'he brings' and *bitt* 'he waits' do not present any problem for the analysis. Harris (1994: 74) points out that final consonants are not subject to the same restrictions as coda consonants in medial rhymes and are contrastively specified for all features. He uses this behaviour as an argument for analysing final consonants as onsets of syllables with empty nuclei.[33] In addition, in many cases the final fricative can also optionally be followed by another |spread| consonant, e.g., *bits*(*t*) 'you wait', *fints*(*t*) 'you find'. The analysis above shows that apparent problematic forms like *cyðde* can be explained away successfully, and, therefore, pose no problem for LR.

3.3 Later assimilations

3.3.1 Middle English laryngeal assimilation

3.3.1.1 The process according to the handbooks

A process similar to the one described in section 3.2 took place at a much later period in the history of English. Luick (1964: 1071) and Lass (1992: 142) point out that a process of /ə/ syncope in unstressed final syllables led to the formation of new consonant clusters. This process was again followed by laryngeal assimilation. Luick argues that the development began in the 14th century and increased in frequency in the 15th century. The process affected the final consonants of the plural and past-tense suffixes *–es* and *–ed.*

Lass argues that that the current system for the plural (and genitive) derives from two Middle English (ME) changes. The first is a process of what he calls fricative 'voicing' in the plural suffix, and more generally in unstressed final syllables. This is described in detail in 4.1.2. In traditional terms and symbols, this means that the previous /əs/ plural suffix became /əz/. The second process is the deletion of certain weak vowels. He argues that a further 'tactical agreement' took place, namely,

[33] However, in the next chapter it is show that laryngeal neutralisation takes place in word final position as well.

'devoicing' of what he interprets to be /z/ to /s/ in the plural suffix in the context of preceding 'voiceless' stem obstruents. This 'devoicing' also took place in the past tense suffix after syncope. When the suffixes ended up next to a 'voiced' stem obstruent, devoicing did not take place. In a similar vain, Luick (1964: 1071) argues that this process resulted in the 'voiceless' sounds in PDE *ships, huts, books, beliefs, months, keeps, meets, looks, laughs, shipped, looked, laughed.* Lass argues that 'voicing assimilation' followed automatically on vowel deletion and he argues that this leads to the assumption that the modern pattern, described in 2.2.2 and 2.4.1, was established quite early, arguably by the 15th century.

However, Lass points out that variation can be seen well into the 16th century. He argues that evidence from the otherwise reliable orthoepist Hart gives rise to a rather problematic picture, which is worthy of consideration. He points out that Hart was sensitive to the distinction between 'voiced' and 'voiceless' sounds and also to pronunciations which were deviant from what the orthography suggested they should be. Hart's (1569, 1570) transcriptions contain many <s> spellings where, given the generalisation that 'voiced' suffixes only occur after 'voiced' stem consonants, they are not expected. Lass points out that the following sample from Hart (1969) is typical of the orthoepist's renditions of this particular process.

(17) *Hart's (1969) s-plural transcriptions*

As expected	*Unexpected*	*Variable*
<s,z>	**<s> for <z>**	**<s~z>**
aksidents	birds	wez, -s
priks	tungs	namz, -s
prints	-selvs	ourz, -s
sinz	acorns	kontrariez, -s
pronounz	silabls	
riulz	leters	
spelerz	ages	
autoritiz	kauzes	
enemiz	prinses	

Lass (1999: 143) argues that the number of occurrences rules out the possibility that these forms are exclusively the result of mistakes made by the author or printer,

although he points out that some mistakes will certainly occur. Lass notes that there could be two possible explanations for the variation displayed in (17). The first one could be that 'voicing' of /s/ in weak syllables was not yet complete in the 16th century. He argues that this would explain /s/-endings after /n, r, l/ and those after /ə/. These instances violate no constraints because English allows a laryngeal contrast in fricatives after sonorants, e.g., /ɛls/ 'else'~ /ɛlz/ 'ells', /aɪs/ 'ice'~ /aɪz/ 'eyes'. It also allows this contrast in weakly stressed syllables: /-Vs/ versus /-Vz/, e.g., *highness* versus *China's*. Lass points out that forms where a 'voiced' obstruent is followed by /s/ are problematic. He notes that English never seems to have tolerated obstruent clusters which phonologically disagree in laryngeal values.

According to Lass, the second explanation could be linked to the observation, outlined in detail in 2.2.1, that in most varieties of English, syllable final 'voiced' obstruents are phonetically less 'voiced' than initial or intervocalic ones. In fact, they may 'devoice' so much that there is no difference between them and what Lass calls their 'true voiceless' counterparts. According to Lass, this could lead to 'perceptual indeterminacy', which could be the cause of the <s>-spellings. He argues that because Hart used a two-way 'voiced ~ voiceless' distinction, it may have been hard to assign the partly 'devoiced' finals to one category or another, and therefore transcription would have varied. In the next section this explanation is reinterpreted to fit in with LR. Lass (1999: 143-144) argues that the second analysis seems better in that it accounts for all the problematic <s> transcriptions. However, he points out that overconfidence should be avoided because syncope in the plural and past tense endings itself is also variable. He claims that this postpones the emergence of the full modern English system until perhaps the 17th century, which is much later than is usually assumed, as pointed out before. However, he argues that it suggests an insight into how long even a phonetically 'natural' change can take to stabilise, and into the problems that arise in the historical investigation of apparently quite simple 'rule-governed' phenomena. Of course, the analyses above do not work in LR as English obstruents are not 'voiced' and 'voiceless'. However, some parts of Lass' analysis could also work in a LR analysis of this process. This will be returned to in 3.3.1.2 below.

Luick (1964: 1071) points out some further particulars of the process. He argues that when a 'voiced' stem fricative precedes the plural suffix marker, it is 'absorbed' by the assimilation to a certain extent. This seems to be pure place assimilation. The

dental fricative of the stem assimilates to the alveolar place of articulation of the suffix obstruent. Luick points out that the plural *clothes* became *clōz* in the largest part of the speech area and *clāz* in Northumbrian. He argues that this was possible because the singular form did not have much influence on the plural because of its specific meaning. In other forms like *breaths, smiths, healths, births*, the analogy of the uninflected form was too strong to allow for a place assimilation process to happen. Similarly, Luick indicates that a '/vz/' sequence became '/z/' in many dialects, e.g., [gɪz] for *gives* with uninflected [gɪ]. Luick argues that the somewhat more independent participle *given*, pronounced as [gɪn], supports this development. He states that forms without /v/ do not occur for *live*, which was not supported by another similar form. Finally, he points out that /v/-less forms of *love* are frequent in Scotland. However, Linda van Bergen (p.c.) points out that in the cases in which /v/ was lost it is unclear whether a /vz/ sequence ever occurred, especially because the uninflected form was [gɪ] where /v/ would never have been adjacent to /z/. She also notes that the Scottish example is a case of loss of inter-vocalic /v/.

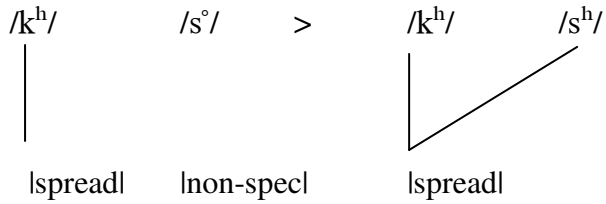
3.3.1.2 An analysis of the process in Laryngeal Realism

Like the OE process above, it is impossible to characterise this process as assimilation of a 'voiced' suffix consonant to a 'voiceless' stem consonant in LR. It was established in 2.4.1 that PDE is an aspiration language, and the section 3.2 has provided evidence that OE was one too. It is highly implausible that English changed its laryngeal specifications back and forth between OE, ME and PDE. Moreover, an analysis of this process in LR is as straightforward as the analysis of the stop cases in OE assimilation in 3.2.3.

Obviously, in LR the plural and past suffix consonants are unspecified or neutral, i.e. /s˚/ and /t˚/ instead of 'voiced' /z/ and /d/, respectively. As indicated briefly above, in the plural suffix this situation came about through a process of laryngeal neutralisation, not 'voicing', in unstressed final position. In other words, |spread| /s^h/ lost its specification in unstressed final position. This is described in detail in 4.1.2. The assimilation process can then be explained very straightforwardly. When the neutral suffix consonants ended up being adjacent to another neutral stem consonant nothing happened. This is because the stem consonant had no specification to extend into the suffix. However, if it ended up next to a stem consonant which was specified for |spread|, the active specification would extend into the unspecified suffix

consonant. This would render the suffix consonant specified for |spread|. This is shown for the plural *books* in (18):

(18) *books*, original /k^h/ + /s˚/



Luick (1964: 1071) attempts to explain why assimilation from the suffix consonant to the stem consonant never takes place. He argues that laryngeal assimilation from the suffix consonant to the stem consonant was blocked because the uninflected forms protected it. However, any difficulty in explaining this apparent discrepancy can be easily dealt with in LR. As pointed out for the asymmetrical assimilation cases in PDE and OE, LR can offer a phonological explanation and does not have to resort to paradigm uniformity. Namely, progressive assimilation to the suffix consonant is ruled out by the fact that the suffix consonant has no laryngeal value to assimilate to. If the suffix consonant was in some way specified for |voice| it would indeed be impossible to explain why reverse assimilation never occurred. This again provides a good argument for why a LR analysis of this process is better than an analysis which incorporates some kind of |voice| feature.

In addition, the exceptional cases presented by Lass, shown in (17), can be explained in LR in a similar way to Lass' second, and, according to him, best, explanation. His first explanation does not seem to be able to account for this variation. It is indeed possible that the process of laryngeal neutralisation in final unstressed fricatives was not yet complete. However, although this is a possible explanation in cases like *silabls, ages, kauzes*, and *princes*, *letters* and *acorns*, it seems impossible in the other instances like *birds, tungs, -selvs.* In the former cases the conditioning environment, an unstressed final syllable, is still present, but in the latter cases it is not. It is difficult to explain why in those cases neutralisation would have taken place at a later date when the conditioning environment had disappeared.

Therefore, it is assumed here that the process of neutralisation had taken place as expected in these forms, and, that, therefore, in terms of LR, both final consonants were neutral in words like *birds.* This still does not explain the unusual rendition by

Hart, and it seems plausible to assume that these forms were indeed due to 'perceptual indeterminacy' on Hart's part. It was pointed out in 2.3.2.3 that I&S argue that the |spread| feature is expected to be weakly implemented in syllable codas. Therefore, the perceptual difference between neutral stops and |spread| stops is also expected to be minimal in this position. 'Voiced' final fricatives do not exist in English, and since Hart had only two symbols, <s> and <z> to represent the sounds he heard, he may have used the one he would normally use for |spread| consonants when he misperceived a neutral consonant. Therefore, it seems that Hart was trying explicitly to be phonetically accurate.

3.3.2 Late Middle English assimilation

Luick (1964: 1063-1065) points out that another series of processes took place in late ME and early Modern English (ModE). These again brought consonants together which did not normally form clusters in English. He notes that, as in all the data in this chapter, this caused laryngeal assimilation in obstruent clusters. He argues that assimilation was regressive and created geminates which were simplified at a later stage. The examples in (19) below show assimilation as a result of compounding. Luick does not render spelling evidence for all these forms. I again use traditional symbols and terminology so as to represent Luick's and other scholars' rendition of these forms without theoretical implications unless I am discussing a possible reanalysis in LR.

(19) a. /pb/ > /bb/ > /b/[34]

cubberd/cobberd		'cupboard'

b. /pw/ > /bw/

cobweb	(< copp(e)webbe)	'cobweb'

c. /kg/ > /gg/ > /g/

blackguard	[blægəd]	'blackguard'
kirkgate[35]		'kirkgate'

[34] These forms were attested in 1583, 1527, and 1514, respectively.
[35] This form undergoes the process in the Windhill dialect only.

d. /kb/ > /gb/

black beetle	[blægbitl]	'black beetle'
blackbird	[blægbəd][36]	'blackbird'
blackberry	[blegbri], [bleg], [blegz][37]	'blackberry'
Blackburn	[blegbərn]	'Blackburn'

e. (/vp/ >)/fp/ > /pp/ > /p/

fippence		'five pence'
twellpennis		'twelvepence'
halfpenny	[heipəni]	'halfpenny'

f. /vs/ > /fs/ > /ss/

lussum	'lovesome'[38]

g. (/ðs/>) /θs/> /ss/ > /s/

lissom	'lithesome'
Sussex[39]	'Sussex'

h. (/ds/ >) /ts/ > /ss/ > /s/

missomer	'midsummer'[40]
Wissontide (<Whitsontide)	'Whitsuntide'
[bousən]	'boatswain'

Some of the cases in (19a,c,d) look like cases of assimilation to |voice|. This would be severely problematic for the framework of LR because, as pointed out several times before, the feature |voice| is assumed not to be actively specified in the laryngeal phonology of English and cannot randomly be introduced. Therefore, assimilation to the feature is not expected. However, a form like *cobweb* can safely be dismissed because it can be argued to be a case of inter-sonorant passive voicing, like the OE fricatives in 3.2.3.2. In terms of LR, /b ˀ/ is laryngeally unspecified and

[36] This form is recorded in Suffolk.
[37] Short forms occur in the Windhill dialect.
[38] Luick (1964: 1066) points out that the PDE pronunciation is *lo*[vs]*ome* again.
[39] The first part of this original compound is derived from OE <suþ>
[40] *mitsomer* for *midsomer*, with laryngeal assimilation, already occurred in ME.

therefore susceptible to passive voicing, which extends from the spontaneously voiced sonorants surrounding it.

However, the obstruent clusters are problematic. In these, the active specification should be |spread| in terms of LR, and, therefore, the cluster in *cupboard* should not have become [bb] in early ModE, as is suggested by the spelling, but [p˚p˚]. As can be seen from the forms in (19e,f,g,h), other data indicate expected assimilation to |spread|. However, even if this would provide evidence for presence of |spread|, it would pose a problem for the view taken in this thesis that laryngeal features are unary. If these forms both constitute real cases of assimilation, then it seems that laryngeal features would, at least, have to be reinterpreted as binary.

Proponents of the view that assimilation to |voice| took place are, e.g., Kökeritz (1932), Zai (1942), Horn & Lehnert (H&L) (1954), Dobson (1968), Jordan (1974), and Faiss (1989). However, Zai (1942: 186), alongside Luick, as outlined above, is the only one who implies an initial process of gemination. He argues that in the dialect of Morebattle in the Scottish Borders, assimilation of /p/ to /b/ also took place in *Campbell,* with subsequent loss of /b/ after /m/. Therefore, he does seem to believe in some kind of gemination which gave rise to the cluster /mbb/ initially before the first /b/ was lost. However, none of the other scholars explicitly argue for an initial geminate state. H&L (1954: 1017) argue that the development in *cobweb* went to the following stages: it went from ME *coppewebbe* to *copweb* and finally to *cobweb*. The last change first appears in writings in 16th century. The old spelling is retained next to the new one until the 17th century. H&L add some examples to the ones in (19) above: 16th/17th century *sagbut* < *sackbut* (< French *saqueboute*), *Agden, Brogden* (Yorkshire place names) < OE *āc* 'oak' and *brōk* 'brook' plus *denu* 'den'. Kökeritz (1932: 92, 96) notes that *cupboard* appears variously as *cuppeburd* (1463), *cobord* (1504), *cubberd* (1583), *cuppord* (1648) in the contemporary Suffolk dialect. He points out that this dialect also exhibits /g/ for /k/ before voiced consonants in as in (19b) and adds the forms *cock-bramble, cock-bird,* and *jackdaw*. Jespersen (1949: 19) also points out that *cob* in *cobweb* had /b/ in early ModE. However, he does not mention assimilation or indeed any reason for the change from /p/ to /b/.

H&L (1954: 1014-1015) argue that /s/ could change to /z/ when compounding positioned it adjacent to /w/, e.g., *Crosswell* (Derbyshire) where /zw/ is more frequent than /sw/. They indicate that *Causeway*, a 14th century loan from Old North French *cauciée* (<L calciata (via)), generally has /z(w)/. The /z/ form is attested next to the /s/

form in 1893. According to H&L, it was originally 'voiceless' in English as shown by 14th century *cauci,* 16th century *caucey, -ie,* and 16th/17th cent *calcey.* They argue that when *way* was added, the compound originally had 'voiceless' /s/. This can be seen from the 15th century spelling <caucy wey>, and 16th -18th century <causey-way>. After the loss of the medial vowel, /sw/ became /zw/ due to assimilation. H&L argue that later the /z/ of the compound form was transferred to the simplex form *causey,* which became more infrequent. Finally, /s/ in *causey,* which was still attested in the 18th and 19th centuries, became less and less frequent. However, as pointed out above, forms like these do not cause any problems for LR because these could be explained away as common loss of |spread| between sonorants.

A lot of rather speculative analyses of this process are offered. Dobson (1968) and Ekwall (1959) add *gooseberry, raspberry,* and *wristband* (the latter also occurs with retained /s/) to the possible forms. H&L (1954: 1014) attribute /z/ in *raspberry* to an older version of 'voicing assimilation' before 'voiced' consonants. They argue that this process affected /s/ only, and took place in words like *wisdom* (OE/ME *wīs*), *gosling* (ME *gōs*), *gooseberry,* and *grizli* (< OE *grislīc*). They do not specify when this 'older process' took place. Jespersen (1949: 47), in his turn, argues that /z/ in *gooseberry* is due to the inflected forms of *goose*. He links this up to *wise*, which derives from the inflected form of the adjective *wīs*, and to words like *gosling, gozzard* 'gooseherd' which have /z/ whereas OE *gōs* had /s/.

Dobson (1968: 965-966) offers the explanation that "In certain words a medial consonant is lost by being assimilated to a following consonant", and H&L (1954: 1016) back this up. They argue that in a word like *raspberry* /p/ first assimilated to /b/, presumably to form geminate /bb/. Then, they claim, /s/ assimilated to /b/ to become /z/. They argue that the medial cluster in *wristband* first lost /t/, after which /s/ assimilated to /b/. Obviously, their approach to this process is far from unified for all data and seems rather ad hoc. They give no reasons whatsoever for why one form would undergo gemination and another form the exact opposite process of consonant loss.

Dobson argues that the whole process is primarily a characteristic of vulgar or dialectal speech. He notes that it affected some words of Standard English but he does not point out which. Like Luick, Dobson claims that the development generally dates from late ME, and he provides orthoepical evidence for many forms in (19) and some additional ones. He points out that *halpenny* is recorded by Gil (1619), Coles (1674,

1676, 1679) ('phonetically spelt' lists) *hah-pen-y;* cf. *hah-puth* 'halfpennyworth', Young (1667?), Cocker (1696), Brown (1700) (all *hapenny*), and Strong (1676) who has *hafpenny.* Similarly *fip(p)ence* is given by Coles, Strong, Young and Brown. Willis (1602),[41] Hodges (1644/1649),[42] and Price (1665) show the loss of /p/ before /b/ in *cupboard*, *upbraid* (Willis, Price, and *WSC* (1695)[43], and *raspberry* by Coles. The loss of /t/ before /s/ is recorded by Brown in *Wis'ntide* 'Whitsuntide'.

Ekwall (1956: 98, 103) also does not support the idea that assimilation took place. He agues that /p/ was simply lost before /b/ in words like *cupboard* and *raspberry*. He points out that the same process applies to /k/ in early ModE, which disappeared in words like *corpuscle, muscle, blackguard*, the latter mentioned in (19b), and *asked.* Strang (1970: 166) supports Ekwall's theory. She claims that there were widespread tendencies for the loss of consonants. She describes the process applying to *cupboard* and *raspberry* as early 15th century loss of /p/, and argues that this was probably simplification of heavy consonant groups. This, she argues, had been going on for centuries, which can be seen from the fact that the lost sounds have often been fixed in spellings.

Interestingly, Wyld (1927: 220-221) gives an instance of *cubard, cobard* 'cupboard' together with data he attributes to processes of inter-sonorant 'voicing' as can be seen in (20)

[41] Dobson also used the 1628 edition.
[42] Dobson also used two undated books by Hodges: *The New Hornbook, Most Plain and Familiar Examples (taken out of the English Prinrose).* Hodges (1649) had a further edition in 1653.
[43] Anon. *Writing Scholar's Companion*.

(20)	crebulle	‘cripple’
	peyndinge	‘painting’
	parde	‘part
	treded	‘treated’
	Jubiter / Jubyter	‘Jupiter’
	radyfyde	‘ratified’
	jeberdy / jubardy	‘jeopardy’
	cobard / cubard	‘cupboard’
	debutye / debity	‘deputy’
	prodistants / proddestant /	‘protestants’
	medigate	‘mitigate’
	prodistation	‘protestation’
	padrole	‘patrole’

Emerson (1896: 131) also refers to the process in *cobweb* as ‘voicing’, and pairs this with ‘voicing’ in words like *lobster* (<OE loppestre), *pebble* (<papol), *pride* (<pryte), *clod* (<clote). In terms of LR, these forms can all easily be identified as instances of loss of |spread| between sonorants. The only possible exception Emerson gives may be *proud* (<prut). However, this form may have analogised with *pride*, in which /d/ presumably did occur in between two sonorants before the final /ə/ was lost. Strang (1970: 82) points out that there was a tendency in ModE to what she calls ‘voice’ consonants in inter-sonorant position. This was subsequently reversed by ‘improved English’. Strang argues that by the close of the 18th century pronunciations of *deputy* with /b/ and *protestant* with /d/ were already regarded as vulgar. They are unknown in the PDE standard. Strang discusses this in the section of her book which deals with the period 1770-1970, and this indicates that this process took place later than the one which has been discussed so far. H&L (1954: 1017) give some more forms, which look like inter-sonorant loss of |spread|, although they argue that they are due to ‘voice’ assimilation, e.g., *Bedlam* (<Betleem = Bethlehem), *Muslin* (Fr mousseline).

There are other arguments against the hypothesis that the data in this section are due to assimilation to |voice|. For one, the data set seems to be insufficiently large to argue for the occurrence of a real process. Then, Luick’s argument that ‘voicing’ led

to a gemination state cannot be proved. Only the examples in (19a) could provide some orthographic evidence for a geminate pronunciation, and that would be only one piece of evidence. Moreover, orthography can be misleading as can be seen from the form *proddestant* in (20). Obviously, the original word has a single /t/ and no adjacent consonant can assimilate to it. Nonetheless, it is rendered with a double <d> spelling. The double consonant spellings could possibly be an orthographic indication of the fact that /t/ is preceded by a short vowel, which could also be argued for the double <b> spelling in the case of *cubbard*.

As pointed out above, several scholars see this process as simple loss of the 'voiceless' consonant. This seems rather plausible for words like *fivepence*, *halfpenny*, *cupboard*, and *upbraid*. Loss of the coda consonant in these cases can also be tied in with an analysis in LR. As was shown in section 3.3.1.2, the |spread| gesture is assumed to be implemented more weakly in syllable coda position and this may lead to perceptual indeterminacy. The second consonant of all medial clusters was already unspecified and homorganic to the first. Therefore, it could very well be that the first consonant was simply either not perceived or perceived to be exactly the same and hence lost. This could be exactly because phonological geminates no longer existed in English. Plus, unlike gemination, which certainly was not a widespread process in late ME and early ModE, consonant loss in clusters is backed up by loss of /k/ in words like *corpuscle*, *muscle, blackguard* and *asked*.

Moreover, many of the data represented in this section may actually be due to a very common process in the history of English, which, as pointed out before, can be characterised as loss of |spread| in inter-sonorant position in terms of LR. Therefore, it seems reasonable to conclude that these data are not to be taken as serious assimilations to |voice|. As a result, the assumption of LR that all assimilation in a |spread| language like English must be to its only actively specified feature |spread| is not proved wrong by these data.

3.4 Conclusion

This chapter has shown that all indisputable cases of laryngeal assimilation in the history of English took place in the direction of the feature |spread|. Both OE and ME assimilation have been successfully shown to follow this pattern. The only cases of possible assimilation to |voice| in late ME and early ModE have been shown to

generally be cases of other processes, like consonant loss or inter-sonorant loss of |spread|, and not assimilation. This provides evidence for LR, in which it is claimed that laryngeal features are unary and that specifications differ in |voice| and |spread| languages. In aspiration languages like English |spread| is assumed to be the only active laryngeal feature. Like other processes, assimilation requires a local source and |voice| is absent from that local source. It cannot be introduced out of nowhere, and, therefore, it is not expected that attestations of assimilation to this unspecified member of the opposition are found.

An explanation of assimilation in LR also provides evidence for phonological change in speakers with a developed phonological system. Only they know that the actively specified feature in English is |spread|. Acquirers do not know this yet and could therefore easily posit a |voice| feature and, therefore, have |voice| assimilation. In the course of acquiring the language they learn the opposition in English through the activity of the feature |spread| and the inactivity of |voice| in adult speech. The analysis also provides evidence that the current laryngeal situation of English, described in 2.4.1, goes back to its very first attestations and has been stable throughout its history.

LR, in its turn, provides an elegant explanation for the historical assimilation data presented in this chapter. As shown in chapter 2, unlike frameworks incorporating the feature |voice|, LR can account for the asymmetry observed in English historical assimilations in favour of the feature |spread|. An analysis which assumes the presence of the feature |voice| would not be able to make sense of this asymmetry, whether unary or binary features are assumed. This is because if |voice| is specified in English, either as the only feature or as part of a binary distinction, a local source is available for |voice| assimilation. Such a framework cannot explain why the feature never takes part in processes like assimilation, and why only its antagonist |spread| or 'voicelessness' is active. When a feature is specified, it is expected to actively participate in processes like these. This mystery is easily solved by LR because in this framework spreading of |voice| is simply not possible as it is not actively specified for obstruents in English. Asymmetry in assimilation is predicted in this case. Therefore, this chapter has shown that LR provides a better explanation for processes of laryngeal assimilation in both present day and historical English.

4 Historical stress-conditioned laryngeal modifications

4.1 Introduction

Two processes of apparently stress-conditioned laryngeal modification in late ME and early ModE are discussed in this chapter. To my knowledge, these have never been presented or analysed in a unified fashion before. Both processes are traditionally referred to as 'voicings' after unstressed vowels. When interpreted in that way, they pose a potential problem for LR. 'Voicing' implies addition of |voice| and this feature is unspecified in English and cannot be randomly invoked without a local source. However, it is shown that LR can deal with these processes as loss of |spread|, which can be interpreted as lenition, in weak positions. In one of the cases, traditionally described as 'final voicing' in unstressed syllables, this analysis is argued to be advantageous over a 'voicing' account. In addition, these data provide an interesting insight into the influence of pitch on laryngeal phenomena in dynamic stress systems.

The handbook descriptions of both alleged 'voicing' processes are discussed in 4.2. Section 4.2.1 describes late ME stress-conditioned 'voicing' in unstressed positions. It is shown that, in traditional terms, 'voiceless' fricatives and the affricate /tʃ/ 'voiced' when they occurred in an unstressed grammatical word, e.g., *was*, or an unstressed syllable, e.g., the *–es* suffix of the third person singular, the plural and the genitive. The process mainly took place in codas although onset cases, e.g., *the* and *that*, are also considered. This change, although initially characterised by much variation, has regular remnants in PDE.

A similar but much less regular process in early ModE will be discussed in section 4.2.2. This process involves cases of stress-conditioned medial pre-tonic fricative 'voicings'. When the stress follows, the fricative 'voices', e.g., *po*ˈ***ss****ess*, but this often fails when primary or secondary stress precedes, e.g., ˌ*di****s****a*ˈ*vow*. The irregularity of the process is probably a result of the fact that it mainly affected French and Latin loans, due to the lack of words with the necessary stress pattern in the native vocabulary of English. The latter fact makes it hard to determine whether the process was in fact native or borrowed from French. However, the process is argued to have become part of the phonology of English because stress-conditioned 'voicings' seem absent from the history of French. They do occur in the history of English, as shown by the process in 4.2.1, which affects native lexemes. In addition, some data can be

argued to represent genuine 'voicing' of original French voiceless fricatives in English.

An analysis of the processes in LR is offered in 4.3. As pointed out above, it is shown that if these data are genuine 'voicings', then they would be problematic for LR. However, as pointed out above, in section 4.3.1 it is assumed that LR can deal with these processes compellingly as loss of the feature |spread|, i.e. lenition, in weak positions. This is in line with the analysis of fricative lenition in OE discussed in 3.2.3.2. It is argued that weakness operates on two different prosodic levels. The inter-sonorant and coda cases constitute weak syllabic positions, and the initial cases constitute weak positions in the foot. As pointed out above, it is shown that in the case of the final modification cases a LR analysis is superior to a 'voicing' analysis. 'Final voicing', i.e. the addition of |voice|, is a highly marked process which does not seem to occur in languages of the world. These data would therefore be baffling when analysed in a traditional account but can easily be dealt with in LR where they do not constitute 'voicings' at all.

Since lenition in medial and final cases seems to be governed mainly by syllabic position, the seemingly stress-related failure of the process needs to be explained. This is done in section 4.3.2. It is shown that these processes bear a strong resemblance to well-known early Germanic process of Verner's Law. Two accounts for this process are presented. Page (1998) proposes a phonological rule, the 'Autosegmental Linking Condition', which states that all uniquely associated laryngeal specifications should be deleted in non-initial fricatives. It is assumed that stressed vowels carried a |stiff| specification, discussed in detail in 2.3.2.5, in late ME and early ModE. This specification linked itself to the |spread| specification of following fricatives, and, therefore, |spread| was not deleted, because it was no longer uniquely associated.

In their account of Verner's Law, I&S (2003) also propose a feature |stiff| in preceding stressed vowels. They provide a phonetic explanation for the process arguing that it was due to passive voicing which was inhibited when the feature |stiff| was specified in preceding vowels. I&S argue that |stiff| was only active in a pitch accent system like Germanic, and, therefore, processes like Verner's Law cannot occur in languages with a dynamic stress system like English. However, the data in this chapter seem to disprove the latter point. It is argued that Page's account provides the best explanation for the English data. However, it is shown that Page's rule needs

to be modified somewhat in order to deal with all the late ME and early ModE data because initial fricatives do undergo lenition in English, as opposed to initial fricatives in Germanic, which did not undergo Verner's Law. Section 4.4 presents the conclusion to this chapter.

4.2 Two historical stress-conditioned laryngeal modifications

4.2.1 Late Middle English laryngeal modification in unstressed syllables

4.2.1.1 Preliminaries

As in all descriptive accounts in this thesis, traditional terms and symbols are used. The handbooks agree that 'voiceless' fricatives in unstressed syllables like *-es* or unstressed words like *was*, *is*, *his* 'voiced' in the whole speech area in late ME times (e.g., Emerson 1896; Müller 1915; Moore 1919, 1957; Sweet 1924; Robertson 1936; Brunner 1948, 1960; Jespersen 1949; Mossé 1952; H&L 1954; Schlauch 1959; Luick 1964; Strang 1970; Jordan 1974; Prins 1974; Wright & Wright 1984; Faiss 1989; Lucas 1991 and Milward 1996). Although the process was most common in function words and suffixes, Luick (1964: 1028) notes that it also occurred in lexical monomorphemic words ending in unstressed syllables such as *adze* 'axe' (<ades), *temse* 'sieve' (<temes), *Thames* 'Thames' (<Themes), *alms* 'alms' (<almes), *treatise* 'treatise' (<tretis).

Brunner (1960: 376) indicates that it is difficult to exactly determine when the process took place because of unchanging or delayed orthography. Dobson (1968: 936) claims that the change appears to have taken place at various periods but argues that there "…may have been a special tendency to it in the fourteenth century…". Jespersen (1933: 354) points out that Chaucer's 14th century rhymes indicate that the 'voiceless' pronunciation was still prevalent in words which now have /z/, e.g., *was: bras, allas: was, glas: was, ywis: is, this: is, amis: is, toos* (pl)*; cloos* (adj). He also claims that a rhyme like *wynes: pyne is* provides evidence for /s/ in the plural ending. However, Sandved (1985: 32) and Jordan (1974: 188) note that rhyme words are normally stressed, and although the rhymes show that final /s/ was 'voiceless' in primary stressed positions, they do not indicate what the pronunciation was in unstressed positions.

