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Patrick Maiwald

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A Quantitative Study

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Abbreviations and symbols

See the list of references for full citations.

AIC	Akaike information criterion
C	any consonant
comp.	compiled
df	degree(s) of freedom
DOEC	Dictionary of Old English Corpus (diPaolo Healey et al. 2009)
eME	early Middle English
EModE	Early Modern English
EML	East Midlands
eOE	early Old English
fn.	footnote
GLM	generalized linear model
GVIF	generalized variance inflation factor
IPA	International Phonetic Alphabet
Ke	Kentish
LAEME	Linguistic Atlas of Early Middle English, 1150-1325 (Laing 2013-)
LAEME CTT	LAEME Corpus of Tagged Texts (Laing 2013-)
LALME	Linguistic Atlas of Late Mediaeval English (Benskin et al. 2013)
LM	linear model
lME	late Middle English
lOE	late Old English
lWS	late West Saxon (Old English)
ME	Middle English
ModE	Modern English
n.	note
n.d.	no date
n.no.	no series number
Nhb	Northumbrian
No	Northern
n.s.	not significant
NWML	Northwest Midlands
OE	Old English
OED	Oxford English Dictionary

OF	Old French
ON	Old Norse
p.c.	personal communication
PDE	Present-Day English
PGmc	Proto-Germanic
PIE	Proto-Indo-European
PPCME2	Penn-Helsinki Parsed Corpus of Middle English (Kroch and Taylor 2000)
preOE	prehistoric Old English
regex(es)	regular expression(s)
RP	Received Pronunciation
SE	Southeast
So	Southern
SW	Southwest
trans.	translated
V	any vowel
VIF	variance inflation factor
WML	West Midlands
WS	West Saxon
YCOE	York-Toronto-Helsinki Parsed Corpus of Old English Prose (Taylor et al. 2003)

∅	deletion, or ‘zero’
.	in IPA transcriptions: syllable boundary
$	in phonological rules: syllable boundary
.	as a rating of statistical significance: ‘marginally significant’ ($0.05 < p < 0.1$)
*	as a rating of statistical significance: ‘significant’ ($p < 0.05$)
**	as a rating of statistical significance: ‘very significant’ ($p < 0.01$)
***	as a rating of statistical significance: ‘highly significant’ ($p < 0.001$)

1. Introduction

1.1 The topic

This study aims to provide a fine-grained quantitative analysis of the factors influencing a certain type of sound change that occurred in medieval English,[1] namely the vocalization of postvocalic semivowels.[2] Simply put, 'the vocalization of postvocalic semivowels' covers the change of the palatal semivowel [j] to the high front vowel [i] (see example 1) and the change of the labial-velar semivowel [w] to the high back vowel [u][3] (example 2) in postvocalic positions. The changes can be illustrated by the medieval English forms given below (cf. Kemmler and Rieker 2012: 14-15; Iglesias-Rábade 2003: 239ff.):

(1) OE *dæȝ* [dæj] > ME *dai* [dai] 'day'

(2) OE *flopan* [floːwɑn] > ME *flowen* [flouen] 'flow'

In many traditional English language histories and historical grammars, the vocalization of postvocalic semivowels is usually treated under the heading 'new diphthongs in Middle English' (e.g. Fulk 2012: 39-42; Baugh and Cable 2013: 153),[4] and it is true that the changes substantively contributed to the emergence of new vowel phonemes.[5] Another important phonological result of medieval

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1 The term 'medieval English' should be taken as an umbrella term covering all varieties usually classified as either Old English (OE) or Middle English (ME).

2 There is no agreement about the spelling of the term *semivowel* in scholarly literature – one currently finds <semivowel> (Giegerich 1992; Roca and Johnson 1999; Carr 2008; Hock and Joseph 2009; Roach 2009), <semi-vowel> (Ladefoged and Maddieson 1996; Anderson 2001; Gut 2009), and <semi vowel> (O'Grady 2013). We will prefer the simplest spelling <semivowel>. Cf. fn. 13 for more on the alternative, yet not wholly synonymous terms *approximant* and *glide*.

3 As will be explained in section 2.1.4, square brackets [ ] will be used in the present study to mark (postulated) sound values, regardless of the phonemic status of the sound in question. This means that the square brackets [ ] should thus not be taken to imply close phonetic transcriptions in the sense of precise sound realizations (about which there is no general agreement anyway – Minkova 2014a: 20); they rather should be read as representing sound values which may or may not have been phonemic at any time.

4 Lutz (1991: 16; 157) also notices and criticizes this fact. – For more sources and more about problems with the teleological treatment of the change in traditional grammars see section 2.3.3.3.

5 The most important other factor contributing to the 'new diphthongs' was [x]-vocalization, which occurred in words such as OE *dohtor* [doxtor] > ME *dou(ȝ)ter* [dɔu(x)ter] 'daughter' (*Oxford English Dictionary* [henceforth OED], s.v. "daugh-

semivowel vocalization concerns the syllabic structure of the forms involved: E.g. the nominative singular form of *day* went from ending in a consonant to ending in a vowel (cf. example 1 above).[6]

The present study will be focused on the temporal and spatial details of the sound change as well as the language-internal factors that influenced it. A lot has been written about the sound change in question from a qualitative point of view, although no consensus has ever been reached about which are the most important influencing factors. This is true even for the relatively straightforward extra-linguistic factors of time and space, as we will see in the following.

Concerning the dimension of time, it can be said that different accounts have claimed the vocalization of OE semivowels to have taken place within the OE period (Brunner 1965), within the ME period (Wright and Wright 1928; Hogg 1992), or to have spanned both OE and ME (Luick 1921-1940; Jordan 1968; Fulk 2012). The relative scarcity of linguistic evidence from the first few centuries after the Norman Conquest of 1066 CE definitely poses a practical problem for any investigation of the temporal circumstances of the sound change. This problem will be addressed in greater detail in section 2.2.1.

The spatial circumstances surrounding the sound changes in question are similarly hazy, which is also a consequence of the relative scarcity of data. Various grammars and histories (e.g. Luick 1921: 228) suggest that the vocalization of [j] and [w] probably took place at very different rates in different regions of England. Nicole Studer-Joho's (2014) recent study has sufficiently dealt with the topic of spatial diffusion in early Middle English (eME); the present study will in-

ter, *n.*"; cf. the overviews in Fulk 2012: 39-42 and Kemmler and Rieker 2012: 14-16). Borrowings from Old Norse (ON), Old French (OF), and Middle Dutch into ME also did their part to reinforce the phonemic status of some of the 'new diphthongs' (Fulk 2012: 42-44; Minkova 2014a: 209; cf. Nielsen 1983, Kolb 1989, and Dance 2012: 1729 on diphthongs such as [ai] and [au] in loanwords from ON).

6 The effects of the sound change in question are still apparent in Present-Day English (PDE), which can be illustrated using the interjections *yay* /jeɪ/ and *wow* /waʊ/, whose written forms begin and end with the same respective letters, but whose spoken forms do not begin and end with the same respective sounds (cf. OED, s.v. "yay, *int.*"; "wow, *int.*"): Both words consist of an open syllable that ends in a diphthong, even though their spelling might suggest otherwise. While these two words have only been in general use for half a century, and for almost a century, respectively (cf. OED, s.v. "yay, *int.*"; "wow, *int.*"), English spelling habits have been in place for a relatively long time, so that the discrepancy between the spelling and the pronunciation of these two PDE words can be said ultimately to hark back to the change in medieval English that is to be the focus of the present study.

clude the spatial dimension as one of many factors potentially influencing the change.

The times, geographical regions, and speeds at which the changes took place were additionally influenced by different phonotactic surroundings, e.g. by whether the semivowel in question constituted a syllable coda (as in example 1 above: [dæj]) or the onset of a following syllable in OE (as in example 2 above: [floː.wɑn] [7]). Different language histories and historical grammars have suggested the influence of a number of such language-internal factors on the vocalization of semivowels; this will be the focus of Chapter 2.4. It is the main aim of the present study to unravel and quantify the influence of such conditioning factors as far as possible.

The sound change is further complicated by the fact that a third OE sound, viz. the voiced velar fricative [8] [ɣ], also took part in it, as is exemplified by the following cases (cf. Kemmler and Rieker 2012: 15; Iglesias-Rábade 2003: 242-245):

(3) OE *niȝon* [niɣon] > late Old English (lOE) / early ME (eME) *niȝen* [niːjen] > ME *nin* [niːn] ‘nine’

(4) OE *boȝa* [boɣɑ] > ME *bowe* [bɔu(e)] ‘bow’

As is to be seen in examples (3) and (4), in some phonotactic environments the voiced velar fricative of OE shifted to [j] around the early ME period and was subsequently vocalized to [i], and in other environments it underwent the same development as [w] and joined the preceding nucleus in the form of an [u] sound. All instances of the lOE voiced velar fricative were thus vocalized, and the results of this [ɣ]-vocalization as exemplified in (3) and (4) are indistinguishable from the results of the vocalization of the semivowels given in (1) and (2). Another reason to include the lOE fricative [ɣ] in the analysis is that there were cases of allomorphic variation between [j] and [ɣ] within lexemes such as *dæȝ* [dæj] ‘day’ ~ *daȝas* [dɑɣɑs] ‘days’ (cf. Hogg 1992: 274), so that the treatment of lOE [j] would seem incomplete without a treatment of [ɣ]. [9]

---

7 The period [.] stands for a syllable boundary in transcriptions. The example of *flopan* is a fairly unambiguous case; see section 2.3.3.2 for more on syllabification and problems such as the possibility of ambisyllabicity in medieval English.

8 See section 2.4.3.1 for a short introduction to this sound, which does not occur in PDE.

9 Indeed, the word *day* continued to show forms such as *dawes* ‘days’ in the ME period (Fulk 2012: 49), so that the lOE voiced velar fricative can be said to have joined the development of both semivowels in the eME forms of this lexeme; all such irregularities were overruled by the force of analogy over time, and the more regular paradigms (along the lines of *day* – *days*) are the ones that have survived into ModE.

This study is based on some of the best-designed electronic corpora of historical English currently available (cf. Traxel 2012: 1133ff.). The most important among these, and indeed the one on which the empirical analysis in chapter 4 is based, is the LAEME Corpus of Tagged Texts (henceforth LAEME CTT), which was published as part of version 3.2 of the *Linguistic Atlas of Early Middle English* (LAEME; Laing 2013-; see section 3.1.2).

1.2 The approach

The semivowel vocalization that occurred in eME, just like any other sound change that pre-dates the invention of audio recording, cannot be observed directly but only via the medium of written historical English (e.g. cf. Minkova 2015b: 72f.; Lass 2015: 100f.). This raises important questions about the methodological approach of the present undertaking; for this reason the actual analysis (Chapter 4) needs to be prefaced by relatively extensive theoretical and methodological expositions (Chapters 2 and 3).

The diagram in Figure 1-1 illustrates the most important methodological and theoretical circumstances that the present study is confronted with, summing up the ‘flow of information’, as it were: In order to draw conclusions about possible realizations of certain sounds in medieval English (symbolized by the first box from the top, “Pronunciations”), we will have to scrutinize spellings (the second box). ‘Step’ (a) is of a rather inferential, or theory-driven, nature and relies on modern assumptions about the phonology of past language stages.[10] The analysis itself is therefore an analysis of spellings, and it begins with step (b): The spellings on which we are to base our conclusions first need to be retrieved from the corpus data (the third box). ‘Step’ (c), again, does not pertain to our methodology, but to a preliminary consideration: The available text corpora of medieval English are of varying quality and usability for our purposes, due to their different compilation procedures. Some corpora are based on modern text editions (the fourth box) and are thus one step further removed from the original manuscripts (‘step’ (d); see section 3.1.2); others are based directly on medieval manuscripts. Many of the presently available corpora of historical English fall into the first category, which makes them barely usable for the present undertaking. The LAEME CTT is a notable exception: All texts in this corpus were closely tran-

[10] Cf. Russ (1986) for a brief overview of the methods of reconstructing historical pronunciations.

scribed from original manuscripts (cf. Laing and Lass 2006: 426), and therefore this corpus suits our needs perfectly.

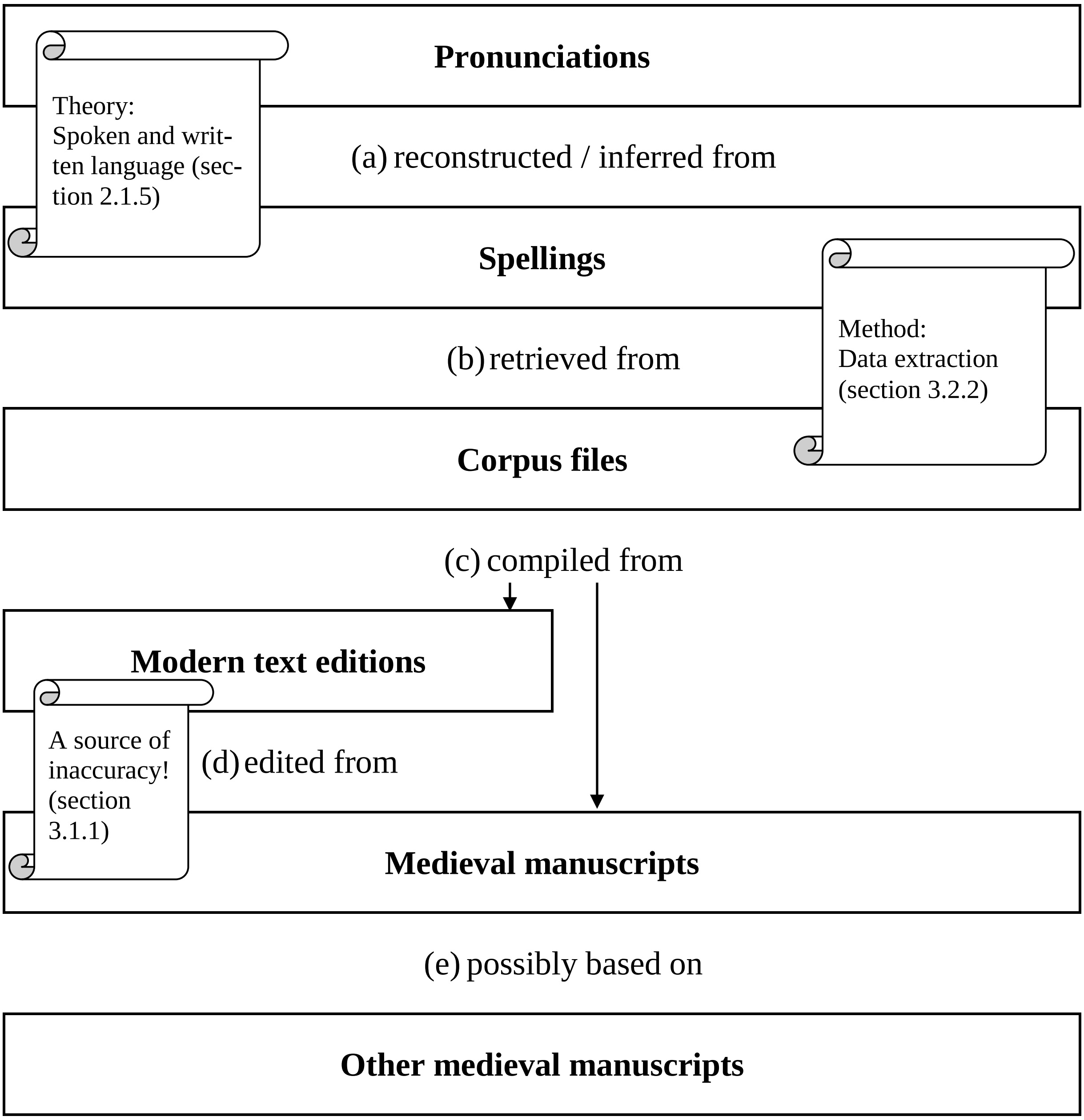

Figure 1-1: Methodological diagram

'Step' (e) is included in the diagram to symbolize the fact that it is very hard to pinpoint medieval texts in terms of their dating: For one thing, very little is generally known about the writers of the texts. Even in the fortunate case that a certain writer, or 'hand', can be located to a certain monastery and dated to a time frame of, say, twenty-five years, this still tells us nothing about the writer's age or place of birth. In addition, many texts are copies or re-workings of other texts (cf. Hough 2012: 41), so that any spellings we encounter in the texts might theoretically have been copied from a source written in another time and at another place.[11] ‘Step’ (e) is thus little more than a given fact about the surviving records of medieval English, although the LAEME CTT does try to work around this problem as far as possible by including only texts that are localizable and datable with some certainty (cf. Laing 1991; Laing and Lass 2006: 422, n.d.a, §1.5.3; see section 3.1.2.5).

1.3 The structure of this study

As already mentioned, Chapters 2 (“Theoretical Foundations”) and 3 (“Data and Methods”) will be rather comprehensive. Section 2.1 will begin with some general remarks on the complex relationship between phonology and diachronic linguistics. Generally speaking, studies of medieval pronunciations need to rely on indirect evidence (cf. Kytö and Pahta 2012: 125; Fuhrop and Peters 2013: 183).[12] The study of Old and early Middle English phonology is therefore typically undertaken on the basis of spellings, combined with general knowledge about typical sound changes (cf. Campbell 2013: 397ff.). In his chapter on Middle English phonology Roger Lass (1992: 27) characterizes a person studying and theorizing about older pronunciations as moving within the realm of “well-grounded belief[s]” rather than established “facts”; the ‘well-groundedness’ of these “beliefs” has a lot to do with the confidence with which pronunciations can be mapped onto certain spellings.

Section 2.2 will therefore move on to a description of the language material under scrutiny, viz. texts from the eME sub-period. This section will feature an overview of the surviving evidence of eME (2.2.1), after which the questions of

11 However, see section 3.1.1.2 on why this is generally not the case.

12 *Direct* evidence consists of written accounts of pronunciation (cf. Russ 1986: 164-167), but these do not exist for medieval English; the earliest systematic contemporary descriptions of English pronunciation were written in the sixteenth century, i.e. in the Early Modern English (EModE) period (Smith 2007: 39ff.; Lange 2012: 1002; Beal 2012: 63ff.; Beal and Sen 2014: 33). Metalinguistic discussion from the ME period does exist, but only in the form of what can be called “passing remarks” (Machan 1994: 148) within Latin grammars, and they cannot be considered systematic in any way. Thomson (1984) provides an overview. – The accounts of pronunciation from the EModE period must also be taken with caution due to the rather prescriptive nature of their respective writers’ agendas (cf. Nevalainen 2006a: 13-16). Machan (1994: 215n.) writes that “it might be argued that English was not analyzed as a grammatically distinctive language until the twentieth century”, and we can take this to include systematic analyses of pronunciation.

sound-to-spelling mappings and of the existence of a standard orthography will be dealt with concerning the situation in eME (2.2.2). It will be argued that in regards to the mapping of spoken sounds to written symbols, the early Middle English period is an extreme case: In his *History of English* Stephan Gramley (2012: 66) fittingly refers to eME as "[t]he non-standard period", and the absence of a supra-regional standard orthography in the eME sub-period (also cf. Freeborn 1998: 446; Schlüter 2009: 199-200) is the reason why we can posit a relatively good, though certainly not perfect, general 'phonographic' correspondence (cf. Haas 1970: 7) between spellings and the speech sounds they represented in eME. The LAEME CTT (Laing 2013-) will be used as a main tool of investigation since it covers the eME period and, moreover, it is unique in that it contains unedited original manuscript spellings (see section 3.1).

Section 2.3 will be concerned with the linguistic phenomenon of vocalization itself, which comprises phonetic as well as phonological aspects: Phonetically, the change can be assumed to involve or require a type of lenition (weakening) and an increase in sonority (sonorization). From the phonological perspective, the speech sounds referred to as semivowels are generally classified as consonants and not as vowels, despite their most usual name. [13] Thus, the vocalization of semivowels entails that an important functional boundary is crossed: Formerly consonantal segments are reanalyzed as vowels. This phonological aspect of what could be called consonant-to-vowel 'conversion' will be treated under the heading of 'nuclearization'.

Section 2.4 will summarize some generally undisputed facts about the sound changes in question and then go on to highlight some contradictions in different standard accounts of the phenomenon. The more traditional accounts (e.g. Luick 1921/1940) favor the idea of semivowel vocalization taking place or beginning early, i.e. within OE, whereas others (e.g. Hogg 1992) postulate the change to have taken place in eME. [14] This section will conclude in lists of potentially relevant factors influencing medieval semivowel vocalization.

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13 The term *semivowel* is itself phonological. In phonetics, the term *approximant* is preferred (Lodge 2009a: 37). *Glide* is a term sometimes used synonymously with *semivowel*. Although some phonologists continue to use it in this sense (e.g. Spencer 1996: 14; Szigetvári 2010: 73; Yule 2010: 32; Minkova 2014a: 25), the term is imprecise when applied to semivowels (Ladefoged and Maddieson 1996: 322). The main problem with the term *glide* is that it also denotes other phenomena within phonetics and phonology (Carr 2008: 63-64, s.v. "glide").

14 Many treatments (e.g. Burnley 1992: 63; Brinton and Arnovick 2011: 270-271) do not concern themselves with diachronic details, but implicitly place the change into eME.

Section 3.1 will be devoted to the description of the corpus data on which the analysis is based. A close look at some corpus files will point out the problems of edition-based corpora and, by contrast, the suitability of the LAEME CTT to the task. The remainder of the section will deal with problems of the dating and the localization of the LAEME texts. Section 3.2 will then describe the methodology already outlined above (cf. Figure 1-1) in greater detail, focusing on the formalizing and coding of the variables (3.2.1), and the process of actual data extraction (3.2.2).

Section 4.1 will be devoted to testing the respective influence of potentially relevant factors (which will now be referred to as 'predictor variables') earlier extracted from secondary literature (section 2.4) on the spellings retrieved from the corpus. In this section 'time' and 'space' variables (4.1.2 and 4.1.3) as well as a number linguistic variables (4.1.4 through 4.1.10) will be described and analyzed separately. In section 4.2, their mutual relationships and their combined effects will then be evaluated in a principled way: Individual predictors will be added stepwise to regression models (cf. Field, Miles and Field 2012: 246ff.; Hatzinger et al. 2014: 424ff.) which quantify their relative influence on 'vocalic spelling' proportions in the retrieved word forms. The aim of this section is to arrive at statistical models which adequately describe which linguistic and extra-linguistic factors had a significant influence on the process of semivowel vocalization as reflected in the eME written records.

2. Theoretical foundations

2.1 Problems relating to corpus-based historical phonology

2.1.1 Synchronic vs. diachronic linguistics

Phonology is the oldest branch of linguistics (Murray 2006a: 2433), which is one reason why any person setting out to study historical phonology in the twenty-first century is faced with a number of different, partially conflicting research traditions (cf. Hale 2012: 235ff.). This section will summarize the main problems for historical phonology that arise from different research traditions.

On the one hand, the general interest in historical and diachronic linguistics has risen in recent decades due to the publication of large electronic corpora of historical forms of English (e.g. Rissanen et al. 1991, Kroch and Taylor 2000, Taylor et al. 2003, Laing 2013-; overviews of historical and diachronic corpora are to be found in Mukherjee 2009: 50-52 and Traxel 2012; also cf. CoRD Team 2011). Similarly to the revolutionary effects that the introduction of large corpora of Present-Day English has had on lexicographical practice (cf. Rundell and Stock 1992), the availability of large historical corpora since the early 1990s has enabled new kinds of diachronic-linguistic research: Kytö and Pahta (2012: 123) even go so far as to speak of “a true revolution in the way researchers have started to look into mechanisms involved in language change and factors possibly accounting for it”. However, while these new methods are in a sense revolutionary, studies of the history of linguistics show that “periods of increased empiricism have coincided with a reinforced interest in problems of language change” (Cherubim 1977: 74n.)[15] in the past. Thus we might conjecture that the renewed interest in historical and diachronic linguistics has come as a natural effect of the emergence of data-driven corpus linguistics within the half-century that has passed since the publication of the first English language corpora in the mid-1960s (cf. Jucker and Taavitsainen 2013: 8).

‘Sound change’ is itself a subject matter which has a long research history; no matter how revolutionary the research methods, any study of language change must to some extent hark back to the paradigms and theories developed by philologists and historical linguists in the late nineteenth century, e.g. to the *Lautgesetze* (‘sound laws’) which were first formulated by members of the school of

[15] My translation. Original: “[…] fallen Phasen stärkerer Empirisierung mit einem verstärkten Interesse an Problemen des Sprachwandels zusammen”.

Neogrammarians (McMahon 1994: 17ff.; also cf. Hale 2012: 235ff.). Like previous generations of scholars, the Neogrammarians focused very much on language change; as David Fertig (2013: 3) puts it, "'linguistics' essentially meant 'historical linguistics'" to them (also cf. Graffi 2013: 471).[16]

On the other hand, more than a century of dominantly synchrony-oriented linguistics has passed since the heyday of the Neogrammarians (cf. Murray 2006a: 2431ff.). Ferdinand de Saussure, Leonard Bloomfield and others famously demanded that primacy of place be given to synchronic rather than diachronic language description, to the effect that modern linguistics has since been generally "equated" with the structuralist approach (Murray 2006a: 2432; also cf. Erfurt 1996: 1399; Graffi 2013: 471). Many fundamental concepts and paradigms central to modern linguistics were conceived within the framework of describing particular language varieties as they are taken, at least in theory, as essentially changeless systems.[17] The influence of such system-linguistic concepts on modern historical phonology up to the present day is often underestimated (Salmons and Honeybone 2015: 32-41). While de Saussure can be said to have stressed the fact that "[s]ynchronic facts cannot be accounted for in diachronic terms" (Graffi 2013: 471-472), present-day diachronic linguistics is confronted with the opposite situation, in which diachronic facts should not, but have to, be accounted for in synchronic terms (see section 2.1.4). As Robert W. Murray (2006a: 2432) puts it, modern diachronic linguistics has had to "come to grips with […] main stream [*sic*] synchronic theories that were […] developed in ways that [seem] incompatible with the facts of language change", and this is especially true for diachronic phonology. Even something as basic as the concept of the phoneme can be seen as inherently problematic for diachronic approaches. Still, such concepts have to be referred to in any serious diachronic-linguistic study. In the following, the kind of tension that can result from the use of originally synchronic-linguistic

[16] Fertig (2013: 3) adds, however, that "this did not mean that the scholars of the period were only interested in the issues that we associate today with the historical subfield" (also cf. Murray 2006a: 2431).

[17] The conflict here described was commented on by both 'traditional' philologists and 'modern' linguists over the course of the twentieth century: Cf. Coseriu (1974: 11ff.) and Bausch (1977: 118ff.) for theoretical evaluations of the tension between synchronic language descriptions and descriptions of language change phenomena; also cf. Mitchell's (1990: 281ff.) rebuttal of modern, theory-driven linguistics from the philologist's point of view. In the preface to his work on the phonology of OE, Hogg (1992: vii) points out that he does not "always find the debate helpful: data, it is true, cannot be validated except in a theoretical context; but nor can a theory be validated except by the examination of data".

concepts in diachronic studies will be illustrated using the example of the phoneme.