Jespersen (1949: 199) argues that the process began later, in the 15th century, and that it was completed in the 16th century for the fricatives /f, θ, s/ and the affricate /tʃ/. Jespersen (1949: 201) highlights the fact that the process only took place in unstressed syllables. He notes that the process fails in accented words like *dice*, *invoice*, *trace* and *quince*. Luick (1964: 1027) points out that spellings like *ez* and *lez, hatz, watz* provide evidence for the process. Dobson (1968: 936) claims that PDE forms with /z/, /ð/ and /v/ should always be analysed as having developed from the late ME 'weak', i.e. unstressed, forms. Retention of /s/ and /f/, and possibly /θ/, is characteristic of the ME 'strong', i.e. stressed, forms.

4.2.1.2 Orthoepical evidence for variation in the process in unstressed words

Orthoepical evidence shows that there was variation in some unstressed words in the early stages of the process. Dobson (1968: 451) points out that *as* is recorded with /z/ by all orthoepists except Hart (1569, 1570), who claims that the sound is [s] or [z] depending on whether the following sound is 'voiced' or 'voiceless'. This matter will be addressed in more detail in 4.3.1. Dobson (1968: 937) notes that Hart (1569) records /s/ nearly forty times beside much more frequent [z]. However, /z/ occurs only five times in Hart (1570). In *whereas* he records /s/ once but /z/ in all other cases. Greenwood/Greaves (1594) also seems to give /s/. Gil (1619) and Willis (1651) have <as> four times against more regular <az>. Dobson (1968: 937) argues that the 'voiceless' form was infrequent in the 16th century, and extinct in the 17th century. *Has* was recorded with /z/ only, for example by Gill (1619). He regards it as a northern form.

Dobson (1968: 937) notes that 'voicing' was regular in *is*. However, he also records /s/ and this pronunciation was actually taught in a revision of Huloet's (1552) dictionary. Hart (1569, 1570) argues that the pronunciation of the sound is dependent on the laryngeal value of the following sound and gives /s/ in sentence final position and, e.g., *his servant*. Gil (1619) records /z/ 100 times whereas /s/ occurs just nine times. Willis (1651) rhymes *his* on [ɪs]. Coles (1674, 1676, 1679) also seems to be aware of both /s/ and /z/.

Is is recorded with /z/ by all orthoepists, except Smith (1568), who records /s/ twice. Willis (1651) shows /s/ cases as well. Hart (1569, 1570) again argues that the following sound is responsible for the variation between /s/ and /z/. *Us* normally has

/s/ as in Smith (1568), Robinson (1617), Gil (1619) and Hodges (1643, 1644). Beside normal /s/, Hart gives /z/ five times, twice before a vowel and three times before a 'voiced' consonant.

This is recorded with /z/ beside /s/ by Hart and Laneham (1575). Again, Hart argues that this variation is due to the following sound, and he uses /ðɪz/ mainly before 'voiced' sounds. According to Dobson (1968: 461), *was* developed a /z/ in the unstressed form of the word. /z/ is recorded as the only pronunciation by most orthoepists from Laneham (1575) onwards. Hart records /s/ next to more frequent /z/, and not only before 'voiceless' sounds; Gill (1619) does the same. Mulcaster (1582) argues that /s/ is as frequent as /z/. Dobson (1968: 458-459) notes that *these* and *those* have /z/ only.

If has /v/ in Mulcaster (1582), and Hart (1569, 1570) transcribes it as <iv> twice before a vowel. Ekwall (1959: 84) argues that, although *if* has /f/ in PDE, it used to be pronounced with /v/ in early ModE, although he gives no supporting evidence. Dobson (1968: 455) points out that *of* has to be divided into the 'weak' form, spelled <of>, and the original 'strong' form, spelled <off>. Jespersen (1949: 199) notes that most early phoneticians only recognise /f/. Mulcaster (1582) is the first orthoepist to mention that there is a difference between the preposition with /v/ and the 'adverb of distance' with /f/. He argues that the 'more colourless' preposition always has /v/, therefore, also analogically where it is stressed. He gives no examples of the latter case. Dobson (1968: 455) indicates that *off* regularly has /f/ in Mulcaster (1582), Gil (1619), Jonson (1640-41) and Cooper (1685). The 'strong' and 'weak' forms exist beside each other, and, therefore, 'The Welsh Hymn'[44] has *off* for *of*. Dobson (1968: 455) and Ekwall (1959: 84) point out that Hart records <of> besides <ov>, and Ekwall notes that Walker (1791) records /v/ as well. Ton/mkis[45] (1612) claims that /ɒf/ is the formal form and /ɒv/ the informal one. Gil regularly writes <of> and claims that this is in accordance with the pronunciation of the 'docti'. However, he points out that "frequentius dicamus <ov>". <of> is found three times in Hodges (1643, 1644, 1649) next to regular <ov>. Merriott (1660) makes no distinction between <of> and <off> and lists them as homophones. Levins (1570), Wilkins (1688) and Willis (1651) also have /f/ in *of*. However, Mulcaster (1582), Robinson (1617), Jonson (1640-41), Coles (1676), and Cooper (1685) only have /ɒv/ for *of* in order to distinguish it from

[44] Hymn to the Virgin, 1500.

[45] His exact name is unknown.

off. Gil (1619) and Hodges (1643, 1644, 1649) regard <ov> as the more common form. Jordan (1974: 154) points out that 'voicing' in unstressed *of* is shown by *oue* in the CM MS Royal College of Physicians, Edinburgh. Luick (1964: 1030) also notes that the process in *of* is indicated by some spellings, like <oue> in Cursor Mundi. Jespersen (1949: 199) points out that Elizabethan English retained /f/ in stressed words. He illustrates this with a quotation from Marlowe's Jew (l. 104): "Which *of* my ships art thou master *off*?" "*Of* the Speranza". He adds that Gill (1619) argues that *ov* is the natural pronunciation whereas *of* is the artificial one. Luick (1964: 1030) argues that /v/ is most common in PDE.

Dobson (1968: 462) and Ekwall (1959: 85) point out that in words like *with,* the 'strong' form with [θ] is most often recorded. It occurs in 'The Welsh Hymn', Smith, Levins, Hart (mainly before 'voiceless' consonants), Bullokar (1580, 1585, 1586), Robinson (mainly when stressed; also unstressed before a consonant), Gil[46], Butler (1633/34, 1634, 1636), Daines (1640), Hodges, Willis, Wallis (1653), Coles and Cooper. In 'The Welsh Hymn' alliteration requires the use of the 'voiced' variant twice. The 'voiced' form is also used by Hart, Bullokar (beside [wɪθ]), and Robinson (once in an unstressed form and twice in a stressed one). Gil admits that the 'weak' form is more common and it is the only pronunciation in Price (1665). Luick (1964: 1030) notes that /ð/ is found next to /θ/ in *with* in the North of England and many dialects. He claims that /ð/ is most common in PDE. Variation in the process in these words is not problematic. In fact, it shows that something significant went on in the phonology of these forms. If nothing had gone on, then nothing would have been recorded.

4.2.1.3 'Voicing' of /s/ in unstressed syllables

Dobson (1968: 937-938) argues that in syllables following the main stress, the development is especially clear in the nominal genitive, plural, and 3rd person singular inflectional ending *–es*. /s/ changed to /z/ in this suffix, e.g., man'[z], *dog'*[z]*; time*[z], *house*[z]*; give*[z] and *live*[z]. Jordan (1974: 188) points out that /s/ must have 'voiced' before the loss of /ə/, discussed in 3.3.1, otherwise the conditioning environment of the unstressed syllable would have been lost. According to Dobson (1968: 937), loss of /ə/ occurred in the 15th century. Jordan (1974: 188) points out that 15th century <z>

[46] Although Dobson points out that Gil admits that [ð] is more common in speech but nevertheless uses [θ] in his transcriptions and attacks Hart's transcription with [ð].

writings like <soulez> and <sonez> clearly indicate the change in these endings. Jespersen (1933: 362) argues that because /ə/ was not lost simultaneously in all cases, minimal pairs like the following are found (Smith 1568):[47] *dice-dies* (*dis* aleæ, *diz* moritur), *else-ells*, *false-falls*, *fence-fens* (*fens* gladiatorial ars, *fenz* loci palustres), *hence-hens* (*hens* apage hinc, *henz* gallinæ), *ice-eyes* (*is* glacies, *iz* oculi), *lease-lees* (*les* locationis charta, *lez* pasqua), *lice-lies* (*lis* pediculi, *liz* mendacia), *once-ones*, *one's*, *pence-pens*, *since-sins*, *spice-spies* (*spis* aroma, *spiz* exploratores).

However, Dobson (1968: 937) and Jespersen (1949: 201) argue that the process took place later than ME syncope in forms like *pence*, where /s/ is clearly descendant from earlier /ɪs/. The word is recorded from about 1300, and, therefore, Dobson agrees with Jordan that the change /əs/ > /əz/ can be placed in the 14th century. Thus, Dobson concludes that there were two processes of syncope. These determine whether the suffix consonant is pronounced /s/ or /z/. He appropriately terms them 'earlier Middle English syncope' and 'later Middle English syncope'. Dobson (1968: 938) and Lucas (1991: 54) point out that by the 15th century this development gave rise to two syncopated forms of the inflection, the earlier /s/ and the later /z/.

Dobson (1968: 938) points out that orthoepic evidence shows that the process was characterised by much variation in the *–es* suffix, like the process in unstressed words outlined above, and was not complete yet in the 16th and early 17th century. He again cites Hart (1569, 1570) as his most prominent source. He claims that Hart "…was so good a phonetician and ordinarily so free from the influence of conventional spelling that his testimony can hardly be doubted (especially because it is considerable in amount and largely self-consistent)". For example, Hart's evidence indicates /əs/ in words in which the suffix *–es* is retained as a separate syllable, like *ages, asses* and also *contraries, copies, enemies,* and *modes* 'moods'. However, /əz/ occurs as well in *exercises* and *premises.* Variation occurs in *enemies.*

According to Dobson (1968: 939), /əs/ must be the result of 'failure' of ME 'voicing' before a word which starts with a 'voiceless' consonant. He notes that Hart gives /s/ four times in the phrase *The Lord's Prayer.* Similarly, /s/ occurs in *enemies tu,* whereas /z/ is found in *enemies of.*[48] /əs/ as a separate syllable in *Jews* which

[47] Words in parentheses are given by Smith (1568) as means to distinguish the minimal pairs.

[48] Dobson (1968: 939) notes that there was a subsequent tendency, for which the only significant representative is Hart, towards regeneralisation of the forms in /əs/ and /s/. This was aided by the analogy of words which had /s/ from a 14th century inflection *–s* instead of *–es.* Hart gives *artikls* 'articles' (and similarly five other Old French words in *–le*), *leters* 'letters' and *mīters* 'meters'. These. according to Dobson, "…must represent new formations in the singulars…and therefore show his

contrasts with monosyllabic *juice* is found in Smith (1568). Laneham (1575) has /s/ in *comes* but /z/ in *beasts* and *nights.* /z/ is noted by Gil in *book's* in the phrase *the book's leaves* (before a 'voiced' consonant), elsewhere he has /s/ in *books* (plural). Possible imperfect phonetic forms given by Gil (1619) are Spenserian unsyncopated forms ending in /s/: <wūndes> 'wounds', <kloudes> 'clouds' and <handes> 'hands'. Gil also has <kloudez> 'clouds' in another place. Jordan notes that *–is* remained in the 'living prose' of the North until the 15th century and even longer in poetry. As with the unstressed words above, this variation does merely shows that a process did in fact take place. Something was going on phonologically.

Other suffixes in /s/ were affected by the process too. Luick (1964: 1028)**,** Dobson (1968: 940) and Jespersen (1949: 201) point out that early ModE /z/ often occurs in the *–(i)ous* ending in, e.g., *jealous, curious* and *notorious*. Nowadays, /s/ is general again in many of these forms because the suffix receives secondary stress. Dobson (1968: 940) points out that the suffix is [uz] in Hart in *commodiously, curious, desirous* (twice)*, jealous, notoriously, superfluous* and *virtuous.* He argues that the only exceptions are found *desirous, commodious* and *dangerous*, all once transcribed as [us]. Dobson claims that PDE [əs] for *–ous* represents earlier [us], which is recorded in the sources of Laneham (1575), Bullokar (1580, 1585, 1586), Robinson (1617), Gil (1619), and later ones. It is a blend form of shortened ME *ū* with /s/ preserved under secondary stress. He claims that the use of /s/ in Latin *–ōsus* probably helped in generalising this pronunciation as well.

4.2.1.4 The process in endings with fricatives other than /s/

Luick (1964: 1028-1029) and H&L (1954: 964) argue that the same 'voicing' must originally also have taken place in the verb-ending *–eth*. However, this ending disappeared from the language in the 16th century and the present pronunciation is a spelling pronunciation. The ending of ordinals like *seventh* and *twentieth* had the right stress conditions to undergo the process. However, according to Luick, they did not undergo the process because of paradigm uniformity with a majority of /θ/ forms in stressed syllables, e.g., *tenth*. H&L point out that 'voicelessness' in these forms was already attested by Gill in 1619. Place names like *Lambeth* and *Redriff*, the old name for London area *Rotherhithe*, do not undergo 'voicing'.

---

regeneralisation of [s]; and the latter's not infrequent occurrence instead of [z] in both native and foreign words in which only late syncope is to be expected…".

Luick (1964: 1028) and Jespersen (1949: 199-201) point out that /f/ in *–if* also 'voiced'. Examples include *hussif* from OE *hūswīf*, also noted by MacMahon (1998: 483), and Old French *Tardiv*. These later became *hussi* and *tardi*. Luick (1964: 1028), Brunner (1960: 376), H&L (1954: 971), and Jespersen (1949) indicate that /v/ was established in ME adjectives like *actif, passif, pensif* and *plaintif* when supported by /v/ in closely related Latin forms ending in *–ivus* and the French feminine form, e.g., <active>, <passive>, <pensive> and <plaintive>. When this was not the case, the /f/ forms came to dominate again after original weakening: <caitiff>, <bailiff> and <mastiff>, although in early ModE these forms often appear as <caitive>, <bailive> and <mastive>. Jespersen points out that the process could not prevail after a 'strong' vowel, e.g., *brief*. Therefore, the unstressed nature of the preceding vowel is important.

4.2.1.5 The process in the affricate /tʃ/

Fry (1860-1861, 1862-1863), Sweet (1924), Jespersen (1933, 1949), Davies (1934), H&L (1954), Ekwall (1956), Luick (1964), Strang (1970), Jordan (1974), Prins (1974) and Faiss (1989) point out that the process also affected the affricate [tʃ]. Faiss (1989: 99) points out that the change was often indicated by spellings like <g, gg> instead of the original <ch> spelling. This can be seen from the forms in (1) (from Luick 1964: 1028-1029, Dobson 1968: 940, Jordan 1974: 168):

(1)	*ME*	*lME/eModE*	*ModE*
	knowlechen		'knowledge' (V)
	knowleche	<knowledge>	'knowledge' (N)
	caboche	<cabage>	'cabbage'
	partich		'partridge'
	cartouche	<cartage>(1579)	'cartridge'
	sausiche (F)	<sausage> (15th cent.)	'sausage'
	autruche (OF)	<ostrige>	'ostrich'
	Burbache	<Burbage>	

Jordan (1974: 168) argues that *knowledge* does not appear in the records until the 15th century, and other forms were not attested until ModE, e.g., <Burbage> (<Burbache). 'Voicing' of initial /tʃ/, e.g., <jol(le)> 'cheeck, jaw' (<choul, under

influence of *jowe* 'cheek' from Old French *joue*), is not attested until ModE. Jordan (1974: 168) argues that <Knawlage> for <–lache> (< OE læcan /læːtʃan/) "…could certainly be influenced by the French ending <-age>. Dobson (1968: 949) points out that [dʒ] is shown in *knowledge* by Hart (1569, 1570), Gil (1619), Hodges (1643, 1644, 1649) and Strong (1676). Jordan (1974: 168) also gives <gruchen> versus <gruggen> 'to grumble' (cp. grudge). However, this looks more like inter-sonorant modification of the affricate.

In PDE, *spinach* retains its original spelling. *Ostrich* keeps its spelling and /tʃ/ pronunciation, in spite of early ModE *ostridge*, which was pronounced with /dʒ/ in the 18th century. H&L (1954: 968) argue that *spinach* is not a good example of the process because forms like *espinache* and *espionage* already existed in French, and, therefore, could have simply been a retention of the French pronunciation. They claim that *borage* had *–age* from the beginning onward, and that forms with *–age* and *aige* exist next to Old French *bourache*.

Fry (1860-1861: 76) points out that Johnson (1755) supplies the entries: "Knowlech (s. obsolete) Knowledge. *Chaucer*", "Knowlech (v.t. obsolete) to Acknowledge. *Chaucer*", and Webster[49] gives: "*Knowledge*, n [Chaucer, *knowleching*, from *knowleche*, to acknowledge. Qu. The sense of *lech*". Fry shows that the form with <ch> occurs in the following sentence in the opening of Chaucer's Persones Tale "Owre swete Lord God of heven, that no man wil perische, but wol that we comen alle to the *knowleche* of him & c."[50] He thinks that this manuscript must have been written within a few years after 1400, the date of Chaucer's death. He considers it to be by far the best of the manuscripts examined by him both with regard to "…antiquity and correctness". He argues that in Tyrrwhitt's edition of 1775 the passage is printed as follows: [51] "that we comen all to the *knowleching* of him". He argues that there are several quotations in Wyclif, e.g., Luke (ii. 44) [They sought him] "…amonge his cosyns and his *knowleche*", and "So ech that denyeth the sone hath not the fadir, but he that *knowlechith* the sone hath the fadir also." The same form of verb is found in Piers Ploughman and the Dialogue Between Soul and Body. Fry (1860-1861: 77) argues that "It is beyond a doubt that the older form of both the

[49] Fry gives no full reference to this work.
[50] Fry adds as a footnote "Harl.MS.No. 7334; and also the edition of 'Canterbury Tales' [Percy Society] based by Mr. Wright upon that MS."
[51] Again, Fry gives no full reference to this source.

Noun and the Verb contained the *sharp* palatal (*knowleche*), and that the *flat* palatal (*knowledge*) is a later pronunciation".

Fry (1860-1861: 78) argues that "The change of pronunciation, from *knowleche* to *knowledge,* by the 'flattening of the final sharp palatal', is precisely similar to the change which has taken place in other words ending with the same sound". Fry (1860-1861: 78) gives *Brummagem* (= *Bromwichham*) which, according to him, is the true name for *Birmingham* as an example of the change in place names. Fry (1862-1863: 38) argues that the change from /tʃ/ to /dʒ/ took place at about the close of the 15th or the beginning of the 16th century. He believes this because the form *knowledge* is found in Letters Relating to the Suppression of Monastries printed by the Camden society in 1843. This shows that the change had taken place, and had become established at as early as 1533 when the letters were written.

However, Jordan (1974: 168) argues that 'voicing' of /tʃ/ in unaccented syllables takes place in the 14th century. Faiss (1989: 99) argues that the process entered northern speech in the 14th century and southern speech in the 15th century. Jespersen (1933: 369) gives another few examples: <carriage> (<caroche, <Fr. caroche, It. carrocio) and <eldritch> (chiefly Scots) 'weird, ghostly'. Although this is clearly not apparent from the spelling, Jespersen argues that the latter has forms with *–age* in the 16th century. The noun *ache* 'pain' formerly had [tʃ] (the verb had and has [k]); a dialectal compound is *eddage* 'headache', which is also indicated by H&L (1954: 968). The other word *ache* ('apium') gives *smallage.*

Jespersen (1933) points out that ME <luvesche> became <lovage> (< Old French *lavache* 'deluge of rain'). He claims that the obsolete <lava(i)ge> became *lavish*. This is the standard form now because of the adjective ending *–ish.* <orach> (plant name) sometimes occurred with <–ge>. <stomager> is found beside <stomacher> (Walker (1791) gives the pronunciation 'stum-mid-jer'). Jespersen (1933) notes that the 'voiceless' pronunciation of *stomach* with /k/ has prevailed. H&L (1954: 964) also point out <stomacher> (Anglo French **stomachier*), which was attested from the 15th century. In the 15th and 18th centuries English <stomager> is attested and Scottish <stammager>. Davies (1934: 16) notes that there was an interchange of /dʒ/ and /tʃ/ in <dydge> 'ditch' and <discharchyng> 'discharging'. Faiss (1989: 99) points out that /dʒ/ is replaced by /tʃ/ in especially in the West-Midlands. In North Yorkshire, North Lancashire, and north of these regions /ʃ/ is replaced by /dʒ/. Both these sounds are found in Scots and Irish.

Jespersen (1933: 369), H&L (1954: 968) and Luick (1964: 1028-1029) note that [dʒ] was further fully established in a number of place and personal names like: *Greenwich, Woolwich, Harwich, Norwich*, *Guttridge, Cowage, Swanage* (from *Swanawic*), and *Sandwich*. The latter usually has /tʃ/ but /dʒ/ pronunciations still exist. <Ipsidg> in a ship journal shows the natural development of the sound whereas in standard speech the standard writing is adhered to. The personal name <Horridge> is derived from the place name *Horwich,* which has had the phonetic spelling since the 17th century. H&L point out that the personal name *Sandwich* gets the spelling <Sandwidg> in 18th century. They point out that forms with ME *–ech*, *-bech* like <Cressage>*,* <Radnage> and <Burbage> exist next to forms which kept the original sound. H&L (1954: 970) indicate that ME *–hatch*, which occurs in <Stevenage> and <Fulledge>, could also undergo the process.

Jespersen (1933: 372) and H&L (1954: 971) note the fricative /ʃ/ did not 'voice' under the same conditions. They claim that this is probably due to the fact that [ʒ] was not yet seen as an independent phoneme but existed in the group [dʒ] only. However, Jespersen points out that 'voicing' of final /ʃ/ to [dʒ] took place in some cases, e.g., *skirmish* > <skirmige, -age> (from 1567 on) > <scrimmage>. In Cockney <radidges> can be found for *radishes,* <rubbidge> for *rubbish,* and <furbidge> for *furbish.*

4.2.1.6 'Voicing' in onset position

'Voicing' in onset position is discussed by Jespersen (1933), H&L (1954: 964), Ekwall (1959: 85), Luick (1964: 1030), Fisiak (1968: 59) and Strang (1970). They note that only /θ/ 'voiced' in this position. Luick argues that there must have been variation here as well, but that the 'voiced' sound established itself in most cases in the whole speech area, including in the Standard. It occurs in words like *thou, thee, they, them, their, the, this, these, that, those, thus, then, than, there, thider* (PDE *thither*), *thens* (PDE *thence*), *though*. The 'voiceless' sound is found in *through.* Interestingly, all these words are function words which predominantly tend to appear in unstressed positions. However, no 'voicing' is attested for words like *for* and *some* even though they were also frequently used in unstressed positions. The latter two did 'voice' in the South-West, due to Southern Middle English initial fricative 'voicing' which is discussed in 5.2.1.

Jespersen (1933: 360) notes that pronominal words had /θ/ in OE. This is shown by Orrm who regularly had <t> in these words, both after words ending in /t/ and in /d/,

e.g., *off tatt, word tatt, þatt blod tatt, greþþedd tuss*. He points out that East Anglian vocabulary from 1825 indicates *tan* for *than* but only in the phrase *now and tan.* He claims that the form of the definite article *t'* in Yorkshire indicates the same development. Jespersen (1933: 360) and H&L (1954: 964) further note that *though* and *although* often have /θ/ in educated Scottish speech, in which the sound is also found in *thence, thither*.

Jespersen (1933: 361) argues that this change may be different from the general process considered in this section because it is difficult to exactly determine when it started. He claims that Chaucerian rhymes like *soothe: to thee, by the: swythe* "…may not prove more than voicing between two vowels, and that may have preceded the voicing in other positions by some time." He notes that from 1500 there are Welsh transcriptions with <dd> (= [ð]), and /θ/ in *though* is frequent in the 18th century and is said to still exist in vulgar speech.

However, Lass (1992: 58-59) argues that stress did play a part in the 'voicing' of these usually unstressed function words. Therefore, he connects it to the change in other unstressed words and syllables. He claims that the modern forms, *the, this that etc,* are all members of a very restricted class in that all of them normally occur under low sentence stress. He notes that these items underwent 'voicing' in the 14th century. He gives some examples where Chaucer probably utilised the change to create rhymes, e.g., *soothe* 'sooth'*: to the* 'to thee'. Lass argues that *sothe* must have been pronounced [soðə]. He argues that this process is the same as the process of fricative 'voicing' in unstressed syllables. He claims that although in most cases the process occurred word-finally, the separate environments are rhythmically parallel in that they occur in the weak position in the foot, specifically the margin of a weak syllable. He claims that this illustrates the point that weak positions in the foot are prime lenition sites. The issue of prime lenition sites was also raised in 3.2.3.2 and will be further investigated in 4.3 below. Lass (1992: 60) points out that these changes are nothing new. He calls them simple 'recurrences' of a type of change that occurred at least once before namely OE fricative voicing discussed in 3.2.3.2.

4.2.1.7 Summary

In simple traditional phonological terms, it has been shown in this section that the traditionally 'voiceless' fricatives, especially /s/, and to lesser extent also /f/ and /θ/ underwent a well-documented stress related process of 'voicing'. This process

affected fricatives in coda position in the former two, and in onset position in the latter in late ME and early ModE. The process also took place in coda position in the affricate /tʃ/. It exhibits a lot of variation at first but becomes more established later in most cases. However, the very fact that orthoepists indicate variation between the original 'voiceless' pronunciations and the new 'voiced' ones indicates that some kind of process did happen in these unstressed words. Many cases of variation also coincide with the following consonant: 'voicing' fails when the following consonant is 'voiceless'.

As pointed out before, the question that arises is what kind of phonological process this exactly was. Was it really 'voicing' or something else? If it was indeed 'voicing', this would mean that an active |voice| specification is gained by the segments, and that this feature, therefore, has to be specified in the laryngeal phonology of English. This would be a major problem for LR. An alternative analysis of this process in LR is given in 4.3.

4.2.2 Pre-tonic /s/ 'voicing' in the late 16th century

4.2.2.1 Preliminaries

Stress-placement seems to have conditioned another process of laryngeal modification in a similar way as in the process above. The handbooks (e.g., Jespersen 1933, 1949; H&L 1954; Luick 1964; Dobson 1968; Strang 1970; Faiss 1989 and Prins 1974) generally describe the process as intervocalic fricative 'voicing'. However, Luick (1964: 1103), H&L (1954: 975), Quirk & Wrenn (1963: 128) and Wardale (1960:50) note that the successful application of this otherwise straightforward process seems stress-dependent. It takes place when the fricative is not immediately preceded by the main stress, and it fails when the primary stressed syllable immediately precedes the fricative. H&L (1954: 976) point out that a similar synchronic process occurs in Present-Day German as can be seen in (2):

(2) ˈjeːfər~jeːvəˈraːnər 'Jever, Jeverian'
haˈnoːfər~ hanoːvəˈraːnər 'Hanover, Hanoverian'
ˈkɑsə~kɑˈziːrən 'till, to encash'

The handbooks indicate that the process mainly affected /s/. It is argued that the process took place during the 17th century in 'good speech' but had taken place

earlier in 'vulgar speech' (Dobson 1968: 941). H&L (1954: 991) point out that the process was first identified by Jespersen (1891). The phonetician Walker (1791) already noted that /s/ of *dis-* was 'flat', i.e. 'voiced', when the stress was on a second vowel-initial syllable. Some examples of the process in /tʃ/ can be found. Luick (1964: 1105) and H&L (1954: 979) note that a change from /tʃ/ to /dʒ/ occurred in *ajar* from original *on char*. They claim that simple *jar* is derived from this 'voiced' form. Luick notes that forms with a <j> spelling are first found in 1674 but may have existed much longer in colloquial speech. H&L (1954: 991) note that judging from spellings the change must have already existed in the 14th or at the latest 15th century in the North of England. H&L (1954: 980) argue that *cheek by jowl* (<**chowl*) can be explained by the 'voicing' process.

Luick (1964: 1105) points out that the process did not affect /f/ and /θ/. H&L (1954: 980) indicate that a form like *athirst*, in which the main stress follows and therefore conditions are right for the change, is influenced by the form *thirst.* They also point out that /f/ in the environment which favours the change occurs in loanwords only, and has been kept before stressed vowels as in *offend, affirm* next to *defend, profane,* and *profess.* They claim that the words show historical coherence in that the influence of the donating languages and the spelling worked against the 'voicing' of the fricative in these words. They do note that south-western pronunciations of *afford* with [v] exist, but that those are due to the 'weakening' of initial fricatives in those dialects, which are dealt with in chapter 5. However, historical coherence to loan words seems to have been less important in words with medial /s/, as discussed directly below. Therefore, this argument for the failure of the process in /f/ and /θ/ certainly does not seem the whole story. Considering the fact that the process more or less took place in /s/ only, calling it 'fricative voicing' seems inadequate. It will from now on be referred to as 'medial/pre-tonic /s/ voicing'.

Native English examples of the change are extremely rare. Luick (1964: 1103) points out that <z> is attested next to <s> in ModE and dialectal *hows'ever* for *howsoever* and infrequently also *hows'mever* for *howsomever* 'as always'. Dobson (1968: 941) points out that Cooper (1685) has <howzever> 'howsoever' followed by WSC (1695).[52] Jespersen (1933: 365) adds that [z] forms ending in *-zeer, -ziver* and *-zivver* are still found in Yorkshire and other places. Jespersen (1949: 203) and Luick (1964: 1130) note that Scots has [z] in *December.* The process did not happen when

[52]Writing Scholar's Companion (anon).

intervocalic /s/ immediately followed a stressed syllable, e.g., in native words like *gossip, gossamer* (<OE *gōs-sumor* 'goose-summer') and *lissom(e)*.

H&L (1954: 976), Luick (1964: 1003) and Dobson (1968: 941) argue that although there are few native examples, medial /s/ 'voicing' did have a big impact on the language because it greatly affected French and Latin loans. This latter point complicates the analysis of the process. H&L, Luick, and Dobson seem to assume without doubt that this process is English in origin. However, the fact that it mainly affected loans calls into question whether the process was in fact an English phenomenon or whether it originated in the predominant donating language French. It seems plausible to argue that because there is so little evidence from the native vocabulary, this 'process' points at foreign influence. However, H&L (1954: 979) claim that the fact that so few English words were affected is due to the fact that there are very few native words with the right stress pattern. In fact, the ones given directly above seem to be the only native words found as examples in the handbooks. Therefore, the process almost had to exclusively apply to loans.

Price (1998: 40), Pope (1973: 136) and Ewert (1963: 69) point out that there was indeed a process of intervocalic voicing of Latin (L) /s/ in Old French (OF), e.g., in words like L *rosa* /s/ > OF *rose* /z/ 'rose', L *causa* /s/ > OF *cause* /z/ 'cause', L *resolvere* /s/ > OF *résoudre* /z/ 'to solve', L *pausare* /s/ > OF *poser* /z/ 'to put'. [53] However, no reference is made to any involvement of the stress in this change. Brunot & Bruneau (1933: 66-69) do mention the relevance of the position of the stress. They argue that in 'strong' word- and stressed-syllable-initial position, Latin /s/ is retained in Present-Day French (PDF): L *sorte* > PDF *sort* 'sort', L *ver*ˈ*sare* > PDF *ver*ˈ*ser* 'to pour'. Data with /z/ in this environment are not mentioned, and may, therefore, not occur. Latin /s/ changed to /z/ in OF in a 'weak' non-initial post-tonic position, e.g., L ˈ*rosa* > PDF ˈ*rose*. Therefore, if stress was at all relevant in the OF process, then it was the exact opposite of the ModE process. Price, Pope, and Ewert do not give any indication of a later process of inter-sonorant fricative voicing in French which could have affected French words with pre-tonic intervocalic /s/ before they were adopted into English.