Modern phonology, which used to be known as ‘phonemics’,[18] is connected with the view of language as an abstract, changeless system that predominated in the first half of the twentieth century (cf. Bauer 2007: 73). The term *phoneme* (French *phonème*) was coined in the 1860s by the French philologist Antoni Dufriche-Desgenettes (cf. Kohrt 1985: 59ff.; Mugdan 2011, 2014; van der Hulst 2013: 173) and it was soon established as a designation for meaning-distinguishing (and hence “semantic”, cf. Jones 1967: 13) functional units as opposed to the formal-phonetic term *phone*, although both terms did not show up in printed works until the early twentieth century (Jones 1967: vi; 254-269). Both the term *phoneme* and the concept that it stands for are thus associated with modern (i.e. early twentieth-century) phonology and with the contemporary ‘synchronic turn’ in linguistics (cf. Herbst 2010: 16-18). As already hinted at, the structuralist approach propounded by Ferdinand de Saussure (1916) and others stressed the primacy of synchrony over diachrony in such a way that “the actual value of a linguistic sign is independent from its history and solely determined by its relationship to the other linguistic signs of the system at that point in time” (Herbst 2010: 17, also cf. Anderson 1973: 6; Seuren 1998: 153).[19] In the French terms that de Saussure (1916) expounded on, linguistics was thought to be mainly concerned with abstract *langue* (language as a system; McMahon 1994: 25), but sound change takes place within *parole* (actual language use), and is therefore much more closely connected with phonetics than with phonology (Anderson 1985: 29-31; 24), although in the long run it can of course have a bearing on a language’s phonology. This means that e.g. the phoneme inventory of Modern English, being a construct from synchronic linguistics, will have to be described independently of the phoneme inventory of, say, Middle English. The two inventories belong to different systems or *langues*, even though they are obviously connected: From de Saussure’s point of view “diachronically related stages of a given language represent distinct *états de langue* which are nonetheless systemat-

[18] *Phonology* is actually the older name of the discipline. *Phonemics* was a brief competitor around the middle of the 20th century, as a search of the Corpus of Historical American English (COHA, Davies 2010-) shows (cf. OED, s.v. “phonology, *n.*”; “phonemics, *n.*”).

[19] Of course, the structuralists’ approach did not include a denial of the fact of language change, of which they were actually very much aware (cf. Cherubim 1977: 65), but the point is that the issue of language change was emphatically excluded from their description of language.

ically related" (Anderson 1985: 30; cf. Aitchison 2013: 38-39). *Langue*, which includes phonology, can be said to change only insofar as changes within *parole* can cause a new system to emerge (Anderson 1985: 30-31).[20] The system itself, however, which is the focus of linguistic description, is synchronic by definition.[21]

As already mentioned, around the turn of the twenty-first century, there has been and continues to be a recognizable shift in focus towards diachronic linguistics once again (cf. Rissanen 2008: 53-54; Kytö 2012: 1509-1510),[22] and yet the complete harmonization of the different linguistic traditions – Kortmann's (2005: 48) hypothesized "balanced position in the middle between the synchronic and diachronic poles" – still remains an unattained ideal. A certain amount of tension created by the clash of different ideas and concepts originating from so vastly different research traditions is itself inevitable; the task of a present-day diachronic linguist can only be to take special care to avoid potential pitfalls caused by the unreflected use of such terms and concepts. E.g. 'diachronic phonology' (as found in Anderson 1973: 204, Barrack 1975: title, Murray and Vennemann 1983: 518, Bermúdez-Otero 2007: title, or Bouchard-Côté et al. 2007: title), strictly speaking, has to be seen as a self-contradictory term according to what has been said above about the synchronic nature of phonology; the study of historical pronunciations can at best entail diachronic comparisons between historical phonologies, or *états de langue* in Saussurean terms (cf. McMahon 1994: 25). The fol-

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20 Structuralists generally view diachronic changes as adjustments that are made in reaction to situations of imbalance in language systems, e.g. structural gaps within phonemic inventories might cause new phonemic distinctions to emerge (McMahon 1994: 28ff.).

21 The structuralist concept of *états de langue*, or "language states", is very abstract, although de Saussure's first editors did allow for "the phenomenon of diachrony" (*le phénomène diachronique*) which they defined as as being "the evolution of the system" (*l'évolution du système*, my translation; qtd. in Cherubim 1977: 66; cf. Chreubim 1977: 76n.). De Saussure's own metaphor for this is that of a chess game: If, metaphorically speaking, synchronic linguistics focuses on describing the relationships between the chess pieces and their positions on the board at any given point in time, language change is to be seen as the chess moves which bring about changes to the configurations of the pieces (cf. Seuren 1998: 154; Matthews 2001: 53). – See McIntosh (1987: 257ff.) and Bybee (2007c: 945ff.) for critical views which stress that language change proceeds not in stages but continuously, and that the distinction between synchronic and diachronic linguistics is artificial.

22 Cf. Fertig (2013: 3) for an overview of recent linguistic studies that are "broadly consistent" with nineteenth-century paradigms.

lowing sections will deal with some implications of these distinctions for the use of certain concepts in diachronic studies of speech sounds.

2.1.2 Clashing theories within diachronic linguistics

In addition to the differences between synchronic and diachronic approaches to language, anyone with a research interest in historical phonology is also confronted with conflicting theories and research traditions within diachronic linguistics itself.[23] This brief section will sketch out an example that will become relevant to the present study.

William Labov (1981: title, 1992: 42, 1994: 16) sums up what he retrospectively calls the 'Neogrammarian controversy': On the one hand, the idea that sound changes happen gradually in regards to phonetics but categorically in regards to lexis, i.e. affecting all lexical items, has generally been held by diachronic linguists since the time of the Neogrammarians. This idea, viz. that sound changes are without exceptions in that they affect the entire lexicon, is often quoted as being typical of the Neogrammarians (e.g. cf. Brinton and Arnovick 2017: 47; Elsen 2014: 36) even though the idea really seems to have been more of a working hypothesis than a 'doctrine'[24] to the Neogrammarians (cf. Labov 1981: 272). On the other hand, evidence of the gradual lexical diffusion of sound changes has been found in diachronic studies particularly in the final decades of the twentieth century (e.g. Wang 1969: 12ff.; Chen and Hsieh 1971; Khrishnamurti 1978; Phillips 1983, 1995; also cf. McMahon 1994: 50ff.; Labov 1994: 424ff.; Embleton 2001: 1999; Bybee 2007b: 200, 2007c: 946ff.; Campbell 2013: 196; Aitchison 2013: 91; Millar and Trask 2015: 273).[25] The idea of lexical diffusion has been nicely formulated by Murray (2006a: 2437): It is the idea "that the word can also serve as a basic unit of change, not only the 'sound' or phoneme". In many cases it is function words that have been found to exhibit certain sound changes first, before lexical words followed suit (e.g. cf. Phillips 1983:

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23 Cf. Honeybone and Salmons (2015) and Salmons and Honeybone (2015), who make similar statement about different perspectives and approaches even within historical phonology.

24 The most famous wording of this principle is to be found in Osthoff and Brugmann (1878: xiii): "Every sound change, inasmuch as it occurs mechanically, takes place according to laws that admit no exception" (transl. by Lehmann 1967: 204; also qtd. in Murray 2015: 22; original: "Aller lautwandel, soweit er mechanisch vor sich geht, vollzieht sich nach *ausnahmslosen gesetzen*", original emphasis). – E.g. Wang (1969: 9) uses the term 'doctrine'.

25 However, according to Campbell (2013: 196), most "mainstream historical linguists" remain unconvinced by the evidence of lexical diffusion.

488ff.). Confronted with these potentially conflicting findings,[26] and informed by his studies of ongoing changes in Present-Day English (PDE)[27], Labov (1981: 303-305; 1992: 44) concludes that there are different types of sound change, that certain linguistic features are prone to change according to the one or the other type, and that there simply are many more potentially relevant factors than have been taken into consideration in previous studies. April McMahon (1994: 57-58) further harmonizes the two ideas by asserting that Labov's (1981; 1992) two types of change are not mutually exclusive, but that e.g. a change that begins as one type might become a change of the other type in the course of time (also cf. Murray 2006b: 2438 and Bybee 2007b).

The present study focuses on a set of sound changes in medieval English which can be nicely formulated in terms of tidy, abstract sound laws in which the passing of time seems to be the only influencing factor (see the examples in section 1.1 above). It will thus be necessary to keep in mind newer theoretical issues such as the idea of lexical diffusion and frequency effects, and to test whether these should be included in the description of the change (see section 3.2).

2.1.3 Paradigmatic and syntagmatic changes

A basic distinction which is made in modern linguistics, and which ultimately derives from de Saussure and was later refined by Roman Jakobson and others (McMahon 1994: 25), is that between the syntagmatic dimension and the paradigmatic dimension of language description. This distinction is important for diachronic studies insofar as one needs to distinguish between changes that affect paradigms, i.e. inventories, and changes that do not. Certain contradictions between statements made by linguists about changes to the consonant inventory of English can be unraveled with the help of this distinction, as we will see in the following.

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[26] Of course, the idea of lexical diffusion can only be said to be at odds with some of the tenets of the Neogrammarians if the latter are interpreted as being more 'doctrinal' than they probably were ever intended to be (see above): The idea that 'each word has its own history' was already discussed during the heyday of the Neogrammarians (e.g. Schuchardt 1885; cf. Murray 2006a: 2437).

[27] In the present study the labels "Modern English (ModE)" and "Present-Day English (PDE)" are interchangeable in many cases; however, the term "Present-Day English (PDE)" will be used in cases that imply a synchronic perspective, or a systematic view, of early twenty-first-century English, and the term "Modern English (ModE)" will be preferred in cases in which the period stretching from EModE to PDE is referred to, or in which a contrast between medieval and Modern, i.e. post-medieval, English is implied.

The inventory of consonant phonemes is commonly described as having remained relatively stable throughout the history of the English language (e.g. Lass 1992: 57; Lutz 2006: 213; Baker 2012: 14; Baugh and Cable 2013: 153). This seems especially true for the medieval period: In his classic *Handbook of Middle English*, Fernand Mossé (1968: 39) summarizes: “Taken as a group, the consonants of OE maintain themselves as such in ME” (also cf. Dietz 2006: 20).[28] In fact, sound changes affecting consonants in the history of English appear almost negligible in comparison to the large number of important sound changes affecting vowels. Despite the fact that there are more consonant phonemes than vowel phonemes in PDE (cf. Gut 2009: 54; 63; Sauer 2006: 13) and that this relation seems to hold true for earlier stages of English as well (e.g. Lass 2006: 53-54 or Murray 2012: 257ff. for OE, Ritt 2012b: 208-209 for eME; Sauer 1998: 16-18 or Horobin and Smith 2002: 48-50 for Chaucerian ME), accounts and summaries of the development of the vowel system usually surpass accounts and summaries of the development of the consonant system in length by far.[29] Accounts of diachronic changes to the consonant system within medieval English are usually restricted to what Roger Lass (1992: 57-58) sums up as “low level [changes]: adjustments in allophonic distribution, loss in certain environments and the rise of a few isolated new contrasts”.[30] Changes concerning consonants are commonly judged to be rather insignificant in comparison to the changes that the vowel system underwent within medieval English, e.g. the changes which have come to be known as ‘Open Syllable Lengthening’ and ‘Pre-Cluster Shortening’ (e.g. Lass 1992: 70-76; Ritt 2012a: 410-411; Minkova 2014a: 221-224; 212-216), the reduction and loss of unstressed and word-final vowels (e.g. Lass 1992: 76-83; Minkova 2014a: 227-233) or the beginnings of the Great Vowel Shift in late

28 Translation by James A. Walker. Original: “[D]ans leur ensemble, les consonnes du vieil-anglais se maintiennent telles quelles en moyen-anglais” (Mossé 1949: 57).

29 E.g. there are 22 pages on vowel developments vs. 5 pages on consonant developments in Mossé (1968), 30 vs. 16 pages in Fisiak (1996), 9 vs. 3 pages in Kemmler and Rieker (2012), and 133 vs. 77 pages in Minkova (2014a).

30 This covers such changes as the phonemicization of the voiced fricatives [v, ð, z] in ME (which had existed only as allophones of /f, θ, s/ in OE), [h]- and [r]-loss, the loss or assimilation of nasals in certain positions, and the epenthesis and metathesis of some sounds (Lass 1992: 61-67). The degemination of the OE geminate consonants /pː, tː, tʃː, kː, bː, dː, dʒː, gː, fː, θː, sː, xː/ (Lass 1992: 60) is what could be called the only *major* change to the consonant system that took place in eME, so that only the singleton counterparts of these consonants have remained in phonemic existence ever since.

Middle English (lME), i.e. in the fifteenth century (cf. e.g. Schlüter 2012: 595; Kemmler and Rieker 2012: 20; Minkova 2014a: 248-267).

On the other hand, in her recent *Historical Phonology of English*, Donka Minkova (2014a: 25) calls the commonplace statement about the relative stability of the consonant inventory to question, calling it “an overgeneralization” in light of the “rich gamut of variation and change” that took place in the history of English consonants. Indeed she dedicates seventy-seven pages of her book to consonantal developments.[31]

The disctinction between the paradigmatic and the syntagmatic levels can help us resolve these two contradictory statements: Angelika Lutz (2006: 213, my emphasis) points out that any generalizations about the consonant *system* or *inventory* of English are made “from a *paradigmatic* point of view”. The structuralists naturally preferred a paradigmatic approach for the description of language systems (McMahon 1994: 26), since abstract language-systematic entities such as phoneme inventories are examples of paradigms; Lutz (2006: 213) is implying that a *syntagmatic* point of view, by contrast, is one that e.g. focuses on differences in the phonotactic *distribution* of certain consonants, which is the case with many of the changes that Minkova (2014a: 74-150) analyzes (and hence Minkova’s (2014a) seemingly unorthodox stance on the stability of the English consonant inventory).

The vocalization of semivowels that the present study will investigate is a sound change for which a syntagmatic point of view is best suited, since there is not much change to see from a paradigmatic point of view, the inventory of semivowels itself having remained very stable from OE to PDE: Both palatal /j/ and labial-velar /w/ have continuously existed as phonemes in English for a long time. Their distribution in words and syllables, however, has greatly changed over time, as will become evident in section 2.4. We therefore must take into account phonotactic factors, e.g. considerations regarding the immediate phonological surroundings of the semivowels, and prosodic factors, e.g. our knowledge about word- and clause-stress patterns in medieval English.

This decision to concentrate on the syntagmatic dimension and to avoid references to closed synchronic language systems as far as possible has consequences for the notation of speech sounds. For this reason the following section will be concerned with the notational treatment of individual speech sounds in diachronic linguistics in general, and in this study in particular.

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31 Nevertheless, as already mentioned, Minkova’s (2014a) treatment of vowel changes is about twice as long.

2.1.4 The notation of speech sounds

The distinction generally made in synchronic linguistics between phones (all produceable speech sound values, represented as International Phonetic Alphabet symbols between square brackets [ ]) and phonemes (a limited range of only such sounds as fulfill a meaning-distinguishing function within a certain phonemic system, represented as IPA symbols between slashes / /) seems very straightforward and is often taken for granted although it causes problems for diachronic language analysis (see section 2.1.1 above). E.g. the study of historical phonemic systems may lead to categorizations that are functional within a language system at a given time, but that make little sense from a diachronic perspective. In the following, this will be illustrated using a concrete example, viz. Fisiak's (1996: 47; 53) and Minkova's (2014a: 83; 103) assignment of the voiced velar fricative [ɣ] [32] to different phonemes in lOE. This example will illustrate the rationale behind the use of such notations in the present study.

The voiced velar fricative [ɣ] was one of several sound qualities regularly represented by the spelling <ȝ> ('insular *g*') in the lOE sub-period, the others being [g, j, ɣ, x]. These values were phonotactically conditioned, e.g. the voiced velar fricative [ɣ] is the sound value generally postulated for <ȝ> if surrounded by back vowels, i.e. in words like *saȝa* 'say' (imperative) (Murray 2012: 262).[33] The voiceless velar fricative [x], on the other hand, is the sound value postulated for the lOE devoiced word-final version of what had earlier been [ɣ] (as in the word *daȝ* [dɑːɣ][34] > [dɑːx] 'dough', Minkova 2014a: 83; 103), but in general [x] occurred more frequently as the sound value of postvocalic <h> (as in the word *eoh* [eːox] 'horse') in lOE. In other words, word-final [ɣ], in becoming [x], merged with the already existing phoneme /x/ (Hogg 1992: 35).

Fisiak (1996: 47, and, similarly, Kohnen 2014: 32) therefore includes lOE [ɣ] among the allophones of the lOE phoneme /x/, which includes all postvocalic palatal or velar fricatives, but not [h]. Minkova (2014a: 103) deals differently with the situation, calling the post-merger lOE phoneme "/x/ or /h/" and as-

32 Fisiak (1996: 53) uses the symbol [g] for the voiced velar fricative.

33 The sound itself is a reflex of a Proto-Germanic (PGmc) sound that probably already was a voiced velar fricative *[ɣ] in most positions in PGmc, even though it is traditionally represented as */g/ (Ringe 2006: 215; see section 2.4.1.2).

34 Following Lass (1992: 43), Baker (2012: 13), Fulk (2012: 30) and Minkova (2014a: 152), we will interpret OE *a* as having been an open back vowel (cf. Baker 2012: 169 on <a ~ o> variation in OE), and hence the IPA notation [ɑ] will used for OE. If the sound remained open in ME, it was fronted to a more central or front [a] (Lass 1992: 45-47), which is why as a general rule [a] will be used for ME.

signs to it all instances of the voiceless phones [h, ç, x]; Minkova (2014a: 102) further postulates that in words like *saȝa* the sound [ɣ] had already undergone lenition (see section 2.3.2) to become an approximant (velar [ɰ] or labial-velar [w]) by lOE, and she therefore treats it as an allophone of /w/. Table 2-1 visualizes the difference between Fisiak's (1996) and Minkova's (2014a) phonemes, using examples from Minkova (2014a: 103).

Fisiak (1996)	**Sound value and example**	**Minkova (2014a)**
/h/	[h] *heard* 'hard'	/x/ or /h/
/x/	[ç] *niht* 'night'	
	[x] *sohte* 'sought'	
	([ɣ]>)[x] *daȝ* ~ *dah* 'dough'	
	[ɣ] *laȝu* 'law'	[ɰ] or /w/
/g/	[g] *ȝrund* 'ground'	/g/
/j/[35]	[j] *ȝiellan* 'yell'	/j/

Table 2-1: Alternative phoneme assignments for some lOE velar and palatal sounds, based on Fisiak (1996: 47; 53) and Minkova (2014a: 102-105)

The source of this discrepancy is the fact that the abstract notion of the phoneme was developed in the context of the synchronic description of language stages (see section 2.1.1 above), and diachronic linguists adapt the concept according to different principles. Fisiak's (1996: 47) inclusion of [ɣ] among the allophones of the phoneme /x/ can be explained as follows: Speech sounds are considered members of the same phoneme (and thus allophones) if they are in complementary distribution and phonetically similar (Giegerich 1992: 210; Carr 2008: 124, s.v. "phonemic principle"). OE (singleton) [x] (as in *eoh*) is the voiceless counterpart to voiced [ɣ], i.e. the two sounds are indeed phonetically similar. In addition, singleton [x] happens not to occur intervocalically. On the other hand, [ɣ] only appears between vowels, and therefore the two sounds are in complementary distribution.

Calling [ɣ] and [x] allophones of the same phoneme, as Fisiak (1996: 47) does, thus seems a viable option for a synchronic description of the lOE phoneme inventory; however, this classification is of very limited use for diachronic de-

35 Fisiak (1996: 52) actually categorizes this sound as a voiced palatal fricative (for which he unorthodoxly uses the non-IPA symbol /ġ/) in his table of lOE consonants; this seems to be a mistake, for he says earlier (1996: 46) that this sound had turned into a semivowel by lOE.

scriptions of sound changes. The phoneme /x/ that includes, besides [ç] and [h], all instances of [ɣ] and [x], which Fisiak (1996: 47) postulates, has little theoretical value when dealing with both the diatopic variation and the diachronic development of these sounds. The complementary distribution of [ɣ] and [x] could at best be called accidental after the merger of [x] and word-final [ɣ]. The fact that after the merger the remaining (i.e. non-word-final) instances of [ɣ] can just as well be said to have remained in complementary distribution with the [g] allophone of /g/ (before they shifted to [j] and [w]; cf. Minkova 2014a: 103) renders Fisiak's (1996) phoneme /x/ even more questionable.[36]

On the other hand, Minkova's (2014a: 103) working definition of the phoneme is better adapted to the needs of diachronic linguistics: Her practice in assigning phones to phonemes is informed by "spelling, subsequent history and typological considerations". In the case of the inclusion of all instances of [x], including devoiced [ɣ], into the phoneme /x/ after the merger, Minkova (2014a) has considered lOE spelling practices: For word-final ([ɣ] >) [x] spelling variants such as <dah> exist (e.g. *Dictionary of Old English Corpus* (DOEC), file T03970: Ælfric's *Glossary*, ed. Zupitza 1880), which cannot be said for intervocalic [ɣ]. Similarly, her treatment of ([ɣ] >) [ɰ ~ w] as an allophone of /w/ is based on the subsequent history of words such as *laȝu* > *law*.

As the phoneme is a concept that leads to these kinds of problems when used in diachronic language descriptions, in the present study square brackets [ ] will be used more frequently than slashes / / to mark (postulated) sound values regardless of the phonemic status of the sound in question.[37] Philological studies traditionally avoid the problem of phonemes and (allo-) phones altogether by using italics for the general representation of sound values (cf. Barber, Beal and Shaw 2009: 120), as shown in example (5).

(5) the *h* in *fēoh*

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36 Fisiak (1996) definitely has reasons for his choices; as Erdmann (1972: 163) points out, a phonemic reanalysis (original: "Rephonologisierung") of the phonic values [h, x, ɣ, g] becomes necessary in lOE (original: "Für das Altenglische der klassischen Periode").

37 This means that the square brackets [ ] should not be taken to imply, as they do in synchronic linguistics, close phonetic transcriptions in the sense of precise historical sound realizations (about which there is no general agreement anyway – cf. McIntosh 1989a: 2; Minkova 2014a: 20); they rather should be taken to represent (approximate) sound values which may or may not have been phonemic at any given point in time. – Similat reasoning can be found in Brinton and Arnovick (2017: 30).

Such forms given in italics are abstractions in that they can be treated as medium-independent elements (cf. Esser 2009: 23) in contrast to their material embodiments as strings of either (actual) letters or (reconstructed) sounds.[38] This kind of notation has clear advantages, but also a heavy disadvantage, viz. a lack of precision: A modern linguist might justifiably ask whether "the *h*" in example (5) refers to a pronunciation, a spelling, both, or neither.[39] A study such as the present one needs to differentiate finely between spellings and sounds; spellings will be given in pointed brackets < >, pronunciations will mostly be given in square brackets [ ], and italics will be reserved for examples of medium-independent word forms, which are usually longer than a single letter (cf. example 6) or a single phone (cf. example 7):

(6) the <h> in *feoh*

(7) the [x] in *feoh*

In both of these examples the word *feoh* is given in italics because it is an examplary word form in which the letter <h> or the phone [x] occurs, respectively, but which is itself not being scrutinized for its phonotactic or graphotactic properties in its entirety. The representation of such more-or-less abstract word forms is usually given in a form that closely resembles their written manifestations for practical reasons.[40]

In the case of reconstructed language stages such as Proto-Germanic (PGmc), things are quite different: Since no written language material exists for these periods, it makes no sense to differentiate between pronunciations and spellings: The (reconstructed) word forms *are* the pronunciations. It is therefore customary to eschew all sorts of brackets and simply give forms in italics (preceded by asterisks) for reconstructed language varieties, a custom which will be followed.

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38 Units such as word forms are the provenance of linguistic studies at the level of lexicology, and therefore they are by their very nature rather 'abstract' from the point of view of the present study because they transcend the levels of phonology and graphemics.

39 The macron above the vowel *ē* is another philological abstraction that does not really help us decide.

40 In most cases, any word forms given in italics will approximate the way they typically appear in the original manuscripts, i.e. without the macrons and other interpretive symbols (hence the form *feoh* is given without a macron in the examples above).

2.1.5 The relationship between spoken and written language

As briefly mentioned in Chapter 1, the study of speech sounds that are older than audio-recording devices and contemporary written descriptions of pronunciation can only happen indirectly, e.g. based on conclusions drawn from the analysis of spellings. This means that, unfortunately, the discussion of phonetic and phonological features of medieval English that is the target of this study is removed from direct observation: The general difficulty lies in the impossibility of "[m]aking the dead speak", as Merja Stenroos (2002: 445) puts it. A practical consequence of this is that Chapter 4 will really be an analysis of the variation in corpus-retrieved *spellings*; conclusions about phonetic or phonological change in the language have to be inferred from these spellings. These facts call for some remarks on the relationship between spelling and pronunciation in general (this section) as well as in regards to the eME sub-period (section 2.2.3).

The relationship between spoken and written language is not easily unraveled, and neither are their respective treatments in modern linguistics. For one thing, the terms 'spoken language' and 'written language' themselves are ambiguous, and much of what is said by linguists about the differences between speech and writing tends to focus on stylistic differences, and especially on differences "in terms of words and structures" (Esser 2006: 24), e.g. differences pertaining to the levels of morphology, lexis and syntax, and not to the levels of phonology and graphemics, [41] which would be more important for our present focus.

Another noteworthy fact is the fundamental spoken-language bias which has been prevalent in modern linguistics up to the present day. [42] Once again, this feature of modern linguistics derives from the early structuralists, who viewed speech as the primary and prototypical form of language, [43] and judged writing to

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41 This seems very justifiable, as the levels of phonology and graphemics pertain *only* to spoken and to written language, respectively.

42 Cf. Dürscheid's (2012: 13) term "Logozentrismus" ('logocentrism').

43 This should not be taken to mean that the structuralists are wholly to be credited for the idea of the primacy of spoken language. There can be no doubt that speech *is* more primary and prototypical than writing in many ways, and that this has long been universally acknowledged (cf. Dose 2014: 12 for a concise enumeration of ways in which speech is 'prior' to writing), as is to be seen e.g. in the fact that many languages express the idea of 'language' using a word which is identical to or derived from either a word meaning 'tongue' (e.g. Latin *lingua*, Greek *γλῶσσα*, archaic English *tongue*, Polish *język*, Hungarian *nyelv*, Finnish *kieli*, etc.) or a word meaning 'speech' (German *Sprache*, Dutch *spraak*, etc.). However, the early structuralists held the opinion that modern linguistics was to acknowledge the primacy of speech over writing by explicitly keeping its focus on spoken language.

be a means to record spoken language more than anything else[44] (this is usually called the "relational" perspective on the writing system, cf. Sgall 1987: 2-3; also cf. Dürscheid 2012: 23, 35ff.), ignoring or downplaying the fact that writing systems are never completely phonographic (Rogers 2005: 13; Emiliano 2011: 158n.; Rutkowska 2012: 227-228; Minkova 2015b: 72f.). For this reason phonology has traditionally been considered an important part of modern linguistics while its logical counterpart, which for now will be referred to as graphemics,[45] has been viewed as marginal within linguistics, or, as Liuzza (1996: 27) puts it, written language has been "removed […] from among the proper objects of linguistic inquiry". This is generally as true for modern historical linguistics as it is for synchronic linguistics, which leads Bergs (2013: 242) to comment that "[m]ost of current language change theory is based on speakers and hearers, rather than writers and readers".[46]

From the middle of the twentieth century, and particularly in the past few decades, linguists have begun gradually to rehabilitate the study of spelling and spelling systems to linguistics (cf. Sampson 2015: 2), so that today writing and speech are often recognized as two potentially (though not actually, see below) autonomous media, or modes, in which language material is encoded (this view is usually called the "autonomistic" perspective on the writing system, cf. Sgall 1987: 3). E.g. for the *Survey of English Usage*, which was initiated by Randolph Quirk in 1959 as one of the first English-language corpus projects (cf. Survey of English Usage 2016), the collected language material was categorized at the most fundamental level according to the binary factor of "origin in writing" vs. "origin in speech" (cf. Esser 2009: 76). A highly influential textbook highlighting the essential differences between spoken and written language was M. A. K. Halliday's (1989 [1985]) *Spoken and Written English*. Similarly, the *Longman*

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44 De Saussure (1983 [1916]: 15) famously writes that "[l]anguage and writing are two distinct systems of signs; the sole purpose of the second is to represent the first" (translation by Liuzza 1996: 26; original: "Langue et écriture sont deux systèmes de signes distinct; l'unique raison d'être du second est de représenter le premier"); Bloomfield (1933: 21) even states that "[w]riting is not language, but merely a way of recording language by means of visible marks".

45 The term *graphology* is ambiguous as it also denotes the (often pseudo-scientific) study of handwriting styles and psychological implications (cf. OED, s.v. "graphology, *n.*"; Seibt 1994: 14ff.).

46 Interestingly, popular opinion often sees the roles of written and spoken language reversed, ascribing primacy to the written code, which is generally perceived as more essential and more exact than the spoken language by non-linguists (cf. Dose 2014: 12).

Grammar of Spoken and Written English (Biber et al. 1999: 16) considers "spoken" and "written" to be the two basic "modes" of language.[47] In recent decades, this division of language, and of language data, according to two modes has led to more attention being paid to the system of spelling in its own right. A consequence of the autonomistic reinstatement of written language as an object for linguistic investigation is that present-day graphemics has become very systematic, even adopting a theory of formal graphs and functional graphemes which "seeks to march parallel" (McIntosh 1961: 110) with that of phones and phonemes in the spoken system (also cf. McLaughlin 1963: 20; Smith 1996: 57; Rogers 2005: 10ff.; Sampson 2015: 15).[48]

Even though many scholars now tend to see the written code as 'relatively autonomous' and speech-independent (cf. Stenroos 2002: 453)[49] and as a matter that linguistics should deal with in its own right (cf. Glaser 2011: 11-12), the study of spelling systems has actually not been completely integrated into linguis-

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47 Cf. Halliday (1989: 92): "Talking and writing […] are different modes for expressing linguistic meanings"; Halliday and Matthiessen (2004: 7) use the similar phrase "modes of expression". – The variation between spoken and written texts has also been termed the "diamesic" dimension of language variation (Italian *dimensione diamesica*), a term coined by Mioni (1983: 508) and well-established in Italian linguistics (Berruto 2000: 37ff.) but used only very infrequently for other languages (cf. e.g. Sinner 2014: 209ff. for an example of the use of the terms *Diamesie* and *diamesisch* in German, and Berruto 2010: 235 for the use of *diamesia* and *diametic* in an English article).

48 Fuhrop and Peters (2013: 180) stress this fact when they write that "within graphemics it is important to first of all distinguish units of the writing system independently of sounds. The connection with sounds is only established in a second step" (my translation; original: "Für die Graphematik ist es wichtig, dass die Einheiten des Schriftsystems zunächst lautunabhängig bestimmt werden. Der Bezug zum Lautlichen wird erst in einem weiteren Schritt hergestellt"). – Indeed, the term *grapheme* itself has been modeled on the term *phoneme* (cf. Mugdan 1990: 50; Coulmas 2003: 36), and autonomists use it to denote an abstract 'letter' which exists as a "purely distinctive visual unit", i.e. independently from the spoken language, and which is "part of an autonomous semiotic system" of writing (Liuzza 1996: 28, also qtd. in Rutkowska 2012: 230). In practice this means that the graphemes of a written language are defined as the smallest meaning-distinguishing units of the written system, units which can be elucidated via minimal pair tests (as is frequently done in German linguistics, cf. Kohrt 1985: 413, 429; Dürscheid 2012: 133; Fuhrop and Peters 2013: 202).

49 Cf. Fuhrop and Peters's (2013: 180) characterization of speech and writing as "independent *to a certain degree*" (my translation and emphasis; original: "Schriftsystem und […] Lautsystem bestehen zu einem gewissen Grad unabhängig voneinander").

tics.[50] In particular, studies of the English spelling system[51] stress that writing fulfills the double function of theoretically existing as a speech-independent mode while at the same time encoding pronunciation, so that a written text might always be read aloud: E.g. Angus McIntosh (1961: 111) speaks of the ever-present "[p]honic meaning" of spellings, which means that, while "written language and spoken language *both* symbolize mental experience, […] written language, by virtue of its graphological system, *also* symbolizes spoken language" (McIntosh 1961: 108, original emphasis; also cf. Lass 1997: 65; Scahill 2002: 197-198). This does not mean that the implications of the autonomistic view of the writing system are ruled out completely, but, as Liuzza (1996: 28, my emphasis) puts it, "the capacity [of written language] for autonomous signification exists *alongside* some necessary relation to a spoken counterpart". The view most frequently adopted by linguists evaluating the relationship between speech and writing in English is neither completely autonomistic nor completely relational, but one which occupies a sort of middle position, aiming to integrate the two views by treating the written and the spoken mode as 'independent though convergent' (cf. Bolinger and Sears 1981: 274-283).[52]

One reason why a completely autonomistic approach to the spelling system is hard to maintain especially for English is the fact that there are many individual lexemes whose orthographic spellings are far removed from the spoken word's

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50 The frequent use of the word *orthography* in this context (e.g. cf. Rutkowska 2012: title) is also telling; the term sounds prescriptive in that it contains the Greek root *ὀρθο-* 'straight, right' and is therefore, etymologically speaking, the writing-focused equivalent of the term 'orthoepy' rather than that of the term 'phonology' (cf. OED, s.v. "orthography, *n.*", "ortho-, *comb. form*"). More neutral, descriptive terms such as 'graphemics', 'graphology' or 'graphonomy' (cf. McLaughlin 1963: 20) are relatively young and not firmly established in linguistics (none of them seem to have been used in a systematic way by linguists since the 1960s, cf. OED, s.v. "graphemic, *adj.* and *n.*", "graphology, *n.*"). Current practice in English linguistics (cf. e.g. Emiliano 2011: 159; Rutkowska 2012: 226) is to go on using the established term 'orthography' but to stress (if needed) that it is intended to be understood in a non-prescriptive way.

51 As already mentioned, systematic graphemics of the kind described above is currently practiced in German linguistics (e.g. Fuhrop and Peters 2013; Eisenberg 2013: 298ff.).

52 It is easy to find examples of such views being expressed. E.g. in their *Introduction to Functional Grammar* Halliday and Matthiessen (2004: 7) write: "Although every writing system is related to the sound system of its language in systematic and non-random ways […], the relationship is not a direct one". Similarly, Kristian Berg (2013: 389, my emphasis) characterizes the written mode as being "*partly* autonomous".

phonological structure. This seems to be very true for PDE with its “deep orthographic system” (Coulmas 2003: 213; also cf. Read 1983: 147-148; Firnberg 1985: no pag.; Horobin 2013: 34ff.), i.e. a system of spellings which for historical reasons will typically encode not only phonological, but also morphological as well as lexical, or etymological, information (cf. Yule 2010: 218-219; Yavaş 2011: 241-242; Berg 2013), resulting in a plethora of possible spelling-pronunciation combinations (e.g. Andrew Rollings’s [2004: 142-239] list of all spellings of all sounds of PDE is roughly a hundred pages long).[53] Michael Stubbs (1996: 1443) neatly summarizes the principles underlying the PDE spelling system as “convey[ing] a wide range of information: phonological, lexical, syntactic and semantic”. Any study of spelling systems must therefore be open to the potential influence of morphological and lexical issues, even if the spelling system of earlier stages of the English language is assumed to have been much more phonographic than that of PDE.

There is no universal agreement about the use of the term ‘grapheme’ (Rogers 2005: 11)[54] and many scholars either opt for emphasizing relational aspects and taking grapheme-to-phoneme mappings into account when using the term (e.g. Carney 1994: xxvii; Coulmas 2003: 97-102; also cf. OED, s.v. “grapheme, *n.*”), or they avoid the term completely (e.g. Venezky 1999: 7, also qtd. in Cook 2004: 63). In studies concerned with the English spelling system (historical or otherwise), written language is often seen as intrinsically connected to spoken lan-

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[53] This fact is also regularly noticed and commented on by non-linguistis. As Bolinger and Sears (1981: 283) sum up, “[n]o other spelling system in the world has been the occasion of so much amazement, frustration, irritation, sarcasm, and cold fury as that of English – a reflection as much of the large numbers of non-English-speaking people who have tried to learn it as of its own inherent refractoriness”. In addition, one finds philologists and linguists pronouncing similarly harsh judgments of the English spelling system, especially in older publications, e.g. Horn and Lehnert’s (1954: 16) comment that “the orthography of Modern English is the most outdated and the least logically arranged spelling system among the civilized languages of Europe”. [My translation. Original: “Die neuenglische Rechtschreibung ist die am meisten veraltete und am wenigsten folgerichtig durchgeführte Schreibung der europäischen Kultursprachen”.] Such judgments have been made from the sixteenth century, as is clear from John Hart’s (1569; qtd. in Upward and Davidson 2011: 2) statement that “in the moderne and present maner of writing […] there is such confusion and disorder, as it may be accounted rather a kind of ciphring”, but one also still finds statements like the following in newer publications: “English has the worst relationship between sound and spelling of any language” (Blake 2008: 175).

[54] Scragg’s (1974: 10n.) apology for using the term ‘grapheme’ “loosely” in his survey of English spelling history is prototypical in this respect.

guage, so that many discussions of 'graphemes' are really discussions of representations of phonemes in the written mode (cf. Balmuth 1982: 9; Rutkowska 2012: 230).[55] Lass (2015: 102) explicitly emphasizes that most historical spelling systems, including those used for eME, are not "emic", meaning that it is not fruitful to treat them as constituting an autonomous level of language description down to the 'smallest units'. As António Emiliano (2011: 158) sums up the situation, "[i]n an alphabet-based system graphemes are mostly 'phonograms'" although they usually "can be mapped to more than one phoneme".

Taking this relational view for granted, the next question to raise is what exactly spelling represents. Generally speaking, so-called phonographic spelling systems represent phonemes rather than phones (Smith 2007: 32; Blake 2008: 173-174),[56] or even 'deeper' units connected with allomorphic variation (Rollings 2004: 10; 16-17), syllabification (Dürscheid 2012: 134ff.), or etymology (Voeste 2012: 186). As Charles Read (1983: 147) argues, it indeed makes sense for most spelling systems to predominantly represent information relating to the phoneme inventory: "General-purpose writing systems, as opposed to systems specifically for phonetic representation, rarely if ever represent allophonic variation, since it is by definition not significant and therefore either totally free or totally predictable". In other words, spelling systems are generally thought to represent only the distinctive sounds of a language, as opposed to representing all actual variation in the realizations of sounds, which, if not distinctive, usually goes unnoticed by speakers anyway (Blake 2008: 174).[57]

[55] This is of course an oversimplification, as Liuzza (1996: 28) demonstrates using the example of <s> and <c>, which could theoretically be analyzed as 'allographs' of the same 'grapheme' in written PDE because they can both represent the phoneme /s/ when read aloud, e.g. in the words *cite* and *site* (cf. Liuzza 1996: 28). A view of the grapheme that relates it to phonology must also be complemented by semantic considerations.

[56] In other words, the term 'phonemographic' (which has been used e.g. by Trager 1974: 383) would be a more precise term than 'phonographic'. – According to Laing and Lass (n.d.b, §2.2.1), allophones are very rarely represented in writing systems.

[57] Such allographic variants as exist within spelling systems, e.g. capital vs. small letters, special ligatures, or the graphotactically determined variant shapes of the <s> found in older manuscripts (cf. Baker 2012: 157) and early typescripts, generally have no direct connection with allophonic variants of the spoken language. As Angus McIntosh (1989a: 11) puts it, allographic and allophonic variation are not truly related but "only in the sense that they both spring from a psycho-physiological organisation which tends to produce similar types of variation in parallel situations".

The two modes of language are fundamentally different in some respects: Human speech happens continuously over comparatively long stretches, which are only interrupted by the need to draw air (Gut 2009: 15); written texts, by contrast, are made up of rather small physically discrete units such as letters (Lyons 1981: 21-22; Dürscheid 2012: 27). More specifically, speech is time-continuous. Even though written texts themselves can be argued to be continuous in the sense of being ‘linear’ (cf. Galliker 2013: 205), this is not necessarily true for the *production* of written texts: A written text generally does not disclose to its readers at which points its producer paused. Spoken texts are witnessed as events in progress, while written texts are presented as finished products (Halliday 1987: 74, 1989: 81).

As a consequence, the act of writing generally requires a larger amount and different kinds of planning on the part of the producer than the act of speaking does (cf. Rickheit, Weiss and Eikmeyer 2010: 56ff.; Galliker 2013: 204).[58] In a model of the writing process developed by Hayes and Flower (1980: 11; also cf. Wrobel 2000: 459), “planning” is the name of one of three basic elements of the writing process, the other two being “translating” and “reviewing” (a strict chronological order is not necessarily implied, as all three elements are monitored by the writer during the entire process).[59] We will return to these ideas and apply them to the issue of text production during the eME period in section 2.2.3.

2.2 Problems relating to the early Middle English period

We will now turn to the early Middle English period. The present section first gives an overview of the period and the principles behind periodization (2.2.1) as well as the textual evidence of eME (2.2.2) before evaluating the general relationship between spoken and written language in the relevant period (2.2.3). The remainder of the section then deals with the question of whether a lOE standard orthography had existed (2.2.4) and describes the eME period as a non-standard

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58 From a cognitive-linguistic standpoint, both speech *and* writing require planning, but there are some fundamental differences regarding the much greater role that planning plays in the production of writing than in the production of speech. Planning is such an integral part of the writing process that studies of the linguistic characteristics of the written versus the spoken mode have turned out to be more successful when undertaken along the lines of “planned versus unplanned” language (Miller 2006: 672).

59 Hayes’s and Flower’s (1980) model pertains to all linguistic levels and not just to spelling.

period (2.2.5), in which spelling habits were very much localized (2.2.6). The final part (2.2.7) will draw conclusions regarding the notation of eME spellings in the present study.

2.2.1 Periodization

Table 2-2 visualizes the traditionally recognized periods and sub-periods of the history of the English language up to 1500 CE (e.g. cf. Baugh and Cable 2013: 48) and simultaneously brings the time spans covered by several historical text corpora into perspective. Most importantly, the bold label “LAEME” marks the stretch of time covered by the LAEME Corpus of Tagged Texts (LAEME CTT), which constitutes the main source for the analysis in Chapter 4.

<table>
<tr><th>Periods</th><td></td><td colspan="3">OE</td><td></td><td colspan="4">ME</td></tr>
<tr><th>Sub-periods</th><td></td><td colspan="2">eOE</td><td>lOE</td><td></td><td colspan="2">eME</td><td colspan="2">lME</td></tr>
<tr><th rowspan="2">Corpora</th><td rowspan="2"></td><td colspan="3" rowspan="2">e.g. YCOE, DOEC</td><td rowspan="2"></td><td colspan="4">e.g. PPCME2</td></tr>
<tr><td colspan="2">LAEME</td><td colspan="2"></td></tr>
<tr><th>Centuries</th><td>7th</td><td>8th</td><td>9th</td><td>10th</td><td>11th</td><td>12th</td><td>13th</td><td>14th</td><td>15th</td></tr>
</table>

Table 2-2: Timeline of periods and sub-periods within medieval English and periods covered by several corpora

The year 1150 CE is conventionally given as an approximate date for the beginning of the Middle English period (e.g. van Gelderen 2006: 10; Jucker 2011: 7; Baugh and Cable 2013: 48).[60] This is also the approximate date at which the earliest manuscript included in the LAEME CTT was produced, i.e. the second continuation of the *Peterborough Chronicle* (written in 1154 or 1155), which is often labeled the ‘first Middle English text’ (cf. e.g. Dickins and Wilson 1956: 3; Irvine 2006: 56-57; Home 2007: 19-29; Jones 2013: 315; Laing and Lass n.d.a, §1.3).[61]

Areas shaded in gray in Table 2-2 mark undocumented or poorly documented stretches of time, e.g. the ‘Great Hiatus’ (cf. Lass 2006: 59) of roughly one hundred years during which virtually no new English texts were produced. Following general practice, we will call this the ‘transitional period’ (cf. Laing and Lass

60 Alternatively, the boundary between OE and ME is sometimes placed at 1100 CE (e.g. Fennell 2001:1; Horobin and Smith 2002: 1; Kohnen 2014: 6-7) or even at 1066 (Gramley 2012: 66); from a corpus-linguistic point of view it does not make much of a difference due to the overall scarcity of new texts written in the decades before 1150.

61 Rusch (1992: 84) refers to the language of the second continuation of the *Peterborough Chronicle* as “Old/Middle English” on account of its “transitional” nature.

n.d.b, §2.1; Millar 2000: 27) between OE and ME.[62] While new copies of OE texts were made during the transitional period (cf. Laing 1991: 36; Liuzza 2000; Jones 2013: 314), new texts in English did not begin to be composed in any great number before the late twelfth century (Laing 1993: 3) and the very few new texts that were composed closely adhered to the earlier conventions for written OE (Irvine 2006: 55; Dietz 2006: 19).

The sub-period of early Middle English (eME) will be defined as beginning around 1150 and ending around 1350 CE, since this is the period covered by the LAEME CTT. The surviving written evidence from the eME sub-period will now be described in more detail.

2.2.2 Textual evidence

Because historical evidence is always limited, it is a characteristic feature of historical corpus linguistics that it has to rely on relatively small and unbalanced data sets (Labov 1994: 11; Mukherjee 2009: 125). In the words of Kytö and Pahta (2012: 125), diachronic linguistic studies often depend on "written documents whose survival is fragmentary, haphazard, and skewed", and especially when dealing with medieval English, it is important to stress that any empirical observations that can be made are always based on such written material as happens to have survived. This brings up the issue of representativeness (cf. Leech 2007) and in particular the question of what exactly a corpus of medieval English texts can even aim to be representative of: If e.g. the aim of an eME text corpus is to represent 'the eME language' in its full temporal and geographical extent, then the project must fail simply because the available data is scarce and very unequally distributed. It may seem trivial to emphasize that a corpus can only represent data that actually exists, but in the case of rather poorly-attested historical varieties, the crux of the matter is that the corpus cannot aim to represent language 'as it was', but 'as it is' on the basis of surviving records.

As implied in the preceding section, the eME sub-period is characterized by the appearance of new "spontaneously produced up-to-date written English" texts (Laing and Lass n.d.b, §2.1). Around this time Europe generally saw an increase in the production of vernacular texts due to a number of interconnected political, economic, intellectual, artistic and religious changes sometimes subsumed under the name of 'the twelfth-century renaissance' (cf. Russell 1991: 72; Swanson 1999: 173ff.; Stein 2006: 159; Hannam 2009: 61ff.), a term first used by Charles

62 The corresponding German term is *Übergangszeit* (Schlemilch 1914: title; cf. Dietz 2006: 12).

H. Haskins (1927). The secularization of learning that took place in the twelfth century brought with it a general increase in literacy, which in turn meant that already existing vernacular (in our case lOE) texts were now read and copied more widely (Swanson 1999: 174),[63] and also that there was an increasing need for new vernacular (in our case eME) texts (Stein 2006: 167-168).

Despite this increase of text production, eME sources are still rather scarce compared to other periods (cf. Smith 1996: 20-21), especially in the north of England (Laing 1991: 36). One reason for this is that Norman French and Latin were the languages generally used by the ruling (as well as reading and writing) classes, and, by contrast, English was still very much a language used “locally and at home” (Nevalainen 2012: 127). Millar (2000: 74) concludes from this that many eME texts were written “as a hobby”, as writing in the vernacular was considered “an eccentric act” at the time.[64]

2.2.3 Speech and writing in medieval English

If we consider the relationship between the spoken and written modes (see section 2.1.5) throughout the history of English, the medieval period is exceptional in various ways. For one thing, properties of the spoken language are neither observable nor ever described in great detail by contemporary witnesses,[65] so that medieval spoken language itself is an object of study which heavily relies on methods of reconstruction. As mentioned in chapter 1.2, the study of medieval pronunciations is indirect in that it relies on the analysis of spellings. In this context it is obligatory to adopt a relational point of view towards the spelling system, or to focus on the relational aspects of the written mode, because all recon-

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63 Over the course of the eME sub-period the ability of readers to comprehend classical OE texts actually declined, as is evidenced by the growing number of glosses and explanatory notes in copies of pre-Conquest texts from this time (Irvine 2006: 58); for the first time, older English texts that scribes were working with “needed either to be ‘modernized’ or, to some degree, studied”, as Chris Jones (2013: 315) writes. – Elaine Treharne (2011: 217) points out that a certain manuscript (Cambridge University Library MS Ii.1.33, containing texts originally written by Ælfric of Eynsham) which was produced in the late twelfth century is often seen as containing “the last vestiges of the pre-Conquest Old English textual tradition” despite its being younger than the ‘first Middle English text’ mentioned above.

64 However, Treharne (2011: 220-221) points out that the relative scarcity of English texts from this period should not be taken to imply that English was generally a language of low prestige. We will return to the relationship between English and the more commonly written languages in section 2.2.5.

65 That there are some minor exceptions was pointed out in fn. 12.

structed phonology of the older stages in the history of English by its very nature depends on the representation of spoken-language features in the written mode. Secondly, and fortunately for historical-phonological studies, medieval English can be expected to show a relatively good overall correspondence between spellings and pronunciations (cf. Dietz 2006: 17).[66] The reasons for this will now briefly be explained.

One reason why we can posit a closer correspondence between spellings and pronunciations for OE and ME than we can for ModE is the fact that the degree to which spelling represents pronunciation can be expected to drop with the emergence of a written standard like that of ModE.[67] This is because the written standard is by definition bound to remain unchanged and not to represent ongoing sound changes in the spoken language (cf. Coulmas 2003: 96; Horobin and Smith 2002: 41) unless there are regular spelling reforms whose instigators consciously push towards a more phonographic orthography. In their introduction to the LAEME, Laing and Lass (n.d.b, §2.2.2) put it this way:

> If an orthography lasts long enough it will tend to represent ‘ghost contrasts’ due to sound change not indicated by spelling change: e.g. for PDE, except for some Northern Scots, <kn-> vs <n->, and for many dialects <wh-> vs <w->. This kind of purely orthographic pseudo-contrast is generally removable only by deliberate spelling reform. (Laing and Lass n.d.b, §2.2.2)[68]

ModE spellings, which generally have remained unchanged since about the seventeenth century, must therefore be further removed from the spoken language than pre-Modern English spellings (cf. Elmentaler 2003: 11; Linn 2013: 368ff.).

The eME sub-period can specifically be referred to as a “non-standard period” (Gramley 2012: 66) given the complete absence of any standardized varieties during this time (see section 2.2.5). The existence of supra-regional spelling

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66 Also cf. Lass’s (1992: 27, my emphasis) comment on historical phonology being dependent on “*well-grounded* beliefs” quoted in section 1.3.

67 Indirect evidence for the plausibility of this idea might be drawn from psycholinguistics: Studies of written language produced by pre-school children show that children who have not yet been exposed to standard orthography tend to represent “phonetic contrasts and similarities” which are “not represented directly in standard spelling because of its abstract lexical character” (Read 1971: 30).

68 John McLaughlin (1963: 23) provides a further example from PDE: “The words [*hair* and *hare*] are presumably distinguished by the grapheme sequences <ai> and <a e>; obviously, this opposition tells us nothing about the phonemic oppositions in the phonology”.

'standards' has been postulated for both the lOE and the lME sub-periods,[69] so that e.g. Bennett and Smithers (1968: liv) assess that "[t]he period *c.* 1050 to *c.* 1400 begins with the end of one form of standard written English and ends with the emergence of another". However, in both cases the term 'standard' has become increasingly controversial in recent decades. We will take a closer look at the lOE situation in section 2.2.4 below.

Another reason for assuming a close phonographic correspondence for eME derives from what can be said about the writing process in medieval times: As was seen in section 2.1.5 above, "planning" plays an important role in the general model of the writing process developed by Hayes and Flower (1980: 11), and it is safe to say that the production of written texts in the eME period must have been an especially well-planned process. A glance at any medieval manuscript (e.g. cf. the beginning of *Ayenbite of Inwyt* in Figure 3-2 in section 3.1.1) yields a very different impression from the informality and untidiness often associated with handwritten texts from the present day. Such manuscripts were the products of professional writers, and were often either considered to be works of art, or made for frequent practical use, or even both at the same time (Treharne 2000a: 39). More importantly, the mere costliness of early medieval writing materials (cf. Wolf 2008: 118ff.; Hauschild 2013: 71)[70] and the labor-intensity associated with book production (cf. Haskins 1927: 75-76; Williams-Krapp 2014) should be enough to warrant a fair amount of planning on the part of the scribes. As Alexander Bergs (2013: 246) puts it, in the Middle Ages "writing was not an ad hoc process, but rather something planned, and maybe even […] supervised". That medieval scribes produced their texts with a lot of care is indicated by several factors.

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69 The lME variety known as 'Chancery English', which became established in fourteenth- to fifteenth-century London, has been referred to as a sort of 'proto-standard' time and again (e.g. cf. Samuels 1963; also cf. Bennett and Smithers 1968: lv; Rusch 1992: 13ff.; Fisher 1996: 3ff.; Nevalainen 2003: 132ff.; Upward and Davidson 2011: 81; Durkin 2013), but especially newer sources are rather skeptical of such assignations (cf. Machan 1994: 150-151; Benskin 2004: 4ff.; Stenroos 2013: 161-164; also cf. Lange 2012: 1001-1002 and the sources cited there). In a diachronic-diatopic study of selected linguistic features of fourteenth-century English texts, Nevalainen (2006b: 130; also qtd. in Lange 2012: 1001) *does* find a tendency towards what she calls "supralocalisation". However, the role that Chancery English might have played in terms of orthography in the later Middle Ages has no bearing on the data used in the present study.

70 Paper became common in Europe only from the late thirteenth century (Schneider 2009: 110; Hough 2012: 41).

For one thing, the actual process of text composition was one step in the much larger project of book production. We might tentatively assume C. H. Haskins's (1927: 74) mention of the production of a particular book having taken an entire year "from the preparation of the parchment to the final illumination" to be a typical time span for the production of medieval books (also cf. Williams-Krapp 2014). Indeed, frequent practices of scribes such as carefully lineating pages before the writing process, or leaving spaces for the later addition of text coloration or illustrations, point into the same direction (Hauschild 2013: 72-73; both features are visible in Figure 3-5).