[53] Because French is a |voice| language, the traditional terms *voiced* and *voiceless* seem legitimate in this context and the same goes for a process of voicing. Hence the terms will be used without quotation marks with regard to French.

4.2.2.2 'Voicing' of French and Latin pre-tonic /s/ in English

The most compelling evidence that medial /s/ 'voicing' was an English phenomenon comes from data that apparently had /s/ in the donating languages by the time they were adopted into English. They changed to /z/ after they entered English, indicating that the process was indeed English. In order to assess whether words had an /s/ or /z/ pronunciation in medial inter-sonorant position in French, the spelling and phonology of that language have to be taken into consideration. Pope (1973: 136) points out that after the intervocalic voicing of obstruents in French, just described above, /s/ in traditional French words only existed when it was derived from lengthened consonants, Gallo-Roman intervocalic groups, or Old French affricates, e.g., in *passer* 'to pass', *chaser* 'to hunt', *façon* 'way, manner', *hache* 'axe'. Pope (1973: 146) argues that reduction of geminates took place later than the voicing of single consonants before the end of the Old French period, but that traditional spellings were frequently maintained. Price (1998: 40) agrees with this and points out that it gave rise to the possibility of a very early intervocalic /s/ ~ /z/ opposition in French. This is because after simplification of /ss/ to /s/, the new single /s/ phonemically contrasted with the new /z/. Therefore, the latter must be considered as having had phonemic status already.

Ekwall (1956: 87), Ewert (1963: 113), Luick (1964: 1003), Pope (1973: 276), and Faiss (1989: 100) note that French /s/ was orthographically represented by <s, c, ç, ss, sc>, and /z/ mainly by <s, z>. Intervocalic <s> almost always meant /z/, <s> before or after consonants almost always /s/, and final <s> was /s/ before it went silent. Ewert (1963: 113) argues that, unlike the general non-phonetic nature of French orthography, <s>-doubling in spelling had a phonetic significance in the past in that intervocalic <ss> served to distinguish /s/ from /z/, spelled <s>.

The first set of data in (3) presents forms which, according to Luick (1964: 1003), had /s/ in French or Latin. In most cases this is evidenced by the <ss> spellings present in their French ancestors by the time they were adopted into English. The etymological information was obtained from the electronic version of the Oxford English Dictionary (OED) (www.oed.com). These spellings serve as evidence for a process of pre-tonic /s/ 'voicing' in English. This is because the words were presumably borrowed into English with French /s/, which then changed to /z/ in pre-tonic position after they were borrowed. The abbreviations used in (3) are: att.: 'attestation', OF: 'Old French', MF: 'Middle French', AN: 'Anglo Norman', F:

'French', obs: 'obsolete', L: 'Latin' Pol. Party: 'Political Party' and (var) means that there is variation between /s/ and /z/ in English.

(3)	po'**ss**ess	< MF possesser	1st att. 1394
	po'**ss**ession	<AN poss/scessiu/ion/ioun	1st att. 1325
	de'**ss**ert	<F dessert[54]	1st att. 1539
	mu'**s**eum	<L mūsēum	1st att. 1603
	Con'**s**ervative (Pol. Party)	< F conservatif, -ive	1st att. 1830
	pre'**s**entment (var)	<obs F presentiment	1st att. 1400
	Thoma'**s**in	<F Thomassine	1st att. unknown
	di'**ss**olve	<L dissolvere	1st att. c1374
	di'**sc**ern	<F discerner	1st att. c1374
		OF also disserner	
	re'**c**ited (only in Cockney)	<F réciter, or L recitāre	1st att. 1430-31

Dobson (1968: 941) points out that the earliest orthoepists do not show the change. However, he does note that some forms with /z/ occur. Coles has <z> in *Thomasin* which is pronounced Tom-ma-zeen (<F *Thomassine* with /s/) and Cocker has <dezern> 'discern'. According to Dobson (1968: 942), the fact that Pery (1539) has <z> twice in <recited> must show early 'voicing' in Cockney speech. In most of these forms, original French /s/ is uncontroversially evidenced by spellings indicating the voiceless sound. Moreover, Present-Day French (PDF) /s/ pronunciations testify for the fact that they had /s/ historically. Pronunciations given in relatively recent French dictionaries (Davau et. al (1972), Atkins et. al. (1993)) indicate that PDF *posséder* 'to possess', *possession* 'possession', *dessert* 'dessert', and *réciter* 'recite' are all pronounced with medial /s/.[55]

As can be seen there are a few words in which single <s> spellings can be found. According to the OED, *presentment* had a single <s> spelling in French. However, H&L (1954: 977) point out that the French form *pressentiment* with /s/ also existed. In fact, the dictionaries give the latter form as the PDF spelling and give /s/ as the pronunciation of the medial fricative. This backs up the fact that by the time the form was borrowed into English, /s/ must have been the pronunciation of the medial

[54] From *desservir*.

[55] French /s/ in the source of *recite* is also backed up by the fact that, generally, English has retained the French /s/ pronunciation.

fricative in French. H&L claim that English /z/ pronunciations are dominant. However, previously dominant /s/ pronunciations still exist. H&L (1954: 977) and Ekwall (1956: 87) argue that /s/ pronunciations are also etymological in that they bring out the two parts of the word. They note that in the 18th century [s] in *presentiment* is recorded by Elphinston (1765) and Walker (1791). Knowles (1835), Smart (1836) and Stormonth (1871) give /s/ in the 19th century, and in the 20th century /s/ occurs in NED (1909).[56] From 1917 onward Jones attests /z/ next to /s/ and Wyld (1932) attests just /z/. Therefore, the process seems to take place late in this word.

Another word in which the process seems to have taken place quite late is *Conservative.* H&L (1954: 988) argue that this word in its sense "The most common current designation of one of the two great English political parties, the characteristic principle of which is the maintenance of existing institutions political and ecclesiastical (OED)" has undergone the process. They claim that this is because, due to it being the name of a political party, it has entered every day language. They claim that when words entered everyday language, they were more likely to undergo the process and lose influence from donating languages or spelling. This will be returned to in various places later. H&L note that the change for *Conservative* of course did not take place before about 1830 when the party was founded. Interestingly, if words like *presentment* and *Conservative* underwent the process this late, then the change had not yet been completed by at least the 19th and perhaps the 20th century.

However, the case of *Conservative* is debatable. The OED indicates that PDE has medial /s/ in this word. The alleged PDF word *conservatif, -ive* cannot be found in the French dictionaries and the English term is translated as *conservateur*. The latter form, *conserver* 'conserve' and *conservatisme* 'conservatism' are rendered with PDF /s/ pronunciations. This could, of course, be a case of a PDE shift back to /s/. The OED gives *discern* with a /z/ pronunciation, but also points out that nowadays it is usually pronounced with /s/. This example at the very least indicates that the change is no longer active in English, and it could even indicate that in some cases, *discern* and possibly *Conservative*, there is a shift back to /s/. Although these are the only two words found here which would show such a reversion.

In some cases it is hard to determine whether data represent genuine 'voicing' of French /s/ or whether the word was simply borrowed into English with French /z/. This is the case for forms which are written with medial <x>. Ekwall (1956: 90),

[56] *New (Oxford) English Dictionary*.

H&L (1954: 982), Luick (1964: 1105), Dobson (1968: 934), and Prins (1974: 233) point out that the PDE pronunciation is [gz] before a vowel with primary or secondary stress, and they emphasise the importance of the pronunciations in the donating languages. Examples are given in (4).

(4)	Lu[**g**'**z**]urious (var.)	<OF luxurieus	1st att. c1330
	E[**g**'**z**]alt	<L exaltāre	1st att. 1400/1450
	E[**g**'**z**]act	<L exactus	1st att. 1533
	E[**g**'**z**]aggerate	<L exaggerate[57]	1st att. 1533
	E[**g**'**z**]amine	<F examiner	1st att. 1303
	E[**g**'**z**]ample	<OF exa/emple[58]	1st att. 1382
	E[**g**'**z**]empt	<F exempter	1st att. 1401
	E[**g**'**z**]haust	<L exhaust	1st att. 1433
	E[**g**'**z**]hilarate	<L exhilarāt	1st att. 1540
	E[**g**'**z**]ist	<F exister	1st att. 1602
	E[**g**'**z**]onerate	<L exonerāt	1st att. 1524
	E[**g**'**z**]orbitant	<L exhorbitant/–em	1st att. 1460
	E[**g**'**z**]ult	<F exulte –r	1st att. 1570
	E[**g**'**z**]hibit(V)	<L exhibit	1st att. 1490
	E[**g**'**z**]hibit (N)	<L exhibitum	1st att. 1626
	E[**g**'**z**]ert	<L exert[59]	1st att. 1660
	E[**g**'**z**]ertion	<L exertion/–em	1st att. 1677
	E[**g**'**z**]ecutor (var.)[60]	<L executors	1st att. c1440
	An[**g**'**z**]iety	<L anxietāt/–em	1st att. 1525
	E[**g**'**z**]otic (var.)	<L exōtic/-us	1st att. 1599
	E[**g**'**z**]iguous (var.)	<L exigu/-us	1st att. 1551
	E[**g**'**z**]ecutive	<L ex(s)ecūtīv/-us[61]	1st att. 1646

Most above mentioned scholars agree on the fact that these data were direct adoptions from French and Latin, i.e. the original sounds of the ancestors were

[57] F *exagérer.*
[58] Refashioning after Latin of earlier *essaumpel.*
[59] Also rendered as *exsert.*
[60] With the stress on the second syllable the word means "A person appointed by a testator to execute or carry into effect his will after his decease" (OED).
[61] From *ex(s)ecīt-* ppl. stem of *exsequī.*

retained. H&L (1954: 984) point out that early phoneticians do not attest the /gz/ sound for <x>, but that that does not prove the sound did not exist. Later phoneticians sometimes do not pay attention to the stress pattern. Peyton (1756), normally a good observer, only records /ks/. He starts recording /gz/ in Peyton (1765) only. Ekwall (1956: 91) and Dobson (1968: 934) point out that there was a parallel between the English and French pronunciations of the words in question, which is apparent from PDF pronunciation.

H&L (1954: 982) note that Latin had /ks/ and French now has /gz/, but still had /ks/ in the 16th century. The /gz/ pronunciation became common in French in the 17th century. Luick (1964: 1105) points out that around the 15th century the /gz/ pronunciation for intervocalic <x> had arisen, which continued in the 16th century and became general in the 17th century. If these authors are right, then an examination of the data and their etymologies above leads to the conclusion that an actual laryngeal modification took place in most of these words, and not just retention of the French sound. Only six of the twenty-one forms in (4) are adopted directly from French and if the French pronunciation was indeed still /ks/ in the 16th century, many of the words could still have been adopted with this cluster. Only *exulte* and *exist* have their first attestations in the 16th and 17th century respectively, and even this does not mean that they were not adopted at an earlier stage. The rest of the words adopted from French seem to have been adopted much earlier and first occur in the 14th and 15th centuries.

However, Dobson (1968: 934) claims that medieval French (and English) pronunciation of Latin must have used /gz/ for intervocalic Latin <x>. He claims that this must have also held for <x> between a vowel and orthographic <h>, which was probably silent as in PDF. Dobson (1968: 934) and Ekwall (1956: 91) argue that /ks/ occurs for Latin <x> in French both before and after other consonants, e.g., *experience* 'experience' and *anxiété* 'anxiety'. Dobson (1968: 934-935) points out that at a later date a reform of the pronunciation of Latin took place which led to the replacement of /gz/ by /ks/ for intervocalic <x>. They argue that this affected English pronunciation more than French pronunciation, which remained largely the same. /ks/ was introduced in many words in English.

The handbooks on French historical phonology do not pay much attention to this matter. However, Ewert (1933: 92-93) does mention that there was a tendency to pronounce <x> as /gz/ in the 17th century, but that the sound had been /z/ in the 16th century. At a later date in the 17th century the /gz/ pronunciation had been reversed in

many words by the learned influence, e.g., *vexer* 'to hurt/offend', *maxime* 'maxim'. He claims that initial <ex>- was still pronounced /egz/ in, e.g., *examen* 'exam', *exemple* 'example', *exercer* 'exercise'. This seems to indicate that the 'voiced' pronunciation had indeed existed longer, either in /z/ or /gz/ form. Ewert does not mention anything about the Middle Ages. However, if Dobson is right and French already had /gz/ in these words then the words adopted from French are all cases of adoption of the French pronunciation and not of the process of pre-tonic /s/ 'voicing'.

Dobson claims that PDE /gz/ in *anxiety* is a single case in which it seems likely that there may have been a ModE development from /ks/ to /gz/, since the PDF pronunciation suggests that the medieval pronunciation of the word had /ks/. This possibility is strongly supported by the evidence of Coles (1679), whose 'phonetic' spelling shows [ŋkz]. The /s/ of the group /ks/ was 'voiced' to /z/ before the stress and /k/ became /g/ in between /ŋ/ and /z/. This seems a natural process and would be supported by the analogy of /gz/ in other words. Although most evidence suggests that the French pronunciation of <x> was /gz/ at the time the *ex-* forms were borrowed into English, it cannot be said with absolute certainty. Therefore, it remains uncertain whether the forms in (4) above constitute examples of a 'voicing' process or simply the adoption of a 'voiced' fricative from the donating language. Nevertheless, it is shown in the next section that <x> forms are relevant, as it seems that they sometimes had 'voiceless' pronunciations when they occurred in post-tonic position.

4.2.2.3 Failure of 'voicing' in post-tonic position

It is argued in this section that unmodified French /s/ forms can also provide compelling evidence for the process of medial /s/-'voicing'. It has been shown that there is evidence that French pre-tonic intervocalic /s/ 'voiced' in English. If it can be shown that the process failed in post-tonic position, this provides evidence for the fact that the process was stress-conditioned. There is indeed some evidence that French /s/ was retained when the preceding vowel was stressed. According to the handbooks, this happened in, e.g., ˈ*fo***ss***il* (<F *fossile*), ˈ*ma***ss***acre* (<MF, F *massacre*), ˈ*me***ss***age* < AN *me/issage*, OF *message*), ˈ*ve***ss***el* (AF & OF *vessel*, OF *ve/aisseal/-el/-eau*), ˈ*va***ss***al* (OF *vas(s)al*). These words had medial /s/ in French as evidenced by the <ss> spelling in their French ancestors. Therefore, these examples appear to be straightforward cases of failure of 'voicing' of French /s/ in post-tonic position.

Luick (1964: 1104), Dobson (1968: 929), and H&L (1954: 981) argue that, in the case of the *dis-* prefix, a regular division can be observed from the 18th century onwards between /z/ in pre-tonic position, e.g., *di'sarm, di'shonour, di'shonest, di'sinterest, di'sorder* and /s/ in post-tonic position like *ˌdisa'vow, ˌdisa'gree, ˌdisad'vantage, ˌdisen'gage, ˌdiso'bey, ˌdisa'ffect, ˌdisa'llow* and *ˌdisa'ppear*. These latter forms have secondary stress on *dis-*, which seems sufficient to halt the process. Luick and Dobson argue that this division must be due to the process of 'voicing' discussed in this section.

In the case of the <x> forms there is also evidence that 'voiceless' /ks/ occurs when the main stress does not immediately follow it. This is shown in (5):

(5)	'luxury (var)	<OF luxurie	1st att. 1340
	'executor	<AF executour	1st att. 1432-1450
	'execute	<F execute/-r	1st att. c1386
	'exercise	<ME exercise[62]	1st att. c 1340
	'exigent	<L exigent/-em	1st att. c1430
	'exodus	<L exodus	1st att. c1000
	'exit	<L exit/-us	1st att. c1485
	'anxious	<L anxi/-us	1st att. 1623

Luick (1964: 1105) argues that words containing /ks/ are scholarly words, adopted mainly in the 15th century. However, most /gz/ words, discussed in 4.2.2.1, are scholarly too but entered the language at a later date. This can be seen from the data in (4) and (5). Dobson (1968: 934) points out that there is some degree of variation and this usually occurs when one pronunciation is replaced by another and not phonetically developed from it. Ekwall (1956: 91) points out that variation between /gz/ and /ks/ also occurs in French in words like *excès* 'excess', *excepter* 'except', *accepter* 'accept'. Ekwall (1956: 91) argues that English /ks/ in most cases parallels French, Latin, and OE /ks/. Luick (1964: 1105) argues that no real sounds change took place in these forms. Instead, he argues that there was a split of two pronunciations: one French and the other Latin. These developed according to measures of the native articulatory habits, which were actually due to a sound change. Whether this is true or not is not the most relevant issue surrounding these data. What

[62] OF exercīce.

is relevant about these data is the fact that stress seems to have played a part in the retention of /ks/, whereas pre-tonic forms 'voiced' or retained the French 'voiced' sounds. This provides evidence for the failure of 'voicing' in post-tonic position in English.

More examples of post-tonic /s/ are given in (6). The 'voiceless' sounds in (6) are usually characterised as retention of Latin /s/ in the grammars.

(6)	ˈdesolate	<L dēsōlātus	1st att. c1374
	ˈprosody	<L prosōdia	1st att. c1450
	ˈfancy	< contraction of *fantasy*	1st att. c1360-1576
	ˈprosecute	<L prōsecūt-[63]	1st att. 1432-50
	ˈcrisis	<L crisis	1st att. 1543
	moˈrose	<L mōrōsus	1st att. 1565
	moˈrosity	<MF, F morosité[64]	1st att. 1534
	verˈbose	<L verbōsus	1st att. 1672
	verˈbosity	<F verbosité (16th cent.)[65]	1st att. 1542
	ˈthesis	<Gr Θεσις	1st att. 1398[66]
	joˈcosity	<L *jocōsitās < jocōsus	1st att. 1646
	phiˈlosophy	<AN+OF, MF, F philosophie[67]	1st att. c1325
	phiˈlosopher	<Prob. AN and MF philosophe	1st att. 1330
	ˈchrysolite	<ME crisolite < OF crisolite	1st att. c1300
	ˈpresage (N)	<F présage (15th/16th cent.)	1st att. 1393
	ˈpresage (V)	<F présager[68] from N presagier	1st att. 1562
	ˈresearch	<Obs. F recerche (1539)	1st att. 1577
	ˈresource	<F ressource, † ressourse[69]	1st att. 1611
	ˈquincy	<F wine-producing region in upper Loire valley.	1st att. 1935
	sacriˈfice	<F sacrifice (att. 12th)	1st att. 1250

[63] past participle stem of prōsequī. So obsolete French *prosecuter* (1519 in Godefroy (1895))

[64] Plus its etymon Classical Latin *mōrōsitā*.

[65] Or Latin (post-classical) *verbōsitas*.

[66] Followed by a long period of nearly no use until the 17th century.

[67] c1175 in Old French; also in Anglo-Norman as <philosofie>, in Old French as <philozophie>, <phylosophie>, <phyllosophye>, and in Middle French as <phillozophie>.

[68] Common in 16th cent French.

[69] From Old French *res*(*s*)*oudre*.

H&L (1954: 787) point out that Latin and Greek loans which were adopted between the 14th and 17th centuries generally did not undergo 'voicing'. These words were used by the higher classes and were never used in colloquial speech. Therefore, they have Latin /s/ more frequently. Ekwall (1956: 87), Faiss (1989: 100) and H&L (1954: 794) point out that Latin loans mostly have /s/ according to the ModE school pronunciation. In the words above it can be argued that this goes for *desolate, prosody, morose, basis, thesis, crisis*, which, according to the OED, were all directly borrowed from Latin.

The handbooks point out that Latin /s/ does 'voice' in three cases: (i) when it occurs in final position of an unstressed syllable, e.g., in *Achilles, Hermes, Hercules, Soctrates, series* ([z] is certainly attested for this word since the 18th century), (ii) they 'voiced' when Latin /s/ occurred after a sonorant consonant as in *lens* and *Mars*. (iii) 'voicing' also took place before endings like *-ia, -ium,* e.g., *ambrosia, euphrasia, aphasia* ([z] is attested here since the 18th century), and *Elysian, Elysium* (there had been writings like <Elyzian> since the 16th century). The first of these seems to be a result of the process described in section 4.2.1. The other two seem to be straightforward cases of 'voicing' in inter-sonorant position, discussed in 3.2.3.2.

MacMahon (1998: 438) points out that only /s/ is recorded for *crisis* in 1917. H&L (1954: 792-793) argue that Latin loans were sometimes influenced by the French form of the word. Therefore, *thesis* is sometimes spelled with <z> in the 18th century. *Desolate*, spelled with <z> in the 16th century, points at the influence of the French word as well. Nowadays, both words have /s/, according to the OED, so this means that the French form did not win out in these cases. This may very well have to do with the position of the stress. H&L (1954: 790) note that the noun *sacrifice* has adapted to the Latin spelling. The noun was still pronounced with /z/ until well into the 19th century, and the verb had /z/ until modern times. H&L argue that this can be attributed to the influence of the *–ize, -ise* suffixes in e.g., *organise.* Therefore, *sacrifice* seems to be an exception until the 19th century. Perhaps, adoption of the Latin spelling pronunciation was encouraged by the fact the /s/ is the preferred pronunciation in post-tonic environments in English. It is unclear if it is possible to speak about an active process in the 19th century but perhaps analogy with other post-tonic cases made the adoption of the spelling pronunciation easier.

Orthographically, in the case of *presage, research, resource*, the only word which could have had /z/ in French is *presage*, because it is spelled with a single <s> in 15th

and 16th century French. Ekwall (1956: 89) claims that /s/ is due to Latin influence. H&L (1954: 988) argue that retention of the /s/ of the borrowing language is the cause of /s/ in *research* and *resource*. In these words the spellings in French denote /s/ pronunciations; *resource* has <ss> spellings and *research* is spelled with <c>. However, the fact that the fricatives are post-tonic can again be argued to have encouraged the retention of /s/.

The occurrence of /s/ in other forms in (6) like *chrysolite, philosopher,* and *philosophy* is explained by Ekwall (1956: 89) and H&L (1954: 790) as being due to Latin influence. H&L (1954: 790) argue the latter two were borrowed from French as ME *filosofie, filosofre*. They were adapted to the Latin or Greek spelling and pronunciation, with /s/, which is attested in the 16th century. However, obviously these words all have the right stress pattern to have a 'voiceless' sound in this position. Luick argues that early ModE *philosophic* with /z/ is due to following main stress, as opposed to *philosophy* with /s/, which is due to preceding main stress. Therefore, if these forms really came in from French with /z/ pronunciations it could be argued here, from a traditional point of view, that /z/ underwent 'devoicing' in these cases. Dobson (1968: 930) and H&L (1954: 788) point out that /s/ was generalised in suffixes like *-osity, -sory,* as in *curiosity, illusory* and *-sive* as in *decisive.* This can also explain certain forms in (6) like *morosity*, *jocosity* and *verbosity.* According to Ekwall (1956: 89) and H&L, this is due to generalisation of Latin /s/ (both suffixes occur in both French and Latin words). H&L point out that adjectives ending in /s/ like *curious* and, most importantly, the placement of the stress may also have helped.

4.2.2.4 Exceptions to the process

Dobson (1968: 941) claims that the process is generally sporadic. It has many exceptions in pre-tonic context where 'voicing' should have taken place but failed. The handbooks attempt to explain these exceptions. H&L (1954: 987) claim that 'voicing' could fail due to adaptation between derivational forms and simple forms, i.e. paradigm uniformity. According to them, this goes for the forms in (7) in which /s/ occurs pre-tonically and yet does not undergo 'voicing':

(7) *Pre-tonic contexts where 'voicing' fails due to paradigm uniformity*

be'side	a'sunder
a'side	ab'sent
be'set	ne'cessity
be'seech	ta'xation
fore'see	ve'xation
re'set	philo'sophical

Luick (1964: 1003) and Dobson (1968: 941) back up H&L's claim that /s/ in these forms is due to the non-derived forms of the words. Therefore, /s/ occurs in *ab'sent* (V) due to *'absent* (N). Similarly, /ks/ in *taxation* and *vexation* is argued to be due to *tax* and *vex. Beseech, beside, aside, foresee, asunder, reset,* and *beset* have /s/ due to *seech, side, see, sunder* and *set. Philosophical* is argued to have /s/ due to *philosophy,* and *necessity* due to *necessary.*

H&L (1954: 988) give retention of the /s/ of the borrowing language in loan words as the second reason for failure of- or variation in the change. This was described above for *presentment.* According to H&L this goes for the words in (8):

(8) *Pre-tonic failure of 'voicing' due to the influence of the donating language*

pali'sade	<MF, F palissade
a'sylum	<L asylum

H&L claim that Latin /s/ occurred in *asylum* and French /s/ occurred in *palisade*. The fact that this word had /s/ in French can be seen from the <ss> spelling in French. However, this argument is not very strong: if the /s/ in the donating language was so powerful, then why did the forms in (3) undergo the process?

A third reason for variation indicated by H&L (1954: 989), and backed up by Jespersen (1949: 204), is the influence of the spelling. They claim that the spellings <c, sc, ss> have often contributed to either the introduction of the /s/ or fixation of the sound, as in the forms in (9):

(9) *Failure of 'voicing' due to influence of the spelling*

re'ceive	di'ssect
pre'cise	di'ssemble
De'cember (non-Scots)	di'ssent
pre'centor	di'ssociate
suc'cess	e'xcept
a'ssail	e'xcite
di'scern	e'xceed

However, yet again, the forms in (3) above show that spelling did not always influence pronunciation. H&L themselves point out that in *dessert* the spelling pronunciation has not been able to stop the natural development. Schröer (1913) has both /z/ and /s/ but Jones (1937) and Wyld (1932) do not give /s/. The spelling pronunciation of this word was already attested in the 18th century by Buchanan (1766) and Perry (1795). H&L (1954: 990) point out that there is not a trace of the spelling pronunciation in *dissolve*, but less frequently used *dissolvent* has /s/ next to /z/. Perry has /z/ for the former and /s/ for the latter. Therefore, yet again, this does not seem like the strongest explanation for failure of 'voicing'.

However, a possible reason for greater influence of the sound in the donating language and the spelling in the words in (9) and (10) is brought forward by Jespersen (1933), H&L (1954), and Ekwall (1956). They believe that the exceptions did not enter the everyday language because they consisted mainly of learned words. For this reason, they were not as susceptible to the 'rules' of the language as more everyday words like the ones in (3). Jespersen (1933: 365) claims that "It is worth noting that all the words in which we have [z] from [s]…according to our formula- belong to popular strata of our language, while many of the exceptions are more or less book-words". It can indeed be argued that concepts like *possess*, *possession*, *dessert* and possibly even *museum* and *presentiment* play a bigger part in people's everyday lives than concepts like *palisade* and *asylum* etc. Therefore, it could be the case that loan words denoting the former concepts are more likely to enter the everyday language. However, whether this is really the case should be investigated before any such claim can be made with reasonable certainty.

4.2.2.5 Summary

In simple traditional phonological terms, the process described in this section consists of medial pre-tonic 'voicing' of /s/ to /z/, and to a significantly lesser degree of /tʃ/ to /dʒ/, in early ModE. The fact that the process almost exclusively affects /s/, justifies the choice to call it medial /s/ 'voicing'. The process failed when the preceding syllable carried primary or secondary stress. As already described in section 4.2.1.7, a process of 'voicing', i.e. the active addition of 'voice', in a supposed |spread| language like English, would be very problematic for the assumptions made by LR. Section 4.3 will offer an alternative analysis.

The process brings a lot of complications along with it. First of all, as pointed out in the introduction to this section, the bulk of the evidence for the process comes from loans, and this makes it difficult to determine whether the process was native or originated in French phonology. The lack of an obviously stress-conditioned modification process in French, as shown in section 4.2.2.1, and the clear modification of French /s/ in the data presented in (3) in 4.2.2.2 seem to evidence that the process of laryngeal modification was in fact an English phenomenon. It should be noted here that additional evidence for the fact that the process was likely to be English is that there is evidence that there was at least one other stress-related process of laryngeal modification in English, namely, the change described in 4.2.1.

A second complication is that the process exhibits a lot of variation and exceptions. It is by no means a regular across-the-board sound change. Although no real satisfactory explanation for these exceptions is presented in the handbooks, it can be argued that the fact that the process predominantly applied to loans may have played a part in this. It may have indeed been the case that these words entered everyday speech more slowly because many of them were part of a highly learned vocabulary. In addition, the learned loans may have been sensitive to the influences of the borrowing languages and the spelling.

4.3 An analysis of the processes in Laryngeal Realism

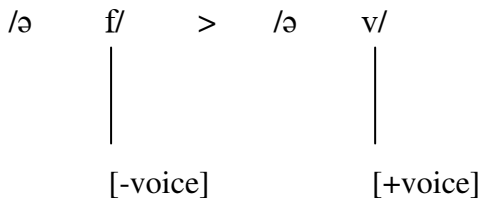
4.3.1 'Voicing' versus loss of |spread|

This section discusses both processes together because they have been shown to be similar. They are arguably part of a more general development in unstressed syllables. This could have started off in late ME in coda position, where it affected all fricatives,

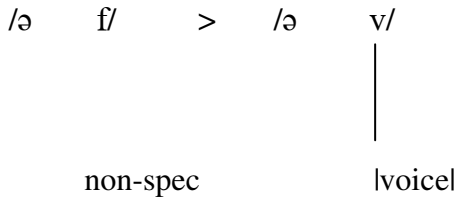
and then have continued into early ModE, where most favourable environments happened to occur in loan words. The process was heavily restricted in early ModE in that it applied medial /s/ only, and very sporadically to /tʃ/. Even if the two processes are entirely unconnected, their analysis is essentially the same. Therefore, I analyse them together as 'fricative voicing'. However, it should be borne in mind that the early ModE development did not apply to all fricatives.

As mentioned several times before, the standard handbooks see both processes above as cases of 'voicing'. Therefore, in their view, the processes involve the acquisition of an active |voice| feature, be it binary or unary. In a binary system a feature [-voice] would be replaced by a feature [+voice]. In a traditional privative framework, 'voiceless' sounds are non-specified or neutral, as shown in chapter 2, and therefore 'voicing' consists of the addition of the feature |voice| to the specification of an obstruent. The traditional view is represented for the final 'voicing' cases in the word *of* in (10a,b). The initial and medial cases are represented in exactly the same way.

(10) a. *Final fricative 'voicing' in 'of' in a binary framework.*



b. *Final fricative voicing in 'of' in a unary framework.*



If the above data are true cases of 'voicing', then they pose a major problem for the framework of LR. As argued before, the feature |voice| is inactive in an aspiration language like English. 'Voicing' can be a phonetic passive effect in obstruents but the phonological feature is not present in the phonological specifications of the language. As pointed out several times before as well, |voice| cannot randomly be introduced into the laryngeal phonological opposition in order to account for these processes.

Consequently, it can not participate in any phonological processes. Therefore, it is of crucial importance that an explanation for these data can be offered in LR, otherwise the claims made by the framework for English have to be drastically revised.

However, it is argued here that LR is indeed capable of dealing with the phenomenon in the same way as it was shown to be able to tackle the OE fricative system in 3.2.3.2. Namely, all supposed cases of 'voicing' above can be reinterpreted as loss of the feature |spread|. This means that previously |spread| fricatives did not 'voice' as such but neutralised to become unmarked unaspirated voiceless stops in English. Therefore, when translated into symbols compatible with LR the processes can be represented as the lenition of the |spread| fricatives /f^{h}, s^{h}, θ^{h}, tʃ^{h}/ to the non-specified fricatives /f̊, s˚, θ˚, tʃ˚/. This is illustrated in (11a) for the final cases in *of*, and in (11b) for the medial /s^{h}/ cases in *possess*.