The writing process in the narrow sense probably also took a fair amount of time. Writing universally happens at a much slower pace than speech (Wrobel 2000: 465), and this difference was even more pronounced in the Middle Ages (Dürscheid 2012: 168). Evidence of how long it actually took medieval scribes to produce texts is very sparse and partly anecdotal, but again, C. H. Haskins (1927: 74) provides one concrete example: "In 1004 Constantine of Luxeuil copied in eleven days the so-called *Geometry* of Boethius, about fifty-five ordinary pages of modern print". Constantine produced the equivalent of five printed pages per workday, which we might take to mean roughly between seven thousand and ten thousand characters per workday (cf. Advanced International Translations 1998-2017). Assuming that a scribe at the time would spend something between six hours (Clement 1997: 7) and eight hours (Rogers 1949: 542-543) per day writing, Constantine will have produced between fifteen and thirty characters per minute, meaning that, on average, it will have taken him two to four seconds to produce one letter. This does indeed appear to be a rather slow and careful pace compared with typical modern handwriting, even if we allow for the kinds of pauses which typically occur in any given writing process (cf. Wrobel 2000: 465).

A general consequence of what could be called the 'well-plannedness' of medieval written texts is that we might assume writers to have had the opportunity to consciously decide exactly which spellings to use at any given time. Writing at a relatively slow pace in the absence of a standard orthography might be surmised to increase spelling-to-sound correspondence. We might assume there to have been less automatized hand movements associated with the spellings of words (cf. Galliker 2013: 204-205) as writing will generally have proceeded letter by letter rather than word by word.

The following section will focus on the question of whether a supra-local written standard existed in the lOE period, as the existence of a written standard around the time of the Norman Conquest might arguably have had consequences for the relationship between pronunciation and spelling in the eME period.

2.2.4 The question of a previous standard orthography

As hinted at in the previous section, the lOE period is often claimed to have coincided with the emergence of what has been called a "first Standard English" (Gneuss 1972: 64), which is said to have spread supra-locally from eleventh-century Wessex (also cf. Toon 1992: 426ff.; Rusch 1992: 7ff.; Freeborn 1998: 36; Kornexl 2000: 257ff.; Jucker 2011: 25; Upward and Davidson 2011: 75; Nevalainen 2003: 128, 2012: 130; Gretsch 2013: 290-291) and to have been in place until c. 1150 CE (Bennett and Smithers 1968: liv; Anderson and Britton 1999: 302). This 'standard' is most often referred to as the 'late West Saxon (lWS) standard'. The idea that there was a 'standard' form of lOE was prevalent throughout the twentieth century;[71] however, the extent to which such a label is fitting or even useful is now highly controversial (cf. Lange 2012: 1000) for various reasons.

The answer to the question of the existence of a lWS standard hinges on one's definition of what constitutes a 'standard' language in the first place. In his survey of OE dialects Richard Hogg (2006: 401) refers to Haugen's (1966) general characterization of the stages and elements of the process of standardization (also cf. Leith 1997: 31ff.), *none* of which Hogg (2006) finds fully realized in the lOE period (cf. Kornexl 2012: 381). E.g. one does not find spellings that were uniform to a degree comparable to present-day written Standard English orthography, but there was always a certain amount of variation in spellings (Horobin 2013: 66).

Other scholars who view the idea of an OE standard critically will base their arguments on the question of the possible geographical spread of a lWS 'standard'. On the one hand, it seems safe to say that in the lOE period texts produced in English were often "West-Saxonized"[72] copies of earlier Mercian or Northumbrian originals (cf. Ringe and Taylor 2014: 7). On the other hand, the history of OE texts is often complex and far from clear to begin with.[73] Thus, one reason

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[71] A typical proponent of the idea of a lWS standard spelling is Donald Scragg (1974: 7), who claims that the lOE period saw the establishment of "a single stable orthography for English", which was brought about with the help of "the new political unity of England" under King Alfred and his successors. Scragg's very wording seems highly idealized.

[72] Sauer and Waxenberger (2012: 345) use this term.

[73] Especially OE poetical texts are said to exhibit 'Anglian' (i.e. Mercian and Northumbrian) features (Ringe and Taylor 2014: 7). Such text might actually be from

why the existence of a supra-local standard is difficult to prove is, quite simply, the limited extent to which OE texts are datable and localizable in general. An additional complication arises from the simple fact that medieval scribes were no less mobile than other human beings, so that some OE texts might have been "dialectally mixed" in their original forms due to their writers' idiolects (Sauer and Waxenberger 2012: 345; also cf. Greenfield and Calder 1986: 42 on scribes from Mercia employed at King Alfred's court).

Another explanation for the prevalence of West Saxon forms in the surviving records that is frequently given by contemporary scholars is that in the lOE period there were several competing systems in place in different regions, but the lWS variety was the one that happened to yield the greatest number of surviving texts. E.g. Mechthild Gretsch (2006: 172) compares the large corpus of WS writings by Ælfric of Eynsham with lOE texts from other regions and concludes that "what Ælfric wrote was not 'Standard Old English' per se, but 'Ælfric's Standard Old English', and that this existed side by side with other standards, though perhaps none as systematic as his was". Hogg (2006: 404) takes the existence of a twelfth-century manuscript from Worcester containing the Mercian OE *Life of St. Chad* (cf. Greenfield and Calder 1986: 62) as evidence that lWS did not go completely unchallenged as a literary language (also cf. Kornexl 2012: 383; Horobin 2013: 67).[74] Whatever the situation really was, the relatively large quantity of surviving written records from post-Alfredian Wessex alone prompts most scholars to treat the lWS variety as a "de facto written standard" of OE (Amodio 2014: 30; also cf. Baker 2012: 10).

In general, the idea of a WS variety exerting influence on the writing and spelling of English in other regions in the lOE period has not been completely discarded, but it is now approached more carefully than it was in the mid-twentieth century. In particular, scholars have recently begun speaking of 'focusing' and 'focused varieties' instead of 'standardization' and 'standards', when talking about medieval English (e.g. cf. Horobin and Smith 2002: 31ff.; Schaefer

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Wessex, but written in a special poetic register which happened to preserve e.g. certain archaic lexemes and forms that are otherwise associated with geographically non-WS texts simply because these lexemes generally survived longer in non-WS varieties than they did in WS prose (cf. Amodio 2014: 31).

74 It is, however, not clear whether this text is really contemporary with the lWS variety. Horobin (2013: 67) claims that the original was composed in eleventh-century Mercia; Greenfield and Calder (1986: 62) date the text to c. 850 CE. The YCOE (Taylor et al. 2003) includes the eME manuscript copy but does not give a date for its original composition.

2012: 523; Minkova 2014a: 187). Jeremy Smith (1996: 66) defines a focused variety as “a centripetal norm towards which speakers tend, rather than a fixed collection of prescribed rules from which any deviation at all is forbidden” (also cf. a similar definition in Nevalainen 2012: 127). The idea of lWS having been a focused variety to which lOE writers from different regions would orient themselves to varying degrees pays homage to the disproportionate amount of WS dialect features in the surviving material while still leaving room for the high amount of variation and dialect “mixing” that is prevalent in lOE texts.

Whatever the situation really was like in lOE, the relatively homogeneous, possibly somewhat standardized, or rather ‘focused’, spellings found in extant lOE texts have long been thought to have reduced the generally close correspondence between pronunciations and spellings to the effect that (a) phonographic spellings were increasingly given up in favor of e.g. lexically bound spellings (Kornexl 2012: 381),[75] and (b) ongoing sound changes were not reflected regularly in the written language (cf. Dietz 2006: 18-19). On the other hand, the lOE sub-period is relatively short (see Table 2-2 above), so that pronunciations would not seem to have have had much time to develop very far from spellings. Fortunately for our purposes, the situation was quite different about a century after Norman Conquest; this will be the topic of the following section.

2.2.5 The absence of a contemporary standard orthography

It seems safe to assume that the situation in which the production of vernacular writing was continued about a century after the Norman Conquest was one in which there no longer was anything even remotely suggestive of a supra-regional spelling standard; to the contrary, Merja Stenroos (2002: 454) fittingly characterizes the eME period as “a time of much adjustment and remodeling” at the level of spelling. This means that, very broadly speaking, compared with lOE there is even less doubt that spellings corresponded fairly closely to contemporary pronunciations in the eME sub-period (Cook 2004: 160). Although the influential philologist Karl Luick’s (1921: 38) statement that in eME “one wrote as one spoke”[76] is now infamous[77] and usually taken with a grain of salt (cf. Laing

[75] Cf. Scragg’s (1974: 13) similar statement that “[e]leventh-century English spelling […] was not an accurate phonemic transcription, but […] the tradition that each lexical item should be spelt in a set manner was already strong”.

[76] Stanley’s (1988: 311) translation; original: “[…] man schrieb wie man sprach”.

[77] This statement is quoted and dealt with again and again, e.g. by Stanley (1988), Stenroos (2002: 448) and Laing (2008: 1).

2008: 1ff.), it still seems to be essentially true that in this period spellings corresponded more closely to pronunciations than directly before or ever since; in other words, the view voiced by Horn and Lehnert (1954: 17) that ME spellings in general were "essentially phonemic"[78] is still defensible.

The absence of a supra-regional written standard variety of English means that eME spellings can also be expected to represent to a very high degree the variation that was present in the spoken language, e.g. in the form of regional dialects:[79] The late twelfth century, i.e. the beginning of the ME period, saw what Donald G. Scragg (1974: 15) calls a "proliferation of regional spelling habits".[80] The term 'habits' here points to the fact that some scribes, or communities of scribes working at certain scriptoria, did in fact tend to systematize or harmonize their spellings (cf. Mihm 2007). The important fact to bear in mind, however, is that the resulting eME spelling systems did not have the character of 'standards', but of local agreements concerning the application of (mostly Latin-derived) spelling rules to local spoken varieties without being guided by "any kind of central or common norm" (Janson 2012: 150). The only norms that there could be were based on Latin, and therefore 'exoglossic' (cf. Nevalainen 2012: 127ff.). Such continuity of pre-Conquest spelling conventions for English as may possibly have still existed slowly but steadily "became a localised affair" (Scragg 1974: 19) in increasingly isolated places. We will now briefly address the question of the possible influence of Latin and French spelling habits on eME spellings before moving on to the question of the regularity or irregularity of eME spellings in general.

As mentioned above, one important fact to bear in mind is that the scribes who wrote eME texts had received their training based on Latin and on the language emerging as its rival, Anglo-Norman French (cf. Berndt 1960: 9-10; Hector 1966: 21-25; Hanna 2010: 208), so that they must have adhered to a number of exoglossic norms for the spelling of these languages when writing in English. Josef Vachek's (1989b [1959]: 126) conclusion from this, viz. that "the all-pervading influence of Norman scribal practice could not but lead to profound changes" in

78 My translation. Original: "[…] im wesentlichen phonetisch".

79 Conversely, eME texts are generally localizable with a greater degree of certainty than OE texts. The LAEME CTT (Laing 2013-; cf. Laing 1993) is constructed on the basis of this fact: 119 of the 166 texts in the corpus are localized to counties (see section 3.1.2.5).

80 Accordingly, scholars that hold a supra-regional 'standard' to have existed in lOE speak of it "collaps[ing]" (Scragg 1974: 15) or "dissolv[ing]" (Gretsch 2006: 164) in the eME period.

the writing system, is a typical statement found in mid-twentieth century literature. While it is definitely true (a case in point being the new spelling <qu> instead of earlier <cp> for the sound sequence [kw], cf. Upward and Davison 2011: 148-149), whether these facts have any bearing on the general correspondence between pronunciations and spellings is an entirely different question.

In fact, in past publications too much emphasis has been placed on possible negative consequences of ME scribes' presumed non-English training. In particular, ideas about negative language interference have caused the cliché of the "confused Anglo-Norman scribe" to emerge (Laing 1999: 254; also cf. Milroy 1992: 133; Laing and Lass 2003: 257). E.g. Rolf Berndt (1960: 10) postulated "Norman scribes who frequently possessed only a deficient command of the English language" trying their hands at what were "only very imperfect attempts at a phonetic script" in the eME sub-period.[81] In an influential paper Cecily Clark (1992: 117ff.) assembles a small collection of twentieth-century quotations that argue this way, and goes on to refute "[t]he myth of 'the Anglo-Norman scribe'" which stood behind the earlier negative judgments of post-Conquest spelling habits. Angus McIntosh (1989a: 11) attacks the idea of 'confused scribes' more generally, arguing that the word 'confusion' is often applied to situations in which there is not a one-to-one correspondence between phonemes and letters, in which case, however, words like 'confusion' are "misleading words which should have no place in the vocabulary describing the written language". The spellings found in certain texts have been dismissed as chaotic and unreliable "seemingly mainly because [they are] *variable*", as Milroy (1992: 133, original emphasis) puts it. It seems that the only people who regularly feel confused when confronted with such variable spellings are modern people who are used to having a strict orthography.

In recent decades scholars have thus begun investigating eME spellings and spelling systems in their own right, operating under the assumption that eME scribes were "native English-speaking professionals who knew what they were doing" (Laing and Lass 2003: 258). Similarly, Klaus Dietz (2006: 328-329) concludes from his close analysis of the development and function of certain spellings in medieval English that "following the Norman Conquest, insular writers of vernacular texts did sporadically orientate themselves towards (Anglo-) French models, but generally resorted to Anglo-Latin spelling traditions just as their An-

[81] My translation. Original: "Häufig nur über mangelhafte Kenntnisse der englischen Sprache verfügende normannische Schreiber"; "nur sehr unvollkommene Versuche einer phonetischen Schreibweise".

glo-Saxon predecessors had done”.[82] In other words, there is no particular reason to treat eME spellings as being more dependent on exoglossic, or ‘foreign-language derived’, norms than OE spellings. It seems that the early Middle English scribes’ multilingualism did nothing to limit and much to enrich the texts. Elaine Treharne (2011: 219) speaks favorably of the “multilingual effortlessness” pervading texts from this period, which is evidenced in the way manuscript pages often contain texts in multiple languages or even texts in which code-switching between languages occurs (also cf. Stein 2007: 31ff.; Schendl 2012: 508ff.). Treharne (2011: 220) concludes from this that, although Latin was the most frequently written language by far, all three languages (Latin, French, and English) seem to have been “equally viable choices for writing in the two centuries after the Norman Conquest”, at least potentially.

Indeed, ME spelling habits and spelling systems, whether standardized or not, would not have been functional without certain conventions that limited the ways in which sounds may be represented (cf. Milroy 1992: 134-136; Lass 1997: 61), which means that eME spellings cannot be called ‘chaotic’ in any true sense, although terms like “chaotic” (Miles 2005: 85) and “disordered” (Bennett and Smithers 1968: 374)[83] do continue to be used to describe the general character of ME spellings. In a recent article, Alexander Bergs (2013: 251) sides with those who (like Laing and Lass 2003, see above) stress that eME scribes must have ‘known what they were doing’ and reasons that

> if spellings really had been random and chaotic they would have caused severe communication problems. Since we have no evidence whatsoever of these problems, we can assume that most spellings somehow made sense to contemporary authors and readers. (Bergs 2013: 251)

Bergs’s opinion is shared by the compilers of the LAEME CTT, who write that “a spelling system is a mnemonic for native speakers”, and that this is as true for eME as for any other language variety (Laing and Lass n.d.b, §2.2.2; also cf. Lass 2015: 107). We therefore will assume that spellings found in eME texts were perceived as efficient and sensible by contemporary users, no matter how they are

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[82] My translation. Original: “[…] daß sich insulare Schreiber volkssprachiger Texte nach der Normannischen Eroberung zwar punktuell an (anglo)französischen Vorbildern orientieren, im übrigen aber wie ihre angelsächsischen Vorgänger auf die anglolateinische Schreibtradition zurückgriffen”.

[83] Bennett and Smithers (1968: 374) use this expression to characterize the spellings of the *Peterborough Chronicle* scribes.

perceived by modern eyes.[84] The eME spellings of the sounds relevant to the present study will be dealt with in section 4.1.1.

2.2.6 Local spelling systems

While no supra-regional standard spelling system was in place in the eME period, there were locally confined spelling systems. As already hinted at, the common characterization of ME spellings as ‘chaotic’ (assuming that this includes ‘unsystematic’) fades the more one concentrates on the spellings found in individual texts or regions. An example of an eME regional ‘system’ used by more than one scribe is to be found in the texts written in a relatively homogeneous variety of English in two South-West Midlands manuscripts. This written variety is known as the ‘AB language’, a term coined by J. R. R. Tolkien (1929).[85] Spatially, the provenance of the AB language is close to the provenance of the earlier lWS focused written variety, but the AB spelling system shows signs of being derived from Mercian OE (Scragg 1974: 28).

A different spelling system is famously used in a roughly contemporary, but geographically remote (East Midlands) manuscript written by Orm, an Augustinian canon who invented “a consistent orthography” characterized by its high phonographic accuracy (Scragg 1974: 29; Anderson and Britton 1999: 199ff.; Murray 2000: 618ff.).[86] Orm is the most popular example of an eME scribe attempt-

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84 In some cases, the impressions that lead to characterizations of the spelling variation found in ME texts as ‘chaotic’ are a natural result of subsuming many texts that manifest rather different spelling systems under the abstract rubric of ‘Middle English’. This is frequently done in introductions to Middle English: E.g. Fulk (2012: 26) warns his readers that “[s]ome scribes write <g> for <ȝ> or <y>, as with *gære* ‘year’ […], *gyff* ‘if’”. These examples are taken from the *Peterborough Chronicle* entry for the year 1137 (i.e. the ‘first Middle English text’, see section 2.2.1) and from John Barbour’s *Bruce* (a text from fourteenth-century Scotland), respectively, i.e. from texts from the temporal and local fringes of what can be called ‘Middle English’. Fulk’s (2012) warning might lead readers to expect <g>s to show up randomly in ‘Middle English’ as a representation of [j], but this is certainly not the case. A great advantage of the quantitative approach adopted in this study is that such infrequently occurring ‘fringe phenomena’ will be brought into proper perspective.

85 ‘A’ stands for *Ancrene Wisse*, the main work contained in one of the two manuscripts, and ‘B’ for Bodley 34, the name of the other manuscript (cf. Scragg 1974: 27-28).

86 The two main innovations of Orm’s system are the marking of short vowels in closed syllables via diacritics or doubled coda consonants (Anderson and Britton 1999: 326), and a new consistency in using different symbols for sounds that had all been represented by ‘insular *g*’ <ᵹ> in OE (cf. Scragg 1974: 31). Scragg (1974:

ing to disambiguate their spelling system (cf. Dietz 2006: 329), although even in this case disambiguation did not go so far as establishing a 'one-phoneme-one-grapheme' correspondence: Orm still used "many letters which expressed the same sound, 'ð' and 'þ' for example", as Cannon (2004: 87) points out.

Generally speaking, there has never been a perfect fit of spelling to sound and vice versa in any spelling system (apart from the IPA, which exists only for this purpose). Moreover, the new spelling habits and 'systems' that emerged in the eME period did not all exhibit the same degree of phonographic correspondence. It makes sense to distinguish, as Hogg and Denison (2006: 62-63) do, between relatively "economical" spelling systems (i.e. systems in which the rule of 'one symbol for each phoneme' generally holds true) and relatively "profligate" spelling systems whose users seem to "delight in [variation]". The latter kind of spelling system is more cumbersome to deal with, but it is not automatically less useful for the reconstruction of pronunciations: To stay with the example quoted above, once it has been established that e.g. <ð, þ> are distributed in a way that has no bearing on phonology, the same 'th sound' will be reconstructed any time any one of these symbols occurs in a certain word in a text. In this context, Laing and Lass (2003: 258) emphasize that eME "[w]riting systems could be prodigal yet still systematic". The question to ask is which variations should be seen as being connected with pronunciation and which should not, in a given spelling system.

In a survey of contrastive features within certain medieval English spelling systems, Angus McIntosh (1989b: 47ff.) makes the helpful distinction between 'S-features' (i.e. contrastive features directly representative of contrasts made in the spoken language, such as *etes* vs. *eteþ* '(he) eats', *vox* vs. *fox* 'fox', or *hem* vs. *þem* 'them'; cf. Lass's [1997: 62] term "phonologically significant spellings"), and 'W-features' (i.e. contrastive features not indicating any contrasts in the spoken language, such as <sche> vs. <she> 'she', or <it> vs. <itt> vs. <yt> 'it', or the aforementioned example from Orm, i.e. <ð> vs. <þ>; cf. Lass's [1997: 62]

29; also cf. Pearsall 1977: 102) speculates that the practical reason for the invention of this new system was "a desire to improve the delivery of the preachers who used the sermons", but this is doubtful since the *Ormulum* is a single, very long verse homiliary hardly fit for loud reading performances. Christopher Cannon (2004: 86ff.) suggests that Orm considered the very act of spelling out his English text in a regular and rule-based fashion a devotional practice. Whatever was the reason for Orm to devise (and continually revise) his new spelling system, it certainly has made his book a favorite among scholars investigating the features of eME phonology.

term “purely graphic variation”). Simply put, the ‘S-features’ of a written system are its features that relate to the spoken mode, and its ‘W-features’ are features that do not. Of course, this classification of written contrasts into ‘S-features’ and ‘W-features’ already entails some interpretation, but it can safely be undertaken in the light of past historical-linguistic scholarship in most cases. McIntosh’s (1989b: 47) examples show that his ‘S-features’ relate to cases in which the variants represent conspicuous regional accent differences (e.g. Southern *vox* vs. non-Southern *fox*), or in which the underlying variation is not of a phonological, but of a morphological (*etes* vs. *eteþ*) or lexical (*hem* vs. *þem*) nature. His ‘W-features’, on the other hand, relate to what could be called true spelling variation, i.e. cases in which there is no reason to assume any variation in the spoken language due to what is known about spelling habits and about the historical development of the words in question (e.g. <yt> vs. <it>).[87]

Applying this distinction to the question of the development of semivowels, it will become clear (see section 2.3.3.2) that the vocalization of semivowels resulted in a phonological change in the words in question, and that most differences among the eME spellings of the relevant sounds in words such as *day* and *flow* thus can definitely be taken to be ‘S-features’, or, to put it the other way around, the vocalization of semivowels is a change whose effects can be expected to “surfac[e]” (cf. Laing and Lass n.d.b, §2.1) to a large extent in the eME written records.

The existence of different spelling systems in the eME period should definitely be taken into account in any study based on eME spellings. One possibility to do this would be to make an *a priori* distinction between texts or groups of texts known to exemplify different spelling systems, and to treat them in isolation from one another. By doing this, we would ensure that the differences between spelling systems be sufficiently accounted for. On the other hand, the different sets of spelling conventions used in the eME period also certainly had many things in common. The present study will thus go the opposite way, i.e. begin by making generalizing statements about spellings and then bring the different local systems into the equation whenever needed.

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87 In other words, ‘W-features’ are spelling contrasts which are generally thought not to reflect phonological (i.e. contrastive) variation. However, McIntosh’s example of spellings of *she* suggests that this does not include cases in which there might have been some phonetic (i.e. non-contrastive) variation (cf. the discussion of the possible development of the consonant in the word ‘she’ in Horobin and Smith 2002: 131: It could be possible that the different spellings [<sch>, <sh>] do tend to be used at different stages in the sound shift).

2.2.7 The notation of spellings

In their introduction to the LAEME Laing and Lass (n.d.b, §2.2.2) warn modern readers and researchers that with historical spellings “we have no right to expect systems that cohere […] with orthographic models derived from particular formal linguistic theories”. This thought harks back to what was said above (see section 2.1.1) about the incompatibility between certain views of language that present-day diachronic linguists have to deal with.

The present study will henceforth avoid referring to the concept of the ‘grapheme’, which is problematic when applied to medieval spellings, no matter whether an autonomistic view of the written language is adopted or not:

– Any discussion of pronunciation-based ‘graphemes’ (i.e. spellings used to represent sounds) from a relational point of view would be circular owing to the fact that any knowledge of medieval English pronunciation is established on the basis of spelling analyses, as Glaser (1988: 316) has pointed out;
– from an autonomistic point of view, to speak of ‘graphemes’ carries implications of a somewhat standardized system of spelling (cf. Voeste 2008: 13), and the eME period is known for its lack of a standard orthography and its great variation in spellings: It is not an exaggeration to state there were almost as many eME spelling systems as there were eME scribes.

Even more crucially, the LAEME corpus compilers and annotators Laing and Lass (n.d.b) are generally critical of the application of modern linguistic concepts such as that of the ‘grapheme’ to early ME texts, saying that

> such concepts do not always characterise what [eME] scribes appear to be doing. [The scribes] are frequently not ‘structuralists’, and it seems to us better to use a theoretical framework and notation that cohere more closely with what scribes would have experienced in their education (Laing and Lass n.d.b, §2.3.1).

Similarly, Michael Benskin, one of the compilers of the *Linguistic Atlas of Late Mediaeval English* (LALME, cf. Benskin et al. 2013), has argued that, in contrast to speech, “writing is subject to design”, and that we must therefore always take note of “the conceptual categories of the designers” (Benskin 1991: 226) when analyzing written language material.

One such ‘conceptual category’ that the producers of eME texts would have used is the notion of the *littera*. This concept was current from late Antiquity and throughout the Middle Ages (cf. Benskin 1991: 226; Laing 1999: 255ff.; Laing and Lass 2003: 258; Smith 2007: 31; Laing 2008: 8n.; Laing and Lass n.d.b;

Rutkowska 2012: 229-230; Lass 2015: 109f.). The concept of the *littera*, e.g. as applied by Laing and Lass (n.d.b) to their LAEME CTT data, is of a highly relational nature, "[tying] together both the written and the spoken representations of language" (Laing and Lass 2003: 258; see Figure 2-1 below): The *littera* itself is to be thought of as the abstract 'letter' which has a name (*nomen*) and includes as its realization in writing all possible letter shapes (its *figurae*) and as its realization in speech all sound values that the shapes can stand for when read aloud (its *potestates*).[88]

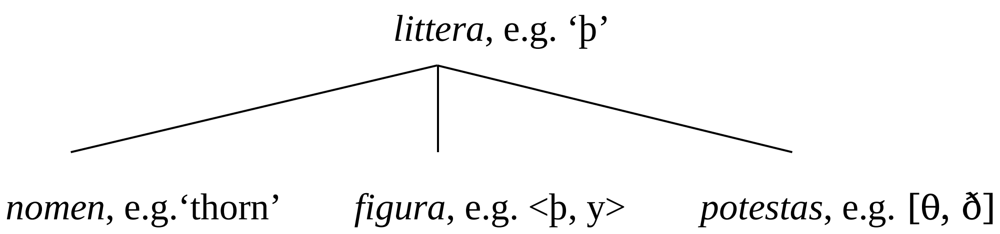

Figure 2-1: The concept of the *littera*

Benskin's (1991) producer-culture focused argumentation quoted above is complemented by systematic reasons for the use of the *littera* framework, such as the fact that the notion of the *littera* is in some respects more exact and less problematic, and therefore better suited for an application to medieval texts than modern concepts are. Especially since we are dealing with handwritten texts, the spelling situation is often quite complex due to the fact that in some cases the same *figura* could be used to represent different *litterae*, e.g. in some eME texts the *litterae* 'y', 'þ' and 'ƿ' were theoretically distinguished, but could in practice all be represented with the same letter shape (Laing 1999: 255ff.).[89]

A practical, much-quoted example (e.g. Harley 2006: 274ff.; Laing and Lass n.d.c, §3.3.3) is that of the letters made up of minims, i.e. vertical strokes, in some later medieval scripts: E.g. a sequence of two minims <ıı> is a *figura* that might be interpreted as either 'n' or 'u' at the litteral level. Another striking example of this principle is the spelling of 'feet' as <wed> by a scribe of MS Trinity College B.14.39 ('Trinity 323'; Laing and Lass 2003: 259), which, however unorthodox it might seem in isolation, is in keeping with the general spelling

[88] This definition of the *littera* is already adapted to its practical application to medieval texts: The original (i.e. classical) notion was that one *figura* and one *potestas* together made one *littera*. Inspection of medieval data has shown that obviously "the medieval notion is different in major ways from the late antique one" (Laing and Lass n.d.b, §2.3.2).

[89] Also cf. McLaughlin's (1963: 33-35) term 'neutralization'.

practices of the scribe: <w> belongs to the range of possible *figurae* for the representation of the *potestas* [f], just as <d> is among the possible spellings of [t], so that <wed> is a realization of the *litterae* ‘f’ + ‘e’ + ‘t’ in this text. Considering such cases, a theory involving overlapping grapheme-graph-phone mappings would not only throw up many theoretical problems such as those discussed in sections 2.1.4 and 2.1.5 above,[90] but the lists produced in such an approach would be simply unmanageable (also cf. Milroy 1992: 134-136).

Instead of using the term ‘grapheme’, we will prefer to speak more generally of ‘spellings’. Since Laing and Lass (n.d.c, §3.3.3) have transcribed the LAEME texts at the litteral level, the *littera* concept will be implicit in the notations of spellings, but it will be explicitly referred to only when necessary.

2.3 Problems relating to semivowels and vocalization

We will now get to the heart of the linguistic matter: This section deals with some theoretical issues involved in the phenomenon of semivowel vocalization. The sound change can either be described from an articulatory-phonetic point of view with the help of continuous terms (as the articulation of a sound gradually becoming ‘weaker’), or as a phonological change with the help of discrete terms (as a consonant becoming a vowel, or structurally ‘joining’ a preceding vowel). The following sections will thus introduce the most relevant discrete (2.3.1) and continuous terms (2.3.2) and then use these to describe the process of semivowel vocalization in medieval English (2.3.3).

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90 The problems involved in applying modern graphological theory to e.g. the situation in which the *litterae* ‘y’, ‘þ’ and ‘ƿ’ could be represented by the same *figura* in a given Middle English text become apparent from Josef Vachek’s (1989a [1945-1949]: 3) emphasis on the requirement in graphemics that “the graphemes of a given language – like its phonemes – remain differentiated from one another, i.e. that they do not get mixed up. The importance of this fact is promptly realized if a graphemic opposition comes to be neglected – thus, e.g., if a writing individual does not duly distinguish in written utterances his *a*’s from his *o*’s, his *h*’s from his *k*’s, his *s*’s from his *z*’s, etc.”. Thus, even though Vachek (e.g. in Vachek 1989b) applies terms like ‘grapheme’ to medieval English, it appears that the actual scribal practices in the ME period were not far removed from what Vachek here depicts as a worst-case scenario. – In Laing and Lass’s work on eME texts their decision to work with what they call ‘Litteral Substitution Sets’ (LSS; cf. Laing 1999; Laing and Lass 2003: 259ff.; Lass 2015: 110f.; also cf. Russ’s [1986: 170] concept of “graphemic variables”) and ‘Potestatic Substitition Sets’ (PSS; cf. Laing and Lass 2003: 262ff.; Lass 2015: 110f.) has proven fruitful in such cases.

2.3.1 Discrete terms: Consonants, vowels, and semivowels

As briefly mentioned in Chapter 1, semivowels are classified as consonants.[91] This classification is usually not undertaken on phonetic grounds, since phonetically semivowels are more similar to prototypical vowels than to consonants (Ladefoged and Maddieson 1996: 322; also cf. Roach 2009: 50; Watt 2010: 84-85).[92] According to Josef Vachek (1964: 65), "the only really outstanding difference between [i] and [j] [in Modern English] is that of their function within the syllable": Semivowels are classified as consonants on phonological grounds, namely due to the positions they occupy within syllables (cf. Giegerich 1992: 94; Gimson 2001: 210; Skandera and Burleigh 2005: 25).[93] In general, the obligatory nucleus of a given syllable will be filled with a vowel and not a consonant, and the optional onset and coda positions will be filled with consonants and not vowels. Semivowels are 'syllable-marginal' in that they can occur in onset and coda

91 The OED (s.v. "semivowel, *n.*") documents the use of the term *semivowel* since the sixteenth century, with the earliest uses echoing "that of the Roman grammarians, who applied the term to the spirants and liquids (including nasals)" while "the word now most commonly denotes only *w* and *y*", i.e. the sounds [w] and [j] (OED, s.v. "semivowel, *n.*"). With the emergence of modern linguistics in the nineteenth century the term *semivowel* acquired its current, more specific meaning, being used this way first in discussions of French phonology (cf. Kohrt 1985: 73ff.).

92 In his *Manual of English Phonetics*, Herbert Pilch (1994: 152-153) even claims that in PDE [j] and [w] are "indistinguishable" from proclitic [i] and [u], respectively, except in "overdifferentiated pronunciation", giving examples of "homophonous" pairs such as *the ear – the year* and *to aid – to wade*. However, see the following footnote for contradictory phonetic evidence.

93 However, due to their occurrence outside of syllable nuclei, the duration of semivowels is often shorter than that of vowels (cf. Ogden 2009: 79; 83); Lodge (2009a: 216) phonetically characterizes them as "brief vocoids" (see fn. 95); Roach (2009: 50) says that "[f]rom the phonetic point of view the articulation of [[j]] is practically the same as that of a front close vowel such as [i], but it is very short. In the same way [[w]] is closely similar to [u]". Maddieson and Emmorey (1985) acoustically analyzed the outputs of speakers of the three unrelated languages Amharic, Yoruba and Zuni and found evidence for what had long been commonly surmised (e.g. by Chomsky and Halle 1968; cf. Maddieson and Emmorey 1985: 164), viz. that the semivowels /j/ and /w/ are generally produced with more constriction than the vowels /i/ and /u/ in all analyzed languages, "perhaps" including greater lip rounding for /w/ than for /u/ (Maddieson and Emmorey 1985: 171). Similarly, Yavaş (2011: 115) finds that in acoustic-phonetic analyses "semivowels […] reveal patterns very similar to, but markedly fainter than, high vowels".

positions only (cf. Carr 2008: 157, s.v. “semiconsonant”; [94] Herbst 2010: 47), and they are thus classified as consonants. [95]

The class of consonants has traditionally been subdivided into three basic groups on articulatory-phonetic grounds, i.e. based on manner of articulation (cf. Carr and Montreuil 2013: 1). [96] This three-way classification gives us the consonantal sub-categories of stops (including oral plosives and nasals), fricatives, and approximants (including semivowels and liquids). [97] Table 2-3 sums up the common three-way classification of consonants and provides some examples of sounds that are phonemic in ModE, given in IPA symbols (cf. Jones 2010).

Within this broad three-way division, semivowels are classified as approximants along with [l] and [r]. Approximants are best characterized as consonants during whose articulation the airflow through the mouth is neither blocked (as with stops) nor manipulated in a way that creates audible friction (as with fricatives): They are the most vowel-like of the three groups of consonants.

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94 The term ‘semivowel’, which has long been the cause of some bewilderment (cf. Kohrt 1985: 75), should thus be taken to imply something along the lines of ‘*like* a vowel (although it is not a vowel)’. This might be the reason why alternative terms such as ‘semiconsonant’ have not acquired currency – after all, semivowels *are* truly consonants.

95 This reasoning implies that the general division of speech sounds into the two categories of ‘vowels’ and ‘consonants’ is itself easiest to make on functional grounds, namely based on which part(s) of a syllable the sound in question will typically occupy. Indeed, vowels and consonants can be hard to distinguish categorically on phonetic grounds (cf. Giegerich 1992: 94; Roca and Johnson 1999: 268-270; Gut 2009: 28; 52; Herbst 2010: 47; O’Grady 2013: 29, s.v. “consonant”); in fact, two other terms – *contoids* and *vocoids* – have been coined for the acoustic-phonetic ‘counterparts’ of consonants and vowels (Lodge 2009a: 38; Lodge 2009b: 78; Skandera and Burleigh 2005: 26; O’Grady 2013: 29, s.v. “Consonant”). Thus, when we refer to semivowels as consonants, we are making a phonological statement, as the concept of the consonant, taken this way, is in itself phonological, i.e. describing function rather than form.

96 “Manner of articulation” is the classical term used for the discrete stop-fricative-approximant distinction, even though this classification could also be argued to involve continuous degrees of stricture of the airflow, from complete obstruction (stops) to very little obstruction (approximants).

97 Affricates are not included in this list because they articulated as a combination of the first two manners of articulation, regardless of whether they are best to be viewed as single phonemes or as sequences of two phonemes (cf. Lagefoged and Maddieson 1996: 3). In his *Manual of English Phonetics* Pilch (1994: 152) writes that from a phonetic point of view affricates “can be classified with the stops” because of their first element.

Classification according to manner of articulation	
stops	[p, t, k, b, d, ɡ, m, n, ŋ]
fricatives	[f, θ, s, ʃ, v, ð, z, ʒ, h]
approximants	[l, r, j, w]

Table 2-3: Classification of consonants according to their manner of articulation, with some examples of consonants occurring in PDE

In the late 1960s, generativists established a more fine-grained classification of speech sounds according to a set of 'distinctive features' (cf. especially Chomsky and Halle 1968). This approach takes more of a phonetic perspective (O'Grady 2013: 119, s.v. "sonorant"): Phonemes are seen as unique combinations of binary phonetic feature values (cf. Bird 2003: 5-7; Hall 2011: 104). The conventional notation of these binary features is as words in square brackets with prefixed plus or minus symbols, e.g. [+ high] for the feature 'high' or [– back] for the feature 'non-back' (Chomsky and Halle 1968: 64ff.). Within this framework, distinctive features cluster together hierarchically to form 'classes' of all possible speech sounds. E.g. at the highest level of abstraction there are three "major class features" that work together in terms of the kind and degree of constriction of the airflow through the articulators (Chomsky and Halle 1968: 301-303): [± consonantal], [± vocalic] and [± sonorant].[98]

98 Chomsky and Halle's (1968) system has since been revised by various scholars (e.g. Halle and Clements 1983; McCarthy 1988; Clements 1990): [± vocalic] is sometimes left out, and [± approximant] is often included in more recent accounts of major class features (cf. Hall 2011: 104-107). These changes do not greatly affect our brief characterization of Chomsky and Halle's system.

Table 2-4 shows that all possible speech sounds fall into five different categories according to the three major class features.

	[± sonorant]	**[± consonantal]**	**[± vocalic]** [99]
non-nasal consonants [100]	–	+	–
nasal consonants	+	+	–
liquids	+	+	+
semivowels, [101] voiceless vowels	+	–	–
voiced vowels	+	–	+

Table 2-4: Classification of speech sounds according to three "major class features" (adapted from Chomsky and Halle 1968: 303)

In Chomsky and Halle's (1968) system, semivowels are classified as neither 'vocalic' nor 'consonantal', but as positively 'sonorant'. [102] Since the present study focuses on semivowels becoming vowels, it is interesting to note that what the two categories of semivowels and vowels have in common is that they are both 'sonorant' and 'non-consonantal' according to Chomsky and Halle's (1968) original classification. This means that the change from semivowel to vowel can be seen as a change of sign in regards to the single feature [± vocalic]. [103]

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99 Chomsky and Halle (1968: 302) reserve the feature [+ vocalic] for sounds during whose articulation "the most radical constriction does not exceed that found in the high vowels [i] and [u]" (thereby excluding semivowels, cf. Maddieson and Emmorey 1985).

100 The term "consonants" as employed here obviously excludes all approximants.

101 Chomsky and Halle (1968: 303) use the term "glides".

102 According to more recent revisions (see fn. 98), semivowels are [– consonantal], [+ sonorant] and [+ approximant] (Hall 2011: 105-106).

103 According to Chomsky and Halle's (1968: 302) phonetics-based definition, the feature [± vocalic] refers to the degree of "constriction" of articulators among other things. It has already been shown (see fn. 93) that phonetic differences between vowels and semivowels are minimal and hard to come to terms with. Chomsky and Halle (1968: 302n.; 354) are aware of this difficulty and offer an alternative list of "major class features" in which the formal feature [± vocalic] is replaced by the functional feature [± syllabic], commenting that the 'syllabic' feature is positive for "all segments constituting a syllabic peak" and that "[w]hen [high vowels] become

The feature [± sonorant] has been well integrated into modern phonologal theory (cf. Spencer 1996: 12; Carr 2008: 160, s.v. "sonorants"; Gut 2009: 30; Hall 2011: 22; Collins and Mees 2013: 52). Like all distinctive features, [± sonorant] is binary [104], and the two oppositional terms 'obstruents' and 'sonorants' play an important role in phonology (cf. Giegerich 1992: 20): [105]

Classification according to the feature [± sonorant]	
obstruents	[p, t, k, b, d, g, f, θ, s, ʃ, v, ð, z, ʒ, h]
sonorants	[m, n, ŋ, l, r, j, w, i, u, o, e, ɜ, a]

Table 2-5: Classification of sounds according to the major class feature [± sonorant], with some examples of sounds occurring in PDE (adapted from Gut 2009: 30)

All obstruents are consonants, but not all sonorants are vowels: Some sonorants are consonants, and these are the more vowel-like consonants: Once again, the phonetic proximity of semivowels to vowels is highlighted by the fact that they cluster together according to this binary distinction.

In summary, we might say that semivowels are classified as consonants on functional grounds, and as approximants and as sonorants on formal grounds. Both terms, 'approximants' and 'sonorants', can be said to apply to the most vowel-like consonants. The following section (2.3.2) will introduce some continuous concepts which will be useful for the discussion of the process of vocalization (section 2.3.3).

2.3.2 Continuous terms: Sonority, strength, and lenition

The obstruent-sonorant distinction discussed above is related to a phenomenon with a similar name, viz. sonority. The term was first used in synchronic discussions of syllable structure (e.g. Jespersen 1904: 186ff.; also cf. Clements 1990; Giegerich 1992: 132ff.; McMahon 2002: 107-109; Skandera and Burleigh 2005:

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nonsyllabic, they […] turn into the high glides [w] and [y]" (Chomsky and Halle 1968: 354).

104 Chomsky and Halle (1968: 302) define sonorants as "sounds that are produced with a vocal tract cavity configuration in which spontaneous voicing is possible", with the binarity resulting from the fact that either 'spontaneous voicing' is possible or not in certain vocal tract positions.

105 E.g. Spencer (1996:12) introduces and explains these terms even before mentioning the concepts of manner of articulation, place of articulation and voicing in his *Phonology* textbook.

66; Gut 2009: 80; Lodge 2009b: 77-78; Gouskova 2010: 543; Noack 2010: 60; Yavaş 2011: 135ff.). T. Alan Hall (2011: 230) refers to sonority as “the most important universal phonotactic principle in syllable phonology”. [106] While the concept of sonority itself is hard to define (cf. the list of “[c]orrelates of sonority” in Parker 2002: 44-46; also cf. Hall 2011: 231), most scholars would probably agree with Minkova (2014a: 31), who says that it refers “loosely” to the loudness of speech sounds; similarly, Giegerich (1992: 132) defines sonority as the “relative loudness [of particular speech sounds] compared to other [speech] sounds”. [107] ‘Relative’ is a key word in this definition: [108] Sonority is usually taken as a relative concept since it derives from comparing consecutive sounds in the context of discussions of syllable structure. [109] There is a language-universal rule (cf. Jespersen 1904: 188; Hall 2011: 231; Fuhrop and Peters 2013: 92) which states that each syllable has a sonority peak (its nucleus) towards which any preceding sounds within the same syllable ascend, and from which any following sounds decline, in terms of sonority. In other words, all sounds in a syllable’s onset and coda are usually [110] sorted according to their sonority, with those with the highest sonority closest to the nucleus. In treatments of syllabification, one often finds diagrams like the one given as Figure 2-2, which is a sketch of the sonority pattern of the phonemes in PDE *print*.

106 My translation. Original: “Das wichtigste universelle phonotaktische Prinzip in der Silbenphonologie […]”.

107 There is no universally accepted definition of the term ‘sonority’: E.g. Yavaş (2011: 135) defines the term as being “primarily related to the degree of opening of the vowel tract during […] articulation”, but Yavaş (2011: 135) himself states that that the definition of the term is controversial and that his definition was chosen “[f]or pedagogical purposes”. Staffeldt (2010: 180) uses the rather vague term ‘intensity’ (“Intensität”). Ohala and Kawasaki (1984: 122) even claim that the term is indefinable (cf. Hall 2011: 231).

108 Giegerich (1992: 132) is actually echoing Jespersen’s (1904: 188) expression “relative […] Schallfülle”.

109 There are varying opinions as to whether sonority exists as an independent phenomenon, i.e. whether some sounds are intrinsically sonorous, or whether it is a relative concept that only makes sense when comparing different sounds within a language (Hickey 2009: 121). – Cf. Lodge (2009b: 77-78) for more on the problems involved in using the phonetically-defined concept of sonority to explain phonological notions.

110 This principle is seen as universal although it can sometimes be violated, or appear to be violated, in some languages (Hall 2011: 233).

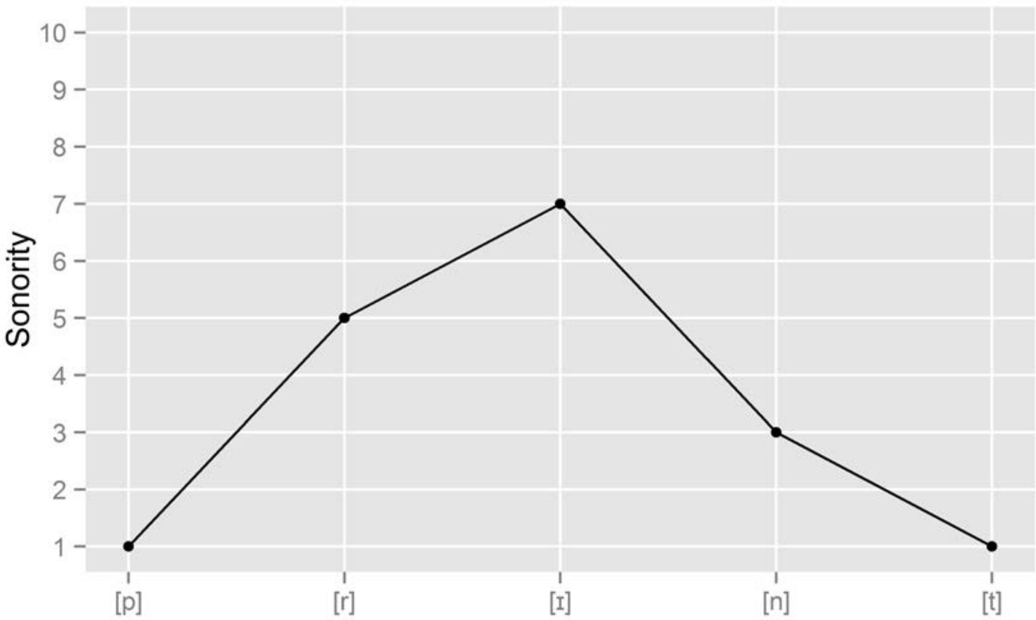

Figure 2-2: The sonority of the sounds in PDE *print* (based on Gut 2009: 81) [111]

The relativity of the concept of sonority is here manifested in the ‘scalarity’ (cf. Jones 1989: 56-57; Grijzenhout 2012: 107) of the y-axis, the ten grades of which will be explained in the following. This ‘scalarity’ is also precisely what makes the notion of sonority particularly useful not only for the discussion of syntagmatic relationships between sequences of sounds, but also for discussing and evaluating gradual sound changes over time (e.g. Jones 1989: 56ff.; Keydana 2008; Hickey 2009: 121; Minkova 2014a: 50).

The concept of sonority can be used to rank groups of phonemes from ‘low’ to ‘high’ based on the two factors ‘degree of airflow constriction’ (ranks 1 to 10 on the y-axis in Figure 2-2, and in Table 2-6) and ‘voicing’ (a vs. b in Table 2-6): A sound articulated with less obstruction of the airflow will be more sonorous than

111 This plot and many more to follow were made with the help of the R package `ggplot2` (Wickham 2009; cf. Chang 2013: 373ff; Toomey 2014: 176ff.). – Figure 2-2 represents an admittedly neat abstraction in that both axes visually suggest much more of a ‘scalarity’ than is actually given: This is true of the phones given on the x-axis because in connected speech, sounds are not articulated individually, but overlappingly (Ladefoged and Maddieson 1996: 329; Gut 2009: 33), and even if they were articulated in isolation, they would not all take equally long to be pronounced (Gut 2009: 164); the y-axis likewise perhaps suggests too much of a ‘scalarity’ because the way in which speech sounds differ in terms of sonority cannot really be measured on a scale with equal distances between all ranks.

a sound articulated with more obstruction, and a voiced sound will be more sonorous than an unvoiced sound.[112]

Classification of speech sounds			**Sonority**
consonants		1a [p, t, k]	low
		1b [b, d, ɡ]	
		2a [f, θ, s, ʃ]	
		2b [v, ð, z, ʒ]	
	sonorants	3 [m, n, ŋ]	
		4 [l]	
		5 [r]	
		6 [j, w]	
vowels		7 [i, u]	
		8 [o]	
		9 [e, ɜ]	
		10 [ɑ]	high

Table 2-6: Speech sounds in a sonority hierarchy, with some examples of sounds occurring in ModE (based on Crowley and Bowern 2010: 24 and Vogel 2012: 19)[113]

The resulting order is often referred to as a 'sonority hierarchy' (cf. Mowrey and Pagliuca 1995: 79; Parker 2002: title).[114] The ten degrees of constriction can be described as follows: There is a complete blocking of the airflow (grade 1); two articulators move very close together, creating audible friction (2); the airflow is not blocked, but forced through the nasal cavity (3) or through smaller or greater

112 The second factor 'voicing' is taken into account only if phonemes are identical in terms of their manner of articulation, i.e. in terms of the first factor 'degree of constriction', as is the case with the obstruents in Table 2-6. Hickey (2009: 121-122) says that for the consonants (grades 1 to 6 in Table 2-6) place of articulation "can lead to further differentiation" in terms of sonority; debuccalization (the change from oral to glottal as in [x] > [h]) might be a good example (cf. Honeybone 2012: 774).

113 For the sake of simplicity, the types of sounds typically included in such a scale are both simplex (in that affricates are left out) and singleton (in that geminates are left out) (Lavoie 2009: 33).

114 The term 'sonority scale' is also used (cf. Rice 1992: 65; Duanmu 2009: 42; Grijzenhout 2012: 107) although it is infelicitous for the reasons mentioned above (see fn. 111).

gaps by positioning of the tongue in the oral cavity (4-10).[115] Grades 3 to 10 (the sonorants) are categorically different from ‘grades’ 1 and 2 (the obstruents) in that they are always voiced and there is no obstruction of the airflow through the mouth. By contrast, the differences between grades 4 through 10 are truly gradual, with [ɑ] being the most open vowel in ModE.

As can be seen in Table 2-6, the semivowels [j] and [w] are the consonants with the highest degree of sonority, and therefore the most vowel-like consonants (Fulk 2012: 23). The sequence of grades 4 to 10 suggests that the vocalization of semivowels (i.e. the change from grade 6 to grade 7) involves an increase of sonority and thus constitutes a gradual phonetic change, though the long-term consequences involve categorical changes in the language’s phonology, as has become obvious in section 2.3.1.[116]

Another concept that frequently underlies discussions of sound changes, and which is directly related to sonority, is what will be referred to in the following as ‘articulatory strength’. More than anything else, this concept is known for its diachronic decrease – called weakening or ‘lenition’ – over time: Introductions to

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[115] Nasals (grade 3) are a special case: In terms of the complete obstruction of air in the mouth they are on par with grade 1 (hence their classification as stops according to manner of articulation), but because their articulation requires unhindered airflow through the nose, they are more sonorant than the obstruents.

[116] The IPA symbols in Table 2-6 happen to visualize this fact: Rows 6 and 7, which contain the semivowels and the high vowels, look more similar than any other two consecutive rows. The IPA draws most of its symbols from the Latin (and ‘Romanized Greek’) alphabets (Jones 1949: 1-2; 2010: 301-302; also cf. Bauer 2007: 131ff. for more on the implications of IPA traditions), which themselves are largely arbitrary in the mapping of speech sounds to letters. In this case, however, the optical similarities between the symbols [j] and [w] and the respective vowel symbols [i] and [u] are not coincidental, the letter <j> being in origin a variant of <i> (Scragg 1974: 81; Minkova 2014a: 88; Minkova 2014b: 60-61), and the <w> being a ligature of two <v>s, a letter which was in turn originally a variant of <u> in the Latin spelling system (Scragg 1974: 81; Brekle 1994: 198; Freeborn 1998: 447). The symbols thus share a common history, and they remained interchangeable in the history of English for a very long time: Although there oldest advocates for a consistent use of <i, u> for vowels and <j, v, w> for consonants lived in the sixteenth century (Scragg 1974: 81), in practice “[t]he letter <j> was a variant of <i> and was treated as such until the seventeenth century, when the shape of <i> was preferred for the vowel and <j> for the consonant” (Minkova 2014a: 88). Donald Scragg (1974: 81; also cf. Hector 1966: 40) even claims that the graphic variation between <i ~ j> and <u ~ v> generally continued to be upheld “up to the eighteenth century”, and he lists the example of a nineteenth-century dictionary (namely Richardson 1836) in which <i ~ j> and <u ~ v> were still treated as the same respective letters.

sound change phenomena frequently begin by stating as a universal rule that speech sounds tend to become ‘weakened’ (cf. Hock and Joseph 2009: 129; Crowley and Bowern 2010: 23ff.; Millar and Trask 2015: 51ff.). E.g. Blake (2008: 211) poignantly summarizes that sound changes are most commonly “reductive [and] involve a kind of erosion”. Hock and Joseph (2009: 126) break it down to the generalization that in languages around the world “changes which seem to ease pronunciation make up the bulk of regular sound change”. Lenition involves the loss or diminishment of elements and/or a reduction of complexity, and it occurs far more commonly than its directional opposite fortition, i.e. changes involving the gain or augmentation of elements and/or an increase of complexity (cf. Mowrey and Pagliuca 1995: 79; Millar and Trask 2015: 55).[117] Lenition is usually identified by its (negative) diachronic results, e.g. Minkova (2014a: 51) defines “weakening” as the “propensity towards deletion” of speech sounds (also cf. Lass and Anderson 1975: 159; Hock 1991: 81; McMahon 1994: 16; Lavoie 2009: 31; Honeybone 2012: 774).[118]

The concept of ‘articulatory strength’ itself, i.e. of that which is reduced in lenition, is hard to define (Lodge 2009a: 49; Lavoie 2009: 29-30; also cf. Campbell and Mixco 2007: 100); attempts at definitions have included phonetic parameters such as the degree of airflow obstruction (Lass 1984: 178; Vennemann 1988:8; Kirchner 2004: 313; Zuraw 2009: 13), the number of ‘muscular events’ during sound production (Mowrey and Pagliuca 1995: 79-80; Zuraw 2009: 14-15), or the duration of these events (Browman and Goldstein 1992; Mowrey and Pagliuca 1995: 75-78; Zuraw 2009: 13-14). Articulatory strength is always higher for consonants than for vowels, which is why it is also known as ‘consonantal strength’ (e.g. Vennemann 1988: 9; Murray 1988: 5). Berg (1998: 79) even uses the term “consonanthood” to speak of the phenomenon: Consonants can be more or less “consonant-like” in his terminology (Berg 1998: 80). Some even suggest that the idea of strength is only applicable to consonants, with vowels having a strength of 0 (cf. Millar and Trask 2015: 51). However, the reason the term ‘ar-

117 This fact is often interpreted as exemplifying a more general ‘principle of least effort’ which motivates sound changes (cf. Nielsen 1983: 156; Zuraw 2009: 16; Salmons 2010: 92; Millar and Trask 2015: 51).