(11) a. *Final loss of* |spread| *in 'of'*

o/f^{h}/ > *o*/f˚/

/f^{h}/ /f˚/

[spread] [spread]

b. *Medial loss of* |spread| *in 'possess'*

po/s^{h}/*ess* > *po*/s˚/*ess*

|spread| |spread|

The final cases provide strong evidence for the superiority of an analysis of the process in LR over a traditional |voice| analysis. This is because the analysis of a process such as final 'voicing' is highly problematic in any theoretical framework. The feature |voice| is regarded as a marked feature. Kiparsky (2004, 2006) outlines the arguments for this assumption and its consequences. Kiparsky (2006: 2) points out that word-final and medial coda positions are 'weak'. He argues that "Phonologists have postulated as a universal that marked features may be suppressed in such 'weak' positions in favour of unmarked features, but not conversely". Kiparsky (2004: 17)

argues that cases of coda-neutralisation result in the suppression of place and manner contrasts in syllable codas and word-final position and that neutralised features generally adopt their unmarked values. He notes that a process like coda 'devoicing' seems irreversible in that no convincing cases of coda 'voicing' are found in the languages of the world. Some possible cases of coda 'voicing' are put forward by Blevins (2004). However, these are all shown to be quite different processes by Kiparsky (2004, 2006). One of these cases is discussed in more detail below.

Kiparsky (2004: 20) observes that a cross-linguistic markedness asymmetry with regard to laryngeal features is observed in coda position. For example, regressive laryngeal assimilation is blocked when it would give rise to a voiced coda in the northern Ghanaian language of Konni and Meccan Arabic, even if the latter generally allows voiced codas. Kiparsky (2004: 20-21) also points out that 'The Emergence of the Unmarked'[70] effects suggest the same asymmetry. This is because spontaneous final devoicing takes place in languages with a strict CV pattern when loan words with CVC pattern are borrowed and the coda consonant is voiced. Similarly, spontaneous devoicing also occurs in first language acquisition.

Kiparsky (2004: 18) takes these facts as a strong suggestion that there is a universal constraint in the architecture of languages that prevents processes such as final 'voicing' from happening. He argues that this neutralisation constraint specifies that "…onsets have at least as many place and manner contrasts as codas…" and "…neutralised features assume their unmarked value…". This is 'voicelessness' in the case of laryngeal coda neutralisation. He argues that the 'limiting case' is context free neutralisation. Languages that have no laryngeal manner contrast realise their stops as voiceless and unaspirated.

It follows that the obvious advantage of an analysis of the process of final laryngeal modification in LR is that, in this framework, the fricatives do not undergo 'voicing' at all. As all other apparent 'voicings' this laryngeal modification can only be analysed as loss of the feature |spread|, i.e. lenition. This analysis is consistent with all of Kiparsky's claims, discussed directly above. The marked feature in the laryngeal contrast in English, |spread|, is suppressed in the prosodically 'weak' coda position. Cases like *cyðde*, discussed in 3.2.3.2, show that this phenomenon had occurred before in English laryngeal phonology. The outcomes of the process are not

[70] "…manifestations of latent markedness constraints [within Optimality Theory (Prince & Smolensky 1993)] where higher-ranking constraints that override them are not in play" (Kiparsky 2004: 20).

marked final 'voiced' segments but neutral unmarked ones which are universally preferred in these positions, as described above. Kiparsky (2006: 6-9) argues that at least one of the cases of supposed 'final voicing' proposed by Blevins (2004) involves a language with the same laryngeal systems as English. Somali has two series of stops 'tense' /t, k/, which are aspirated, and 'lax' /b, d, g/, which are only contextually voiced. The contrast between these two series neutralises in final position where all stops are 'lax'. This process in Somali can be analysed in exactly the same way in LR as the English neutralisation processes in this section. Therefore, LR can do away with the marked concept of final 'voicing', which makes it preferable over analyses which incorporate the feature |voice|.

Therefore, LR cannot only deal with the data in 4.2.1 but actually provides a superior analysis to that of a final 'voicing' account. If these data were instances of final 'voicing' they would be bizarrely unique. A language like Somali, with a similar laryngeal system as English, undergoes a similar process. Therefore, LR can offer a plausible cross-linguistic unified account of final neutralisation data as loss of |spread| in a weak prosodic position, coda position.

Lenition can also account for the fact that Hart's orthoepical evidence indicates that final modification fails when a 'voiceless' consonant follows the fricative, this was briefly pointed out in 4.2.1. Dobson (1968: 937), Luick (1964: 1027) and Jespersen (1949: 201) note this and Dobson argues that Hart "…clearly attempts to distinguish the variant forms according to their phonetic context, giving forms without voicing not only in final position or before a pause (where the stressed forms would be expected) but also before voiceless consonants…, and forms with voicing before voiced sounds…".[71] Jespersen (1949: 201) also shows that variation in 'habitually weak words' like *is, as, was,* and *has* is regulated by the initial sound of the following word. Jespersen (1949: 206) gives the following examples of context dependent variation in Hart, transcribed in traditional symbols here to follow Jespersen: /i**z** **w**el, a**z** **a**ni, hi**z** **o**(u)n/ versus /i**s** **s**ed, a**s** **s**un, hi**s** **s**eiŋ, ði**s** **s**alt/.

These facts can easily be dealt with when the so-called 'voicing' processes are analysed as loss of |spread|. In this case they are not cases of failure of 'voicing' but cases of laryngeal assimilation, as described in the previous chapter. When the fricative lost its |spread| specification it naturally became unspecified, and, therefore,

[71] Strangely enough, Dobson seems to make no spelling distinctions, or at least not always, between 'voiceless' and 'voiced' sounds. It is unclear whether the examples he gives are his adaptations or the spellings that were found in the 16th or 17th century texts.

it was susceptible to laryngeal assimilation to the |spread| feature present in any adjacent obstruent. This presents yet another case of laryngeal assimilation to |spread| in the history of English, and so provides additional back-up for the fact that |spread| is the actively specified feature in the laryngeal phonology of English. It also provides evidence for the lenition process itself. Only empty, unspecified, obstruents can undergo laryngeal assimilation. If the laryngeal specification of the segment was already filled, e.g., with |voice|, then it could not take over the |spread| specification of the adjacent consonant in a unary framework.

Loss of |spread| in a weak prosodic position also seems to work for the medial /s^{h}/ cases, e.g., *possess*. Here the weak prosodic position is inter-sonorant position, and this is a prime lenition site too cross-linguistically. However, the cases of late ME initial modification in words like ***the*** constitute a syllabic onset position. Although it is not impossible, as shown in the next chapter, lenition is not expected in word-initial position, as this is generally a 'strong' position. However, as pointed out earlier, Lass (1992: 58-59) argues that the initial cases take place in a very restricted class of words, function words, and only under low sentence stress. He claims that they occur in a weak position in the foot. Therefore, this actually is a prosodically weak position. However, it seems to be weak one prosodic level up from the coda and inter-sonorant cases. In other words, coda and inter-sonorant positions are prosodically weak at the syllable level, whereas the word-initial cases constitute a prosodically weak position at the foot-level. The next section will address the interesting fact that, in the final and medial cases, lenition fails in post-tonic position even if the fricatives occur in the same weak positions.

The implications for the locus of linguistic change of this analysis can be argued to be less clear than in the case of the assimilations discussed in the last chapter. This is because there are two contexts of lenition. For the final lenition cases it can be argued that because markedness constraints are involved, acquirers will not as readily posit the feature |voice| as they would in laryngeal assimilations. Namely, if they would posit |voice| and therefore voicing, then they would be positing an unnatural process in the final cases. In order for them not to do this, markedness principles would have to be innate. Evidence that this latter assumption is true can be derived from Kiparsky's (2004: 20) claim that spontaneous devoicing occurs in first language acquisitions and not spontaneous voicing.

However, in the medial cases 'voicing' would not lead to an unnatural process. In fact, passive voicing can even take place in a |spread| language like English. Therefore, it can again be argued that children have no reason to posit a rule of lenition in these medial cases. They have not yet analysed |spread| as the only specified feature in the laryngeal phonology of English. Therefore, they can just as easily posit a |voice| feature in medial cases, especially when they are prompted by occurrences of passive voicing. Therefore, in these cases it, again, seems plausible that the process takes place in speakers with an already developed phonological system. They already know that |spread| is the distinctive laryngeal feature in English, and, therefore, they can modify it.

4.3.2 Shared laryngeal specifications

In spite of the fact the fricatives in words like ˈ*off* and ˈ*desolate* occur in the same weak positions as in words like *of* and *po*ˈ*ssess*, i.e. inter-sonorant- and coda position, they do not undergo lenition. The significant difference between the former and the latter forms is the position of the stress. Therefore, it has to be concluded that successful lenition not only depends on the syllabic position of the fricatives but also on the presence or absence of stress in the preceding vowel. This section will explore why neutralisation failed in post-tonic position.

To my knowledge, a formal explanation for the English data has not yet been offered. However, it is noted in the handbooks that both the medial and the final processes exhibit a striking similarity to the well-documented and well-scrutinised change of Verner's Law (VL). Briefly, VL took place in early Germanic. The handbooks point out that, as in the data presented in this section, 'voiceless' fricatives 'voiced' when they occurred pre-tonically in inter-sonorant position as in, e.g., *wur*ˈ[ð]*anáz* and *fa*ˈ[ð]*ér* and post-tonically between unstressed syllables, e.g. ˈ*bati*[z]*o.* The change fails when the fricative occurs immediately after the stressed vowel in, e.g., ˈ*brō*[θ]*or.* As in the data in 4.2.1, VL also affected non-intervocalic coda fricatives as can be seen from the renditions of the Germanic nominative /s/ as /z/ in the endings, *-os, -is* and *-us*. It appears as /r/ in North Germanic, due to a change from /z/ to /r/. This applied to all instances of /z/, and, therefore, indicates that /s/ had indeed changed to /z/ in this dialect, otherwise it would not have undergone the change to /r/.

Luick (1964: 807-808), Quirk & Wrenn (1963: 127), Wardale (1960: 50), Hogg (1992: 70) and Campbell (1959: 163) argue that VL is especially clear in strong verbs. The present and singular past tenses of these were stressed on the root vowel, and the plural past tenses and the past participle had stress on the ending. So Quirk & Wrenn (1963: 128) give the examples *weor**ð**an* 'become' beside *wur**d**on*, with the change /θ > ð > d/ in the latter, and the preterite singular of *cēosan* 'choose', *cea**s*** and its plural *cu**r**on*, in which the changes /s > z > r/ took place. Another example is *teon* 'draw' with the preterite singular *tea**h*** beside *tu**g**on* and the past participle *to**g**en* (< teohan), which illustrates the change /x > ɣ/. This interchange is the reason why the VL was called *Grammatischer Wechsel* 'Grammatical Shift' by Grimm.

Because of the interesting similarities of VL to the data in this chapter, it merits investigation whether explanations offered for the process in its ancestor can also explain the apparent stress-related failure of lenition in the English medial and final data. Page (1998) argues that VL must be due to a shared phonetic property between the stressed vowel and the following 'voiceless' fricative. This property is assumed to have halted the 'voicing' of the fricative in an environment otherwise conductive to the process. Page points out that the accentual system of Proto-Germanic at the time of VL is difficult, if not impossible, to reconstruct with any precision. It may have been a pitch accent, a dynamic stress system or a mixed system. However, he argues that it is clear from VL that the location of the word-stress affected obstruent 'voicing'. He further notes that pitch is crucial to the implementation of both pitch accent and dynamic stress. It was argued in 2.3.2.5 that vowels can be specified for the laryngeal feature |stiff|. Page assumes that all stressed vowels in Germanic were characterised by a high pitch, which he represents as the feature [stiff vocal folds] following Halle & Stevens (1971).

Page's account for VL is based on the view proposed in LR that |spread| is the relevant feature for laryngeal distinctions in Germanic. However, he refers to segments as 'voiced' and 'voiceless'. Like the analysis presented in this chapter and Chapter 3, he interprets VL as resulting from deletion of what he calls [spread glottis] instead of 'voicing'. He argues that when a stressed vowel preceded the fricative, the feature [stiff vocal folds], was spread rightwards from the vowel and attached to the consonant marked for [spread glottis]. This, he argues, accounts for inhibition of the application of VL. He invokes the Autosegmental Linking Condition, which states

that “Association lines in structural descriptions are exhaustive” (Page 1998: 181) and proposes the following rule for VL:

(12) “Delete uniquely associated laryngeal nodes for all non-initial fricatives”.

He claims that because the |spread| fricative and the stressed vowel shared the laryngeal feature [stiff vocal folds], the fricative had no uniquely associated laryngeal feature. The application of VL is then blocked by the Autosegmental Linking Condition. Page claims that this is consistent with subsequent developments in Germanic where non-initial obstruents, especially fricatives, tend to lenite in a voiced environment.

I&S (2003: 59-66) build on Page’s assumptions that lexically accented vowels in Germanic were specified for pitch and attribute VL to passive voicing, which was phonologised after the Germanic stress system changed. They argue that in its early stages Germanic obstruents were specified for the GT dimension, the default implementation of which is [slack], as explained in 2.3.2.5. However, like Page, they argue that lexically accented vowels were marked for [stiff] in order to mark the phonemic status of high tone. Rightward extension of the [stiff] feature into the, then, unspecified voiceless obstruents inhibited vibration of the vocal folds under low transglottal airflow. That is why VL failed in post-tonic position. Therefore, according to I&S, VL is less about ‘voicing’ of fricatives than about the failure of the process in post-tonic position.

Crucially, I&S argue that this analysis only works when it is assumed that Germanic stress was accent based. According to them, stress in dynamic systems, like English, relies primarily on intensity and duration. Pitch plays just a secondary role in a dynamic stress system and [stiff] plays no role at all. Therefore, VL-like processes cannot occur in languages with a dynamic stress system. I&S (2003: 66) argue that “…the notion that modern accentual systems of the type found in Dutch, English or German should show Verner-like effects on neighbouring vowels would indeed be…a challenge to phonetic reality”. They argue that this explains why VL is a rarity which was fully dependent on the Pre-Germanic accentual system. They add that it is noteworthy that no Germanic languages show the phonetically driven form of VL.

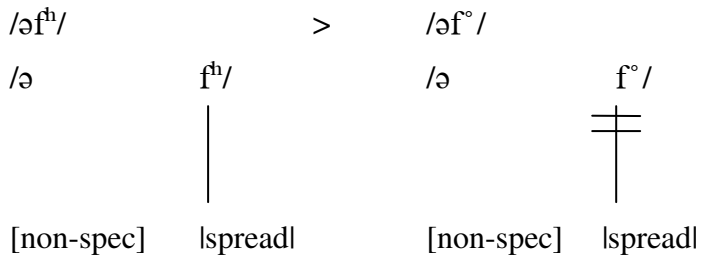
It is immediately clear that I&S’s assumption is contradicted by the data in this chapter. Late ME and early ModE display VL-like characteristics. These may not be

regular in the medial /s^{h}/ data in 4.2.2, but they are very regular in the final data in 4.2.1. If |stiff| plays no more role, as I&S argue, it would be very hard to explain these data. Therefore, it may be wondered whether |stiff| is entirely inactive in English or at least whether it was entirely inactive in late ME and early ModE. In fact, I argue immediately below that it was indeed specified in these periods.

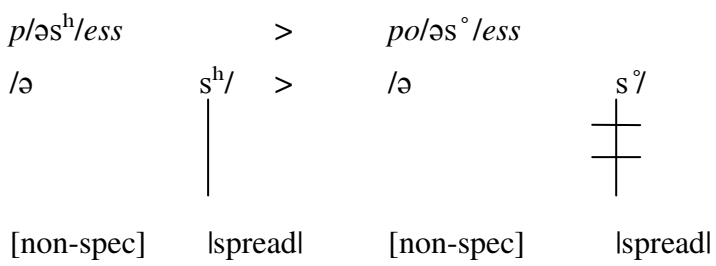
I&S's account proves to be too restrictive and focuses too much on the accentual system of Germanic. Crucially, Page places the emphasis on a much more general concept, namely, positional strength. VL takes place in weak syllabic positions, coda and inter-sonorant position. Even if post-tonic fricatives occupy the same positions, they gain extra strength because their laryngeal nodes are not uniquely associated. Importantly, Page does not restrict the |stiff| feature to accentual stress systems only, but to all stressed vowels.

It is argued here that the English data in this chapter provide additional evidence for Page's account of VL and for the fact that at least one VL-like process has taken place after the original Germanic process. Therefore, it is argued that, the rule in (12) applied to late ME and early ModE fricatives, which lost their |spread| specification when they occurred in weak syllabic positions and were not preceded by stressed vowels as in (11), repeated here in (13) with the preceding vowel. It is assumed that because the preceding vowel was unstressed, it was unspecified. Therefore, the laryngeal feature of the consonant was uniquely associated and could be lost:

(13) a. *Final loss of* |spread| *in 'of'*

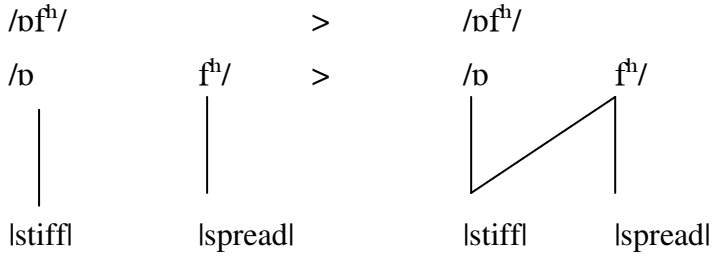


b. *Medial loss of* |spread| *in 'possess'*

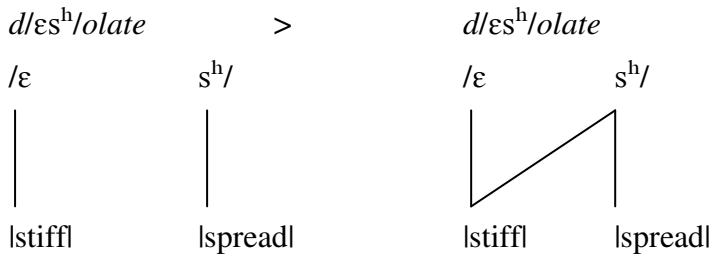


However, when fricatives occurred in the same weak syllabic position but a stressed vowel preceded them, the Autosegmental Linking Condition took effect and the segments gained extra strength by sharing their laryngeal node with that of the preceding vowel, which is specified for |stiff|. This is also predicted by Honeybone (2005b). This is shown for *off* and *possess* in (14a,b). Lexical *off* is stressed in this case unlike the function word *of*.

(14) a. *Retention of* |spread| *in 'off'*



b. *Retention of* |spread| *in 'desolate'*



The word-initial cases in, e.g., *the* pose a slight problem for the rule in (12). Obviously, unlike VL, the process in late ME did take place in initial fricatives, so the rule that all uniquely associated laryngeal features should be deleted in non-initial position must be modified in order to account for these data. It was shown in the previous section that this process takes place in function words only, and that these words normally occur under low sentence stress because they are incorporated into other feet and are unstressed themselves. Therefore, the normally 'strong' onset position can also be considered a 'weak' position in these cases. Therefore, all cases of lenition have in common that they occur in a weak position and the rule in (12) has to be modified as in (15) for late ME and early ModE:

(15) Delete all uniquely associated laryngeal specifications in fricatives in weak foot- or syllabic positions.

This adequately explains the stress related issue connected with these data. Moreover, it provides evidence for an active |stiff| specification in stressed vowels in late ME and early ModE, and therefore for the fact that this feature is not just tied to accentual stress systems. In addition, the English data in this chapter provide evidence for Page's (1998) account of VL.

A problem, seemingly inexplicable in any framework, is presented by the medial /k^hs^h/ clusters, written <x>, which were presented in (4) and (5) above. The cluster can be assumed to share its |spread| specification, along the lines proposed by I&S, discussed in 2.3.2.3. This would invalidate the Autosegmental Linking Condition. These clusters by definition do not have uniquely associated laryngeal specifications. Moreover, even if the two consonants would have their own laryngeal specifications, then the Autosegmental Linking Condition would apply to just one of them, and |spread| would always be lost in the other. In addition, it would be impossible to explain why both specifications are lost in pre-tonic cases. As was shown in 3.2.3.2, loss of |spread| failed in clusters of two |spread| consonants in OE. The only possible way to deal with this cluster is to treat it as an affricate, i.e., one segment with one laryngeal specification. However, this seems problematic. /k^hs^h/ never function as an onset in English. The cluster would be no problem whatsoever if it can simply be stated that the laryngeal specifications of the cluster are the mere result of retention from French. However, it seems hard to explain why they seem to almost completely comply with English stress conditioning. These clusters therefore remain a mystery and would merit future research.

4.4 Conclusion

The data in this chapter had, to my knowledge, never been analysed in a unified fashion before. It has been shown that LR can deal with all these data as loss of |spread| in environments conducive to lenition. In the case of function-word-initial fricatives this weak environment concerns a higher prosodic level, namely, a weak position in the foot. In the case of the medial /s^h/ and final fricatives this environment concerns a lower prosodic level, namely a weak syllabic position. This supports the analysis in LR of English proposed in this dissertation. Namely, |spread| is the only actively specified feature in the obstruent laryngeal phonology of English and therefore it can participate in processes. |voice| is not present in the obstruent

laryngeal phonology of the language and cannot be introduced without a local source. Therefore, it is inactive in processes.

The most compelling evidence for this conclusion comes from the final modification data in 4.2.1. In an account which incorporates the feature |voice|, be it binary or unary, these data would have to be analysed as instances of final 'voicing', and, therefore, require the application of a highly marked and apparently cross-linguistically unique and baffling process in the history of English. LR does not need to refer to such a highly marked process in order to explain these data. Instead, they can be analysed as undergoing simple loss of |spread|, i.e. lenition, in a prosodically weak coda position. An account in LR makes the process both natural and explicable, and is therefore superior to an analysis in a 'voicing' account. The medial /s^h/ data in 4.2.2 can also be explained as lenition. In 3.2.3.2 it was shown that single fricatives in OE lost their spread specification in these weak inter-sonorant positions. Therefore, LR can present a unified and elegant solution for the unstressed final, initial and pre-tonic medial cases, as lenitions in weak syllabic or foot positions, which are cross-linguistically unmarked and widespread.

It was shown that lenition fails when the preceding vowel is specified for the feature |stiff|. This feature extends rightward into the laryngeal specification of the neighbouring fricative. This strengthens the |spread| specification in the neighbouring fricative because it is no longer uniquely associated. Therefore, it does not delete. These data provide interesting evidence of the influence of stress on historical English laryngeal modifications. This shows that, as opposed to the opinion of certain scholars, e.g., I&S (2003), that stress conditioned modifications are restricted to pitch accentual systems like Germanic, the influence of pitch in the form of a |stiff| specification on stressed vowels was, at least, still present in the dynamic stress system of ME and early ModE.

5 Morpheme-edge laryngeal neutralisations

5.1 Introduction

This chapter deals with a number of morpheme-edge historical laryngeal modifications in English. These processes are traditionally seen as initial 'voicing' and final 'devoicing'. In other words, in traditional frameworks they would involve either the addition or the deletion of the feature |voice| in a privative framework, and a change from [-voice] to [+voice] and vice versa in a binary framework. As with the supposed stress-conditioned 'voicings' in the previous chapter, a traditional interpretation of these processes is problematic for LR because the feature |voice| is assumed not to be underlyingly specified in the laryngeal phonology of English. It cannot randomly be added to underlying specifications due to the local source constraint. Therefore, the feature can neither be added nor deleted from feature specifications. For this reason, it has to be investigated whether these two types of laryngeal modification can be tackled satisfactorily by LR.

A discussion of the processes according to the standard handbooks is offered in section 5.2. As always, traditional terms and symbols will be used throughout the section in order to stay true to the original handbook descriptions. The process of Southern English morpheme initial 'voicing' of the fricatives /f, θ, s/ is discussed in section 5.2.1. It is shown that, traditionally, this process is viewed as a change from /f, s, θ/ to /v, z, ð/ in morpheme-initial position. Orthographic data for the change from /f/ to /v/, and the one from /s/ to /z/ are presented. No such data exist for the change from /θ/ to /ð/. However, it is shown that evidence that the process affected the dental fricative as well is provided by Present-Day dialects. These still have 'voiced' reflexes of this sound. A short discussion of parallel developments in some Germanic sisters of English is also presented.

Various morpheme-final processes, traditionally seen as 'devoicings', are discussed in section 5.2.2. In section 5.2.2.1 data are presented for a process of 'devoicing' of the fricatives /v/ and /ɣ/ in OE. A similar fricative 'devoicing' process, which was restricted to northern dialects, is discussed in 5.2.2.2, and 5.2.2.3 deals with an equally dialectally restricted process, this time to mainly the West Midlands, of morpheme final stop 'devoicing' in ME.

An analysis of the processes in LR is offered in 5.3. It is shown in 5.3.1 that LR can indeed deal with initial 'voicing' in the same way as alleged 'voicings' were dealt with in the previous chapters, namely, as loss of |spread|, i.e. lenition. This process is argued to be followed by a reanalysis of the laryngeal specifications of fricatives in favour of neutrality in the southern English dialects. This reanalysis of the underlying system is shown to provide evidence for the argument that an account of the process as lenition is once again superior to a 'voicing' account. Reanalysis to a system with only underlyingly voiced fricatives in the southern English dialects and no more neutral fricatives would violate universal markedness constraints. If the process is viewed as simple lenition, these problems disappear.

In 5.3.2 it is argued that LR can also deal with apparent 'devoicings' as 'final fortition', i.e. the addition of |spread| to unspecified segments. However, it is shown that in this case LR is not superior to |voice| accounts. Final 'devoicing' would not lead to a situation which opposes universal markedness constraints because the neutral voiceless segments it would give rise to are unmarked. Moreover, final fortition proves problematic as it involves the insertion of a feature without a local source. However, it is shown that final fortition is not an entirely ad hoc concept and that a motivation for the process in terms of demarcation of prosodic boundaries can be argued for. It is argued that although final fortition does not offer the strongest evidence for LR presented in this thesis, it still shows that the framework does not encounter unsolvable problems when apparent 'devoicings' are taken into consideration. Section 5.4 presents the conclusion to the chapter.

5.2 The developments according to the handbooks

5.2.1 Southern morpheme-initial fricative 'voicing'

5.2.1.1 Preliminaries

The process of Southern morpheme-initial fricative 'voicing' in ME is well-documented in the handbooks on English historical phonology, e.g., Sweet (1874, 1924), Oliphant (1891), Emerson (1896), Wyld (1907, 1927), Jespersen (1933, 1949), Wardale (1949), Mossé (1952), H&L (1954), Bennet (1955), Luick (1964), Jordan (1974), Brunner (1960, 1970), Dobson (1968), Fisiak (1968), Strang (1970), Wright & Wright (1984), Faiss (1989), Lucas (1991), Hogg (1992), Lass (1992), Milward (1996) and Smith (1996). In traditional terms, the change involved the 'voicing' of /f,

s, θ/ to /v, z, ð/ in word-initial position in the South and South-West Midlands. The development probably took place in the 11th century. The location and time of the change are turned to in more detail below. Orthographic data for the change /f/ > /v/, taken from various handbooks, are given in (1), in which <u> denotes Present-Day <v> according to the orthographic practices of the time. More spelling evidence is given in the next section.

(1) *Southern ME fricative 'voicing' in initial /f/*

<uader>	'father'	<uri>	'free'
<ualle>	'fall'	<uram>	'from'
<uayre>	'fair'	<uyf>	'five'
<uolk>	'people/folk'	<uless>	'meat/flesh'
<ver>	'fire'		

Luick (1964) and Honeybone (2004a) note the fact that the change did not just affect word-initial 'voiceless' fricatives. They give examples like <þeruore> 'therefore', <beuore> 'before' and <harmuolle> 'harmful' which provide evidence of foot- or morpheme-initial voicing.[72] Wildén (1949: 79) notes that /v/ occurs in compounds such as *afford, afore, before, Thornford,* and *wet-footed* in Dorset. Dobson (1968: 932) notes that 'Saxon' /v/ for initial OE /f/ is recorded as a dialectism by Gil (1619), who argues it occurs in both southern and western dialects. Wildén (1949: 78) points out that variation between /f/ and /v/ can have a functional character in the dialect of Dorset, e.g., *fiddle* (N) has /v/ but *fiddler* has /f/, similarly *fish* has /v/ but *fishing* and *fisherman* have /f/, and *farm* has /v/ (next to /f/) whereas *farmer* has /f/ only.

Orthographic data for the change /s/ > /z/, again taken from various handbooks, are given in (2). Again, more spelling evidence for this change is given in the following section.

[72] Honeybone (2004a: 11) points out that he collected this evidence from the *Linguistic Atlas of Early Middle English* (M. Laing, Institute for Historical Dialectology, University of Edinburgh).

(2) *Southern ME fricative 'voicing' in initial* /s/

<zenne>	'sin'	<zayl>	'seal'
<zelf>	'self'	<zester>	'sister'
<zaule>	'soul'	<zuyn>	'pig'
<zigge>	'say'	<zuete>	'sweet'

Wyld (1927: 98) adds <zoþe> (< OE *sōþ* 'true'). Again, Honeybone (2004a: 11) presents evidence that the change took place in foot- or morpheme- initial position as well: <alzuo> 'also', <bezide> 'beside', <miszigge> 'missay' and <izode> 'seethed'. Wildén (1949: 84) points out that /z/ occurs in the following compounds in Dorset: *besides, hay sweep,* and *myself.* Luick (1964: 935) notes that /z/ can still be found in the 'living dialects' in Kent and also in the South-West and Somerset, which Luick calls 'Zed-Land'. Wildén (1949: 83) notes that variation between /s/ ~ /z/ can also have a functional character in Dorset where words would be complete homophones if it was not for the laryngeal distinction if the first segments, e.g., *sea* /s/ ~ *see* /z/, *son* /s/ ~ *sun* /z/, and *set* /s/ (N) ~ *set* /z/ (V).

Wardale (1949: 60), Mossé (1952: 39), Luick (1964: 935), and Strang (1970) point out that there is no spelling evidence for the change from /θ/ to /ð/. Wardale (1949: 60) notes that spelling evidence cannot be obtained because <þ> and <ð> were used interchangeably to represent both [θ] and [ð] until they were both replaced by <th>, which was introduced by French scribes. However, they argue that the change is apparent from the Present-Day dialects of the whole South where words like *thank, thatch, thin, third, thistle, thousand, thumb, thunder* are pronounced with /ð/. Wildén (1949: 81-82) points out that /θ/ has changed to /ð/ before vowels in Dorset in, e.g., *athwart*, which has /ð/ in the present-day dialect. He adds that /θ/ before /r/ has regularly become /d/ in the dialect in words like *thrash, thread, threaten, three, threepence, threshold, throat, throb, throng, through,* and *throw*. /rð/ became /rd/ in words like *farthing* and *further.* Luick (1964: 935) notes that /ð/ in *the, this, these, that, those, then, there,* also present in the standard language, is due to a later development outside the area, namely the laryngeal modification process in unstressed words and syllables described in 4.2.1.

5.2.1.2 Orthographical and orthoepical evidence for the process

According to Luick (1964: 933), spelling evidence for the process is irregular; it is most regular for the development from initial /f/ to /v/ because French orthography provided a means to distinguish between the sounds with the symbols <f> and <v>. Jordan (1974: 154) argues that the process started with /f/. Hogg (1992: 283) and Bennet (1955: 367) indicate that the earliest examples of the change are <uif> 'five' in the Guild Statute of Bedwyn (Wiltshire c.925-50) and <uilmenum> 'film dat. pl.' (c.950). More frequent examples start occurring in the mid-11th century. Luick notes that evidence for the change is also found in misspellings, e.g., <finter> for <winter> and <fivel> for <wivel> 'beetle' in the Kentish Coloured Glosses of the 11th century. Luick (1964: 934) points out that the process is very clearly shown for /f/ to /v/ in two 13th century West-Midland manuscripts: Ancren Riwle and the Cathrine Group. In these texts <v> occurs in sentence initial position and after vowels and 'voiced' consonants. Luick (1964: 933) argues that the change first took place in these positions. 'Voiceless' fricatives were retained when voiceless sounds preceded them. H&L (1954: 936), Mossé (1952: 39), and Jordan (1974: 191) underline this, and Jordan gives the examples <þe **v**end> versus <kue**s** **f**odder>. Jespersen gives <þeo**s** **f**ondunges> ~ <ilk**e** **u**ondunges>; <scheawe**ð** **f**orð> ~ <scea**u** **u**orð>; <þ**e** **u**eorðe> ~ <þe**t** **f**eorðe>; <þ**e** **v**ifte> ~ <þe**t** **f**ifte>; <min**e** **u**oan> ~ <hi**s** **f**oan>; <stinckind**e** **u**lesshes> ~ <hwa**t** **f**leschs>.[73] This bears an interesting resemblance to the final laryngeal modification cases described in 4.2.1. There alleged 'voicing' failed when a 'voiceless' consonant followed. Jespersen claims that the only exception to this rule which is of any importance is of an orthographical nature. This is when <f> is written before <u>, denoting the vowel /u/, in order to avoid two successive <u>s as in <hor**e** **fu**le> and <echt**e** **fu**r>. Here <f> should have been <u> but is rendered as <f> because of the following <u>. Luick also indicates that the 'voiced' fricatives were expanded to all positions at a later point.