118 This means that, from a diachronic point of view, ‘zero’ (∅) might be added at the very end of the strength scale. The addition of ‘zero’ to the sonority scale, however, would make little sense because a zero element can of course not be said to be the most sonorous sound. According to Lavoie (2009: 33), the concept of sonority “[g]enerally […] assumes that the segment will be articulated in some way”, and so the sonority scale ends in [ɑ] and not in zero.

ticulatory strength' is chosen here is because it *can* also be applied to vowels: In a "Universal Consonantal Strength" hierarchy introduced by Vennemann (1988: 9, cf. Table 2-7 below), consonants are aligned with vowels once more. The high vowels rank higher on this 'scale' than the lower vowels because in the case of the vowels, articulatory strength can be equated with length, and high vowels generally take slightly longer to articulate than low vowels do (cf. Minkova 2014a: 50, also cf. Lavoie 2009: 31-32).[119]

Speech sounds	Articulatory strength
11 [p, t, k]	low
10 [b, d, g]	↑
9 [f, θ, s, ʃ]	
8 [v, ð, z, ʒ]	
7 [m, n, ŋ]	
6 [l]	
5 [r]	
4 [j, w][120]	
3 [i, u]	
2 [o, e, ɜ]	↓
1 [ɑ]	high

Table 2-7: Speech sounds in an articulatory strength hierarchy, with some examples of sounds occurring in ModE (based on Vennemann 1988: 9)

As the almost exact repetition of the ten 'grades' from Table 2-6 in Table 2-7 suggests, articulatory strength and sonority balance each other out. In other words, the 'sonority scale' introduced in Table 2-6 relates to the concept of articulatory strength in such a way that the most sonorous, or 'loudest', speech sounds are those with the least articulatory strength (cf. Crowley and Bowern 2010: 24;

119 Place of articulation might be taken into account as an additional factor, as it is for sonority (see fn. 112). E.g. Crowley and Bowern (2010: 90) characterize the glottalization of oral sounds as a type of lenition and, by implication, as an increase in sonority.

120 Vennemann's (1988: 9) original hierarchy does not include semivowels because he treats them as non-syllabic versions of vowels, e.g. [i̯]. Scholars who do include semivowels in their strength hierarchies (e.g. Hooper 1976: 206; Brakel 1979: 49; Jany et al. 2007: 1404) invariably place them between the liquids and the high vowels.

Fuhrop and Peters 2013: 91; Minkova 2014a: 50).[121] We can visualize this by adding a second line to Figure 2-2 in order to represent the positions of the respective phonemes in PDE *print* on Vennemann's (1988) scale:

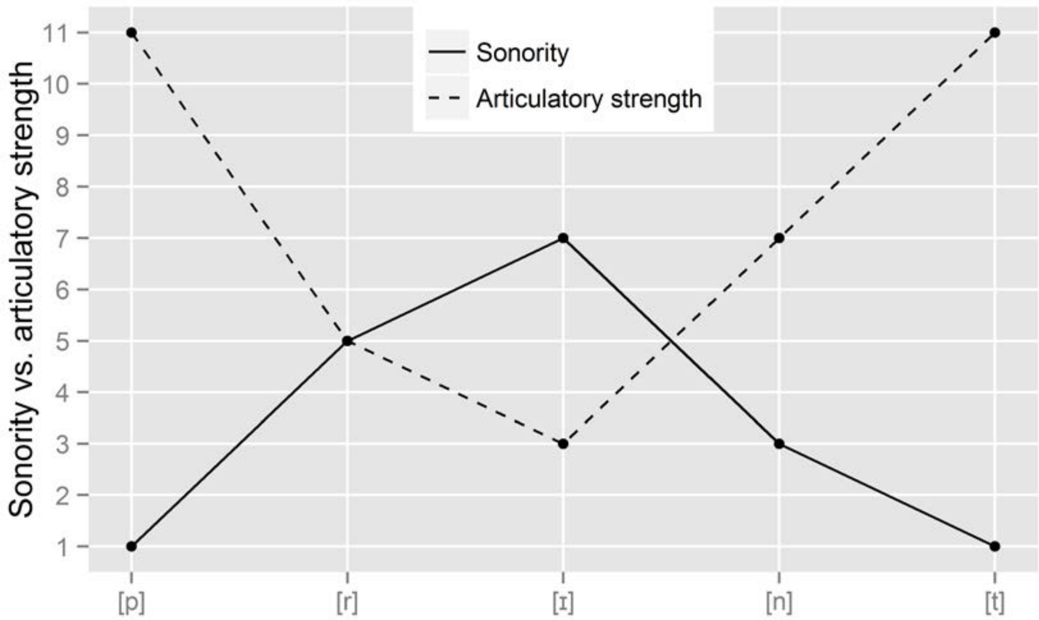

Figure 2-3: The sonority and the articulatory strength of the sounds in PDE *print* (based on Gut 2009: 81 and Vennemann 1988: 9)

From a diachronic point of view, the inversely proportional relationship between sonority and articulatory strength means that any loss of articulatory strength in which the sound in question is not simply deleted is to be seen as an increase of sonority: Using Robert Kirchner's (2004: 314) expression, lenition equates to "sonority promotion".

The following section will relate what has been said generally about sonority and strength to the process of semivowel vocalization.

[121] The inversely proportional relationship between sonority and articulatory strength might be conceived of along the lines of the tongue compensating for what the vocal chords are not doing and vice versa. In terms of articulation, the 'indeterminate vowel' [ə] is all voice and no tongue activity on one side of the clime while on the other side voiceless plosives are all tongue activity and no voice. – Parker (2002: 72-73) argues that there is some redundancy in maintaining both a sonority hierarchy and a strength hierarchy: Since the two phenomena behave inverse-proportionally, one of the two hierarchies should be discarded. While this is essentially true of the two *hierarchies*, it still makes sense to preserve both *concepts* because they are tied to the action of different articulators during speech production.

2.3.3 Semivowel vocalization

2.3.3.1 Semivowel vocalization as sonority increase and lenition

In section 2.3.2, it was established that semivowel vocalization is a sound change that involves an increase of sonority and a decrease of articulatory strength, i.e. lenition. Keeping in mind the facts that semivowels are the consonants with the highest sonority and the lowest articulatory strength (cf. Minkova 2014a: 50), and that speech sounds generally have a propensity for lenition over time (cf. Honeybone 2012: 774), it is not at all surprising that semivowels should be vocalized, and indeed they are the most frequently vocalized class of consonants (Vogel 2012: 19).

It might be recalled that such phonetic differences as may exist between semivowels and high vowels are minute (see section 2.3.1 above); generally speaking, semivowels and vowels are much easier to distinguish on phonological rather than phonetic grounds. Be that as it may, the rather 'consonantal' qualities of the OE semivowels are undisputed: In his *Grammar of Old English,* Richard Hogg (1992: 41) suggests that both [j] and [w] had a higher articulatory strength in OE; this seems especially clear for lOE [j], most instances of which had been lenited from earlier [ɣ], as shall be further explained in section 2.4.1.2. In the case of [w], it is synchronic evidence from OE syllable structures (particularly the prevalence of onset clusters like [wr, wl]) which suggests that the sound was less sonorous and articulatorily 'stronger' in earlier times (Anderson 2001: 209ff.; see section 2.4.2.2).

Lisa Lavoie (2009: 42) points out that a phonological change such as semivowel vocalization might begin as a phonetic weakening, but then become what she calls "phonological […] weakening" caused by the "perceptual reinterpretation" of the lenited sounds by listeners (also cf. Ohala 1981). In the next section, we will focus on the phonological aspects of semivowel vocalization, and on what 'phonological weakening' might mean.

2.3.3.2 Semivowel vocalization as nuclearization

As was shown in section 2.3.1, from a phonological point of view semivowel vocalization means that a previous consonant turns into a vowel, which means that a sound previously filling a syllable-marginal position (although, phonetically speaking, it might already have been rather vowel-like) comes to fill a syllable-central position.

This syllable-central position, i.e. the syllable nucleus, was already filled (as it must be) before the vocalization began. Thus, postvocalic semivowel vocalization means that what was formerly a consonantal element following a nucleus now 'joins', i.e. becomes part of, the preceding nucleus. This has been referred to as nucleation (Colman 1983: title) or nuclearization (Vennemann 1988: 74; Murray 2012: 264); we will prefer the latter term. Simply put, nuclearization consists in the structural reanalysis of a VC (in our case V + semivowel) sequence as a VV sequence. This has two necessary consequences: It results in a long nucleus (i.e. a 'bimoraic' nucleus in terms of abstract units or 'morae', cf. Giegerich 1992: 142; Jensen 1993: 62; Carr 2008: 103, s.v. "mora"; Carr and Montreuil 2013: 242),[122] and it results in an 'open' syllable by deletion of the coda (cf. Hall 2011: 221). It is important to point out, however, that both of these necessary outcomes might already have been the case before the change: (a) The syllable in question might already have had a long (or 'bimoraic') nucleus, and (b) the syllable might have already been open, i.e. coda-less, the semivowel having been part of the onset of the next syllable. These cases will now be briefly commented on with reference to the concrete situation in medieval English.

(a) If the OE syllable nucleus in question was made up of a long segment, the vocalized semivowel did not lengthen it any further, but the result in ME was invariably a long vowel, a diphthong in most cases. However, this is not to say that the original quantity of the nucleus plays no role; it has long been conjectured to have influenced the process of semivowel vocalization (e.g. Schlemilch 1914: 42; Jordan 1968: 169). The question of the influence of vowel quantity will be addressed in the analysis. If the original nucleus consisted of a long monophthong that was homorganic[123] with the semivowel (i.e. [iː] + [j] or [uː] + [w]), complete assimilation would take place. This combination is generally hard to find; lOE *stiȝe* [stiːje] '(I) ascend' and *tiȝen* [tiːjen] '(they) tie' are among the rare examples.

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122 A mora (pl. morae) is an abstract unit of what is usually called 'syllable weight', but that is a metaphor. James D. McCawley (1968: 58n., also qtd. in Jensen 1993: 62) defines a mora as "something of which a long syllable consists of two and a short syllable consists of one".

123 Although the term *homorganic* usually means 'having the same or a similar place of articulation' and the concept of 'place of articulation' does not hold for vowels, it does make sense to apply the term to the semivowels [j, w] and the 'corresponding' high vowels [i, u] because of their respective phonetic similarities (cf. Trager 1942: 222; Colman 1983: 36).

(b) The question of whether there was a syllable boundary between the sounds under consideration (i.e. VC vs. V.C) is treated under the headline of 'tautosyllabicity': The OE semivowel was tautosyllabic with the preceding vowel if it belonged to the same syllable. Like vowel quantity, the question of tautosyllabicity was identified early on as a main contributing factor to the sound change (e.g. Luick 1940: 945); it will therefore play an important role in the analysis (see section 4.1.5). Traditionally, this factor has been assumed to be binary: Either the semivowel belonged to the same syllable as the preceding vowel, or it belonged to the following syllable.[124] However, modern synchronic linguistics identifies a third possibility: For formal reasons, an intervocalic sound might have to be seen as ambisyllabic, i.e. as belonging to both syllables (cf. Carr 2008: 12, s.v. "ambisyllabicity"; Duanmu 2009: 9; Gut 2009: 82; Hall 2011: 268ff.). The question of whether or not to posit ambisyllabic consonants for medieval English has so far remained unresolved (cf. Minkova 2015a: 139-140).[125] Robert Murray (2000: 634) sums up the discussion by stating that the phenomenon of ambisyllabicity is usually said to have emerged "by or during the Middle English period", adding that it is therefore "not unreasonable to consider its possible relevance to [eME]". Thus, in addition to having tautosyllabicity as a binary variable, the present study will also include an alternative version of the variable offering a three-way distinction in order to single out potentially ambisyllabic cases and be able to test whether they show any peculiarities as a group (see section 3.2.1.1.2 for further details).

In cases in which the lOE semivowel was tautosyllabic with the preceding vowel, the structural change undergone by the syllable under consideration can be rendered schematically as follows (disregarding vowel length):

(8) (C)VC > (C)V

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124 In the case of intervocalic consonants, syllabification undertaken for medieval English has thus adhered to the universal "Maximal Onset" rule (cf. Duanmu 2009: 56ff.; Hall 2011: 223-225; Fuhrop and Peters 2013: 94).

125 E.g. Hogg (1992) and Suzuki (1994) favor the idea of ambisyllabicity in OE and ME while Fulk (1997) rejects it. Others (e.g. Lass 1992) posit ambisyllabicity for ME, but not for OE (cf. Minkova 2015a: 139). Murray (2000: 634) rules out that ambisyllabicity played a role in Orm's spelling system, saying that it existed at best as a "derivative property" of the newly-emerged phenomenon of abrupt syllable cut (Murray 2000: 641; cf. Mailhammer 2010: 266ff.). In her *Historical Phonology of English*, Donka Minkova (2014a: 41-42, 2014b: 20ff.) remains undecided on the issue of ambisyllabicity in medieval English, but says that recent studies on OE data (e.g. Minkova and Zuraw 2016) do make the idea of ambisyllabic consonants in OE plausible.

The coda deletion that thus took place at the structural level is symptomatic of the general tendency of speech sounds towards reduction over time (see section 2.3.2 above), and more specifically, it exemplifies the rule that the results of sound changes often produce outputs that are closer to the syllable structure CV, which is the universally preferred form of the syllable in the languages worldwide (Schlüter 2009: 200; also cf. Hooper 1976: 229-230; Lass 1980: 32; Jensen 1993: 47ff.; Berg 1998: 79; Salmons 2010: 94ff.; Hall 2011: 221; Minkova 2014a: 41, 2015a: 137-138).[126] In her survey of diachronic changes in English consonants, Angelika Lutz (1991: 149ff.) thus treats the vocalization of semivowels as one of several instances of 'coda weakening' in the phonological history of English. Similarly, Hooper (1976: 201) writes that "[d]iachronic evidence [...] attests the relative weakness of syllable-final position [*sic*]. The loss of consonants in syllable-final position is extremely common".

This structural change that we refer to as nuclearization, i.e. Lavoie's (2009: 42) "perceptual reinterpretation" of the sounds involved, is the more central of the two issues involved in semivowel vocalization; the phonetic aspects delineated in section 2.3.2 play a comparatively minor role. This fact leads Fran Colman (1983: 33) to (rightly) treat nuclearization as the crucial element of vocalization, or as "vocalisation proper".[127]

2.3.3.3 Semivowel vocalization as a source of new diphthongs

As already mentioned in section 1.1, the phenomenon of semivowel vocalization in medieval English is very often treated in the context of the resulting changes in the phonology of ME, particularly the 'new diphthongs in Middle English' (cf.

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126 The optimal syllable structure CV results from the combination of Vennemann's (1988: 13; 21) "Head Law" (the most unmarked onset consists of one consonant) and his "Coda Law" (the most unmarked coda is unfilled), cf. Hall (2011: 221).

127 Colman (1983) actually takes a relatively extreme position on semivowel vocalization, which we will return to in section 2.4.1.3. For Colman (1983: 33, my emphasis) the "reassignment of a phone from a consonantal phoneme to a vocalic phoneme *is* a reassignment of phonemic category, a restructuring of the phonological system"; lenition might take place *prior* to vocalization and only to make the consonant "eligible for [nuclearization]". This means that in the case of the final sound in OE *dæȝ*, Colman (1983) would apply the word *lenition* to the development [ɣ > ʝ > j] of the consonant within the OE period, but not to the subsequent change [j > i]. In light of what phoneticians have said about the slight differences between semivowels and vowels (see fn. 93), however, we will not rule out the possibility that 'phonetic weakening', i.e. sonority increase and lenition, played a role in semivowel vocalization, since it is what must have prompted the restructuring or "phonological weakening" (Lavoie 2009: 42) to happen.

e.g. Wright and Wright 1928: 53; Pope 1934: 436; Dickins and Wilson 1956: 146-147; Mossé 1968: 27-29; Samuels 1972: 159; Lucas 1991: 44; Fisiak 1996: 46-49; Fennel 2001: 100; Horobin and Smith 2002: 58; Iglesias-Rábade 2003: 238-257; Lass 2006: 61; Hogg and Denison 2006: 61; Kemmler and Rieker 2012: 14-15; Fulk 2012: 39-42; Baugh and Cable 2013: 153). This teleological treatment of the phenomenon – focusing very much on its systematic results – is very widespread and not restricted to works that describe ME phonemic inventories from a synchronic perspective (cf. e.g. Ritt 2012a: 412-413).[128]

The most interesting aspect of the 'new diphthongs' of ME is that they constitute a *new* type of diphthong compared to the OE diphthong inventory. OE seems to have had only "height-harmonic" diphthongs (Lass 1992: 39; cf. Lass and Anderson 1975: 195; Hogg 1992: 101ff.; Harbert 2007: 64; Minkova 2014a: 206), i.e. diphthongs whose start and end points shared roughly the same height.[129] By contrast, the end points of the diphthongs resulting from semivowel vocalization are invariably close to the high vowels [i, u], so that "whatever the height of the [starting point], the [end point] is high" (Lass and Anderson 1975: 195).[130] The results of this fundamental change to the diphthong inventory of English still hold true in PDE: The so-called closing diphthongs,[131] which end as high vowels,

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128 The fact that the emergence of the 'new' diphthongs of ME coincided with the monophthongization of all 'old' OE diphthongs (cf. Campbell 1977: 135; Fisiak 1996: 46) has led to the suspicion that there are systematic factors involved, i.e. that the emergence of new diphthongs 'filled' what otherwise would have been a conceptual 'gap'; e.g. Minkova (2014a: 204) remarks that for ME to have had no diphthongs "would be a strange situation, given the rich diphthongal presence" in the vowel system throughout the history of English. Such speculations will, however, not be pursued in the present study. Cf. Millar and Trask (2015: 75ff.) for a general assessment of the concept of 'phonological space' and changes in phonological systems.

129 There are some uncertainties about the actual heights of the end points (Murray 2012: 258).

130 There is no such restriction on the horizontal dimension, as Lass and Anderson (1975: 195) point out: "There seem to be no particular constraints on backness relations".

131 The terms 'closing' and 'opening' are to be preferred over 'rising' and 'falling' when talking about vowel height because the latter two terms are used to talk about the "prominence" (i.e. the higher sonority) of a diphthong's individual elements (Carr 2008: 52-53, s.v. "falling diphthong"; 151, s.v. "rising diphthong"): In a falling diphthong the starting point is more prominent, and in a rising diphthong the end point is more prominent. Regular OE, ME and ModE diphthongs have all been of the falling type (Minkova 2014a: 177); exceptional cases in which the second element became more prominent than the first are limited to certain lexemes, e.g. OE

have remained the only type of diphthongs occurring within Standard pronunciations of ModE (cf. Spencer 1996: 31 [Figure 1.4]).[132]

Another novelty about the situation in ME concerns vowel length: It is a well-known and relatively undisputed fact[133] that the length (in terms of duration, cf. Baker 2012: 12) of vowels, including diphthongs, was phonemic in OE (e.g. cf. Lass 1992: 39ff.; Barber, Beal and Shaw 2009: 114; Murray 2012: 257-258; Kohnen 2014: 29), although minimal pairs for diphthongs are hard, if not impossible, to find.[134] The short and long 'versions' of all vowels changed their qualities over the course of the lOE and eME sub-periods (cf. the overview in Lass 1992: 42-48), so that vowel quantity itself can no longer be said to have been phonemic in ME and all subsequent periods.[135] Hence it is a characteristic feature of the 'new' diphthongs that they existed in only one quantitative version. As a consequence of this, while we may expect different OE 'input vowel lengths' to

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scēotan > ME *shōte(n)* or OE *fēower* > ME *four(e)* (cf. Minkova 2014a: 177; also cf. Liberman 1995: 207ff.; Fulk 2012: 42). This change is referred to by Brunner (1951: 106) and Minkova (2014a: 177) by its German name *Akzentumsprung* (rendered as "shifting stress" by Liberman 1995: 207 and as "shift of […] prominence" by Minkova 2014a: 177) and by Mossé (1968: 29n., transl. Walker) as a "displacement of accent" within the diphthongs; it occurred only rarely in English, but regularly in North Germanic: Cf. Old Norse (ON) *skjóta* 'shoot' and *fiórer*, *fiórar* 'four' (OED, s.v. "shoot, *v.*"; "four, *adj.* and *n.*").

132 The only exception are such non-closing diphthong and triphthong phenomena as have arisen as an effect of non-rhoticity in some modern accents, e.g. in RP (Gut 2009: 62; Minkova 2014a: 206).

133 There have always been exceptions, e.g. Minkova (2014a: 152 [Figure 6.2]) places the short and long versions of lOE monophthongs at different heights; we will trust in Murray's (2012: 258) judgment that the traditional view which assumes "a contrast built primarily on duration" is true.

134 One example of such a minimal pair could possibly be *ȝeara* [jæɑrɑ] 'altogether, very much' and *ȝeāra* [jæːɑrɑ] (?) 'formerly, of yore' (cf. Bosworth and Toller 1898: 367, s.v. "geara", "geára"), although the <e> in the second word is nowadays most often interpreted as silent (see fn. 145), so that *ȝeāra* was probably pronounced as [jɑːrɑ] (Obst and Schleburg 2004: 67; Peter Baker, p.c.; cf. Baker 2012: 18). – Length was a property that concerned entire diphthongs, and not just initial elements (Murray 2012: 258); it has nevertheless become the norm to mark length on the first elements of diphthongs (words like *ȝeāra* being an exception for the reasons sketched out above).

135 The fact that differences in vowel quantity always coincide with differences in vowel quality in PDE (Baker 2012: 12) is illustrated by the different IPA symbols used to represent e.g. the vowels in *beat* [bi(ː)t] and *bit* [bɪt], essentially making length diacritics redundant for PDE (Giegerich 1992: 70ff.; Gut 2009: 64).

have influenced the sound change in question (see section 3.2.1.1.2), the resulting vowels in ME did not differ in terms of length.

2.4 The relevant sounds and their development

As mentioned in section 2.1.3 above, the vocalization of postvocalic semivowels did not affect the *inventory* of English semivowels as much as their *distribution*. In terms of the inventory, it is remarkable that the semivowels [j] and [w] have led an unbroken existence from the OE period until PDE (Lutz 2006: 212; also cf. Laker 2010: 137). In terms of their distribution, it can be said that semivowels have only occurred in syllable onsets in English ever since the ME period. Within complex onsets, i.e. within consonant clusters, their position is further restricted to the effect that they must directly precede the vowel (Yavaş 2011: 140), which makes sense given the general rise of sonority in onsets (see section 2.3.2 above). In the following, the two semivowels will briefly be described.

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2005)

CONSONANTS (PULMONIC) © 2005 IPA

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

OTHER SYMBOLS

ʍ Voiceless labial-velar fricative
w Voiced labial-velar approximant
ɥ Voiced labial-palatal approximant
ʜ Voiceless epiglottal fricative
ʢ Voiced epiglottal fricative
ʡ Epiglottal plosive
ɕ ʑ Alveolo-palatal fricatives
ɺ Voiced alveolar lateral flap
ɧ Simultaneous ʃ and x

Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary. k͡p t͜s

Figure 2-4: Official IPA consonant chart (based on IPA 2015)

The official IPA chart (Figure 2-4) classifies consonants according to their place and manner of articulation. The sound [j] is unambiguously placed within this chart: It is a palatal approximant. The sound [w], on the other hand, is listed under "other symbols" beneath the chart because it has two places of articulation, with the lips moving to a rounded position and the back of the tongue approaching the soft palate simultaneously; the sound is therefore classified as "labial-velar".[136]

The following sections (2.4.1 to 2.4.3) will explore the vocalization of the three different 'input sounds' involved from a theoretical point of view. For each of the three sounds, a brief general description will be followed by a summary of its history and, most importantly, a survey of how scholars from the past 130 years have described the sound changes. These sections will lay the most important foundations for the analysis to follow (Chapter 4): In each case, the relevant historical literature was searched for factors that are said to have exerted an influence on the change. The results (summed up in Tables 2-9, 2-11, and 2-13) will then be used in the coding of the variables for the corpus-based analysis (see section 3.2.2). As mentioned in Chapter 1, the sound that was a voiced velar fricative [ɣ] in lOE is included as well (section 2.4.3) because it 'joined' the development of the two semivowels in eME.

2.4.1 The palatal semivowel [j]

2.4.1.1 General facts

Very generally speaking, the palatal semivowel [j], also referred to as 'yod' (Bauer 2007: 141; Carr 2008: 197, s.v. "yod"), is the most common semivowel: It is phonemic in about 85% of the languages in the world (Ladefoged and Maddieson 1996: 322). Within spoken PDE, occurrences of [j] make up about 1% of the segment tokens.[137] Of the two semivowels of English, [j] is the more

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136 An alternative expression is *labiovelar* (e.g. Bauer et al. 1980: 22; Ladefoged 2005: 115; Gut 2009: 32; Minkova 2014a: 28). The hyphenated form *labial-velar* seems to be perceived as more exact in some recent sources (e.g. O'Grady 2013: 85ff.; Carr and Montreuil 2013: 6; Collins and Mees 2013: 97), as it highlights the fact that it denotes a situation in which there are *two* simultaneous places of articulation (labial and velar), in contrast to terms like *labiodental*, which is to be taken to denote *one* place of articulation (i.e. the lower lip touching the upper teeth).