Luick points out that spelling variation between <f> and <v> occurs in most texts from the South, including those from the West Midlands. He argues that the interchange is a purely orthographical one because the symbol <f> in initial position denotes /v/. This is clear from the use of <f> for initial /v/ in French loans, e.g., <fessel> 'vessel' and <fanish> 'vanish'. H&L (1954: 939) and Dobson (1968: 932) point out that Salesbury (1547) and Gill (1621) attest /f/ for /v/ in the southern

[73] Jespersen gives no glosses with these examples.

dialects. Salesbury points out that the pronunciations *fineger* for *vinegar* and *feal* for *veal* occur in Essex. Gill attests *fineger* and *ficar* 'vicar' for the southern dialects. Coote (1596) gives *feal* as a dialect form of *veal* in Suffolk. Hunt (1661) follows Coote, and adds the converse case *vather* 'father'. The northerner Mulcaster (1582) has 'non-Saxon' /f/ in *fixen* 'vixen', and Fox & Hookes (1673) record *fate* 'vat'. H&L also note that some words have /f/ instead of /v/ in the Midlands, e.g., *fenom* and *filts*.

Sometimes /f/ also occurs in the old <v> area, e.g., in <victuals>, <vogue> in Wiltshire and <victuals> in Sommersetshire. H&L (1954: 940) note that a form with /f/ for /v/ occasionally entered the literary language, e.g., <fartuous> 'virtuous' occurs in Shakespeare's Merry Wives. However, they claim that this could also be due to emphasis placed on such words. In an unspecified dialectal poem (1552) a man who has *vox* for *fox* also says *fery* for *very* and *fengeance* for *vengeance*. Infrequently, forms with /f/ for /v/ also entered the Standard speech and orthography. *Vetch* had the alternative <fetch> until the 18th century and <fitch> occurs in the 1611 Bibel. The latter still occurs in dialects as far north as Lancashire. The <f> writing already existed in the 14th century. <fagary> and <figary> are found for *vagary* in the 17th and 18th centuries for instance in Richardson (1677) and Lowe (1770). H&L argue that forms like these are hypercorrections. However, they could very well indicate a merger of /f/ and /v/ because the spellings indicate the same sound (Patrick Honeybone, p.c.).

Luick (1964: 934) points out that the development of initial /s/ to /z/ is often not visible in the orthography. The spelling <s> was used for both the 'voiced' and 'voiceless' sounds, and, therefore, the development can only be seen from living dialects. These may have changed due to later changes and the influence of the Standard. Jordan (1974: 188) points out that 'voicing' of initial /s/ in Kentish is only apparent from Ayenbite, a Kentish text from the mid 14th century. According to Luick (1964: 934), the change is fully complete in this manuscript. Luick (1964: 934) argues that the fact that the scribe uses the otherwise rare <z> for the 'voiced' sound provides evidence for the development. His spelling indicates that the process only took place before a vowel and /w/ as was shown in (2).

Luick (1964: 934) and H&L (1954: 937-938) point out that the characterisation of dialect speakers in Elizabethan drama also provides some evidence for the process. H&L and Emerson (1896: 131) note that the feature occurs in Shakespeare's King Lear (IV, 6, 240) where it is used by a farmer, who pronounces *so, sir,* and *swaggered*

as *zo, zir,* and *zwaggered*. H&L (1954: 937-938) point out that Fielding and Barns, who came from Somerset and Dorset, also use <v> and <z> as indicators of the dialect. They occur in Blackmore's novels, which are set in East Devonshire, Hardy, in the Wessex Novels and Galsworthy, in the stories from Devonshire. H&L indicate that Fielding and Blackmore sometimes use the spelling <zh>, e.g., *zhow* 'show' which could indicate that /ʃ/ was also affected. They claim this was sporadically the case in *ship, shepherd, shrimp,* and *sure.* Honeybone (2005a: 341) shows that Fisiak (1984) and Lass (1991-1993) also argue that /ʃ/, which developed from Germanic /sk/ clusters, underwent the process.

5.2.1.3 The date and geography of the process

Bennet (1955: 367) points out that it is difficult to date the process exactly. As already pointed out in 3.2.1, Bennet, Jespersen (1933: 347), and Brunner (1960: 376) indicate that OE spelling used <f, s, þ, ð> for both 'voiceless' and 'voiced' sounds. Bennet argues that this could mean that the change already started in OE but was simply not indicated in the orthography. However, certain assimilation cases, discussed in 3.2.1, seem to render an early OE dating for the change unlikely. If /f/ in, e.g., *gesuntfulness* 'health' had been 'voiced' (or non-specified) then laryngeal assimilation of original /d/ would not have taken place. Additionally, even when French spelling introduced <u, v, z>, there was still no consistent spelling distinction between /θ/ and /ð/, and therefore, as pointed out in 5.2.1.1, 'voicing' of /θ/ can only be confirmed by PDE evidence. Bennet claims that attempts to date the change have been based on three major considerations namely (i) the virtual limitation of this development to pre-conquest words, (ii) appearance of <v, z> spellings in ME texts, and (iii) data provided by PDE dialects. He claims that on the basis of these, the change has been assigned to the late OE or early ME period without exception.

With regard to point (i), there seems to be some consensus that the process probably took place before the Norman invasion. The main evidence for this is that /f/ and /s/ were not affected in later French loans. Brunner (1960: 376) argues that the process takes place after the borrowing of OE religious loans which do undergo the process. However, Wildén (1949: 79, 83-84) points out that a number of French forms were actually affected by the change in Dorset. For French /f/ he notes the change affected *face, farm, fatal, feast, fillet, fine, finish,* and *foundation.* Some affected French forms can also be found in Wiltshire, West Somerset and Devon.

Wildén points out that a much larger number of French words with initial /s/ underwent the process. Wildén claims that this is because of the high frequency of /s/ words in the dialect of Dorset. Some examples of French /s/- initial words which were affected are *certain, cider, saunter, save, seal, season, sécauteurs* (first recorded in the 19th century), *sergeant, sermon, serve, session, sever, several, sign, sir, sober, sort, sound,* and *suffer*. He notes that in Wiltshire and West Sommerset the number of French words with /z/ is regular and in Devon they are not infrequent. Wildén therefore claims that the change was still in operation at the time of the great influx of Anglo-Norman words. However, Patrick Honeybone (p.c.) notes the apparent change in French forms could just be cases of loanword adaptation. A form like *sécauteurs*, which was first recorded in the 19th century, presumably long after the process had ceased to be active, backs this up. Therefore, Wildén's point is certainly disputable.

Luick (1964: 933) points out that the ME sources do not provide clarity as to the precise geographical area of the process. H&L (1954: 933) argue that that the process began in Kent and spread to the southern and eastern counties. Oliphant (1891: 148) points out that the influence of the process may have even extended into northern texts, in which <v> is sometimes substituted for initial <f>, e.g., <vette> for <fette>. He claims that "It is the influence of the South-Western shires that make us write *vixen* and *vat* instead of the old *fixen* and *fæt*; it is a wonder that we do not write *vox* for *fox.*" Strang (1970) indicates that in the West the development "swings" north to meet the Welsh border at the Mid-Wales level.

Luick (1964: 933), Bennet (1955: 367) and H&L (1954: 933) point out that in the current dialects the 'voiced' sounds are still general in Devonshire, Somersetshire and Wiltshire in the South West. In the Mid-West they are still found in Herefordshire, parts of Gloucestershire, Pembrokeshire and in Berkshire. 'Voiced' sounds are dying out in Hampshire and the Isle of Wight in the South, and they have disappeared from the dialects of Kent, Surrey and Sussex. They note that the western area must have stretched more to the North to comprise Worcester and possibly Staffordshire. Variation in manuscripts could indicate that the geographical area was not the same for all three sounds. However, Luick argues the orthographical practices in ME are largely responsible for variation.

H&L (1954: 935) point out that some areas have kept place names with <v> for <f> and <z> for <s>. They can be found in Herefordshire, Wiltshire, e.g., *Vasterne* (<OE fæsten), Devonshire, e.g., *Vauxhall* (< Falkes-Hall), Somersetshire, Dorsetshire,

Surrey, Essex, e.g., *Vange* (OE fen-ge), Buckinhamshire, Devonshire, Wiltshire. Rubin (1951: 222) adds *Venns, Vinnetrow* (<OE fenn), *Vinehall* (<OE fīn), *Varncombe* and *Varndean* (both <OE fearn). He notes that /v/ could also change to /w/ in place names, e.g., *Wysserisgate* (att. from 1288) (<OE fiscere), *ate Wyshar* (att. from 1296) (<OE fiscgear) and *Wox hearl* (att. from 1279) (<OE fox). H&L (1954: 935) give the following place names for /z/ from /s/: *Zeals*, *Zeal* (<OE sealh), and *South Zeal* (<OE sele). In Kent writings in <v> and <z> occur in *Fairbourne*, *Faversham*, *Folkstone*, *Fordwich*, *Sandgate*, and *Sandwich*. Family names such as *Venn*, *Vidler*, and *Vowler* originate from these areas.

Luick (1964: 934) and Strang (1970) point out that initial 'voicing' was still general in the South in the 16th century and some reflexes of the process made it into the Standard, e.g., PDE *vat, vixen, vane*, and possibly *van* although the latter could also be due to French or Latin influence. Strang argues that in areas other than the South the process receded westward in the 16th century with the spread of the standard in the South-East. H&L (1954: 938) note that <vyle> 'file' is attested in London in 1400, Caxton has <vlycche> 'flitch', *fade* appears as <vade> and *finew* 'mould' *finewed* 'moulded' has <v> forms beside <f>. <v> remained in *vixen*, but the form <fixen> occurred until the beginning of the 18th century. <vat> and <vane> remained next to earlier <fat> and <fane>. <fan> still exists next to <van>. The written form first appeared in the 15th century, and, therefore, French influence is unlikely. Johnson's dictionary (1755) gives the spellings <vade>, "a word useful in poetry, but not received", next to <fade>, and <vat> next to <fat>. However, he has <v> forms only for <vane>, <vinewed>, and <vixen>. Initial /z/ has replaced original /s/ in <zax>.

5.2.1.4 The possible source of the process

Bennet (1955: 367) points out that the possible source of the change is not clear from the available evidence either. He argues that a substratum influence from Welsh or Cornish is out of the question on grounds of both phonological and geographical evidence. Namely, geographically, the Midland area would have been just as susceptible to voicing as the South if Welsh influence had been the trigger of the process. Moreover, like Lass (1992: 59), he points out that it is not certain that the process took place in Britain. It may have just as well taken place on the continent. He notes that the main problem with this possibility is that Old Low Franconian is barely

known. There is a late badly transmitted version of the Psalms of uncertain date (maybe 1200 or before). In these texts 'voicing' of initial /f/ occurs with as much consistency as in the ME texts of the same period in e.g.,, <vōr> 'fared', <vuss> 'fox', and <-vallen> 'fall'.

However, there is abundant evidence for precisely the same 'voicing' in Middle Low Franconian (even including [θ, ð]), although the spelling fluctuates in both Middle Low Franconian and the British dialects. In addition, Lass (1992: 59) points out that a very similar change is reflected in Present-Day descendants of Continental Germanic, namely, in German <v> in *Vater* 'father', now pronounced with /f/, and in Dutch <v> and <z> in *vader* 'father' en *zon* 'sun'. The latter now has /f, s/ in more innovative dialects, while more conservative ones keep /v, z/. Bennet gives the following examples of the change in Middle Low Franconian and Southern and Kentish ME:

(3)	*Middle Low Franconian*	*Southern/Kentish ME*	
a.	<vallen>, <varen>	<vallen>, <varen>	'fall, fare'
	<vat>, <vor>, <vuur>	<vat>, <vor>, <vēr>	'fat, for, fire'
b.	<zee>, <zegghen>	<zee>, <ziggen>,	'see, say'
	<zone>, <zo>, <zone>	<zenne>, <zo>, <zone>	'sun, so, son'
c.	<daer>, <dat>, <dan>	<ðer>, <ðat>	'there, that'
	<dief>, <dinc>	<ðēf>, <ðing>	'thief', thing'

Bennet argues that, in itself, the exact parallelism proves little. It has to be determined whether there was a period of contact between the Low Franconians and the tribes that were to settle in southern England. He claims that the Saxons and Jutes passed through the Lower Franconian area where they also acquired other cultural aspects, for which there is archaeological evidence. The Angles came directly to England. Bennet argues that it is possible that Jutes and Saxons acquired initial fricative 'voicing' while they were still living in the Low Franconian territory.

Bennet claims that later cross-Channel influence is unlikely. He argues that the English Channel is still a barrier for linguistic influence. In addition, not only southern tribes had contact with the Low Franconians. Bennet points out that if the

change can be proved to go back to the time of direct contact, then the Germanic settlers already possessed initial 'voiced' allophones and the conventional formula has to be revised. However, if 'voicing' occurred after the Juto-Frisians and Saxons had established their settlements in Southern England, the development was purely local, apparently independent of substratum influence, and in no way related to the changes in Continental Germanic. Luick (1964: 935, 937) does not believe that the English development was a general one. He argues that it took place too late for that. H&L (1954: 936) do not give any indication whether they believe the change in English had anything to do with the processes in German and Dutch. They do indicate that the change also took place early in Dutch because French loans were not affected in this language either.

Lass (1992: 58/59) argues that the process in English may have helped facilitating the adoption of initial voiced fricatives in loan words, which, according to Patrick Honeybone (p.c.), would be another case of loanword adaptation. Lass claims that "Old English was not receptive to initial [v]". When a French loan word had an initial [v] in OE, it was borrowed with [f]. This is what happens with the Latin /v/ in <fann> 'fan' (< vannus), <fers> 'verse' (< versus), <Fergillius> 'Virgil'. However, it can be argued that this is not entirely certain as there was no orthographic distinction between 'voiced' and 'voiceless' sounds in OE, as pointed out several times before, they were all spelled <f>. Moreover, /v/ is the reflex in PDE in the two latter words. Lass claims that the most likely reason for adoption of initial 'voiced' fricatives in loan words was that they had developed in southern varieties. He argues that contact between southern speakers and those who did not have the 'voicing' may have facilitated borrowing of French /v/ and /z/, by making the sounds less outlandish.

5.2.1.5 Summary

This section has shown that, in simple traditional phonological terms, a process of 'voicing'' of the 'voiceless' fricatives /s, f, θ/ to /z, v, ð/ took place in morpheme-initial position. Although the precise time and place of the process are the subject of much discussion amongst scholars, it can be argued that the change took place in ME, probably before the introduction of French loans, in South-Western dialects. The source of the process is also unclear; it may have been a general process in the West-Germanic languages, but it may also have been entirely unrelated to similar changes on the continent. Orthographical evidence is rare but clearest for the change in /f/,

even scarcer for the change in /s/ and absent for the change in /θ/. However, additional evidence for the process can be found in renditions of the forms in Present-Day dialects.

As in the previous chapter, if this process indeed consisted of a series of 'voicings', this would pose a major problem for LR. Again, the feature |voice| is assumed not to be specified in the obstruent laryngeal phonology of English and cannot be introduced into specifications without a local source. Therefore, it does not actively participate in processes. It has to be investigated whether LR can deal with these data in an alternative way. This is done in section 5.3.1.

5.2.2 Historical morpheme-final 'devoicings'

5.2.2.1 Old English final 'devoicing'

The subject of so-called final 'devoicing' in OE was briefly touched upon in 3.2.3.2. Bülbring (1902), Brook (1955), Campbell (1959), Luick (1964) and Hogg (1992) point out that, like other Germanic languages and Old French, OE 'voiced' consonants became 'voiceless' within certain limits in final position.[74] Campbell (1957: 182) argues that the development began pre-historically, as evidence for it can already be found in early texts.

As pointed out in 3.2.3.2, Luick (1964: 861), Bülbring (1902: 191) and Hogg (1992: 285) indicate that the development is especially clear for the fricatives. Only the 'voiced' fricatives /v/ and /ɣ/ remained in OE because /z/ and /ð/ had undergone a general Germanic developments to /r/ and /d/. Luick (1964: 861) draws attention to the fact that /ɣ/ had developed two allophones, (i) a palatal: [j], still written <g>, which arose from an early development, and (ii) a guttural sound, which became 'voiceless' in morpheme- and syllable final position before the time of the oldest evidence, and was written <h> in this context. This spelling became decidedly frequent after Alfred's time (Luick 1964: 861 and Campbell 1959: 180).

Campbell (1959: 181) and Brook (1955: 30) show that final 'devoicing' caused an interchange of the spellings <h> and <g> in forms like <burh> ~ <burge>. Inverted spellings like <mearg> and <þurg> are also found for <mearh> 'horse' and <þurh> 'through' and this confusion is extended to medial position, e.g., <dahum> 'days'. Data for the process are given in (4):

---

[74] Luick (1964: 865) points out that 'devoicing' of coda fricatives can be found in Gothic. A late repetition of the development can be seen in Scottish forms like *lāgh* 'law' and *drāgh* 'pull' etc.

(4) *Final 'devoicing' of /ɣ/*

genōh 'enough'

bēah 'ring'

sorh 'worry'

beorh 'mountain'

Luick (1964: 861) and Hogg (1992: 286) mention the fact that the process also affected final /ɣ/ in stressed syllables, e.g., <fuhlas> 'birds' (cf. <fug(o)l> 'bird') and <āhnian> 'to own'.[75] This could arguably be due to the inhibition of 'voicing' after stressed (|stiffl) vowels due to the shared laryngeal feature of the vowel and the consonant, as discussed in the previous chapter. Luick (1964: 861) indicates that [ɣ] in syllable final position was often restored again because of related forms with the fricative in syllable onset, e.g., *fugel* and *āgen.*[76] Hogg (1992: 285) also argues that syllable final fricative 'devoicing' was much less frequent than word-final 'devoicing'. He claims that "…there is no doubt that fricative devoicing is primarily a word-final phenomenon…". Luick (1964: 861) notes that <gh>, e.g., <bogh> and <sorgh>, was used for the new sound in many manuscripts.

Luick (1964: 862) points out that the syllable final 'voiced' bilabial fricative /β/ became /f/. He notes that determining the exact time of the change is difficult, but he expects that it took place at the same time as the change from /ɣ/ to /x/. Hogg (1992: 285) and Luick (1964: 862) note that orthographic substitution of <f> for <b> as in *<healb> > <healf> 'half', *<leab> > <leaf> 'leaf', *<stæb> > <stæf> 'staff' and *<wib> > <wif> 'wife', might reflect the change to 'voicelessness'. However, it is more likely that this only expresses the merger of [v] and *[β] in medial position after lenition of fricatives in this position, discussed in chapter 3, because the symbol <v> for /v/ did not exist yet. Data are given in (5):

(5) stæf 'staff'

rēaf 'raven'

līf 'life'

healf 'half'

[75] The velar fricative also 'devoiced' when it became syllable final due to compounding, e.g., <lahbryce> 'breach of the law' (< *lagu* 'law') (Hogg 1992: 285).

[76] Luick does not mention the period in which this development takes place, but Linda van Bergen (p.c.) points out that it must have been post-OE otherwise the vowels would not have been reduced.

Hogg (1992: 285-286) notes that, dialectally, fricative 'devoicing' was most common in West Saxon. In early West Saxon texts, <h> is found only sporadically next to much more frequent <g>. However, in late West Saxon texts <g> spellings have almost disappeared. Kentish charters show no signs of fricative 'devoicing' up to 900 AD. Later spellings which indicate the change are entirely regular and the situation in Kentish parallels the one in West Saxon. In Anglian the process seems far less regular. Early Mercian glossaries show a few dubious cases of word- and syllable-final 'devoicing', and in Northumbrian only the Lindisfarne Gospels show a clear sign of the process in <genoh> (3x) versus <genog> (1x). Other examples in this manuscript are extremely rare. Northumbrian texts do exhibit a slight tendency to replace <h> with <gh> as in <gesægh> 'he saw' and <hegh> 'high'. Hogg (1992: 286) argues that

> "It would therefore appear that during the OE period fricative devoicing was a characteristic primarily expressed in S[outhern] texts, and that orthographically it had scarcely intruded upon the [Anglian] dialect area. But in ME the change was widespread…The *gh* type spellings in [Northumbrian] may be a reflection of this".

Hogg (1992: 287) argues that the evidence suggests that, chronologically, fricative 'devoicing' started in the South and only eventually spread to Anglian, maybe at the end of the period.

As pointed out in 3.2.3.2, Bülbring (1902: 218), Brunner (1960: 375), Luick (1964: 865), and Hogg (1992: 287) argue that OE stops also 'devoiced' but not as frequently as fricatives. Stop 'devoicing' is more frequent in ME, as discussed in detail in 5.2.2.3 and still occurs in living dialects. Hogg (1992: 287) assumes the process took place very early but notes that dating it is difficult due to sporadic examples in OE. Luick (1964: 865) points out that the 'voiceless' sounds were not represented as such in the spelling and were simply rendered <b, d, g>. <p, t, c> were used only infrequently, possibly in cases of emphasis. Therefore, evidence for stop 'devoicing' is difficult to find.

Brunner (1960: 375) argues that the process particularly affected /d/, and rarely affected /b/. He points out that, next to sporadic indication in the spelling, the process is obscured by levelling of consonant and vowel final forms. Bülbring (1902: 218) gives some spellings which exemplify the change like <hælsent> 'clairvoyant', <sint> 'are', <weorþmynt> 'worship', <hēafut> 'head', <hēhstaltnisse> 'maidenhood' and

<bæclinc> ‘backwards’. Hogg (1992: 287) and Luick (1964: 866) indicate that ‘devoicing’ is practically only found after alveolars and occurs as a minority form even in that position, e.g., <færelt> ‘way’ beside <færeld>. Other examples of stop ‘devoicing’ are mainly sporadic and isolated. Hogg argues that <sint> ‘they are’ is very frequent in early West Saxon (beside late West Saxon <sind(on)>), Northumbrian, Mercian and Kentish. The Lindisfarne Gospels have <-et> and <-at> in weak past participles, e.g., <geset(t)et> ‘sat’. Luick gives <gemætet>.

The fact that Present-Day reflexes of the process do not always occur when expected is explained by Luick (1964: 862). He notes that the processes of medial onset ‘voicing’ of /f, s, θ/ in Germanic, and ‘devoicing’ of /v/ and /ɣ/ in coda position led to a situation in which there were ‘voiceless’ fricatives in coda or word-final position- and ‘voiced’ fricatives in medial onset position only. Therefore, there was a frequent alternation of sounds within the same inflection which was later commonly levelled out. Luick (1964: 863) points out that when a verb inflection was dominated by two or three syllable forms, the voiced fricatives were carried through as in the forms in (6).

(6) PDE gave, drove, wove, rose, chose (past)
OE geaf, drāf, wæf, rās, cēas
PDE drive, weave, believe (imp.)
OE drīf, wef, belīef

A similar development took place in some inflected forms of adjectives. ‘Voiced’ fricatives were generalised in, e.g., PDE *wise* and *smooth* with /z/ and /ð/ from OE *wīs* and *smōþ*. Some adjectives kept ‘voiceless’ fricatives, e.g., PDE *(un)couth* and *wroth* from OE *cūþ* and *wrāþ*. Luick argues that this is possibly due to the frequency of non-inflected forms in these words. In noun declensions, the monosyllabic nominative and accusative contrasted with the polysyllabic inflected forms. The monosyllabic form came to dominate in cases like those in (7a), whereas in cases like (7b) the consonant of the inflected form became dominant:

(7) a. PDE cliff, hoof, roof, turf sg.
cliffs, hoofs, roofs, turfs pl.
OE clifu, hōfas, hrōfas, tyrfas

b. PDE grave, glove, hive, furze
OE græf, glōf, hyyf, fyyrs

In other cases the interchange was connected with the singular ~ plural opposition. Luick (1964: 864) notes that this happened in three cases (i) /(l)f/ forms, e.g., *wife*, *life*, *wolf*, and *calf*. (ii) /θ/ forms, e.g., *path*, *mouth* and (iii) in *house*. Luick (1964: 865) notes that in Scotland the levelling often went further. He still records 'voiced' fricatives in the plurals of *leaf, thief, knife, life, wife* but no longer in the plurals of *half, loaf, shelf,* and *elf.* The plural *houses* also no longer contained a 'voiced' fricative. In Aberdeenshire all plurals nowadays have /f/ and that holds for Perthshire as well, but the plural of *house* has [z] in the latter.

5.2.2.2 Northern final fricative 'devoicing'

Mossé (1952), Luick (1964: 1006-1007), Brunner (1970: 37), Jordan (1974: 154) and Faiss (1989) point out that OE 'voiced' medial fricatives, which developed due to the process described in 3.2.3.2, regularly ended up in coda position in ME after a process of schwa syncope. The 'voiced' fricatives appear to have been retained in their new position in southern dialects, including the Standard, as can be seen from PDE forms like *reeve, love, above, live, have, choose, rise, nose, furze, seethe, writhe, bequeath, blithe, smooth,* and *bathe*.[77]

Luick (1964: 1008), Dobson (1968: 944), Brunner (1970: 37), Jordan (1974: 154), Faiss (1989: 100), and Lucas (1991: 53) note that the effects of the change of position were different in northern English dialects. The process of schwa loss already took place in the 13th century in these dialects, whereas according to Jordan (1974: 194), it took place later in the South. They point out that <f> or <ff> spellings for previously inter-sonorant /v/ can be found in northern texts. Examples of such spellings are given

[77] Luick (1964: 1007-1008) argues that the development of /ð/ after schwa-loss in the standard is not entirely clear. Forms like *pith* and *froth* (< OE piða, < ME froth(e) and ON froða) suggest that 'devoicing' took place after short vowels, and forms like *earth* and *birth* (<ME erthe < OE eorðe,-an; ME birthe < Old Swedish byrþ) suggest that it also took place after /r/. Faiss (1989: 104) argues that devoicing of final /ð/ took place in the standard in words like *breath, cloth, moth, earth* and *mirth*.

in (8). Zai (1942: 188) notes that in the Scottish Borders dialect of Morebattle words in expressions like *giff-gaff* 'give and take' still have /f/.

(8) *Northern final 'devoicing'*

<gif>	<giff>	'give'
<lif>	<liff>	'live'
<luf>	<luff>	'love'

According to Forby (1830: 200), traces of the development can be found as far south as Norfolk and Suffolk in which *gyff* (1535) and *gyf* are recorded, the latter is very frequent. Other examples in these dialects include *haffe* and *reamofe.* Jordan (1974: 194) points out that these the spellings extended to the onset in inflected forms, i.e. morpheme final position, e.g., *giffis, luffis,* whereas in monomorphemic words, like *seuen* 'seven', *neuer* 'never' and *euill* 'evil', the earlier /v/, written <u>, remained. This is probably due to the fact that the fricative never surfaced in word-final position in the later three. <w> also sporadically occurs for both onset groups: *lywys, ywyll, luwyd, lewyng, lowed, abowyn.*[78] Similarly, but much less commonly, <ss> occurred for previous /z/ as in the forms in (9).[79]

(9) *Spellings indicating final 'devoicing' in /s/ in Norfolk and Suffolk*

<rīss>	'rise'
<cheiss>	'choose'
<diseiss>	'illness'

Therefore, it looks like some sort of process of coda 'devoicing' also took place in the South. However, there is some debate in the handbooks as to whether it really did. Luick (1964: 1008) argues that the change is a purely graphic one because the 'voiced' sound occurs in the Present-Day dialects. Jordan (1974: 195) acknowledges that more southern 'devoiced' forms were probably due to influence of Northern writing. However, he does not indicate that he does not believe that a real sound change took place in the North. Brunner (1970: 37) seems to believe that a sound

[78] Jordan (1974: 194) notes that in newer dialects the vowel of the inflected forms has won out, which can be seen from an alternation in the inflection: *gif ~ gevis, lif ~ levis*.

[79] It is unclear whether these are only spelling geminates or phonetic geminates, Luick does not indicate this.

change took place. He argues that variations were produced by levelling with forms ending in /ə/ and a consonant, i.e. the suffixes *-es*, and *-ed*. Dobson (1968: 944) argues that a sound change took place in the North. It can be argued that even if the 'voiced' forms are present in northern dialects today, then those were reintroduced to the dialects either because of the influence of the southern Standard or due to analogy with inflected forms which do have 'voiced' fricatives, or both.

5.2.2.3 Early Middle English 'devoicing' of coda stops

As pointed out several times before, 'devoicing' of coda stops occurred more frequently in ME than in OE. Luick (1964: 947) argues that coda stop 'devoicing' took place in early ME in the 12th or possibly the 11th century. It took place later in many dialects. 'Voiced' stops became 'voiceless' in coda position as far as they were still present in the language. This was reflected in the spelling by the use of the symbols <p, t, k (c)>. Emerson (1896: 231), Brunner (1948: 39), Mossé (1952: 40), Luick (1964: 948), Jordan (1974: 154, 183) and Wright & Wright (1984: 109) point out that 'devoicing' of stops in stressed syllables took place in the West-Midlands only and it was generally restricted to the groups /nd, rd, ld, ŋd, mb/. The process was attested in this area since the 13th century. Data are given in (10):

(10) <feont> 'enemy'
<freont> 'friend'
<lont> 'land'
<bront> 'flame'
<wint> 'wind'
<ert> 'earth'
<tilt> (<OE *teldan*)

Certain forms like *lant* 'land' and *chilt* 'child' still exist in the modern dialects of the West-Midlands in Lancashire, Cheshire, Staffordshire and Derby. Luick (1964: 950) notes that 'devoicing' in final position in past-tenses, like *went*, should probably first be attributed to this development and then to analogical developments. Zai (1942: 197) notes that the dialect of Morebattle in southern Scotland does not have 'devoicing' of /d/ after vowels and /l, m, r/. 'Devoicing' does occur after /n/ though as in [əhɛnt] 'behind' and [jont, əjont] 'beyond'.

Luick (1964: 948), Jordan (1974: 177), Wright & Wright (1984: 109) and Faiss (1989: 97) point out that another ME development in stressed syllables, the change from /ŋg/ to /ŋk/, took place in the North-Western Midlands in certain (isolated) spellings like <stronk> 'strong' and <lonk> 'long'. In the living dialects these forms occur in Lancashire, Cheshire and Derbyshire. The development possibly also occurred in the unstressed syllable in *nothing* which occasionally had a <k> spelling in ME. It was pronounced with /k/ in the areas given above and in some places outside these areas.[80] /k/ was apparently never developed in the gerund in *-ing* and it apparently completely lacks in the Northumbrian area.