137 Instances of [j] make up 0.88% of all segment tokens in Fry's (1947) study based on RP (cf. Gimson 2001: 216) and 1.09% of the segments (1,134 tokens) in Mines, Hanson and Shoup's (1978: 227) study based on American English conversations.

vowel-like and therefore the one with less articulatory strength (Lutz 2006: 213). There is strong evidence that in the world's languages the palatal semivowel is also the consonant which tends to become a vowel most frequently: In a study undertaken by Brown, Holman and Wichmann (2013a, 2013b) based on data from the ASJP (i.e. Automated Similarity Judgment Program) database (cf. Wichmann, Holman and Brown 2016), the palatal semivowel 'corresponds'[138] to the high front vowel in cognate words within 7.99% of all language genera[139] worldwide (Brown, Holman and Wichmann 2013b: s19). The correspondence between [j] and [i] is thus the most frequently occurring vowel-consonant correspondence across related languages, followed by the correspondence between [w] and [u], which is observable in 3.67% of all language genera (Brown, Holman and Wichmann 2013b: s19). The palatal semivowel is certainly the consonant that has the strongest universal affinity to become vocalized.

In PDE, /j/ occurs only in syllable onsets. As mentioned above, the fact that its distribution is restricted to onsets can be seen as a long-term consequence of the sound change in medieval English that is the focus of the present study. In words which derive from OE (e.g. *yet*, *youth*, and *yard*; Carney 1994: 254), PDE /j/ is always represented in writing as <y>. The pronunciation of the semivowel has remained unchanged since roughly the lOE period in these cases.[140]

In the most recent (2015) version of the IPA, the symbol [j] is reserved for the true (frictionless) palatal approximant/semivowel (cf. Figure 2-4 above), i.e. the sound represented by <y> in ModE and by <j> in the standard orthographies of several northern European languages including German (hence the IPA symbol, cf. Ladefoged 2005: 54). On the other hand, the current IPA symbol for the

138 In this context "sound correspondence" means that two or more sounds "occur in cognate words of genealogically related languages" (Brown, Holman and Wichmann 2013a: 4).

139 In the ASJP database, language genera are language sub-families such as Germanic within the larger language families such as Indo-European (Brown, Holman and Wichmann 2013a: 6).

140 There are two other positions in which /j/ occurs in PDE, viz. as a reduced form of high front vowels before other vowels (in words like *savior* [seivjə(r)] and *cordial* [kɔː(r)djəl]), in which case it is represented in writing as <i>, and as an excrescent glide between a preceding consonant and a following high back vowel (in words like *cute* [kjuːt] and *mule* [mjuːl]), in which case it is not represented in the written language (Carney 1994: 254-255). What these 'newer' instances of the palatal semivowel in ModE have in common with the instances 'inherited' from OE is that they are all prevocalic.

voiced palatal fricative is [ʝ].[141] The sound with which we are dealing had this fricative value for some time in the history of English (see the overview in the following section). However, at no point in the history of English was there a phonemic contrast between the fricative and the frictionless semivowel, so that both in phonological transcriptions of PDE and in phonological descriptions of historical English, /j/ is the only symbol ever used to cover both realizations. The fricative symbol [ʝ] does feature, however, as an allophone of /j/ in PDE;[142] e.g. Bauer et al. (1980: 87; also cf. Gimson 2001: 210) write that "audible friction may arise" during the production of /j/ in the vicinity of /i/. This occasional realization of /j/ as [ʝ] in PDE makes sense if it is understood as an instance of dissimilation from the phonetically similar high front vowels for the sake of clarity (cf. Fromkin, Rodman and Hyams 2003: 306). For the discussion of historical pronunciations, it might be assumed that the sounds generally subsumed under /j/ particularly in older textbooks will probably have included the realization as a fricative [ʝ] in the OE period.[143] Especially newer sources (e.g. Murray 2012: 262) actually posit [ʝ] as the regular eOE value of a sound which had been the velar fricative [ɣ] in Proto-Germanic (PGmc) and became the semivowel [j] around the lOE period.

The following sections will provide an overview of the history of the OE palatal semivowel and give a brief account of the sound's vocalization while concentrating on points that most English language histories and historical grammars agree on (2.4.1.2), and then move on to point out some discrepancies in different accounts in standard grammars and language histories published from the late nineteenth century to the present day (2.4.1.3).

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141 These facts are worth mentioning because things were not always this clear-cut – some IPA symbols, including [j], used to have a broader range of application: According to an official IPA description from 1949, "[t]he letter **j** is employed to denote both the fricative and frictionless sounds, since the two varieties have not been found to exist as separate phonemes in any language. The same applies to **ɣ** and **ʁ**" (Jones 1949: 13; 2010: 313; no emphasis implied; bold print sets off the IPA symbols in the original). This ambiguity in older IPA conventions has implications for to use of the symbol [j] in older linguistic descriptions of historical forms of English.

142 E.g. Rodriguez (2008) uses [ʝ] in a transcription of speech by a speaker from Cuba, who seems to produce the sound as a realization of both /j/ and /dʒ/.

143 E.g. Lutz (1991: 155) speaks of "a semivowel or a very weak lenis fricative" in OE [my translation; original: "einem […] Halbvokal oder sehr schwachen Lenisfrikativ"], summing up Luick's (1940: 849-850) and Kuhn's (1970: 45) views; see fn. 141.

2.4.1.2 [j] in the history of English

In lOE and eME, the palatal semivowel [j] occured as the reflex of what had been two different sounds in PGmc (traditionally given as PGmc **g* and **j*). Figure 2-5 (taken from Lass and Anderson 1975: 134) illustrates this merger of the two different sounds into [j]. Both of these sounds had been represented as <ᵹ> in OE (‘insular *g*’) although their pronunciation initially differed:[144] [j] as the reflex of PGmc **j*, as in OE *ᵹeoc* [juːk ~ joːk] ‘yoke’ (< PGmc **jukǫ*) or *ᵹeonᵹ* [juŋg] ‘young’ (< PGmc **jungaz*), had already been a palatal fricative/semivowel [ʝ ~ j] in PGmc and in eOE (Ringe 2006: 128; OED, s.v. “yoke, *n.*[1]”), whereas the reflex of PGmc **g*, as in OE *ᵹos* [ɣoːs] ‘goose’ (< PGmc **gans*), was realized as a voiced velar fricative [ɣ] in most positions from PGmc and throughout the OE period (Ringe 2006: 101-102), but palatalized and lenited in the vicinity of front vowels (cf. Scargill 1951: 41),[145] which means that in the case of a word like *ᵹeolu* ‘yellow’ (< PGmc **gelwaz*) we might reconstruct a change sequence such as [ɣ > ʝ > j] to have affected the initial consonant over the course of the OE period. We will return to the (non-palatalized) voiced velar fricatives in section 2.4.3. For now it will suffice to point out that the two sounds (PGmc **g* and **j*) coalesced into [j] in the lOE sub-period (Hogg 1992: 268; Murray 2012: 262); according to Minkova (2014a: 57), this merger had happened “[b]y the middle of the tenth century”.

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144 The fact that there must have been a perceptible difference between the reflexes of PGmc **j* and **g* in eOE is evident e.g. from the runic inscription on the Ruthwell Cross, in which two different symbols are used (Kluge 1901: 997; cf. Brunner 1965: 167).

145 The regular addition of a silent <e> (or, to be more exact, the representation of [j] as <ᵹe>) in the spelling of words such as *ᵹeoc* ‘yoke’ shows that Anglo-Saxon scribes were aware of the irregularity of [j] (which was usually a palatalized [ɣ]) occurring before a back vowel and adjusted their spellings to accommodate the unusual sound sequence (Baker 2012: 18; also cf. Lass and Anderson 1975: 137, who use the term “palatalization diacritic” for the silent <e>). The equally unusual <o> for [u] in the case of OE *ᵹeonᵹ* is in turn a graphotactic consequence of the addition of the silent <e>: Baker (2012: 18) explains that “the Old English spelling system appears (for unknown reasons) to have prohibited the letter-sequence *eu*, and scribes sometimes wrote *eo* instead to avoid it”, adding that wherever [j] from PGmc **j* is represented as <i> and not as <ᵹe>, the <u> is restored in place of the unexpected <o>: <ᵹeonᵹ> ~ <iunᵹ> (Baker 2012: 18).

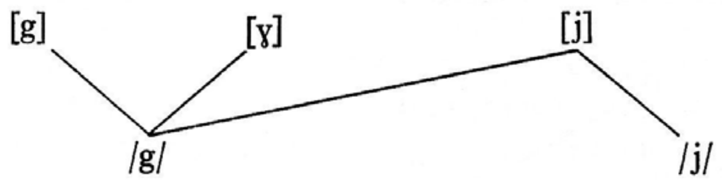

Figure 2-5: The [j]-[j] merger in Old English (Figure 4.20 in Lass and Anderson 1975: 134)

The fact that lOE [j] originated from two different sources (or phonemes in Figure 2-5) will not come into play in our treatment of the further development of the palatal semivowel in eME. There are several reasons for this. For one thing, OE [j] (< PGmc **j*) was overall much less frequent than OE [j] (< PGmc **g*). In addition, OE [j] (< PGmc **j*) almost always occurred word-initially, and we are interested in the postvocalic position.[146] In summary, the instances of the sound pronounced as [j] in lOE that will be interesting in the present study had all been palatalized from earlier (PGmc/eOE) **g*/[ɣ]. This means that all relevant instances of the sound will be post-frontvocalic, and also that the sound had already undergone a history of lenition which was then continued in its vocalization to [i].

2.4.1.3 Accounts of [j] vocalization in medieval English

We will now turn to some of the major English language histories and historical grammars that have been published over the last 130 years and highlight some of their similarities and differences in regards to the phenomenon of [j] vocalization.[147] The same will subsequently be done for the vocalization of lOE [w] and [ɣ] (see sections 2.4.2.3 and 2.4.3.2), although these sections will be much shorter because scholars often put forth the same basic ideas and conclusions in regards to the vocalization of all three sounds.

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146 The historical reason for both of these facts is that the sound **j* had itself been lost in many phonotactic positions within PGmc (Ringe 2006: 129). Examples of word-internal [j] (< PGmc **j*) retained in OE are extremely rare; an example would be the plural form *herȝas* ‘armies’ (< PGmc **harjaz*; OE singular *here*) (Ringe 2006: 130).

147 This should not be taken to imply that all accounts are completely independent of each other. As Donka Minkova (1991: 15) points out in her study of schwa deletion, “[h]istories of English are not unique in drawing extensively on earlier statements and conclusions, and indeed it would be absurd to conceive of scholarship without continuity. It is no surprise then that certain accounts keep recurring in the standard textbooks […]”.

What all accounts agree on is that the sound that was the palatal fricative [ʝ] in eOE became the vowel [i] by ME if following a front vowel, i.e. it became part of the same syllable nucleus. If the vowel was a high front vowel in lOE (henceforth we will refer to the lOE situation as the 'input situation' and to the lOE vowel qualities as 'input vowels' although preceding vowels are technically not the input, but only a conditioning factor for the change), this resulted in a long high front vowel [iː], and in all other cases it resulted in closing diphthongs [ei, ɛi, ai], which all actually coalesced into [ai] in later ME (e.g. cf. Kemmler and Rieker 2012: 14-15). It is also quite clear that this change is reflected in the spellings, so that e.g. both <þeȝ> and <þei> appear as spellings of *way* in medieval English texts, but that the forms with <ȝ> are much more frequent that forms with <i> in OE.[148] Such <i> spellings as do appear in OE are most frequent in fairly early texts, which makes it hard to connect them with the vocalization that is often said to have begun around the lOE period (see the accounts below). The early <i> spellings are often taken as evidence of an early wave of [j] vocalization which later was retracted again (cf. Campbell 1977: 113). Another point about which there seems to be general agreement is that the vocalization of [j] happened first following [i], i.e. in cases which resulted in complete assimilation. There is no general agreement about any more specific chronological details. Finally, a factor that is mentioned as potentially significant in many (but not all) accounts is the question of whether the postvocalic [j] belonged to the same syllable or the next.

The main aim of this survey will be to examine which factors have been thought to have had a significant influence on the vocalization of [j]. The factors mentioned in these accounts will then be summed up in Table 2-10 and ultimately coded in the data retrieved from the LAEME CTT in order to be assessed in the analysis. Another, more practical, reason for the survey is the gathering of relevant lexemes, which will become crucial in the analysis (see section 3.2.3). The fifteen different accounts are given Roman numerals (i – xv) which will also be taken over in sections 2.4.2.3 and 2.4.3.2.

(i) **Karl Brunner's *Altenglische Grammatik* (1965)** is an updated version of Eduard Sievers's (1882) *Angelsächsische Grammatik*, the first major grammar of

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[148] A quick search of the *Dictionary of Old English Corpus* (DOEC; see section 3.1) corroborates this: <e> or <æ> followed by <g> occurs 52,883 times (94.51%) in the OE corpus while <e> or <æ> followed by <i> occurs only 3,072 times (5.49%), and only 1,995 times (3.57%) if we rule out cases in which <ei>/<æi> is followed by <g>.

OE to be published. Brunner[149] (1965: 143ff.) mentions that both spellings <i> and <ᵹ>[150] are used for [j] in OE texts, with the latter being the more common spelling. In regards to [j] following [i], Brunner (1965: 143-144) notes the spelling variation <i ~ iᵹ ~ ᵹ> which he has trouble interpreting phonetically: He considers the range [i ~ ij ~ j] possible, so that a word form like *heries* might have been pronounced either as disyllabic ([her.jes]) or trisyllabic ([he.ri.es ~ he.ri.jes]).[151] As other examples of post-frontvocalic [j] occurrences Brunner (1965: 144) lists the forms *ǣᵹ*[152] 'egg', *cǣᵹ* 'key', *clǣᵹ* 'clay', WS *īeᵹ* / non-WS *ēᵹ* 'isle', WS *hīeᵹ* / non-WS *hēᵹ* 'hay', and *cīeᵹ* 'call' (imperative).[153] Brunner (1965: 20-21; also cf. Obst and Schleburg 2004: 58) also points out that the spelling <iᵹ> could represent [iː] in OE as evidenced by reverse spellings such as *hiᵹ* 'they'.

Brunner (1965: 145) is not interested in sound changes whose effects reach beyond the OE period, and thus does not mention any details concerning the vocalization of postvocalic [j]; however, he does imply that in the case of word-final [j], vocalization may have occurred early on in the OE period but been stopped or reversed on the analogy of inflected forms of the same words, in which [j] was retained.

(ii) **Friedrich Kluge's** long essay **"Geschichte der englischen Sprache" (1901 [^{1}1891])**, more than seventy pages of which comprise a subsection on *Lautgeschichte* (phonological history), set the stage for many later discussions of sound changes in the history of English. Kluge (1901: 996) voices the idea that semivowel vocalization took place within the OE period, tentatively dating the vocalization of [j] to the reign of King Alfred, i.e. the late ninth century. Because the spellings <iᵹ> and <i> vary in some relatively early OE texts, Kluge (1901: 996) agrees with Brunner (1965) in suspecting[154] that in later OE the spelling

149 In the following, "Brunner" should be read as shorthand for "Sievers (1882) as revised by Brunner".

150 Brunner (1965) actually uses the symbol <ʒ>.

151 Brunner's (1965: 143) "*her-i-es* oder *her-ij-es*" syllabification is awkward; Sievers's (1882: 58) original has "*he-ri-es* oder *he-ri-jes*" and is thus in line with the universal "Maximal Onset" rule (see fn. 124 in section 2.3.3.2).

152 The heterogeneous spellings of the forms – with modern macrons but medieval <ᵹ> – are Brunner's (1965).

153 Brunner (1965: 144) also remarks that the sound occurs only after long vowels and diphthongs – a statement which is consistently contradicted by later sources (e.g. Iglesias-Rábade 2003: 239; Kemmler and Rieker 2012: 14; Minkova 2014a: 206) and which will therefore no more concern us here.

154 Kluge's (1901: 996) own wording: "Verdacht".

<iȝ> could have generally stood for the high front vowel [i]. In regards to the sound following non-high front vowels, Kluge (1901: 996-997) infers from the same variations in the spelling that the sound was probably a semivowel (although he also uses the expression 'diphthong') in OE, but completely vocalic even in the earliest ME. In other words, the vocalization took place in lOE, but became visible in the spellings only in the eME period.[155] As evidence Kluge (1901: 997n.) cites the use of the OE spelling <-iȝ> in rendering Old Norse names actually ending in (nominative) [i], e.g. *Tostiȝ*: In these cases the Anglo-Saxons "substituted" the consonantal spelling for word-final short [i], which did not regularly exist in OE.[156] This, however, cannot be taken as evidence that <iȝ> already generally represented a vocalic pronunciation; it seems much more probable that the Anglo-Saxons would have adapted loan words from Norse to their native phonology and thus generally closed the final syllable in *Tostiȝ*: [tostij].

Kluge (1901: 997) gives a list of examples showing the deletion of [j] after [i] and the change [j] > [i] after other front vowels that became visible in ME through the substitution of <ȝ> by 'vocalic' spellings, including OE *tiȝele* > ME *tile*, OE *siȝþe* > ME *sithe*, OE *næȝl* > ME *nail*, OE *fæȝer* > ME *fair*, OE *þeȝn* > ME *thein*, and OE *leȝde* > ME *leide*.

(iii) **Karl Luick's *Historische Grammatik der englischen Sprache* (1921-1940 [^{1}1914-1929])** was never completed; nevertheless, its two existing volumes (which deal exclusively with historical phonology) have been greatly influential for generations of scholars (Minkova 1991: 20). The work was the first to specify diachronic and diatopic details of sound changes on a large scale. It is therefore from Luick (1921-1940) that we will now extract some hypothesized sound change rules.

Luick (1921: 228; 1940: 849) places the earliest instances of [j]-vocalization within preOE, hypothesizing that [j] enclosed by [i(ː)] was assimilated and deleted in preOE, yielding [ii], i.e. [iː] in eOE, and resulting in forms such as *īl* 'hedgehog' (< preOE **igil*):

(9) preOE/eOE [j] > ∅ / i __ i

155 Original: "Für das gesamte ME. hat urengl. ȝ intervokalisch dann nur noch die Funktion *i* […]. Es ist wichtig nochmals hervorzuheben, dass diese Vokalisierung, die im ME. graphisch sichtbar wird, chronologisch in die altenglische Zeit gehört" (Kluge 1901: 997).

156 Original: "*ig* […] ist Substitution für *ĭ*, da das jüngere AE. kein *ĭ* im Auslaut kannte".

Following Luick, this preOE sound change can only have affected [j](< PGmc **j*), since the merger with later [j](<**g*) had not happened yet.[157] This deletion of [j](<**j*) between surrounding [i]s happened earliest in the South (in WS and possibly in Ke);[158] during the lOE period it was generalized to include all [i(ː)] + [j] instances (now including [j](<**g*)) in unstressed or weakly stressed syllables:

(10) lOE [j] > Ø / i ___

This change is evidenced by ‘vocalic’ spellings such as <hefie> instead of regular <hefiȝe> [heviː(j)e] ‘heavy’ or <dysi> for regular <dysiȝ> [dyzi(ː)(j)] ‘foolish’, as well as by reverse spellings (in word-final position and preceding [j]) such as <biȝ> for regular <bi> [biː] ‘by’ and <hiȝ> for regular <hi(e)> [hiː] ‘they’ (Luick 1921: 228). The complete assimilation of [i(ː)j] to [iː] is said to have taken place in the ninth century in the South, and by the eleventh or twelfth century[159] in An varieties, as is demonstrated by corresponding ME spellings (Luick 1921: 228).

In the case of [j] following the non-high front vowels [e] and [æ] – both short *and* long, in contrast to what Brunner (1965: 144) claims – Luick (1921: 233) implies a difference between cases in which the semivowel belonged to the same syllable[160] and cases in which it did not. If tautosyllabic, i.e. within the same syllable, the semivowel is said to have been vocalized to [i] to form the new diphthongs [ei] and [æi] very early on, i.e. in the preOE period, in Ke (Luick 1921: 233), and in the eleventh or twelfth century, i.e. in the lOE period, in the other varieties (Luick 1940: 945).

$$\text{(11) lOE [j]} > \text{[i]} \; / \quad \begin{cases} \text{e} \;\_\_\; \$ \\ \text{æ} \;\_\_\; \$ \end{cases}$$

Once again, this change is attested through ‘vocalic’ spellings such as <ȝrei> instead of regular eOE <ȝreȝ> ‘gray’ as well as by what Luick (1921: 233) interprets to be compromised spellings[161] such as <ȝreiȝ>, in which he takes <iȝ> to be a digraph representing [j ~ i]. The vocalization of [j] following [e] and [æ]

157 This cannot be completely true, since the obstruent in preOE **igil* derives from PGmc **g* (< Proto-Indo-European [henceforth PIE] *$\acute{g}^{h}$), not from PGmc **j* (cf. Ringe 2006: 90; DWDS, s.v. “Igel”).

158 “Dieser Wandel war in älterer Zeit dem Westsächsischen eigen, aber wohl auch dem Kentischen” (Luick 1921: 228).

159 Original: “[…] spätestens im elften oder zwölften Jahrhundert”.

160 Original: “[…] im Silbenauslaut”.

161 Original: “Kompromißschreibungen”.

is said to have been completed before 1150: “Towards the end of the OE period, it seems, tautosyllabic <æȝ> and <eȝ> everywhere stood for the diphthongs [æi] and [ei] even though the old spelling was generally retained. However, as the old spelling tradition was discontinued in the twelfth century, <i> as well as its equivalent at the time, <y>, immediately replaced <ȝ>” (Luick 1921: 233).[162] Similar to Kluge (1901), Luick thus proposes a discrepancy between spelling and pronunciation in lOE, resulting from conservative spelling traditions (along the lines of a lWS focused written variety) that were adhered to until c. 1150, at which point the vocalization was not ongoing but already complete. Luick (1921: 233) enumerates some prototypical examples that show ‘vocalic’ spellings in ME, viz. *wei/wey* ‘way’, *grei/grey* ‘gray’ *dæi/dei* > *dai/day* ‘day’ and *mæiden/meiden* > *maiden* ‘maiden’.

In cases in which post-frontvocalic [j] was not tautosyllabic with the preceding vowel but belonged to the next syllable, Luick (1921: 234) posits that vocalization did not occur before the ME period. As evidence he cites forms like *peȝes* ‘way’s’ (genitive). Compromised spellings of non-tautosyllabic forms, as in *deiȝe* ‘day’ (dative) or *forleiȝer* ‘adultery’ that occur in late Ke and Nhb OE, are rare[163] and suggest only the beginnings of a vocalization process (Luick 1921: 234).

(iv) **Joseph Wright and Elizabeth Wright’s *Elementary Middle English Grammar* (1928 [^{1}1923])** was one of the first grammars of Middle English, and highly influential (Minkova 1991: 25). Wright and Wright (1928: 53; 129) treat the vocalization of [j] under the heading of “The Formation of New Diphthongs in ME” as well as in a section named “Gutturals”.[164] They say that ‘palatal *g*’ was a fricative (i.e. [ʝ]) up to lOE, when it became an “i-consonant”, i.e. a semivowel, in coda position (Wright and Wright 1928: 129). In eME the sound also lost its friction in non-coda position (“medially between vowels”), and “then” – implying eME as the earliest possible time frame for this second step – it was vocalized to “diphthong[s] of the i-type” and to [iː] if following [i(ː)] (Wright and Wright 1928: 129). Examples given include OE *mæȝ* > ME *mai* ‘(he) may’, OE

162 My translation. Original: “Wahrscheinlich haben also in der ausgehenden altenglischen Periode überall bereits die Diphthonge *ǣ̆i*, *ē̆i* für tautosyllabisches *ǣ̆ȝ*, *ē̆ȝ* gegolten, wenn auch die alte Schreibung im allgemeinen weitergeführt wurde. Als aber im zwölften Jahrhundert die alte Schreibtradition abbrach, trat sofort *i* und das um jene Zeit damit gleichwertige *y* an die Stelle von *ȝ*”.

163 Original: “[v]ereinzelt[e]”.

164 The term *guttural* has fallen out of use in phonetics and linguistics (Lodge 2009a: 49) due to its imprecise nature – it was applied by twentieth-century linguists to various sounds whose places of articulation range from velar to glottal.

lǣȝon[165] > ME *leien* '(they) lay', OE *pleȝian* > ME *pleien* 'play', lOE *ēȝe* > ME *eie* 'eye', OE *stiȝel* > ME *stīle* 'style', and OE *stīȝan* > ME *stīen* 'ascend' (Wright and Wright 1928: 129).

Strangely, Wright and Wright (1928: 52) claim that lOE already "had a number of such diphthongs", apparently meaning that the change happened earlier with some lexemes, but systematically only in ME: They provide the examples of the lOE forms *dæi* 'day' and *meiden* 'maiden' (Wright and Wright 1928: 52), which they seem to consider to have been lexically bound exceptions within OE.

(v) **Richard Jordan's *Handbuch der mittelenglischen Grammatik* (1968 [[1]1925])** reinforces Luick's (1921: 233-234) idea of the vocalization of postfrontvocalic [j] having taken place within lOE if tautosyllabic with the preceding vowel, but not until eME if non-tautosyllabic. Jordan (1968: 169) adds that postfrontvocalic, non-tautosyllabic [j] remained consonantal for longer when following a long vowel, e.g. in ME *eye* [eːje] 'eye', than when following a short vowel, e.g. in ME *weies* [weies] 'way's'.[166] Input vowel length can thus be added to the list of potentially relevant factors.

Jordan (1968: 104ff.) also specifies some diatopic details of the vocalization process, so that according to him the factors that influenced the process were the qualitative and quantitative differences between the vocalic input from OE (e.g. [ej] vs. [eːj] and [ej] vs. [ij]), the syllable position of the postvocalic semivowel (e.g. [mæj] vs. [dæ.jes]), and, in the case of [y(ː)j], the dialect. Table 2-8 gives an overview of these factors, concentrating on the chronological development of the different OE phonetic inputs according to Jordan (1968: 104ff.) and Iglesias-Rábade (2003: 238-244).

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165 The macrons are those of Wright and Wright (1928; see fn. 152).

166 Jordan (1968) was not the first to suggest an influence of the quantity of the preceding vowel on the vocalization process – cf. Schlemilch 1914: 42.

OE input	**OE example**	**Further development**			
		lOE:	**eME:**	**ME:**	
tautosyllabic [æj]	*mæʒ* ‘may’	> [æɪ]		> [aɪ]	
non-tautosyllabic [æj]	*dæʒes* ‘day’s’		> [æɪ]	> [aɪ]	
[æːj]	*æʒþer* ‘either’	> [ɛːɪ]	> [ɛɪ]	> [aɪ]	
[ej]	*weʒ* ‘way’		> [ei]	> [ɛɪ]	> [aɪ]
tautosyllabic [eːj]	*heʒ* ‘hay’		> [ei]	> [aɪ]	
non-tautosyllabic [eːj]	**deʒan* ‘die’		> [ei]	> [iː]	
[yj]	*ryʒe* ‘rye’			No/EML: > [iː]	
				WML: > [yːɪ]	> [yː]
				So/Ke: > [ɛɪ]	> [aɪ]
[yːj]	*dryʒe* ‘dry’			No/EML: > [iː]	
				WML: > [yɪ]	> [y]
				So/Ke: > [ɛɪ]	> [aɪ]
[ij]	*tiʒele* ‘tile’	> [iː]			
[iːj]	*hiʒian* ‘hurry’	> [iː]			

Table 2-8: The phonological input for semivowel vocalization according to Jordan (1968: 104ff.), with some examples taken from Iglesias-Rábade (2003: 238-244)

(vi) **Fernand Mossé’s *Handbook of Middle English* (1968 [[1]1949])** briefly sums up the change and relates it to “the shifting of the syllable boundary” in lOE in cases such as *peʒan* ‘weigh’, for which he suggests a development that can be transcribed as follows: OE [we.jɑn] > lOE [wej.en] > ME [wei(.e)] (Mossé 1968: 27). This is essentially the phenomenon that Luick (1921: 233-234) and others described as postvocalic, but non-tautosyllabic [j]; in contrast to earlier grammars, Mossé (1968) explicitly mentions the change in syllable structure that accompanied, or laid the foundation for, the sound change (see section 2.3.3.2), and dates it to lOE. In other words, Mossé (1968) provides a theoretical reason for assuming that the vocalization of non-tautosyllabic [j] took longer than that of tautosyllabic [j]: In the former case the sound change was more complex because it involved a change in the syllabification of the lexemes concerned. He lists examples of changes from the OE inputs [æj, ej, æ:j, yj, y:j] (Mossé 1968: 27-28).