Luick (1964: 947) notes that the 'voiced' stops were often restored through levelling. In addition, the development of simplification from /nd, ld, ŋd, mb/ to /n, l, ŋ, m/ had started. Therefore, Luick (1964: 948) points out that the area in which the development took place is not clearly marked. The different temporal relations of both developments in the individual dialect areas explain the differences in the diffusion of the 'devoicing' of coda stops. Luick (1964: 948) and Jordan (1974: 190) point out that final /b/ only occurred in a consonant group in the stressed syllable when it occurred in an /mb/ cluster and these clusters frequently became /m/. Taylor (1901) records *comb* and *dumb* with final <p> for South Lancashire only. Syllable final /b/ occurred in unstressed syllables in compounds only or in loan words as in (11):

(11)	<gossip>	<	godsib	'gossip'
	<warderop(e)>	<	OF warderobe	'wardrobe'
	<silip/sylipp>	<	OF sillabe	'syllable'

Luick and Jordan argue that these forms are northern in origin and may therefore be older than their first recordings in the 15th century. Faiss (1989: 97) also argues that *gossip* is originally northern and made it into the Standard language. He argues that 'devoicing' of /b/ in this word parallels the northern change /ŋg/ to /ŋk/, described above, and northern 'devoicing' of /d/ in forms like <hangyt> 'hanged', <rowyt> 'rowed', and <warnyt> 'warned'. Zai (1949: 198) points out that 'devoicing' of /d/ freely occurs in the Morebattle dialect after 'voiceless' fricatives, e.g., [past] 'passed'. However, this does not seem to be a case of final 'devoicing' but a clear cut case of laryngeal assimilation. Seemingly, proper 'devoicing' of /d/ occurs after

[80] Patrick Honeybone (p.c.) notes that /k/ is still found in these dialects in *-thing* words.

liquids and nasals when the latter are preceded by another consonant, e.g., [lernt] ‘learned’. It also occurs in unstressed syllables ending in a vowel, a liquid or a nasal, e.g., [kerit] ‘carried’. Emerson (1896: 231) mentions *unkempt* (< ME *unkembed* ‘uncombed’). Zai (1942: 197) points out that /d/ mostly ‘devoices’ to /t/ in unstressed syllables in the dialect of Morebattle, e.g., [stəpit] ‘stupid’, [worəlt] ‘world’, and [kʌbɛrt] ‘cupboard’.

Kökeritz (1932: 197) notes that ‘devoicing’ in unstressed syllables can also be found in a Suffolk dialect in spellings like <deuydet> ‘divided’ (1537), <legent> ‘legend’ (1528), <powdert> ‘powdered’ (1534), <weddit> ‘wedded’, <allments> ‘almonds’ (1632), and <sentyng> ‘sending’ (1547). It also took place in the West Midlands in, e.g., <hevet> ‘head’, <naket> ‘naked’ and <þusent> ‘thousand’, and in past tenses of weak verbs written -<et>, -<it>. ‘Devoicing’ also occurred in weakly stressed words like <ant> ‘and’ and <mit> ‘with’. In Northern England there is some variation in certain manuscripts between <-ed> and <-et>, and <-it> and <-yt>, the latter three forms also occur in Scotland. Moreover, forms like <–wart> ‘-ward’ and others can be found. The <-et> ending is very frequently retained in Scotland and Cumberland, and to lesser extent in Yorkshire, Lancashire and Westmorland. Other bisyllabic forms like <backwart> ‘backwards’ and <husbant> ‘husband’ can infrequently be found in other dialect areas up to the south coast. *Tilt* (<ME *teld*) ‘tent’ made it into the Standard by about 1500. In early ModE some remnants still occurred, e.g., <sallat> ‘salad’, <ballet> ‘ballad’, <errant> ‘errand’, and <cubbert> ‘cupboard’. Luick points out that, generally, final stop ‘devoicing’ is exclusive to Northumberland and the West Midlands. It hardly occurs in the East Midlands and Kent: Therefore, it is very rare in the Standard language, which developed from the latter two dialects.

5.2.2.4 Summary

Taken together, morpheme final obstruent ‘devoicings’ in English consisted of the change from the ‘voiced’ obstruents /b, d, g, v, z, ð/ to their ‘voiceless’ counterparts /p, t, k, f, s, θ/ in morpheme final position. Northern forms like *gyffis* show that the morpheme was a relevant entity. Even if /f/ is not word- or syllable final in a form like this, it still ‘devoices’ because it is morpheme final.

It has been shown in this section that final devoicing processes took place throughout OE and ME. The processes take on a different frequency in different

segments and different dialects. In OE the process mainly affected fricatives and in ME mainly stops. The processes take place more frequently in the North and Midlands than in the South.

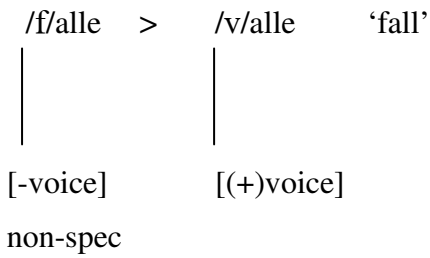
Like the alleged 'voicings' in 5.1 and the previous chapters, 'devoicing' also poses a potential problem for LR. 'Devoicing' in a traditional sense consists of the removal of the feature |voice|. Obviously, since LR assumes that |voice| is not specified in a |spread| language like English, this process cannot take place in English as a |voice| specification cannot be introduced into a specification out of nowhere. Therefore, it has to be investigated whether an alternative analysis of these processes can be found which is compatible with LR. This is done in 5.3.2.

5.3 An analysis of the processes in Laryngeal Realism

5.3.1 'Voicing' versus loss of |spread|, and more markedness

As shown in 5.2.1, the handbooks refer to the southern ME laryngeal modification process as 'voicing'. A traditional 'voicing' analysis of the process in *ualle* 'fall' is given in (12).

(12) *Southern Middle English Fricative Voicing*

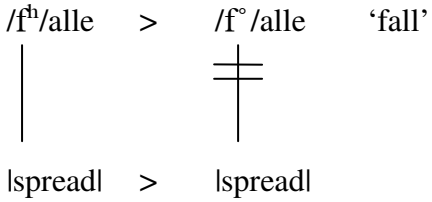


The problems an analysis like the one in (12) poses for LR have been discussed several times before in chapters 3 and 4 with regard to other supposed 'voicings' in English. (12) shows that if this change is interpreted as a process of 'voicing', then it involves the addition of a feature |voice| to unspecified segments in a privative framework or the replacement of [-voice] by [+voice] in a binary framework. Both cases require a phonologically active |voice| feature. As argued several times before, this would evidently be impossible in an aspiration language like English, with privative |spread|, because the feature |voice| is not specified in its obstruent laryngeal

phonology and the feature |voice| cannot randomly be introduced into specifications without a local source.

Therefore, the process has to be interpreted as something else than 'voicing' in English in order for LR to be able to deal with it satisfactorily. As shown in chapters 3 and 4, processes traditionally interpreted as 'voicing' in English can unproblematically be analysed in LR when they are reinterpreted as loss of the feature |spread|, i.e. lenition, leading to neutralisation of the laryngeal contrast in favour of the unmarked, neutral feature of the laryngeal opposition. Translated into terms and features compatible with LR, this would mean that in the form *ualle*, previous /f^{h}/, actively marked for |spread|, lost its laryngeal specification and became neutral unmarked /f ˚/. In other words, the process in 5.2.1 is not fricative 'voicing' but fricative lenition. Following Honeybone (2005a), this is represented in (13):

(13) *Lenition in southern Middle English fricatives*



However, there is a crucial difference between the data in chapter 4 and the initial lenition data presented in this chapter. Lenition is justifiable in the data in chapters 3 and 4 because of the weak positions they occur in: inter-sonorant position, unstressed coda position and initially in an unstressed word. It was shown that Kiparsky (2004, 2006) argues that 'weak' positions favour suppression of marked features of oppositions. That is why lenition in the form of loss of |spread| is expected in inter-sonorant and coda positions as in chapters 3 and 4. However, the southern ME lenition data occur in what is expected to be a strong position, namely, foot-initial onset position. This position cannot be argued to be a prime lenition site. Therefore, loss of |spread| could be seen as a rather unexpected process here.

However, lenition can be justified in this position in this particular dialect. Honeybone (2004b, 2005a) points out that markedness principles, partly discussed in chapter 4, can be invoked in order to show that an analysis of this process as lenition is superior to a 'voicing' analysis. Honeybone (2005a: 318) notes that (implicational, universal) markedness principles limit phonological inventories, and that an

innovation of new processes into phonological systems is possible in accordance with these principles. Honeybone (2005a: 319) points out that there is an agreement between linguists on the existence of markedness generalisations. With regard to markedness in laryngeal features, Honeybone (2005a: 320) quotes Cohn (2002: 200), who argues that "For the obstruents, the least marked category is voiceless, but the obstruents often show a contrast between [+voice] and [-voice]." This underlines the observations made by Kiparsky (2004, 2006), discussed in the previous chapter. Honeybone (2005a: 319) also quotes Hyman (1975: 17-18) with regard to the consequences markedness principles have on laryngeal processes. Hyman argues that

> "…a sound change turning all instances of [p, t, k] into [b, d, g] has never been reported. If such a sound change were to take place the resulting system would include a series of voiced stops but no series of voiceless stops. In other words, the Jakobsonian implicational universal whereby /b, d, g/ implies /p, t, k/ would be violated. As pointed out by Greenberg, any sound change which produces an impossible sound system (such as the one which would result from a change voicing all voiceless stops) is an impossible change".

Honeybone (2005a: 320) argues that the above quotation "… neatly ties together the notions of markedness principles and universals with the idea that there are 'possible' and 'impossible' phonological innovations…". In other words, some processes cannot be innovated because they clash with universal markedness principles.

Honeybone (2005a) points out that under traditional assumptions, the process discussed in 5.2.1 would contradict such markedness principles. He draws attention to the input of the process: the OE fricative system. As pointed out in 3.2.3.2, non-southern OE had two types of surface fricatives regarding laryngeal specifications, which are traditionally characterised as 'voiced' and 'voiceless'. These were in complementary distribution as 'voiced' fricatives occurred in medial inter-sonorant position only. Honeybone (2005a: 340) notes that 'voiceless' fricatives are to be taken as underlying forms in OE, and, therefore, as the input to the southern ME initial process because they are in the majority. In addition, the 'voiced' fricatives are simply a case of cross-linguistically frequently attested medial 'voicing'.

Honeybone points out that this situation was drastically changed by the initial lenition process. He argues that although it is commonly described as a domain initial phenomenon, it is unclear whether any 'voiceless' fricatives remained in the southern systems after this process took place. Namely, the domain initial fricatives joined the already 'voiced' medial fricatives. Therefore, Honeybone argues that the process

changed the underlying form of the fricatives in these dialects. He argues that although 'voiceless' fricatives maybe remained domain-finally "…any reasonable analysis would be forced to assume a 'rule inversion' type change…and assume that the underlying segments had changed following the lexicalisation of the process". In other words, medial 'voicing' was followed by the initial 'voicing', which led to a majority of 'voiced' segments. This could very plausibly have led to a reanalysis by language learners, who may have interpreted the 'voiced' fricatives as underlying and the 'final' fricatives as derived in final context. Honeybone (2005a: 341) argues that southern ME fricative lenition probably first involved a shift of surface segments, and then underlying segments. In other words, this change took place in adults, who modified their surface representations.

Honeybone (2005a: 343) points out that the change is clearly perceived by speakers and linguists as the innovation of a process which changes the 'voiceless' fricatives into 'voiced' ones. This change is a direct counter-example to the claims by Hyman and Cohn, outlined above, that there can only be 'voiced' obstruents in a system if it also contains 'voiceless' ones. Honeybone (2005a: 343) notes that Lass (1991-1993) also discusses this problematic fact, and concludes that southern ME fricative lenition "...thus appears to be an 'impossible' change leaving an 'impossible' phonological system which conflicts with long-held phonological beliefs about markedness in segmental inventories".

However, Honeybone (2005: 343) points out that this problem can easily be solved because the problems described above only exist when traditional assumptions regarding laryngeal features are made. These problems disappear when an analysis in LR is considered. As described in (13) above, the process does not involve 'voicing' at all in LR. It involves the simple removal of the feature |spread|, leaving the fricative system of the South with only the neutral segments /f˚,θ˚, s˚, ʃ˚/. This analysis, according to Honeybone (2005a: 345), "…is entirely compatible with markedness principles and with observed phonological universals. It is far from phonologically impossible for languages to have only one series of obstruents, but it is impossible for them to be specified by |voice|". He points out that Maddieson (1984) reports 50 cases of languages with only one series of plosives, 15.8% of his total inventory. All these languages have neutral voiceless segments and may be analysed as being characterised by neither |spread| nor |voice|, which is the exact result of southern ME lenition. Therefore, as with the previous 'voicing' data, LR cannot just deal with this

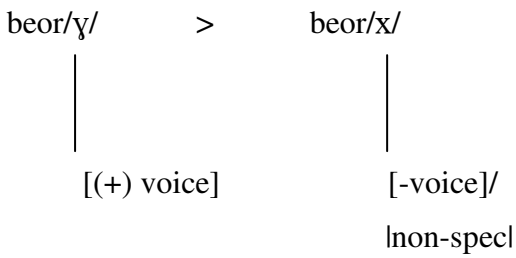
process but it provides an analysis which is superior to a |voice| analysis in that it does not need to resort to 'freak' processes leading to 'freak' situations.

Lenition would also once again easily explain why there is evidence that the process could at first fail when a |spread| consonant preceded. This can be interpreted as laryngeal assimilation to the |spread| feature of the preceding consonant by the now unspecified consonant. As shown in chapters 3 and 4 this was a regular process in OE and also took place after final lenition in unstressed syllables.

5.3.2 'Devoicing' versus final fortition

As discussed before, the processes in 5.2.2 also pose a problem for LR. These processes are traditionally interpreted as 'devoicings'. Therefore, they involve the deletion of the feature |voice|, which is just as problematic for LR as the supposed addition of the feature in supposed 'voicing' processes. The feature is not specified in the obstruent laryngeal phonology of English, and it can also not be randomly introduced into the underlying representation in order to be deleted again by this process. 'Devoicing' is shown in (14) for the change from /ɣ/ to /x/ in OE original <beorg>:

(14) *Final devoicing in <beorg>*



As with the 'voicing' cases, the possibility of a reanalysis of the process in LR has to be investigated. Such an alternative approach to final 'devoicing' phenomena in German, which is a |spread| language and therefore has the same laryngeal phonology as English, is offered by I&S (1999, 2007). I&S (1999: 144) point out that syllable final obstruents in German are subject to a laryngeal modification called 'Auslautverhärtung' or 'final fortition'. They argue that this phenomenon should indeed be understood as 'fortition', i.e. strengthening. I&S (1999: 144) assume that "…voiceless obstruents are imbued with greater 'consonantal strength' than voiced ones…". They argue that because of this they should be analysed as belonging to the

fortis rather than the lenis class. They argue that their view "…rests on a firm bed of phonetic evidence, including tendential final release/aspiration of fortified stops, differences between [voice] and [spread glottis] in cluster assimilations, allophonic progressive devoicing from fortified obstruents, as well as on closely related historical facts" (I&S 1999: 144). They point out that an analysis of German neutralisation as final fortition instead of final 'devoicing' "…is supported by a long line of previous scholarship", e.g., Kloeke (1982), Avery (1996), and Iverson (1997).

I&S point out that final devoicing, i.e. the removal of the |voice| feature, takes place in |voice| languages like Russian, Polish and Dutch. Therefore, they claim that both final fortition and final devoicing involve neutralisation. The difference is that final fortition involves a neutralisation to the marked member of the opposition, through addition of |spread|, whereas final devoicing involves a neutralisation to the unmarked member, through deletion of |voice|. The processes have phonetically similar results although there may be (emphatic) aspiration of final stops in German but not in, e.g., Dutch.

I&S (1999: 145) claim that consequences for other aspects of the phonology provide support for their view that different types of languages undergo different types of final neutralisation. They point out that final devoicing is typically associated with regressive assimilation to |voice| in hetero-syllabic obstruent clusters. The first member of the cluster may devoice due to final devoicing but if the second member of the cluster is voiced, the outcome is still a fully voiced cluster. In other words, even if final devoicing eliminates |voice|, it is reintroduced by regressive spread of |voice| from the following stop. Clusters in languages which have final devoicing always have the same laryngeal value as the last member of the cluster. When the last member is specified for |voice|, the cluster will be voiced throughout. However, a laryngeally unmarked final cluster member results in a wholly neutral cluster because the first cluster member is also neutralised through final devoicing. I&S give the following illustrations for these claims from Dutch, which seem to bear out the expectations:

(15) *Laryngeal values in Dutch initial clusters*

a. Voiced final member

/zb/ & /sb/ > [zb]

ka/sb/oek > ka[zb]oek 'cashbook'

kaa/zb/oot > kaa[zb]oot 'cheese boat'

b. Neutral final member

/zp/ & /sp/ > [sp]

kaa/zp/ers > kaa[sp]ers 'cheese press'

ka/sp/ost > ka[sp]ost 'cashbook entry'

In final fortition systems like German though, there are no phonologically voiced segments. The lenis series are unspecified, and, therefore, there is no laryngeal feature to spread leftward in laryngeal assimilation. As shown in chapters 2 and 3, the only active laryngeal feature in such systems is |spread|. The latter can obviously not extend leftward into an already fortis obstruent. Therefore, if the last member of the cluster is specified for |spread|, all members of hetero-syllabic clusters come to share the laryngeal specification of the last member, e.g., /s^{h}b$^{\circ}$/ & /s$^{\circ}$b$^{\circ}$/ > [s^{h}b$^{\circ}$]; /s$^{\circ}$p^{h}/ & /s^{h}p^{h}/ > [s^{h}p^{h}].[81] However, this is not a consequence of assimilation but one of final fortition. Therefore, even if the last member of a cluster is not specified, the preceding member will still be specified for |spread| due to final fortition. Therefore, laryngeally heterogeneous clusters are possible, like [s^{h}p$^{\circ}$] where the first member is laryngeally specified for |spread| and the final member is unspecified. I&S (1999: 146) argue that if cases of final fortition were analysed as final devoicing, then the differences between assimilations in |voice| and aspiration languages outlined above would be inexplicable. I&S claim that if final fortition is assumed to take place in German, then regressive assimilation is impossible in hetero-syllabic clusters. Final devoicing on the other hand gives rise to the creation of a feature docking site because it involves feature deletion.

Therefore, phenomena traditionally described as final 'devoicing' in aspiration languages can be dealt with by LR as final fortition. The view that some kind of strength is added to previously unspecified consonants is not a new one. Luick (1964: 951) already hints at it. In his description of final 'devoicing' he argues that it is

[81] I&S use traditional features in this example.

preceded by ‘energy decrease’, which leads to a ‘voiceless lenis’ sounds, i.e. it sounds arguably equal to the neutral sounds of LR, and also causes a ‘laxness of articulation’. This is followed by the replacement of the lenis obstruents by fortis obstruents, which means an increase in energy. The process in (14) therefore has to be reanalysed as in (16):

(16) *Final fortition in beorg*

beor/x˚/ > beor/x^h/

|non spec| |spread|

However, this process is not unproblematic either. It has been pointed out several times before that a unary representational framework is constrained by the fact that features cannot just be added randomly to underlying specifications. In the case of final fortition this seems to be exactly what happens. |spread| is added to final consonants without their being a local source. In addition, unlike the analysis of initial lenition, an analysis in LR does not seem to offer any advantage over an analysis of the processes as final devoicing. The markedness principles discussed in the last section are not violated by final devoicing. Neutralisation to the unmarked member of the opposition, voiceless in the voiced ~ voiceless opposition, is expected and even if final devoicing would leave a system with voiceless fricatives only, this would be perfectly ‘natural’. In fact, the notion of final fortition goes right against the markedness principles discussed by Kiparsky (2004, 2006) outlined in the previous section and chapter 4. Obviously, final fortition takes place in coda position where neutralisation processes are common, but, as described several times before, neutralisation to the marked feature of the opposition is not expected. Neutralisation to the unmarked feature is common in codas in languages of the world. Conversely, convincing evidence for neutralisation to a marked |voice| feature in final positions appears to be unattested as yet.

In a recent paper on final fortition, I&S (2007: 126) themselves point out that final fortition and final voicing, as non-assimilatory neutralisation patters, are different from final lenition and final devoicing in that the former two involve the addition of a feature “*ex nihilo*” whereas the latter two involve the deletion of one. They argue that

> "It is noteworthy, then, that the rarity of final voicing –or perhaps its lack of attestation to date- correlates with the oddity of its phonological characterisation as a non-assimilatory neutralisation, *viz.* the addition of a feature (|voice|) from no apparent source, and with no apparent motivation."

They point out that final voicing would join the so-called 'crazy rules' if it were attested. These were identified by Bach & Harms (1972) and are "rules which exist in a grammar, and which of course can be learned, but which are without apparent synchronic motivation, having arisen through sound changes and whose initial impetus has been obscured by the development of other changes" (I&S 2007: 126-127).

However, I&S (2007: 127) argue that unlike final voicing, final fortition does have a synchronic motivation. They argue that it has a demarcative function in that it serves to mark prosodic boundaries. This function gives the segments further force and presumably makes the process of final fortition more likely to occur. I&S point out that some languages mark phonological phrase boundaries by either constricting or spreading the glottis; both these gestures inhibit voicing.[82] As a result, phrase final voiceless obstruents are very common and this serves as a basis for language learners to over-generalise and extend voicelessness to word-final obstruents, which gives an edge marking pattern of final aspiration or glottalisation. This arguably ties in with the discussion in the previous section. Language learners in southern dialects of ME may have reinterpreted the 'voiced', or unspecified fricatives in LR, as the underlying form and attributed original underlying |spread| to a process of final fortition. In addition, it can be argued that a process like final fortition is less 'crazy' in a language like English than final 'voicing'. |spread| is already specified in the laryngeal phonology of the language and therefore the feature that is introduced is at least not alien to the system.

I&S (2007: 128-128) argue that final fortition in German probably has its origins in the marking of the end of a prosodic constituent with a laryngeal feature. However, this function has become obscured because of the emergence of a prescriptive standard influenced by widespread final lenition, i.e. removal of |spread| in the case of German, in the dialects. Final release in present-day standard German is therefore not obligatory. However, whether it is released or not, aspiration demarcates the end of a phrase or word (and a syllable in German), and is, therefore, phonologically marked.

[82] I&S point out that a neutral glottis facilitates vocal fold vibration in obstruents, a spread or constricted one hinders it.

I&S point out that arguments for final fortition in German have originated from a lengthy tradition in German phonetics, e.g., Kohler (1984) and Jessen (1998).

I&S (2007: 131) point out that final fortition crucially only takes place in morpheme margins and not in structures or segments which occur in a different morpheme. I&S argue that this can be explained by a "…general phonological correspondence uncovered in Optimality Theory…".They point out that since the beginning of Optimality Theory (McCarthy & Prince (1993) and Prince & Smolensky (1993)) "… a central idea has been that there is a preference in human languages for prosodic edges (word, foot, morpheme, syllable) to 'line up' with each other, or to co-occur". This is known as 'generalised alignment' or 'prosodic alignment'.

I&S (2007: 136) show that historical evidence for the demarcative function of final fortition in German is already found in the earliest Old High German (OHG) text, a circa 8th century translation of Isidor of Seville's De Fide Catholica. This text displays apparent laryngeal contrast in initial and medial position but in final position it seems to only contain spellings indicating the |spread| sound, <p, t, k, s> etc., although the precise phonetics are of course uncertain. Clearer evidence comes from Notker Teutonicus (early 11th century). Notker spelled sentence- and clause-initial segments as fortis which suggests that he was marking the beginnings of higher-level prosodic units next to the more familiar marking of their endings. Present-Day dialects from Notker's region (South-West) still use this pattern, e.g., [i(χχ) pin] <ich bin> 'I am' versus [du bišt] <du bist> 'you are'. The motivation for final fortition seems to be the only one that works for this otherwise rather marked neutralisation process. As argued before, neutralisation to the marked member of the laryngeal opposition is not expected in a phonological environment where lenition, i.e. neutralisation to the unmarked member of the opposition, would be expected according to general markedness principles.

Alignment of laryngeal contrast in domain edges seems to be a plausible explanation for the process in OE final fricatives. OE domain-initial fricatives were already specified for |spread| and domain-final ones joined them. In fact, it made sure that all OE fricatives were underlyingly marked for |spread| even if medial ones underwent the lenition process described in previous sections. The process seems to work on two levels in OE, albeit disproportionally so. It works on morpheme edges but it also seems to affect certain syllable edges as in *āhnian* and *fuhlas*, discussed in 5.2.2.1. It cannot be argued that it also affected domain-internal morphemes as can be

seen from lenition in a form like *cyðde* discussed in 3.2.3.2. However, as pointed out in 5.2.2.1, Hogg (1992: 285) notes that the development was much rarer in word-internal context. Therefore, the non-morphemic syllable final cases could be an incomplete extension of the domain-final process. It could then be argued that final fortition in OE took place in pre-pausal, domain-final context and is occasionally extended to non-morpheme syllable final position. The early ME dialectal (West-Midlands, Lancashire) development of final stop fortition also seems to be a case of domain-demarcation and possible alignment with domain initial stops, although these, unlike the OE initial fricatives, did contrast with neutral stops laryngeally. It could also be a dialectal attempt to create unity in the obstruent system. Whereas fricatives did not contrast domain initially and finally, stops did. Perhaps the dialect tried to level out all laryngeal contrast in obstruents, although this should have arguably led to initial fortition of neutral stops as well.

In the case of Northern final fortition of fricatives there is a possible demarcative function but this development seems to be mostly conditioned by a desire to restore the OE fricative situation after the loss of schwa. This loss put unmarked neutral fricatives in word-final position, a position to which they were alien in OE dialects in general. Final fortition in Northern fricatives may have plausibly been a levelling out of the briefly newly arisen laryngeal contrast in final position. However, demarcation could also be a possible reason why the Northern dialects wanted to keep fortis fricatives in final position and did not just let the newly arisen laryngeal contrast prevail. It could also be a reason why the OE situation was viewed positively enough to be kept intact.

However, the later tendencies to lenition in final position, i.e. neutralisation of the laryngeal contrast in favour of the unmarked member of the opposition, seem to be far more common. As briefly discussed above, this is not only the case in English but also in German. I&S themselves point out that the notion of final fortition goes against the assumptions of autosegmental phonology and is rare in Germanic languages other than German. This is maybe why two of the processes are rather restricted and dialectal in English, and are followed by far more numerous processes of lenition even in domain initial position as discussed in 5.2.1. This perhaps indicates that even if final fortition is possible and explicable, and moreover, necessary for an analysis in LR in order to deal with traditional ‘devoicing’ phenomena, it seems to be

a rather unnatural process which can easily be subject to remodification. Although not impossible and unarguable, it seems to be the weakest support for LR so far.

5.4 Conclusion

As in chapter 4, the processes presented in this chapter are potentially problematic for LR when they are analysed traditionally. If the laryngeal modification of southern English initial fricatives is analysed as 'voicing', i.e. the addition of the feature |voice|, this would be highly problematic for LR because |voice| is assumed not to be specified in the laryngeal phonology of a |spread| language like English and cannot just randomly be added to its underlying representations. For the same reason, 'devoicing', i.e. the removal of the feature |voice|, would pose major problems for the theory.

However, it has been shown that LR can satisfactorily deal with these phenomena. As all traditional 'voicings', initial laryngeal modification in southern English dialects can be reanalysed as loss of |spread|, or lenition. Traditional final 'devoicings' have to be reanalysed as the addition of |spread|: final fortition. Therefore, laryngeal neutralisation in the history of English apparently took two forms: lenition leaves unmarked neutral voiceless stops, and therefore constitutes neutralisation to the unmarked member of the opposition. Fortition, on the other hand, results in previously unmarked neutral segments acquiring the laryngeal specification |spread|. Therefore, it involves neutralisation to the marked member of the opposition.

It was shown that analysing the southern ME process as lenition is again superior to a traditional 'voicing' account of the data. As in the final cases in chapter 4, a 'voicing' analysis would clash with universal markedness principles. As described before, the least marked category for obstruents is argued to be the voiceless unaspirated series. A change producing a system with voiced obstruents only is viewed to be a highly unnatural, and is, therefore, an impossible change. LR can solve this problem elegantly by reanalysing the process as loss of |spread|. In this way, the markedness principles do not have to be discarded and the process can be seen as a natural one. This, again, provides strong support for LR.

However, final fortition instead of 'devoicing' cannot be argued to have the same advantages for LR as lenition. If the morpheme final processes presented in this chapter were analysed as 'devoicings' they would violate no markedness principles as

neutralisation would be to the unmarked (voiceless) category. Even if the processes led to a phonological system consisting of voiceless segments only, this would be a perfectly legal situation. In fact, the apparent random insertion of a feature breaches the condition that all processes must have a local source. However, LR has no other way to interpret these phenomena, as it assumes |voice| to be absent from the laryngeal phonology of English, as shown above.

However, even if final fortition seems to be much less 'natural' than lenition, some justification in the form of demarcation can be presented. In addition, the process does not introduce a feature that is alien to the laryngeal phonology of English: |spread| is already present. Unlike final 'voicing', the process can be motivated in some way, and therefore does not seem to create a totally unnatural and impossible situation. The process is much less common in the history of English than lenition processes, and this could be justified with the fact that neutralisation to the marked member of an opposition is less 'natural' than neutralisation towards the unmarked member. Nevertheless, it certainly does not present the strongest evidence for LR.

6 Conclusions

6.1 A summary of the assumptions, predictions and traditions discussed in the thesis

6.1.1 The general traditions and assumptions the thesis is set in

It was outlined in chapter 1 that this thesis is set in the tradition of theoretical historical phonology. As shown, the status of the use of historical data in phonological research is disputed amongst phonologists. McMahon (2000) describes four viewpoints: the first, SGP (e.g., Chomsky & Halle (1968)) assumes that a purely synchronic approach to phonological research is desirable. Historical data are viewed to be external in accounts following this framework. The entirely opposite view is advocated by Bailey (1982). He argues that the past enlightens the present and that historical research underlies all knowledge about present phonological processes. Labov (1978) on the other hand argues that present developments can enlighten past ones, and the middle position is taken by Vachek (1966). He argues that the present and past are mutually informative, a view supported by McMahon (2000), and also followed in this dissertation.

Chapter 1 also showed that the existence of theoretical historical phonology as a legitimate discipline is disputed. As pointed out, the legitimacy of theoretical historical phonology is for a large part dependent on the locus of linguistic change. If a strict acquisitionist model of linguistic change is assumed, then theoretical historical phonology is impossible. This is because it is assumed that changes are constrained by representations, and so changes need to be able to take place in systems where these representations are already established. Therefore, it is only possible if we assume that change can also take place in the already established grammar of 'steady-staters'. This view represents the position of anti-acquisitionist models of linguistic change. Because this thesis is set in the tradition of theoretical historical phonology, it requires adopting the assumption that theoretical historical phonology is possible. Therefore, the assumption that change can take place in speakers with an already developed system also has to be adopted. The arguments that this is indeed the case are presented in the introduction: children do not like change, in fact, they attempt to copy the adult patterns around them exactly, much change takes place in the speech of adolescents,

and people can undergo lifespan changes. The implications for the locus of linguistic change of the research done in this thesis are set out in 6.3.

It was discussed in chapter 1 that theoretical historical phonology mixes traditional knowledge and thinking about phonological change with work on phonological theory. In general, it studies the structural mind-internal aspects of language, i.e. 'competence' or 'I-language' in Standard Generative Linguistics, and their interaction with linguistic change. Theoretical historical phonology makes predictions about how common changes are, and whether they are possible or impossible. Predictions are derived from phonological primitives or general linguistic principles. They can also be backwards looking: changes that are known to have happened can be reviewed to see if they would be predicted in the light of a theoretical position. All of this was done in this thesis. Already recorded changes were looked at and reanalysed to see if they met the predictions of LR based on the theory's relevant phonological primitives |spread| and |voice|. They were also tested against general linguistic principles such as universal markedness constraints regarding alleged possible and impossible processes. It was shown that the majority of the data presented in this thesis comply with the predictions made by LR which is discussed in detail in 6.2.

Apart from theoretical historical phonology, the thesis is also set in the representational tradition of phonological research. This means that I assume that segments have clear underlying and surface forms and that these are worthwile and interesting to explore. The thesis is not set in one particular representational framework, such as Dependency Phonology or Government Phonology, but it follows the general assumptions of such representational models. The Underlying representations of segments consist of phonological primitives, in the case of LR these are features, and in line with most recent phonological research on laryngeal phonology I assume that these features are privative. As pointed out briefly above, I assume that these features constrain the direction in which change can go. I assume that only one feature of a contrast is specified phonologically. The other feature in the opposition cannot be phonologically invoked at random. Therefore, changes can only take place in the direction of the specified feature. This notion constrains the model. Finally, I have also investigated the possibility of phonetically fuller phonological features which is what LR stands for.

6.1.2 The assumptions and predictions of Laryngeal Realism

It was shown in chapter 2 that there are two traditions when it comes to the analysis of cross-linguistic underlying laryngeal representations. These two traditions are based on a debate concerning the discrepancy between underlying laryngeal representations and their surface manifestations in different languages. The standard approach assumes that languages like English and French have the same underlying phonological feature |voice|. It assumes that different surface manifestations of the laryngeal contrast in these languages are phonetically governed. As shown in chapter 2, this view is advocated by, e.g., Keating (1984) for binary [voice], and Lombardi (1995a) for privative |voice|. The second tradition, proposed by, e.g., I&S (1995, 1999, 2003, 2008), on the other hand, argues that different surface implementations are phonologically governed. It was shown in 2.3.1.1 that ideas similar to the second tradition go back to at least the 1870s. I&S argue that privative underlying laryngeal distinctions differ between languages with different surface implementations of laryngeal contrasts. This leads to a proposed distinction between |spread| and |voice| languages. Evidence for this proposed view is drawn from surface representations and assimilation facts

|voice| languages have an underlying distinction between obstruents specified for |voice|, represented as /b, d, g, v, z, ɣ/ for obstruents at the three cardinal places of articulation. These specified segments contrast with unspecified neutral segments, represented as /p˚, t˚, k˚, f ˚, θ ˚, x ˚/. In a |voice| language, the specified feature is expected to manifest itself on the surface in fully voiced obstruents in all positions. Assimilation to the active |voice| feature, and processes like voicing and devoicing are possible in these languages. Examples of |voice| languages include Polish and French. |spread| languages on the other hand have an underlying laryngeal distinction between obstruents specified for |spread|, represented as /p^h, t^h, k^h, f^h, $θ^h$, x^h/, and the same neutral unspecified elements as |voice| languages. In |spread| languages the underlying contrastive feature is expected to manifest itself on the surface in the form of aspiration in stops, and in some languages in fricatives. Unspecified segments are voiceless unaspirated, and fully voiced segments only occur in inter-sonorant position when they are subject to the process of passive voicing. In line with the constraining nature of privative representational models, briefly discussed in the last section, the specified feature |spread| can occur in phonological processes only. The feature |voice| is unspecified and cannot actively participate in any phonological process. This leads

to the prediction that a process like assimilation is asymmetric in favour of the |spread| feature. Because obstruents are not phonologically specified for |voice|, assimilation cannot occur in the direction of this feature, and, therefore, it is not expected to be found. In a similar vain, neutralisation processes are expected never to involve the feature |voice|. Processes traditionally described as 'voicings', the addition of |voice|, or 'devoicings', the removal of |voice|, cannot occur because possible processes are constrained to the active member of the privative opposition. Features cannot just be added to representations on an ad hoc basis. Therefore, if such processes appear to occur in a supposed |spread| language, an alternative analysis has to be provided otherwise they provide a big problem for the assumption of privativity.

6.1.3 Testing English historical data

In this thesis, I showed that PDE conforms to all the predictions of a |spread| language within LR. It has a contrast between aspirated stops and neutral stops, obstruents are only ever fully voiced in inter-sonorant position, and all synchronic assimilation processes are asymmetric in favour of the feature |spread|. I then proceeded to test whether historical English processes also comply with the predictions of LR. In order to investigate this, I documented all known processes of laryngeal modifications in the history of English found in the handbooks on English historical phonology. I found two true processes of laryngeal assimilation, one in OE and one in ME, and six processes traditionally described as 'voicings' and 'devoicings'.

In order to comply with the assumptions and predictions of LR, the assimilation data had to show uni-directionality in favour of the feature |spread|. Therefore, it had to be investigated in detail whether there were no possible instances of assimilation to |voice|, which in historical data would be shown by double 'voiced spellings'. For the OE data, I conducted a detailed investigation of 120 forms, using computerised manuscript data, and investigated whether any such spellings occurred. As pointed out above, the alleged 'voicing' and 'devoicing' processes would prove to be very problematic for LR if they would indeed have to be analysed as such. Therefore, I had to investigate whether LR has the tools to deal with these potentially problematic cases. The next section summarises the outcomes of this investigation.

6.2 The importance of historical data for Laryngeal Realism

6.2.1 Assimilations

It was shown in chapter 3 that all assimilations in the history of English support the view that English is best analysed as a |spread| language in LR. As pointed out above, the fact that the marked member in the laryngeal opposition in English is |spread|, leads to the prediction that all assimilation in the language will be in the direction of this actively specified feature. Assimilation to unspecified |voice| is predicted not to occur. It has been shown that there are no cases of |voice| assimilation in the history of English. All recorded assimilation process are of the type predicted by LR. This goes for the OE process of laryngeal assimilation after syncope and compounding in 3.2, the ME assimilation of the past-, 3rd singular, plural and genitive suffixes in 3.3.1, and for various cases in which laryngeal lenition, traditionally described as 'voicing', was followed by assimilation to neighbouring |spread| consonants in 4.2.1 and 5.2.1.

As pointed out above, 120 OE forms, mostly compounds, were investigated, and not a single inexplicable counter-example to the claim of LR that all assimilations in English are to |spread| was found. Only two possible counter-examples were found, *godgundra* and *godgundlice*. However, on further research, they proved to very plausibly be an idiosyncrasy of one particular scribe. Other possible counter-examples were shown not to belong to the same lexeme as their supposed originals. It is, therefore, safe to assume that OE assimilation took place entirely in the direction of the feature |spread|.

The past, plural, 3rd singular and genitive cases in ME show the same exceptionless pattern. Unexpected spellings by the orthoepist Hart can be argued to be due to perceptual indeterminacy. The weak implementation of the |spread| feature in codas may have led to Hart confusing them for neutral obstruents. Therefore, these data also pose no problems for the prediction in LR that all assimilation is to |spread| in a |spread| language. The only cases where assimilation to |voice| could be indicated is in the late ME or early ModE processes in 3.3.2. However, it was shown that these cases are unproblematic as well because they constitute loss of |spread| in inter-sonorant position and loss of consonants from clusters. The true historical assimilation data provide crucial historical evidence for LR and for a historically consistent situation in the laryngeal phonology of English. Therefore, it can be argued that in this case

historical data have proved to provide crucial back-up for a current phonological framework, LR.

LR, in its turn, has provided a new and elegant analysis for the assimilation data in that it can explain the fact that no clear cases of assimilation to |voice| occur in both Present-Day and Historical English. The asymmetry observed in English laryngeal assimilation cannot be explained in a framework, binary or privative, which incorporates the feature |voice|. If it is assumed that the feature |voice| or [+voice] is actively specified, then assimilation to this feature is expected to take place. The asymmetry is easily explained in LR because it assumes that |spread| is the only specified and active feature in the obstruent laryngeal phonology of English. The feature |voice| cannot be invoked in phonological processes and therefore assimilations are constrained to take place to |spread| only. This shows that current frameworks can also shed an interesting light on historical data.

6.2.2 Neutralisations

6.2.2.1 Evidence for Laryngeal Realism from neutralisation processes

A number of neutralisations of laryngeal contrast in the history of English were presented. Several processes of inter-sonorant modification took place in the history of English starting with laryngeal modification of inter-sonorant fricatives in OE, shown in 3.2.3.2. This repeated itself in ME or early ModE although this process was stress-conditioned and far more restrictive, as shown in 4.2.2. Laryngeal neutralisation also took place in final position as shown for late ME in 4.2.1 and, dialectally, in various periods as shown in 5.2.2. It also took place in initial positions as shown for southern ME in 5.2.1. These processes are all traditionally analysed as ‘voicings’ and ‘devoicings’. As pointed out before, in LR such processes are not expected to take place in a |spread| language because the feature |voice| is unspecified and so cannot be added, as implied by ‘voicing’, or removed, as implied by ‘devoicing’. Therefore, had these processes turned out to be actual ‘voicings’ and ‘devoicings’ in English, a supposed |spread| language, then they would have proved to be very problematic for the framework. Such processes would have required an active |voice| feature to be present in the underlying obstruent laryngeal phonology of English. This would clash with privativity assumptions and their theory-constraining properties.

However, it was shown that an alternative analysis, which complies with the assumptions of LR, can be offered for all these processes. The neutralisations of laryngeal contrast, which led to the outcomes traditionally analysed as 'voicings', can be reinterpreted as processes of loss of the feature |spread|. This, in turn, can be interpreted as a form of lenition. The latter fact fits in perfectly with the factor that unifies many of the environments for neutralisation. Namely, the neutralising obstruents occur in weak prosodic positions. This is certainly true for the inter-sonorant and coda cases, and for the weakly stressed function words like *the*. These contexts are prime sites for lenition processes, which are, therefore, expected to take place in these positions. In fact, lenition is more expected than a process which leads to the addition of a feature, as 'voicing' would in a privative |voice| account. It was shown in 3.2.3.2 that inter-sonorant lenition was extended to non-intersonorant coda positions in cases like *cyðde*. This was a result of paradigm uniformity with the infinitive form of the verb which underwent lenition. Cases traditionally seen as final 'devoicings' can only be analysed as final fortition, i.e. the addition of the feature |spread|. This is returned to in detail below. Therefore, these data pose no real problems for LR. Alternative analyses which comply with the assumptions of the framework can be found.

In fact, analysing certain of the above cases as lenition rather than 'voicing' proves to be advantageous. The morpheme-initial and final lenitions would oppose universal markedness constraints when analysed in a |voice| framework. Neutralisations generally take place towards the unmarked member of oppositions, and unaspirated voiceless obstruents are the universally most unmarked segments. Therefore, final neutralisation in the direction of the marked feature |voice| would be very odd. The process has not yet been attested with any certainty in languages of the world. Its occurrence in the history of English would therefore be baffling. When the data are viewed as lenitions though, this problem disappears. The process is then nothing but a natural neutralisation of contrast to the unmarked member of the opposition. The morpheme initial cases would also lead to a highly marked situation when viewed as 'voicings'. 'Voicing' would lead to the reanalysis of the laryngeal contrast in southern ME fricatives as containing the feature |voice| only. Systems with voiced obstruents only are unknown amongst the languages of the world, and, therefore, these data would again be baffling. LR treats these processes as lenitions, and, therefore,

markedness issues do not arise. Consequently, these data constitute crucial support for an analysis of these processes as lenition in LR and thus support the framework.

In addition, an analysis in LR contributes to an interesting analysis of the stress-conditioned cases of lenition. It can be argued that the |spread| specification of post-tonic fricatives is retained in this position because it links up with the |stiff| specification of the preceding vowel. Therefore, lenition fails when an otherwise weak coda- or inter-sonorant position gets extra strength through the sharing of a specification with the preceding vowel. This analysis in turn provides an interesting insight in the activity of the feature |stiff| in stressed vowels in ME and early ModE.

Final fortition, laryngeal neutralisation to the marked member of the opposition, is not as advantageous as a reanalysis as lenition of traditional 'voicings'. In this case, analysing the process as 'devoicing' in a traditional |voice| framework would not have been problematic because it constitutes lenition: the removal of the feature |voice| in coda position, which constitutes a prime lenition site. In addition, in these cases the outcomes of the 'devoicing' process would be unmarked neutral unaspirated voiceless segments. Therefore, the process would not be in opposition to any universal markedness constraints. However, an analysis of this process as 'devoicing' in LR is impossible as the feature |voice| cannot be present in the obstruent laryngeal phonology of a |spread| language like English. The problem with finial fortition is that it introduces a feature into an underlying specification without an apparent local source. This goes against the constraining principles of privative representational frameworks. However, as opposed to final 'voicing', some justification for this process can be found in the form of demarcation of prosodic boundaries and occasional occurrence of aspiration in word final utterances in, e.g., German. In addition, it can be argued that, even if there is no local source, introducing the feature |spread| into an underlying specification in a |spread| language is not as unexpected as introducing |voice| to it because |spread| is specified in English anyway. At least, the process introduces an already specified feature into previously unspecified representations. The fact that this process does not have a local source can be argued to explain why it is much more infrequent than lenition. Therefore, the process does not seem entirely ad hoc but certainly does not provide the strongest case of evidence for LR. At best it can be argued that the apparent 'devoicings' can be handled by the framework and do, therefore, not provide any severe problems for it.

Overall, the lenition data provide evidence in favour of an analysis in terms of LR, and, therefore, once again stress the importance of historical data for the investigation of current theoretical frameworks. In its turn, LR takes away a lot of otherwise baffling facts about these data and shows that they can, in fact, be reinterpreted as natural processes. This again shows that historical data can provide evidence for current theoretical frameworks, and, conversely, current theoretical frameworks are very useful in the analysis of historical data.

6.2.2.2 A summary of the historical development of the laryngeal phonology of English fricatives

The focus of this thesis is on English obstruents as a class. However, in the context of obstruents, chapters 3, 4 and 5 have presented an interesting complete overview of all known historical laryngeal modification processes in English fricatives. It has been shown that English laryngeal phonology displayed a general tendency towards the neutralisation of laryngeal contrast in fricatives throughout its history. It was shown in chapter 5 and the previous section that, in terms of LR, neutralisation can take two forms: fortition and lenition although the latter is, as expected, more common.

The tendency towards the neutralisation of laryngeal contrast in fricatives began with the final fortition in OE of Germanic /f̥/ and /x̥/ to /f^{h}/ and /x^{h}/, described in 5.2.2.1. Lenition in medial fricatives, discussed in chapter 3, left OE with a system in which fricatives were specified for |spread| underlyingly, and were predictably passively voiced in medial position. This system was so strong that Northern dialects maintained it by fortifying neutral previously medial unspecified fricatives which had become final due to loss of schwa, this was discussed in 5.2.2.2.

However, in South-Western ME dialects it was lenition that eventually became the dominant form of neutralisation. Medial lenition was extended to initial position leading to a reinterpretation of the laryngeal contrast in these dialects in favour of neutrality. Therefore, |spread| was no longer contrastively specified and the laryngeal contrast had neutralised entirely. The fact that other dialects were inclined to follow in this trend can be seen from the processes described in chapter 4. In late ME medial neutralisation is extended to unstressed final positions in all dialects of English. The tendency to neutralise towards the unmarked neutral voiceless unaspirated fricatives in inter-sonorant position is also extended to pre-tonic fricatives in inter-sonorant position in loans, albeit irregularly, in early ModE. All these processes argue for a

continuous tendency to neutralise laryngeal contrast in fricatives throughout the history of English.

6.3 Implications for the locus of linguistic change

This thesis also shows that in order for the assumptions of LR to work, a possibility of change in adults, or, at least, speakers who already have a developed phonological system, has to be assumed. Acquirers have no system yet and so they do not know that |spread| is the only specified laryngeal feature in English. Therefore, they could just as well create a system with underlying |voice| and consequent assimilation to |voice|. Speakers who already have a system, on the other hand, can change it in favour of an active specification. The language learner then learns their system.

The locus of processes like lenition is a little more complicated to determine because of the different positions in which the process takes place. It can be argued that an acquirer will not create a process like final 'voicing' or a phonological system with obstruents that are marked for |voice| only, because both these situations are universally highly marked. For this to be true, markedness principles would have to be innate and there is evidence that they are. However, in inter-sonorant positions it can be argued that the acquirer cannot have any clue whatsoever as to the laryngeal specification of the obstruent. Even in |spread| languages, obstruents in this position can be passively voiced. Therefore, the child can just as well posit an underlying |voice| feature. Speakers with a developed system on the other hand know that |spread| is the only specified feature in the obstruent laryngeal phonology of English. Therefore, they can modify this feature and they will not introduce |voice|. The child then learns the lenited segments as unspecified when it constructs its grammar.

6.4 Avenues for future research and the final conclusion

It has been shown that this thesis provides strong support for the ideas, assumptions and predictions of LR. However, due to space and time limits it has only been possible to present a limited perspective on the issue. Only one |spread| language, English, is examined closely. Therefore, an obvious avenue for future research is an investigation of the histories of other alleged |spread| languages. Much work has been done on Present-Day German, as this thesis has shown. A fair bit of work has also

been done on its history. However, it would be interesting to look at other Germanic and also non-Germanic alleged |spread| languages. Their histories would certainly merit investigation as it has been shown that these can provide crucial evidence for current frameworks. It would be interesting to see whether they have undergone similar historical processes to English, as would be expected in LR. Historical assimilation facts and patterns of laryngeal neutralisation should be investigated. In this way it can be tested if the patterns of assimilation and neutralisation in various alleged |spread| languages add up. If this is the case, then this would provide very strong evidence that the position taken by LR is the correct one.

Another avenue for future research concerns |voice| languages. A lot of work has been done on these because their laryngeal distinction represents the standard viewpoint on laryngeal contrast. However, work done in the standard approach was not normally done to test the assumptions and predictions implied by this point of view. The approach has not often been questioned and has not been tested enough as a result. Therefore, it may be investigated whether alleged |voice| languages have all the characteristics that are expected from them, and none which they are supposed to lack under LR. Do they all have assimilation to |voice|? Can their neutralisation processes be described as true voicings and devoicings, and does this lead to any marked unnatural changes like final voicing?

Finally, as pointed out in 4.3.2, the apparent <x> lenition data in English remain a mystery. Clusters are not expected to undergo the same process as single consonants in inter-sonorant position because they can be argued to share a laryngeal specification and their laryngeal specifications are, therefore, not uniquely associated. Even if they would have two separate specifications, lenition would only be expected to apply to one of the consonants. The fact that lenition takes place and fails in exactly the expected contexts makes it unlikely that the forms were borrowed with their French sounds. However, the French situation would certainly merit closer investigation. If the forms turn out to have nothing to do with French phonology, then an explanation for their apparent lenition has to be given.

This thesis has contributed to an essential current debate amongst phonologists with regard to the cross-linguistic specification of laryngeal features in obstruents. It has shown that the ideas and expectations of LR are borne out in English, both Present-Day and Historical, providing support for the analysis of obstruent laryngeal contrasts in languages within this tradition. It is my hope that future research on the

matters presented here will keep emphasising the importance of theoretical historical phonological research as it has been shown that historical data provide valuable evidence for current theoretical frameworks and that those frameworks, in their turn, enlighten the analysis of historical data.

Bibliography

Aitchison, J. (1987) *Words in the Mind: An Introduction to the Mental Lexicon*. Oxford: Blackwell.

Anderson, J. M. (no date) 'http://www.fb10.uni-bremen.de/linguistik/dpng/dp basics/basics iframe.htm' (accessed 28/04/2009).

Anderson, J. M. & C. J. Ewen (1987) *Principles of Dependency Phonology*. Cambridge: Cambridge University Press.

Anderson, J. M. & C. Jones (1977) *Phonological Structure and the History of English*. Amsterdam: North Holland.

Archangeli, D. (1984) *Underspecification in Yawelmani Phonology and Morphology*. Cambridge, MA: MIT dissertation.

Archangeli, D. (1988) 'Aspects of underspecification theory'. *Phonology* 5, 183-107.

Archangeli, D. & D. Pulleyblank (1986) *The Content and Structure of Phonological Representations.* University of Arizona and University of Southern California: MS.

Armstrong, L. E. (1932) *The Phonetics of French*. London: G. Bell and Sons.

Atkins, B. T., A. Duval & R. C. Milne (1993) *Collins Robert French/English, English/French Dictionary* (1st edn. 1978). Glasgow: Harper Collins.

Avery, P. (1996) *The Representation of Voicing Contrasts*. Dissertation: University of Toronto.

Avery, P. & W. Idsardi (2001) 'Laryngeal dimensions, completion andenhancement'. In T. Alan Hall (ed) *Distinctive Feature Theory*. Berlin: de Gruyter, 41-70.

Avery, P. & K. Rice (1989) 'Segment structure and coronal underspecification'. *Phonology* 6, 179-200.

Bach, E. & R. T. Harms (1972) 'How do languages get crazy rules?'. In R. P. Stockwell, R. K. S. Macauley (eds) *Linguistic Change and Generative Theory*. Bloomington: Indiana University Press, 1-21.

Bailey, C. J. M. (1982) 'The garden path that historical linguistics went astray on'. *Language and Communication* 2, 151-160.

Bailey, C. J. M. (1996) *Essays on Time-Based Linguistic Analysis.* Oxford: Clarendon Press.

Battye, A. & I. Roberts (1995) *Clause Structure and Language Change.* Oxford: Oxford University Press.

Beckman, J. & C. Ringen (2005) 'German fricatives and the issue of laryngeal features'. Paper presented at the 14th Manchester Phonology Meeting. University of Manchester.

Beckman, J., M. Jessen & C. Ringen (2006) 'Phonetic variation andphonological theory: German Fricative Voicing'. Paper presented at the 14th Manchester Phonology Meeting. University of Manchester.

Bennet, W. H. (1955) 'The southern English development of Germanic initial [f, s, þ]'. *Language* 31, 367-371.

Biedrzycki, L. (1974) *Abriß der polnischen Phonetik.* Warsawa: Wiedza Powszechna.

Blakely, L. (1964) *Teach Yourself Old English*. London: The English University Press.

Blevins, J. (2004) *Evolutionary Phonology.* Cambridge: Cambridge University Press.

Booij, G. (1995) *The Phonology of Dutch*. Cambridge: Cambridge University Press.

Brockhaus, W. (1990) 'Colourful leagues: a government-based approach to final Devoicing'. *UCL Working Papers in Linguistics* 2, 270-297.

Brook G. L. (1955) *An Introduction to Old English*. Manchester: Manchester University Press.

Browman, C. P. & L. Goldstein (1989) 'Articulatory gestures as phonological units'. *Phonology* 6, 219-252.

Browman, C. P. & L. Goldstein (1992) 'Articulatory phonology: an overview'. *Phonetica* 49, 155-180.

Brown, J. C. (2004) 'Eliminating the segmental tier: evidence from speech errors'. *Journal of Psycholinguistic Research* 33, 97-101.

Brown, R. (1700) *The English-School Reformed.* London.

Brunner, K. (1948) *Abriß der mittelenglischen Grammatik*. Halle: Max Niemeyer Verlag.

Brunner, K. (1960) *Die englische Sprache.* Tübingen: Max Niemeyer Verlag.

Brunner, K. (1970) *An Outline of Middle English Grammar*. Oxford: Blackwell.

Brunot, F. & C. Bruneau (1933) *Grammaire Historique de la Langue Francaise.* Paris: Masson.

Buchanan, J. (1766) *An Essay Towards Establishing a Standard for an Elegant and Uniform Pronunciation of the English Language Throughout the British Dominions*. London.

Bülbring, K. D. (1902) *Altenglisches Elementarbuch.* Heidelberg: Carl Winter's Universitätsbuchhandlung.

Bullokar, W. (1580) *Book at Large, for the Amendment of Orthographie for English Speech*. London.

Bullokar, W. (1585) *Aesop's Fables and the Short Sentences of the Wise Cato.*

Bullokar, W. (1586) *Brief Grammar.*

Butler, C. (1633/34) *The English Grammar.*

Butler, C. (1634) *The Feminine Monarchie.*

Butler, C. (1636) *The Principles of Musik.*

Calabrese, A. & M. Halle (1998) 'Grimm's and Verner's Laws: a new perspective'. In J. Jasanoff, H. C. Melchert & L. Oliver (eds) *Mir Cirad: Studies in Honour of Calvert Watkers*. Innsbruck: Institut für Sprachwissenschaft, University of Innsbruck.

Campbell, A. (1959) *Old English Grammar*. Oxford: Clarendon Press.

Carr, P., J. Durand, & C. J. Ewen (2005) 'Introduction: the structure ofphonological representations'. In P. Carr, J. Durand & C. J. Ewen (eds)*Headhood, Elements, Specification and Contrastivity*: *Phonological Papers in Honour of John Anderson*. Amsterdam: John Benjamins.

Castleman, W. A. & R. L. Diehl (1994) 'Fundamental frequency effects on [voice] judgements in intervocalic stop consonants'. *Journal of the Acoustic Society of America* 95, 29-77.

Chomsky, N. (1965) *Aspects of the Theory of Syntax*. Cambridge, Mass: MIT press.

Chomsky, N. & M. Halle (1968) *The Sound Pattern of English*. New York: Harper and Row.

Churma, D. G. (1985) *Arguments from External Evidence in Phonology*. New York: Garland.

Clark Hall, J. R. (2004) *A Concise Anglo-Saxon Dictionary* (1st edn. 1894). Toronto: University of Toronto Press.

Classen, E. (1919) *Outlines of the History of the English Language.* London: Macmillan & Co.

Clements, G. N. (1988) 'Towards a substantive theory of feature specification'. *North Eastern Linguistic Society* 18, 79-93.

Clemoes, P. (ed) (1997) *Ælfric's Catholic Homilies*, *the first series text*. Oxford: Oxford University Press.

Cocker, E. (1696) *Cocker's Accomplished Schoolmaster.* London.

Cohn, A. (2002) 'Phonology'. In M. Aronoff & J. Rees-Miller (eds) *The Handbook of Linguistics*. Oxford: Blackwell.

Coles, E. (1674) *Schoolmaster.* London.

Coles, E. (1676) *English Dictionary.* London.

Coles, E. (1679) *English-Latin Dictionary*, 2nd edn. London.

Collins, B. & I. Mees (1996) *The Sounds of English and Dutch* (1st edn. 1981). The Hague: Leiden University Press.

Cook, A. S. (1903) *A First Book in Old English.* London: Ginn & Co.

Cooper, C. (1685) *Grammatica Linguæ Anglicana*. London.

Coote, E. (1596) *English Schoole-Master*.

Daines, S. (1640) *Orthoepia Anglicana*.

Dauzat, A., J. Dubois & H. Mitterand (1964) *Nouveau Dictionnaire Etymologique et Historique.* Paris: Libraire Larousse.

Davau, M., M. Cohen & M. Lallemand (1972) *Dictionnaire du Français vivant.* Paris: Bordas.

Davies, C. (1934) *English Pronunciation from the 15th to the 18th Centuries.* London: J. M. Dent & Sons.

Dobson, E. J. (1968) *English Pronunciation 1500-1700* (1st edn. 1957). Oxford: Oxford University Press.

Dresher, E. & H. van der Hulst (1999) 'Head-dependent asymmetries in phonology: complexity and visibility'. *Phonology* 25, 317-352.

Ekwall, E. (1956) *Historische neuenglische Laut- und Formenlehre.* Berlin: Walter de Gruyter & Co.

Elphinston, J. (1765) *The Principles of the English Language Digested: or English Grammar Reduced to Analogy.* London.

Emerson, O. F. (1896) *A Brief History of the English Language.* London: Macmillan & Co.

Ewert, A. (1963) *The French Language* (1st edn. 1933). London: Faber & FaberLtd.

Faiss, K. (1989) *Englische Sprachgeschichte.* Tübingen: Francke Verlag.

Fisiak, J. (1968) *A Short Grammar of Middle English.* Warsawa: Państowe Wydawnictwo Naukowe.

Fisiak, J. (1984) 'The voicing of initial fricatives in Middle English'. *Studia Anglica Posnaniensia* 17, 3-23.

Flom, G. T. (1930) *Introductory Old English Grammar and Reader.* Boston: D. C. Heath & Co.

Forby, R. (1830) *The Vocabulary of East Anglia; an Attempt to Record the Vulgar Tongue of the Twin Sister Countries, Norfolk and Suffolk, as it Existed in the Last 20 Years of the Eighteenth Century.* London.

Fox, G. & E. Hookes (1673) *Instructions for Right Spelling*.

Fry, D. P. (1860-1861) 'On the last syllable in the words *knowledge, revelach,* and *wedlock*'. *Transactions of the Philological Society* 1860- 1861, 75-80.

Fry, D. P. (1862-1863) 'On the last syllable in the words *knowledge* and *wedlock*. further remarks'. *Transactions of the Philological Society* 1862- 1863.

Fujimura, O. (1997) 'Typology: prototypes, item orderings and universals'. In B. Palek (ed) *Proceedings of LP '96*. Prague: Charles University Press.

Gil, A. (1619) *Logonomica Anglica* (2nd edn. 1621).

Godefroy, F. (1895) *Dictionnaire de l'Ancienne Langue Française et Tout Ses Dialects du IXe au XVe Siècle*. Paris : Libraire Émile Bouillon.

Greenwood/Greaves, P. *Grammatica Anglicana,* 1594.

Hall, T. (2001) 'Introduction: phonological representations and phonetic implementation of distinctive features'. In T. Hall (ed) *Distinctive Feature Theory.* Berlin: de Gruyter.

Halle, M. (1962) 'Phonology in generative grammar'. *Word* 18, 54-72.

Halle, M. & K. Stevens (1971) 'A note on laryngeal features'. *MIT Quarterly Progress Report* 101. 198-212.

Hammond, M. (1999) *The Phonology of English: a Prosodic Optimality- Theoretic Approach.* Oxford: Oxford University Press.

Harms, R. T. (1973) 'On some nonrules of English'. Bloomington: Indiana Linguistics Club. (Reprinted 1978 in A. Jazayeri, E. C. Polomé & W. Winter (eds) *Linguistic and literary Studies in Honour of Archibald Hill*, *Vol. 2*. The Hague: Mouton.)

Harris, J. (1994) *English Sound Structure.* Oxford: Blackwell.

Hart, J. (1569) *An Orthographie*.

Hart, J. (1570) *Methode or Comfortable Beginning for all Unlearned*.

Hinskens, F. & J. van de Weijer (2003) 'Patterns of segmental modification in consonant inventories: a cross-linguistic study'. *Linguistics* 41, 1041-1084.

Hodges, R. (1643) *A Special Help to Orthographie.*

Hodges, R. (1644) *The English Primrose.*

Hodges, R. (1649) *The Plainest Directions for the True Writing of English*.

Hogg, R. M. (1992) *A Grammar of Old English.* Oxford: Blackwell.

Honeybone, P. (2002) *Germanic Obstruent Lenition; Some Mutual Implications of Theoretical and Historical Phonology*. PhD, University of Newcastle.

Honeybone, P. (2004a) 'Laryngeal inheritance and borrowing: a new view of the development of the English fricative "voicing" contrast'. Paper presented at *the 13th International Conference on English Historical Linguistics, University of Vienna.*

Honeybone, P. (2004b) 'Voicing and non-voicing in English fricatives, past and Present'. Paper presented at the P-group, University of Edinburgh.

Honeybone, P. (2005a) 'Diachronic evidence in segmental phonology: the case of obstruent laryngeal specifications'. In M. van Oostendorp and J. van de Weijer (eds) *The Internal Organization of Phonological Segments*. Berlin: Mouton de Gruyter.

Honeybone, P. (2005b) 'Sharing makes us stronger: process inhibition and segmental structure'. In P. Carr, J. Durand & C. J. Ewen (eds) *Headhood, Elements, Specification and Contrastivity: Phonological Papers in Honour of John Anderson*. Amsterdam: John Benjamins.

Honeybone, P. (2007) 'When and where does language change? Syntax, phonology, acquisition and diachrony'. Paper presented at the *Cambridge UniversityLinguistics Society*.

Honeybone, P. (2008a) 'Phonological variation and language change'. Paper presented at the *Nordic Language Variation Network PhD Seminar*.

Honeybone, P. (2008b) 'Lenition, weakening and consonantal strength: tracing concepts through the history of phonology'. In J. Brandão de Carvalho, T.Scheer & P. Ségéral (eds) *Lenition and Fortition*. Berlin: Mouton de Gruyter, 9- 93.

Horn, W. & M. Lehnert (1954) *Laut und Leben*. Berlin: Deutscher Verlag der Wissenschaften.

Huloet, R. (1552) *ABCedarium Anglico-Latinum*.

Hunt, T. (1661) *Libellus Orthographicus: or the Diligent Schoolboy's Directory*.

Hyman, L. M. (1975) *Phonology: Theory and Analysis*. New York: Holt, Rinehart and Winston.

Iverson, G. K. (1997) 'Review of W. Brockhaus, Final Devoicing in the Phonology of German'. *American Journal of Germanic Linguistics & Literatures* 9 (2), 255-264.

Iverson, G. K. & S. C. Ahn (2004) 'English voicing in dimensional theory'. Presented at the *Conference on English Phonology*, Université de Toulouse, 2002.

Iverson, G. K. & J. C. Salmons (1995) 'Aspiration and laryngeal representation in Germanic'. *Phonology* 12. 369-396.

Iverson, G. K. & J. C. Salmons (1999) 'Glottal spreading bias in Germanic'. *Linguistische Berichte*, 178 135-151.

Iverson, G. K. & J. C. Salmons (2003a) 'Laryngeal enhancement in early Germanic'. *Phonology* 20, 43-74.

Iverson, G. K. & J. C. Salmons (2003b) 'Legacy specification in the laryngeal phonology of Dutch'. *Journal of Germanic Linguistics* 15.1, 1-26. Iverson, G. K. & J. C. Salmons (2007) 'Domains and directionality in the evolution of German final fortition'. *Phonology* 24, 121-145.

Iverson, G.K. & J.C. Salmons (2008) 'Germanic aspiration: phonetic enhancement and language contact'. *Sprachwissenschaft* (to appear). http://www.uwm.edu/~iverson/gmcaspsprachwissen.pdf, accessed 10/06/08.

Jakobson, R. (1949) 'On the identification of phonemic entities'. *Selected Writings I*. The Hague: Mouton.

Jansen, W. (2004) 'English obstruents and the typology of voicing assimilation'. In P. Carr & P. Honeybone (eds) *Issues in the Phonology of English*. Special double issue of *Language Sciences*.

Jespersen, O. (1891) *Dissertation*.

Jespersen, O. (1933) 'Voiced and voiceless fricatives in English'. In O. Jespersen (ed) *Linguistica: selected papers in English French and German.* Copenhagen: Levin & Munksgaard.

Jespersen, O. (1949) *A Modern English Grammar: Part I Sounds and Spelling.* Copenhagen: Einar Munksgaard.

Jessen, M. (1998) *Phonetic and Phonology of Tense and Lax Obstruents in German.* Amsterdam/Philadelphia: Benjamins.

Jessen, M. (2004) 'Instability in the production and perception of intervocalic closure voicing as a cue to *bdg* vs. *ptk* in German'. *Folia Linguistica* 38, 27- 42.

Jessen, M. & C. C. Ringen (2002) 'Laryngeal features in German'. *Phonology* 19, 189-218.

Johnson, S. (1755) *A Dictionary of the English Language*.

Jones, C. (1989) *A History of English Phonology*. London: Longman.

Jones, D (1917) *An English Pronouncing Dictionary*. London: Dent.

Jones, D. (1937) *An English Pronouncing Dictionary*. London: Dent.

Jones, D. (1956) *An Outline of English Phonetics.* Cambridge: W. Heffer & Sons Ltd.

Jonson, B. (1640-41) *English Grammar* (originally written before 1623).

Jordan, R. (1974) *Handbook of Middle English Grammar: Phonology* (Translated and revised by E. J. Crook). The Hague: Mouton

Kager, R., S. v.d. Feest, P. Fikkert, A. Kerkhof & T. S. Zamuner (forthcoming) 'Representations of [voice]: evidence from acquisition'. In J. v.d. Weijer & E. J. v.d. Torre (eds) *Voicing in Dutch*. Amsterdam & Philadelphia: Benjamins.

Kay, J., J. Lowenstamm & J. R. Vergnaud (1985) 'The internal structure of phonological elements: a theory of charm and government'. *Phonology Yearbook* 2, 305-328.

Keating, P. A. (1979) *A Phonetic Study of a Voicing Contrast in Polish*. Ph.D dissertation: Brown University.

Keating, P. A., M. J. Mikos & W. F. Ganong III (1981)'A cross-language study of range of voice onset time in the perception of initial stop voicing'. *Journal of the Acoustical Society of America* 70, 1261-1271.

Keating, P. A. (1984) 'Phonetic and phonological representation of stop consonant voicing' *Language* 60*,* 286- 319.

Kehrein, W. & C. Golston (2004) 'A prosodic theory of laryngeal contrasts'. *Phonology* 21, 325-357.

Kemenade, A. van (2007) 'Formal syntax and language change: developments and outlook' *Diachronica* 24, 155-169.

Ker, N. R. (1957) *Catalogue of Manuscripts Containing Anglo-Saxon.* Oxford: Clarendon Press.

Keyser, S. J. & K. N. Stevens (1994) 'Feature geometry and the vocal tract' *Phonology* 11, 207-236.

Kim, C. (1970) 'A theory of aspiration'. *Phonetica* 21, 107-116. (Reprinted 1988 in *Sojourns in Language I* (*Collected papers by Chin-Wu Kim*). Seoul: Tower Press, 73-82.

King, R. D. (1969) *Historical Linguistics and Generative Grammar*. New Jersey: Prentice-Hall.

Kingston, J. (1985) *The Phonetics and Phonology of the Timing of Oral and Glottal Events.* Ph.D Dissertation, University of California, Berkely.

Kingston, J. (1990) 'Articulatory binding'. In J. Kingston & M. Beckman (eds) *Papers in Laboratory Phonology I: Between the Grammar and Physics of Speech.* Cambridge: Cambridge University Press.

Kingston, J. & R. L. Diehl (1994) 'Phonetic knowledge'. *Linguistics* 70, 419- 454.

Kiparsky, P. (1982) 'Lexical morphonology and phonology'. In I. S. Yang (ed) *Linguistics in the Morning Calm*. Seoul: Hanshin.

Kiparsky, P. (2004) 'Universals constrain change; change results in typological generalisations'.
http://www.stanford.edu/~kiparsky/Papers/cornell.pdf.
Accessed 08/05/2008.

Kiparsky, P. (2006) 'The Amphichronic Program vs. Evolutionary Phonology'.
http://www.stanford.edu/~kiparsky/Papers/blevins.pdf.
Accessed: 08/05/2008.

Kloeke, W. van Lessen (1982) *Deutsche Phonologie und Morphologie: Merkmale und Markiertheit.* Tübingen: Niemeyer.

Knowles, J. (1835) *A Pronouncing and Explanatory Dictionary of the English Language, etc.* London.

Kohler, K. (1984) 'Phonetic explanation in phonology: the feature fortis/lenis'. *Phonetica* 41, 150-174.

Kohler, K. (1985) 'F0 in the perception of lenis and fortis plosives'. *Journal of the Acoustic Socirety of America* 78, 21-32.

Kökeritz, H. (1932) *The Phonology of the Suffolk Dialect.* Uppsala: A.-B. Lundequistska Boekhandeln.

Labov, W. (1978) 'On the use of the present to explain the past'. In P. Baldi & R. N. Werth (eds) *Readings in Historical Phonology*. University Park: Pennsylvania State University Press, 275-312.

Ladefoged, P. (1982) *A Course in Phonetics* (1st edn. 1975). New York: Harcourt Brace Jovanovich, inc.

Ladefoged, P. & I. Maddieson (1996) *The Sounds of the World's Languages*. Oxford: Blackwell.

Laneham, R. (1575) *A Letter.*

Lass, R. (1980) *On Explaining Language Change*. Cambridge: Cambridge University Press.

Lass, R. (1991-1993) 'Old English fricative voicing unvisited'. *Studia Anglica Posnaniensia* 35-37, 3-46.

Lass, R. (1992) 'Phonology and morphology'. In N. Blake (ed) *The Cambridge History of the English Language*, vol II. Cambridge: Cambridge UniversityPress.

Lass, R. (1999) 'Phonology and Morphology' in R. Lass (ed) *The Cambridge History of the English Language,* vol. III. Cambridge: Cambridge University Press.

Lehnert, M. (1955) *Altenglisches Elementarbuch: Einführung, Grammatik, Texte mit Übersetzung und Wörterbuch.* Berlin: W. de Gruyter.

Levins (1570) *Manipulus Vocabulorum*.

Lightfoot, D. (1979) *Principles of Diachronic Syntax*. Cambridge: Cambridge University Press.

Lightfoot, D. (1991) *How to Set Parameters: Arguments from Language Change*. Cambridge, Mass: MIT Press.

Lightfoot, D. (1999) *The Development of Language: Acquisition, Change and Evolution*. Oxforf: Blackwell.

Lisker, L. & A. Abramson (1964) 'A cross-linguistic study of voicing in initial stops: acoustical measurements'. *Word* 20, 384-422.

Lombardi, L. (1991) *Laryngeal Features and Laryngeal Neutralization.* Amherst: University of Massachusetts dissertation.

Lombardi, L. (1995a) 'Laryngeal features and privativity'. *Linguistic Review* 12, 35-59.

Lombardi, L. (1995b) 'Laryngeal neutralization and syllable wellformedness'. *Natural Language and Linguistic Theory* 13, 39-74.

Loudon, M. (2003) 'Child language acquisition and language change'. *Diachronica* 20, 167-183.

Lowe, S. (1770) *The Critical Spelling Book: an Introduction to Reading and Writing Readily and Correctly, etc*.

Lucas, P. J. (1991) 'Some aspects of the historical development of English consonant phonemes'. *Transactions of the Philological Society* 89, 37-64.

Luick, K. (1964) *Historische Grammatik der englischen Sprache* (1st edn. 1921). Stuttgart: Bernhard Tauchnitz.

Maddieson, I. (1984) *Patterns of Sounds*. Cambridge: Cambridge University Press.

MacMahon, M. K. C. (1998) 'Phonology'. In S. Romaine (ed) *The Cambridge History of the English Language.* Cambridge: Cambridge University Press.

McCarthy, J. J. & A. Prince (1993) 'Generalized alignment' *Yearbook of Morphology* 1993, 79–153.

McMahon, A. M. S. (1994) *Understanding Language Change*. Cambridge: Cambridge University Press.

McMahon, A. M. S. (2000) *Lexical Phonology and the History of English*. Cambridge: Cambridge University Press.

Merriott, T. (1660) *Grammatical Miscellanies*.

Mester, A. & J. Itô (1989) 'Feature predictability and underspecification: palatal prosody in Japanese mimetics'. *Language* 65, 258-293.

Milward, C. M. (1996) *A Biography of the English Language.* Fort Worth: Harcourt Brace College Publishers.

Mobius, B. (2004) 'Corpus-based investigations on the phonetics of consonant voicing'. *Folia Linguistica* 38, 5-25.

Mohanan, K. P. (1986) *The Theory of Lexical Phonology*. Dordrecht: Reidel.

Moore, S. (1919) *Historical Outlines of English Phonology and Middle English Grammar.* Michigan: Ann Arbor.

Moore, S. (1957) *Historical Outlines of English Sounds and Inflections.* Michigan: Ann Arbor.

Mossé, F. A. (1952) *Handbook of Middle English.* Baltimore: The John Hopkins Press.

Mulcaster, R. (1582) *The First Part of the Elementarie*.

Müller, C. (1915) *Die englische Lautentwicklung nach Lediart (1725) und andere Grammatikern.* Darmstadt: K. F. Bender.

Nares, R. (1784) *Elements of Orthoepy, Containing a Distinct View of the Whole Analogy of the English Language.* London

Newmeyer, F. (1986) *The Politics of Linguistic Change*. Chicago: The University of Chicago Press.

O'Connor, J. D. (1973) *Phonetics*. Harmondsworth: Penguin Books

Ohala, J. J. (1987) 'Explanation in phonology: Opinions and examples'. In W. U. Dressler, H. C. Luschützky, O. E. Pfeiffer & J. R. Rennison *Phonological 1984*. Cambridge: Cambridge University Press.

Oliphant, T. L. K. (1891) *The Old and Middle English.* London: Macmillan & Co.

Page, B. R. (1998) 'Verner's law'. *Beitrage zur Geschichte der deutschenSprache und Literatur* 120, 175-193.

Passy, P. (1913) *The sounds of the French language.* Oxford: Clarendon Press.

Perry, W. (1795) *A General Dictionary of the English Language, etc.* London.

Pery, T. (1539) *A Letter*.

Peyton, V. J. (1756) *Les Vrais Principes de la Langue Angloise, etc.* London.

Peyton, V. J. (1765) *Les Élémens de la Langue Angloise, etc.* London.

Piggott, G. N. (1992) 'Variability in feature dependency: the case of nasality'. *Natural Language and Linguistic Theory* 10, 33-77.

Pinsker, H. (1976) *Altenglische Studienbuch.* Düsseldorf: August Bagel Verlag.

Pope, M. K. (1973) *From Latin to Modern French with Especial Consideration of Anglo Norman* (1st edn. 1934). Manchester: Manchester University Press.

Postal, P. (1968) *Aspects of Phonological Theory*. New York: Harper & Row.
Price, G (1998) *The French Language: present and past*. London: Grant & Cutler Ltd.

Price, O. (1665) *The Vocal Organ*.

Prince, A. & P. Smolensky (1993) *Optimality Theory: Constraint Interaction in Generative Grammar*. Oxford: Blackwell.

Prins, A. A. (1974) *History of English Phonemes: from Indo-European to Present-day English.* Leiden: Leiden University Press.

Quirk, R. and C. L. Wrenn (1963) *An Old English Grammar* (1st edn. 1955). London: Methuen & Co.

Ramers, K. H. (1994) 'Verners Gesetz: Ein Beispiel für die Interdependenz segmentaler und prosodischer Faktoren des Lautwandels'. *Sprachwissenschaft* 19, 271-306.

Reiss, C. (2003) 'Language change without constraint reranking'. In D. E. Holt (ed) *Optimality Theory and Language Change*. Dordrecht: Kluwer.

Rice, K. (1993) ‘A re-examination of the feature [sonorant]: The status of ‘sonorant obstruents’’. *Language* 69, 308-344.

Rice, K. & P. Avery (1989) ‘On the interaction of sonorancy and voicing’. *Toronto Working Papers in Linguistics* 10, 65-82.

Richardson, E. (1677) *Anglo-Belgica. The English and Netherdutch Academy.*

Roach, P. (1983) *English phonetics and phonology.* Cambridge: Cambridge University Press.

Robertson, S. (1936) *The development of Modern English.* London: George G. Harrap & Co.

Robinson, R. (1617) *The Art of Pronunciation.*

Rubin, S. (1951) *The Phonology of the Middle English Dialect of Sussex.* Lund: C. W. K. Gleerup.

Rumpelt, H.B. (1869) *Das natürliche System der Sprachlaute und sein erhältnis zu den wichtigsten Cultursprachen, mit besonderer Rücksicht auf deutsche Grammatik und Ortographie*. Halle: Buchhandlung des Waisenhauses.

Salesbury, W. (1547) *Dictionary in Englyshe and Welshe*.

Sandved, A. O. (1985) *Introduction to Chaucerian English.* Cambridge: D. S. Brewer.

Schlauch, M. (1959) *The English Language in Modern Times.* Warsawa: Państwowe Wydawnictwo Naukowe.

Schröer, A. (1913) *Neuenglisches Aussprachewörterbuch.* Heidelberg.

Sievers, E. (1899) *An Old English Grammar.* Boston: Ginn & Co.

Sievers, E. (1901) *Grundzüge der Phonetik*. Leipzig: Breitkopf & Härtel.

Smart, B. H. (1836) *Walker Remodelled.* London.

Smith, J. (1996) *An Historical Study of English.* London & New York: Routledge.

Smith, T. (1568) *De Recta et Emendate Linguæ Anglicæ Scriptione*, *Dialogus*.

Spaargaren, M. (2008) 'Laryngeal specification in present-day and historical English'. *Newcastle Working Papers in Linguistics* 14, 112-128.

Spaargaren, M. & Honeybone, P. (2006) 'Asymmetries in assimilation in English through the ages: new directions for the laryngeal phonology of English obstruents'. Paper presented at the *Directions in English Language Studies* conference, University of Manchester.

Steriade, D. (1987) 'Redundant values'. *Chicago Linguistic Society* 23, 339-362.

Stormonth, J. (1871) *Etymological and Pronouncing Dictionary of the English Language*. Edinburgh, London.

Strang, B. M. H. (1970) *A History of English.* London: Methuen & Co.

Strong, N. (1676) *England's Perfect School-Master* (1st edn. 1675-6).

Sweet, H. (1874) *A History of English Sounds.* Oxford: Clarendon Press.

Sweet, H. (1877) *A Handbook of Phonetics*. Oxford: Clarendon Press.

Sweet, H. (1924) *A Short Historical English Grammar* (1st edn. 1892). Oxford: Clarendon Press.

Taylor, F. E. (1901) *The Folk-Speech of South Lancashire: A Glossary of Words*. Manchester.

Ton/mkis, T. (1612) *De Analogia Anglicani Sermonis*.

Tranel, B. (1987) *The Sounds of French.* Cambridge: Cambridge University Press.

Tsuchida, A., A. Cohn & M. Kumada (2000) 'Sonorant devoicing and thephonetic realization of [spread glottis] in English'. *Working Papers of the Cornell Phonetic Laboratory* 13.

Vachek, J. (1966) *The Linguistic School of Prague*. Bloomington, Ind.: Indiana University Press.

Vachek, J. (1972) 'On the interplay of external and internal factors in the development of language'. In M. Bertil (ed) *Readings in Modern Linguistics*. Stockholm: Mouton.

Vachek, J. (1976) *Selected Writings in English and General Linguistics*. Prague: Academia.

Vachek, J. (1983) 'Remarks on the dynamism of the system of language'. In J. Vachek (ed) *Praguiana: Some Basic and Less-Known Aspects of the Prague Linguistic School*. Prague: Academia.

Vaux, B. M. (1998) 'The laryngeal specifications of fricatives'. *Linguistic Inquiry* 29, 497-11.

Walker, J. (1791) *A Critical Pronouncing Dictionary and Expositor of the English Language.* London.

Wallis, J. (1653) *Grammatica Linguae Anglicanae.*

Wardale, E. E. (1949) *An Introduction to Middle English* (1st edn.1937). London: Routledge & Kegan Paul.

Wardale, E. E. (1960) *An Old English Grammar* (1st edn. 1922). London: Methuen & Co.

Weijer, J. van de (1996) *Segmental Structure and Complex Segments.* Thübingen: Niemeyer.

Weinreich, U., W. Labov & M. I. Herzog (1968) 'Empirical foundations for a theory of language change'. In W. P. Lehmann and Y. Malkiel (eds) *Directions for Historical Linguistics*. Austin: University of Texas Press.

Wetzels, W. L. & J. Mascaró (2001) 'The typology of voicing and devoicing' *Language* 77, 207-244.

Wiese, R. (1996) *The Phonology of German*. Oxford: Oxford University Press.

Wildén, B. (1949) *Studies in the Dorset Dialect.* Lund: C. W. K. Gleerup.

Wilkins, J. (1688) *Essays Towards a Real Character and a Philosophical Language*.

Willis, J. (1602) *The Art of Stenographie.* London.

Willis,T. (1651) *Vestibulum Linguæ Latinæ*.

Winteler, J. (1876) *Die Kerenzer Mundart in ihren Grundzügen dargestellt*. Leipzig: Winter.

Wright, J. & E. M. Wright (1984) *An Elementary Middle English Grammar* (1st edn. 1923). Oxford: Oxford University Press.

Wyld, H. C. (1927) *A Short History of English.* London: John Murray.

Wyld, H. C. (1932) *Universal Dictionary of the English Language*. London: G. Routledge.

Yang, C. (2000) 'Internal and external forces in language change' *Language Variation and Change* 12, 231-250.

Yip, M. (1995) 'Tone in East Asian languages'. In J.A. Goldsmith (ed) *The Handbook of Phonological Theory*. Oxford: Oxford University Press.

Young, E. (1667(?)) *The Complete English Scholar* (5th edn. 1682).

Zai, R. (1942) *The Phonology of the Morebattle Dialect.* Lucerne: Ræber & Co.

Appendix I: Results of the investigation of OE laryngeal assimilation data.

	Data	Forms checked	C11 results[83]	DOE results
1	acbeara (-o)'oak grove'	a**gb**e-	*C11	0
2	acbeam 'oak tree'	a**gb**e-	*C11	0
3	adrengton (<adrencan past pl.) 'submerge, immerse, drown'	adre/æ/i/yn**gd**o-	0	0
4	allmehtgum (<ælmihtig) 'almighty'	a/æ/ea/el(l)me/ih**dg**-,	0	0
5	ascberend <æscberend 'spear-bearer'	a/æs**gb**-	*C11	0
6	atbroden, atbredan, atbrede, ætbroden < ætbregdan 'to take away, carry'	a/æ**db**ro/e-	**abrodene abrodone**	**abrodene**
7	bacbord (bæcbord) 'left side of a ship'	ba/æ**gb**-	*C11	0
8	bedcleofum/-a/-an 'bedroom'	be**dg**leo/ea/i/y-	0	0
9	betstboren/-an 'eldest'	bets**db**-	0	0
10	bisco/e/eopdom/-e/-es 'episcopate, bishopric'	bisco/e/eo**bd**-	*C11	0
11	blostbære (<blostmbære) 'flowerbearing'	blos**db**-	*C11	0
12	campdom-e/-es 'military service, warfare'	c/ka/e/æ/m**bd**-	0	0
13	cēpte 'kept'(<*kōpida)	c/ke**bd**-	0	0
14	cildclaðas	c/ki/yl**dg**la-	0	0

[83] As explained in chapter 3, *C11 means that the neither the form of the word represented in the first column list nor its dictionary form could be found in the C11 database. For C11 mainly the original forms of words were looked for. If such a form occurred then all its variants also appeared. If the form did not appear in the data list alternative spellings were looked for with the forms in the second column of the list.

	‘swaddling clothes’			
15	cildcradole ‘cradle’	c/ki/yl**dg**r-	0	0
16	dincgum > dincge ‘fallow land’	di/yn**g(g)**-	*C11	0
17	drencte (<*dronkida) ‘drank’	dre/i/y/æn**gd**-	0	0
18	drihtguman (<gumdryhten) ‘lord of men’	dri/yh**dg**-	0	0
19	eastdæl ‘eastern quarter, eastern part’	eas**d(d)**æ-	0	0
20	eastdena ‘East Danes?’	eas**d(d)**e-	*C11	0
21	feorhbana ‘man-slayer, murderer’	feo/or**gb**-	*C11	0
22	feorhbealo/-u ‘life bale, deadly evil, violent death’	feo/or**gb**-	*C11	0
23	feorhbenn ‘deadly wound’	feo/or**gb**-	*C11	0
24	feorhberend ‘living’	feo/or**gb**-	*C11	0
25	fontbæð ‘baptismal water’	fo/an**db**-	0	0
26	fulluht/fulwihtbena ‘competitor’	fulw/uu/uih**db**e-, fulluh**db**e,	*C11	0
27	fulluht/ fulwihtbæð ‘baptismal bath’	fulw/uu/uih**db**æ-, fulluh**db**æ-,	0	0
28	gebyrdtid/e ‘birth-time, birthday’	geby/u/ir**d(d)**-	0	0
29	geedcucod/-e (<ge-edcwician/-cucian) ‘to quicken, revive’	gee**dg**u/w/uu	0	0
30	gemetgad (<gemetgian past ptc.)‘to temper, moderate, reflect over’	geme**dg**-	*C11	0
31	gemetgode (<gemetgian past sg.)	geme**dg**-	*C11	0
32	gemetgung	geme**dg**-	*C11	0

	‘measure, proportion’			
33	godcund/-a/-e/-en/ -an ‘religious, sacred, heaven sent’ service’	go**dg**u-	**Godgundra**	0
34	godcundlic/-um/-an/-ere/-es/-dre adj. ‘divine’ godcunlice adv. ‘divinely’	go**dg**u-	**godgundlice**	0
35	godcundnes-ne/-nyss/-nys/-nesse/-nisse/-nysse ‘divine nature, divinity, divine	go**dg**u-	0	0
36	grette ‘greeted’	gre**d(d)**-	0	**grede**
37	gristbitung (<gristbita) ‘gnashing of the teeth’	gris**db**-	0	0
38	handclaðe ‘towel’	han**dg**l-	0	0
39	handcræft ‘skill/power of the hand, handicraft’	ha/on**dg**r-	0	0
40	hatte <hatan <haitida (past pass.)	ha**d(d)**-	0	**hade**
41	heafodpanne/-an ‘skull’	heafo/a**db**-	*C11	0
42	heahdiacon ‘arch-deacon’	hea/e**gd**-	*C11	0
43	heahgnorung ‘great sighing, deep grief’	hea/e**g(g)**-	*C11	0
44	heahgræft ‘carved in bas-relief’	hea/e**g(g)**-	*C11	0
45	he/eahbisco(p) > ‘archbisshop, Jewish high priest’	hea/e**gb**-	*C11	0
46	heahbliss ‘exultation’	hea/e**gb**-	*C11	0
47	heahboda ‘arch angel’	hea/e**gb**-	*C11	0
48	heahburg ‘chief	hea/e**gb**-	*C11	0

	city, town on an eminence’			
49	hnutbeam/-es ‘nut tree’	(h)nu/y**db**-	*C11	0
50	hordcofan ‘treasure chamber’	hor**dg**o-	*C11	0
51	hundredpenegas (<hundredpenig) ‘contribution levied by the sheriff or lord of the hundred for the support of his office’	hundre**db**-	*C11	0
52	hundteontig/-e/-um/-tegum/-tiges) ‘hundred’	hun**d(d)**e-	*C11	0
53	hundtwelftig/-um/-on ‘hundred and twenty’	hun**d(d)**wel-	*C11	0
54	hundtweontige, ‘hundred and twenty’	hun**d(d)**weon-	*C11	0
55	hundtwentig/-e ‘hundred and twenty’	hun**d(d)**wen-	*C11	0
56	iecte ’increased’	ie/æ/e/i/ygd-	0	0
57	lencten ‘spring’ (< *langitin)	le/a/æn**gd**-	0	0
58	leohtbeamede ‘bright shining’ Lucifer’	leo/e/i/ioh**db**-	0	0
59	leohtberend ‘light-bearer,	leo/e/i/ioh**db**-	*C11	0
60	leorningcni/yht/-a/-as/-e/-es/-um,/-on	leorning**(g)**ni/y-	0	0
61	lindcroda ‘crash of shields, battle’	lin**dg**r-	*C11	0
62	lindplega(n) ‘shield-play, battle’	lin**db**l-	*C11	0
63	lustbærlic ‘pleasant’	lus**db**-	*C11	0
64	lustbærlice ‘with enjoyment, pleasantly’	lusdb-	*C11	0
65	lustbære	lus**db**-	0	0

	‘desirable, pleasure’ pleasure, pleasantly’			
66	lustbærness ‘enjoyment, pleasure, desire’	lus**db**-	*C11	0
67	lybcorn/a/-es ‘a medical seed, wild saffron(?)’	ly**bg**o-	*C11	0
68	mette ‘met’	me**d(d)**-	0	**mede**
69	met(t)rum ‘infirm’ (<med+trum)	me/i**d(d)**r-	*C11	0
70	midti (<mid ðy, mid ðam)	mi**d(d)**-	*C11	0
71	modcræft‘mental power’	mo**dg**r-	*C11	0
72	modcræftig ‘intelligent’	mo**dg**r-	*C11	0
73	modcwanig ‘sad at heart’	modgw-/uu-/u-	*C11	0
74	mucgwyrt/-e ‘artemisia, mugwort’	mu**g(g)**w-/uu-/u-	*C11	**mu/ygw/vy/ u/u/ert**
75	mugcwyrt ‘artemisia, mugwort’	mu**g(g)**w-/uu-/u-	*C11	**mu/ygw/vy/ u/u/ert**
76	nebcorn ‘pimple’	ne**b(b)**go-	*C11	0
77	papdome ‘popedom, papacy’	pa**bd**-	*C11	0
78	rædincgum <ræding ‘reading, lesson, narrative, consideration, consultation’	ræ/e/ea/din**g(g)**-	**Rædingum**	**rædingum**
79	sacgad/-t/-te past ptc. ‘to say, discuss, to signify’	sa**g(g)**-	**Saggað**	0
80	sandceosol ‘sand, gravel’	sandge-	*C11	0
81	sandcorn ‘grain of sand’	san**dg**o-	*C11	0
82	scencte ‘poured out’	sce/æn**gd**-	*C11	0
83	scriftboc ‘book of penances’	scri/yf**db**-	*C11	0

84	seldcuð/þ ‘sedom known, uncommon’	sel**dg**u-	*C11	0
85	sette ‘set’	se**d(d)**-	0	0
86	slæpte ‘slept’	slæ/e/ea/a**bd**-	0	0
87	steopbearn/-um ‘orphan’	steo/e/eu/ea**b(b)**-	*C11	0
88	sundcorn ‘saxifrage’	sun**dg**o-	*C11	0
89	tihtbysig ‘involved in accusation, of bad reputation’	ti/yh**db**-	*C11	0
90	tostengte (<tostencan) ‘to scatter, disperse’	toste/æn**gd**-	*C11	0
91	up(p)gang/-e, upgong ‘rising, going up, landing, origin’	**ub(b)g**a/o-	0	0
92	upgan ‘to go up, to make to go up’	U**b(b)**ga-	0	0
93	utgan/-an ‘to go out’	u**dg**a-/o-/eo-	0	0
94	utga/ong/-e/-ende/-endum ‘departure, latter part’	u**dg**a-/o-/eo-	0	0
95	weorcdæd ‘action, operation’	w/uu/u/eo/o/y/oe/ur**gd**-,	*C11	0
96	weorcdagum ‘work-day’	w/uu/u/eo/o/y/oe/ur**gd**-,	*C11	0
97	westdæl ‘west quarter, western part’	w/uu/ues**d(d)**æ-	0	0
98	westdenum ‘West-Danes?’	w/uu/ues**d(d)**e-	*C11	0
100	widcuð ‘widely known, very celebrated’	w/uu/ui**dg**u-	0	0
101	witga/-an/-ana/-um (<witega) ‘wise man, prophet’	w/uu/ui/y**dg**-	0	0
102	witga/ode (<wit(e)gian) ‘to prophecy, predict	w/uu/ui/y**dg**-	*C11	0

	past 1 sg’			
103	wohbogen ‘bent, crooked’	w/uu/uo**gb**o-	*C11	0
104	wohdæd ‘wrong deed, sin, temptation, seduction’	w/uu/uo**gd**-	0	0
105	wohdom ‘unjust judgement’	w/uu/uo**gd**-	0	0
106	wohgod ‘false god, idol’	w/uu/uo**gd**-	*C11	0
107	wordcwide/-as ‘speech, testament, thought’	w/uu/uor**dg**-	*C11	0
108	woroldcampe ‘secular warfare’	w/uu/uo/e/eo/iar(o/u/e)l**d g**-	0	0
109	woroldcundra/-cunde ‘wordly, secular’	w/uu/uo/e/eo/iar(o/u/e)l**d g**-	0	0
110	woruldcara/-um (<woruld-cearu) ‘wordly care’	w/uu/uo/e/eo/iar(o/u/e)l**d g**-	0	0
111	wra/æcmacga/-s/-n/-um ‘exile, outcast, miserable man’	w/uu/ura/æcma**g(g)**-	*C11	0
112	wrohtbora ‘mischief-maker’	w/uu/uroh**db-**	*C11	0
113	wyrtbræð ‘fragrant spice, fragrance’	w/uu/uyr**db**r-	0	0
114	wyrtdrenc/-e/-as/-um ‘herbal drink, medicine’	w/uu/uy/e/ir**d(d)**r-	*C11	0
115	wyscte ‘wished’	w/uu/uy/is**gd**-	*C11	0
116	ymbcly/uppa/ed/-ende/ing (<ymbclyppan) ‘to embrace, clasp, embracing’	y/u/em**bg**ly/u-	*C11	0
117	ymbtrym(-don/-ed) (<ymbtrymbian/-trumman) ‘to surround, set round, fortify, protect’	y/u/em**bd**ry/u-	0	0
118	ymbtrymming	y/u/em**bd**ry/u-	*C11	0

	‘surrounding’			
119	ymbtynan ‘to hedge round’	y/u/em**bd**y/u-	*C11	0
120	ypte ‘opened’	y/i/ie/u**bd**-	*C11	0