(vii) **Hans Ernst Pinsker's *Historische englische Grammatik* (1974 [[1]1959])** distinguishes three different chronological "layers" (German *Schichten*) in which the vocalization of [j] took place (Pinsker 1974: 33-34). These are summed up in Table 2-9.

Layer	OE input	Example	Period
1	tautosyllabic, post-frontvocalic OE [j]	*dæȝ* > *dæi* 'day' (often reversed again)	OE (10th century?)
2	non-tautosyllabic, post-frontvocalic OE [j]	*peȝes* > *weies* 'way's'	transitional period (11th/12th century)
3	post-frontvocalic OE [ɣ]	*niȝon* [ɣ] > *niȝen* [j] > *ni*(*e*)*n* 'nine'	eME (12th/13th century)

Table 2-9: The three layers of [j] vocalization according to Pinsker (1974: 33-34)

Pinsker's (1974) three "layers" are a systematization of many facts mentioned in earlier sources. The whole process is said to have been productive between the tenth and the thirteenth century. The earliest layer is not dated exactly;[167] like Brunner (1965: 145), Pinsker (1974: 33) says that the results of layer 1 were often reversed again in most cases ([wej] > [wei] > [wej]) on the analogy of the yet unshifted non-tautosyllabic [j], e.g. *peȝes* [wejes]. Layer 2 is the prototypical vocalization of [j] itself; it seems to be implied that this also covers the cases in which vocalization had already been undergone in layer 1 but then reversed. Pinsker (1974: 33) dates layer 2 to the poorly documented transitional period (see section 2.2.1 above) although most previous sources date the vocalization of non-tautosyllabic [j] to eME. Moreover, in contrast to Mossé (1968), Pinsker (1974: 33) speaks not just of a shift of syllable boundaries, but of the temporary gemination the semivowel, yielding a sequence that could be transcribed as [we.jes] > [wej.jes][168] (> [wej.es]) > [wei.es]. Layer 3 does not concern the vocalization of lOE [j], but of the 'secondary palatals', i.e. such instances of the lOE voiced

167 The original simply reads "[…] schon altenglisch" (Pinsker 1974: 33).

168 Pinsker (1974: 33) actually uses the symbol *i̯*, 'non-syllabic *i*'.

velar fricative [ɣ] as were ultimately vocalized to [i] (and which will concern us in section 2.4.3.1). The third layer it is dated to eME.

(viii) **Alistair Campbell's *Old English Grammar* (1977 [1959])** contains very little new information; similar to most earlier sources, Campbell (1977: 113) mentions that there is orthographic evidence of a "marked tendency" for post-frontvocalic [j] to be vocalized in eOE, but that the resulting diphthongs were "usually removed" due to analogy; hence this description corresponds to Pinsker's (1974: 33) layer 1. Campbell (1977: 114) finds more evidence of [j]-deletion after [i] than of diphthongizations in OE, quoting the form *bridel* (< *briȝdel*) as dispersed over many texts.

Campbell (1977: 114) is the first to explicitly mention the factor of syllable accentuation, claiming that <i ~ iȝ> spellings vary more freely in unaccented syllables in lWS and Ke texts. He concludes that there is generally "much fluctuation" in OE texts in this respect (Campbell 1977: 114). It is unclear whether this only concerns the written language, or whether it should be taken to imply variation between [i ~ ij] in spoken OE.

(ix) **Jacek Fisiak's *Short Grammar of Middle English* (1996 [^{1}1968])** is a brief treatise in which semivowel vocalization is treated in the context of a "rise of new diphthongs in Middle English" (Fisiak 1996: 46). Fisiak (1996: 46; 48) echoes Mossé (1968: 27) in that he too assumes syllable boundaries to have shifted to the right in forms like *peȝan* 'weigh' in the lOE period. This resyllabification is taken to have been a "reason" for the new diphthongs (Fisiak 1996: 48), and it is said to have been contemporary with the lenition of [ʝ] [169] to [j] and the loss of all OE diphthongs.

(x) As its title suggests, **Peter Erdmann's *Tiefenphonologische Lautgeschichte der englischen Vokale* (1972)** is a work that concentrates on the history of the English vowel system, making heavy use of the generative-phonological notations that were at their heyday following the publication of Noam Chomsky and Morris Halle's influential book *The Sound Patterns of English* in 1968. Erdmann (1972: 184) deviates from other sources in dating the lenition of [ʝ] to [j] to the eOE period. Erdmann (1972: 185) emphasizes that semivowel vocalization means that the affected words are resyllabified. Apart from this, Erdmann (1972) adds nothing new to the discussion of semivowel vocalization.

(xi) Like Erdmann (1972), **Roger Lass and John Anderson's *Old English Phonology* (1975)** follows along the lines of generative phonology, but at times

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[169] Fisiak (1996: 46) somewhat unorthodoxly uses the notation [ġ] for the voiced palatal fricative.

with slightly different results: Lass and Anderson (1975: 139) believe that the lenition of [ɟ] to [j] "must have occurred quite late in the OE period and is in fact intimately connected with the so-called 'vocalization' of OE [j] < /g/ which was such a fertile source of the 'new' Middle English diphthongs".

(xii) The first volume (*Phonology*) of **Richard Hogg's *Grammar of Old English* (1992)** generally views the idea of semivowel vocalization taking place to create new diphthongs in OE rather skeptically. Hogg (1992) does agree with the traditional view that [j] was assimilated to a preceding [i(ː)] to form [iː] in OE (cf. rule 10 above), adding that orthographic forms pointing towards this change are "common to [early] WS and [late] WS, but in other dialects occurrences are infrequent" although existent in Ke and Mer (Hogg 1992: 290). He says nothing about the exact chronology of the vocalization to [iː], although the mention of early WS places it rather early on the time scale.

Regarding the development of [j] after non-high front vowels Hogg (1992: 24; 289-290) is ultimately undecided but leans towards a view originally put forth in a paper by Fran Colman (1983), who claims that the phonological system of OE would make it unlikely for a new type of diphthongs (cf. Lass and Anderson 1975: 195) to arise. Colman (1983: 38) argues that the change [i(ː)j] > [iː], which is generally seen as the earliest instance of [j] vocalization, actually did occur in OE precisely because the result, a long high front vowel, was permissible in OE. All other inputs for [j] vocalization, however, produced closing diphthongs such as [æi] and [ei], for which "there is no template in OE", and whose appearance she therefore dates to ME (Colman 1983: 46). The "template" for closing diphthongs was created by the diphthongization of certain monophthongs through "glide epenthesis" (Minkova 2014a: 206), i.e. the appearance of [i] and [u] in positions where vowels were originally followed by the fricatives [ç] and [x] in eME, exemplified by lOE *ehta* [eçta] > eME *eighte* [eiçte] 'eight' and lOE *tahte* [tɑxte] > eME *taughte* [tauxte] '(he) taught' (Colman 1983: 46). This sound change is also known as "Middle English breaking" (Lass and Anderson 1975: 198; also cf. Kemmler and Rieker 2012: 15-16). Since [i] was inserted after front vowels and [u] after back vowels, this gave rise to diphthongs such as [ei] and [au].[170] Hence, according to Colman (1983: 46), it is only after the sound change known as 'ME breaking' had occurred to produce new diphthongs that the vocalization of semivowels, which resulted in the same diphthongs, can have taken place. Colman's (1983) implied chronology would mean that the vo-

170 The conditioning factor for ME breaking, however, was the following velar fricative and not the preceding vowel.

calization occurred fairly late, viz. not before the final decades of the eME subperiod: Jordan (1968: 84) dates the completion of the breaking of [e] > [ei] to the 13th century after it had occurred only in certain areas in the 12th century,[171] and the breaking of [a] > [au] to the second half of the 13th century (cf. Nakao 1998: 210 for a similar timeline); Fisiak (1996: 48) dates ME breaking in general to “the close of the 13th century”. According to Colman (1983), then, much of the LAEME CTT would predate the formation of the ‘new diphthongs’.

This is a very theoretical argumentation. The first very basic question to ask here is why Colman (1983) ascribes the power to change the vowel inventory through the creation of new phonological templates to ME breaking, but not to semivowel vocalization; a possible answer might be that this inventory-changing power derives from the fact that with ME breaking we are dealing with epenthesis, i.e. with segments appearing where there previously were none, while with semivowel vocalization, on the other hand, we are dealing with the lenition of segments already present. It is doubtful, however, whether such an answer would be tenable: The process in which the pronunciation of a particular sound is weakened or even deleted in a particular environment concerns articulatory phonetics or phonotactics and says nothing about what is happening in regards to changes to the phonological system. In other words, although lenition, *phonetically speaking*, tends toward deletion and not toward addition (see section 2.3.2 above; cf. Lavoie 2009: 30), there seems to be no theoretical reason why the lenition or deletion of a speech sound should have less power to add to the *phonemic inventory* of a language (in this case adding closing diphthongs).

Another question to be raised is what Colman (1983) makes of ‘vocalic’ spellings such as <i> instead of <ȝ>, or reverse spellings such as <iȝ> for <ȝ> in the OE data. Her reasoning is that the substitution of <i> for <ȝ> cannot be assumed to signify anything substantial as these spellings apparently varied ‘freely’ in other positions (i.e. in onsets) as well (Colman 1983: 40). Hogg (1992: 289) concludes that “it should be assumed that spellings [such as <dei>] are merely orthographic variants of [spellings such as <deȝ>]”. In other words, the spelling variation <ȝ ~ i> in OE texts is a ‘W-feature’ (cf. McIntosh 1989b: 47ff.; see section 2.2.6 above) that represents nothing more than phonetic proximity of [j] to [i]. Colman’s (1983) argument, which Hogg (1992: 289-290) condones, relies on the idea of OE spelling variations being essentially so ‘free’ as to make the variants completely interchangeable; an empirically observed, statistically significant quantitative trend in the spellings through time, however, would be enough to

[171] Original: “[…] auf begrenztem Gebiet im 12., allgemein seit dem 13. Jahrh.”.

challenge this idea of the free variation and complete interchangeability of spellings.[172]

Hogg (1992: 289) also gives another reason for his late dating of the vocalization, viz. that the first elements in the resulting diphthongs "normally […] continue[…] to behave" like monophthongs, participating in eME vowel quality changes. This, however, is another very theoretical reasoning that is as hard to refute as it is to verify: There is really no reason why systematic sound changes such as the Southhumbrian rounding of [ɑː] to [ɔː] should have affected only monophthongs and not also elements of diphthongs. E.g. Pinsker (1974: 33), who dates his "layer 2" to lOE, explicitly comments that the first components of the diphthongs resulting from semivowel vocalization also participated in the above-mentioned sound changes.

(xiii) **Luis Iglesias-Rábade's *Handbook of Middle English* (2003**) contains a very systematic and comprehensive account of semivowel vocalization in eME (once again, under the heading of the 'formation of new diphthongs'), which however, is based on and does not divert from Jordan's (1968) earlier survey. Iglesias-Rábade (2003: 238-255) is mentioned here because he lists numerous OE lexemes to exemplify the various kinds of phonemic input to the sound change. Table 2-8 above has already been augmented by some of his examples.

(xiv) Similarly, **R. D. Fulk's *Introduction to Middle English* (2012)** sums up the developments neatly without departing from the traditionally given chronology and decisive factors: Tautosyllabic [j] was vocalized within the OE period, and non-tautosyllabic [j] only slightly later (Fulk 2012: 39-40).

(xv) **Donka Minkova's** fairly recent ***Historical Phonology of English* (2014a, 2014b)** once again leans towards the traditional view of dating the vocalization of [j] and the creation of diphthongs ending in [i] to the OE period. Minkova (2014a: 152) is innovative in that she includes the closing diphthongs [ei] and [æi][173] in a table showing the lOE vowel inventory. Like many others Minkova (2014a: 177) stresses that the vocalization of post-frontvocalic [j] took place in

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172 E.g. Merja Stenroos's (2002) close quantitative analysis of certain spellings in *Laȝamon A*, a text notorious for its "very variable [...] orthography" (Laing 1993: 70), shows that there is an underlying system of vowel representation which really leaves only a handful of forms unexplained (cf. Table 1 in Stenroos 2002: 465). Also cf. Stockwell and Barritt (1961: 78-79).

173 Minkova (2014a: 152) actually uses the notations [ej] and [æj] to show that in OE the diphthongs still had a "more perceptually distinctive end point [j]" (Minkova 2014a: 177), i.e. a semivowel. In other words, Minkova (2014a) seems to categorize these sequences as consonantal diphthongs, a type of diphthong that exists in Modern French (cf. Schane 2004) but that is generally not postulated for English.

lOE only in cases in which it was tautosyllabic with the vowel, but in contrast to others she is very sure that it did take place in OE and not in ME, even saying that the change is "chronologically (dis)placed" if treated under the heading of 'new diphthongs in ME' (Minkova 2014a: 177). The reason for Minkova's placing of [j] vocalization relatively early on the time line will become apparent in the treatment of the voiced velar fricative in section 2.4.3.2.

The main differences between these accounts (i-xv) are summarized in Table 2-10 below.

Account	**Dating**	**Influencing factors**
Brunner (1965)	OE (perhaps eOE, but then retracted)	
Kluge (1901)	OE / lOE, depending on …	input vowel quality ([i] vs. others)
Luick (1921-1949)	from preOE to ME, depending on …	dialect tautosyllabicity
Wright and Wright (1928)	ME (with possible lexically conditioned exceptions in OE)	
Jordan (1968)	lOE/eME, depending on …	dialect tautosyllabicity input vowel quantity
Mossé (1968)	OE/lOE, depending on …	tautosyllabicity
Pinsker (1974)	OE/eME, depending on …	tautosyllabicity
Campbell (1977)	from OE (but retracted in eOE), depending on …	input vowel quality ([i] vs. others) accentuation
Hogg (1992)	ME	*(phonological template for new diphthongs created through ME breaking)*
Fulk (2012)	OE/ME, depending on …	tautosyllabicity
Minkova (2014a)	OE/ME, depending on …	tautosyllabicity

Table 2-10: Details of [j] vocalization according to different accounts[174]

[174] The third column "Influencing factors" is not intended to contain exhaustive lists, but only factors whose influence on the sound change are emphasized by the respective scholars.

2.4.2 The labial-velar semivowel [w]

2.4.2.1 General facts

After palatal [j], labial-velar [w] is the second most common semivowel: It exists in about 76% of the languages in the world.[175] As already mentioned (see section 2.4.1.1), the labial-velar semivowel corresponds to the high back vowel in cognate words across languages in 3.67% of all language genera worldwide (Brown, Holman and Wichmann 2013b: s19). The fact that [w] shows a lower general tendency towards vocalization than [j] might be related to its possessing two places of articulation instead of one, and therefore a greater articulatory strength (see section 2.3.2 above) than [j]. The rounding of the lips might be the crucial factor in this respect: In their survey of American English pronunciation, Bauer et al. (1980: 82) find that "[s]ome speakers protrude and round their lips so strongly for /w/ that the resulting labial stricture may give rise to some degree of friction. This narrow stricture is especially likely to occur before /u/: *woo*, *womb*" (also cf. Gimson 2001: 210).[176] As with [j ~ ʝ] (see section 2.4.1.1), the conditioning phonotactic neighborhood (in this case a high back vowel; cf. Dobson 1968: 979) suggests that the friction is added to achieve a dissimilatory effect in these cases.

English differs from its Germanic relatives in that it has preserved the labial-velar semivowel that was phonemic in PGmc. In fact, in the standard varieties of all other Germanic languages the semivowel /w/ has either been fricativized to /v/ or /β/, or shifted to labiodental /ʋ/ (Harbert 2007: 47; also cf. Laker 2010: 138). In PDE, /w/ occurs more frequently than /j/.[177] /w/ occurs only in sylla-

[175] [j] and [w] are in fact the only two semivowels that exist in any notable quantity of languages in the world; other semivowels are extremely rare by comparison (Ladefoged and Maddieson 1996: 322).

[176] There does not seem to be a satisfactory way to transcribe '[w] with labial friction' using IPA symbols; the notation [ʍ̬] would mean 'voiced labial-velar fricative', but from the contexts in which [ʍ] is normally used the symbol [ʍ̬] would rather imply velar friction with simultaneous (frictionless) lip rounding. The best solution for '[w] with labial friction' might be the notation [w̹], i.e. '[w] with additional rounding' (cf. Pullum and Ladusaw 1996: 254).

[177] [w] makes up 2.81% of all retrieved segments in Fry's (1947) study based on RP (cf. Gimson 2001: 216) and 2.77% of the segments (2,878 tokens) in Mines, Hanson and Shoup's (1978: 227) study of American English conversations. Occurrences of [j] make up only 1% of the respective data material (see fn. 137). For comparison, the most frequently occurring consonant is [n], which makes up around 7% of the material (cf. Gimson 2001: 216; Mines, Hanson and Shoup 1978: 227).

ble onsets, sometimes as the last element of a consonant cluster (Carney 1994: 253). /w/ in syllable codas was relatively rare even in OE (Campbell 1977: 115). English spelling systems have usually had their own symbols reserved for, or closely connected with, the representation of this sound (<uu, ƿ, w>)[178] as opposed to the palatal semivowel.[179] As with /j/, some ModE words in which /w/ occurs derive from OE, and in these cases the pronunciation of the semivowel seems to have remained unchanged since PGmc, as evidenced by cognates in other Germanic languages (e.g. cf. OED, s.v. "win, *v.*[1]").

The following sections will follow the same outline as section 2.4.1, giving an overview of the history of the semivowel [w] as well as a survey of what has been written on the vocalization of postvocalic [w] in major English grammars and language histories.

2.4.2.2 [w] in the history of English

The process of vocalization in medieval English is generally treated as having run parallel for [j] > [i] and [w] > [u] (e.g. Fulk 2012: 39-42; Minkova 2014a: 204-209). While this is generally true, the two semivowels themselves have two rather different histories: As we have seen, the palatal semivowel [j] was one of several allophonic realizations of the phoneme /g/ in lOE; the OE labial-velar semivowel /w/, by contrast, was a phoneme in its own right (cf. Murray 2012: 261). This fact is also reflected in its spelling: In contrast to [j], the sound [w] did have a spelling of its own in OE manuscripts (namely <ƿ>, i.e. the runic letter 'wynn', which had the form <ᚹ> in runic script). The sound's phonological history is not as complex as that of [j] as sketched in section 2.4.1.1 above. /w/ was quite simply a separate phoneme from PGmc[180] throughout the history of English.

The two semivowels [j] and [w] in also differed very much in terms of their distribution in lOE. Like the original palatal semivowel [j] < **j* inherited from

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178 A single <u> was used only in early Nhb OE (Upward and Davidson 2011: 60).

179 Foreign influences on the English spelling system have caused some changes, so that in PDE the sound is sometimes rendered as <u> in Latinate words (e.g. *linguist*, *penguin*; Carney 1994: 254). The cluster [kw] is rendered as <qu> in PDE, a Norman spelling influence that became the norm in the ME period (cf. Upward and Davidson 2011: 148-149; compare the classical OE spelling <cƿen> [kweːn] 'woman, queen'). Finally, the spelling <wh> also represents /w/ in PDE standard pronunciation, a fact which results from the coalescence of /w/ and voiceless /ʍ/ (< /hw/) in certain dialects beginning in the EModE period (Nevalainen 2006a: 128; Schlüter 2012: 593).

180 PGmc **w* was the result of several original sounds in PIE (Wood 1966: 102ff.), the nature of which will not concern us here.

PGmc, the labial-velar semivowel regularly occurred almost exclusively in syllable onsets in OE.[181] This makes its distribution appear similar to that of [w] in ModE (Upward and Davison 2011: 61), but only at first glance. The sound's position within consonant clusters shows that the sound itself must have been less sonorous than in ModE (Anderson 2001: 209): In OE, /w/ could occur at the 'inner', more syllable-central edge as well as the 'outer', syllable-marginal edge of a consonant cluster (cf. *tpa* [twɑː] 'two' vs. *pritan* [wriːtɑn] 'write') whereas in ModE it only occurs in the 'inner' position (hence e.g. the <w> in ModE *write* is regularly silent and has been so since c. 1500, cf. Nevalainen 2006a: 128).[182] Another difference is that [w] used to occur in the onsets of unaccented syllables – cf. OE *snape* [snɑːwe] 'snow' (dative) – whereas it only occurs in accented syllables in PDE (Anderson 2001: 211; hence e.g. the <w> in PDE *answer* is silent).

The fact that [w] occurred almost exclusively in onsets in OE means not only that postvocalic [w] will most often be intervocalic and therefore non-tautosyllabic with the preceding vowel, but we might also expect instances of postvocalic [w] to occur less frequently in the data than postvocalic [j].[183] Its frequent non-tautosyllabicity with the preceding vowel might also prompt us to suspect that the change [w] > [u] happened later than the change [j] > [i], the articulation of [w] having been closely attached to the following vowel in more cases than was true for [j], which was often tautosyllabic with the preceding vowel. Campbell (1977: 115) puts this difference poignantly when he writes that "[t]heoretically *w* should never stand finally after a vowel in OE, for it was lost after some vowels, and combined with others into diphthongs […]. It was, however, often replaced by analogy [with inflected forms]". In other words, lOE coda [w], i.e. [w] that was tautosyllabic with the preceding vowel, did exist, but only

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181 A search for word-initial <w>, or consonant clusters containing <w>, *preceding* a vowel in the Baker mini corpus (see section 3.2.3.2.1) yields 1,916 hits, whereas a search for word-final <w>, or consonant clusters containing <w>, *following* a vowel yields only 39 hits.

182 This description discounts exceptional cases in which in certain ModE /r/ allophones – as in the case of the word *write* – do show what has been called "[s]econdary labialization" (Pilch 1994: 629) so that one finds [r ~ w] in some modern British accents (Pilch 1994: 154).

183 This suspicion is corroborated by a quick search for post-frontvocalic <g> (most of which are instances of [j]) in the entire DOEC, which yields 107,153 hits, whereas a search for <w> following the relevant vowels <a, e, i, o, æ> in the entire DOEC yields little more than half as many hits (64,201).

thanks to replacement processes after its general loss within the OE period, and not systematically.[184]

2.4.2.3 Accounts of [w] vocalization in medieval English

What all of the following sources agree upon is that OE postvocalic [w] became vocalized to [u] and was reinterpreted as part of the nucleus, yielding either [uː] or a diphthong ending in -[u] in ME, depending on the quality of the OE input vowel.

The different accounts will be given the same Roman numerals (i – xv) as in section 2.4.2.3.[185] Once again, the aims of this survey are to elucidate which factors have been deemed influential, and to collect relevant lexemes for the analysis.

(i) **Brunner**[186] **(1965**: 143**)** states that word-final [w] is "vocalized and treated as [u]" in the OE period.[187] This means that the often-quoted 'new diphthongs of ME' that end in [u] were already present in OE according to Brunner (1965). However, in these cases the original [w] was "usually"[188] restored on the analogy of inflected forms. Brunner (1965: 143) further implies that input vowel quantity is a factor that influenced the chronology of the sound change. Examples that he gives include words with originally short vowels such as *streaƿ* 'straw', *hreaƿ* 'raw', *treo*(*ƿ*) 'tree', *ðeo*(*ƿ*) 'servant', and *cneo*(*ƿ*) 'knee' (however, all of them with long diphthongs in lOE), and words with originally long vowels, such as *snaƿ* 'snow', in which case the [w] was "often"[189] restored (Brunner 1965: 143).

(ii) **Friedrich Kluge (1901**: 1031**)** reconstructs the diphthongal realizations [eu, au, ou] for earlier V + [w] from metrical considerations based on the *Ormulum* (c. 1200), and rather hazily adds that "this process will partly have gone

184 We can therefore expect 'tautosyllabic' instances of [w] to be rather infrequent. – On the other hand, tautosyllabic [w], though unsystematically restored and therefore unevenly distributed over lexemes, did occur in forms of some very frequent lOE lexemes; the pronoun *eoƿ* 'you' (accusative/dative plural; vs. *eoƿer* 'your') is a case in point.

185 Not all accounts are included this time: Erdmann (1972), Lass and Anderson (1975), and Fulk (2012) add nothing essential to the discussion of [w] vocalization.

186 As above (see fn. 149), "Brunner" should be read as shorthand for "Sievers (1882) as revised by Brunner" in what follows.

187 My translation. Original: "[…] vokalisiert (*u*) und wie -*u* behandelt".

188 My translation. Original: "[…] meistens".

189 My translation. Original: "[…] oft".

back to the Old English period",[190] suggesting [sɑule] as the regular pronunciation for OE *saple* 'soul' (dative/accusative) around 1000 CE.

(iii) **Karl Luick** says in his ***Historische Grammatik* (1921**: 232**)** that the vocalization of [w] began very early, actually in preOE in some dialects, but reached its full potential in ME.[191] He places the process of coda-[w] deletion and restoration due to analogy into preOE so that according to him [-u] diphthongs and even triphthongs (if original [w] occurred following a diphthong) were present in the earliest English. As examples of such words he lists *snap* 'snow', *brip* 'porridge', *mæp* 'seagull', *stop* 'place', *deap* 'dew', *streap* 'straw', *cneop* 'knee', *treop* 'tree', *cnæpð* 'knows', *flepð* 'flows', and *hiepð* 'strikes', all of them with long vowels in lOE (Luick 1921: 233). Luick (1921: 233) takes eOE spellings such as <meu> and <stou> as evidence of these early diphthongs.

(iv) As mentioned above, **Joseph Wright and Elizabeth Wright (1928**: 52**)** imply the process of semivowel vocalization to have taken place in eME generally, but with earlier lexically bound exceptions. They list the forms *meu* 'seagull' and *saule* 'soul' (genitive) among the cases for which they postulate "diphthongs" in the lOE sub-period (Wright and Wright 1928: 52).

(v) In **Richard Jordan's (1968)** theory the vocalization of postvocalic [w] runs parallel with the vocalization of [j] already discussed above: It took place within lOE if tautosyllabic with a preceding long vowel (the examples he gives are OE *snap* [snɑːw] > [snɑːu] and *stop* [stoːw] > [stoːu])[192] and in eME if non-tautosyllabic (the example he gives is *claue* 'claw'; Jordan 1968: 102-103). Jordan (1968: 103) further says that this change happened earlier with short vowels than with long vowels.

Just as he does for [j] (see section 2.4.1.3 above), Jordan (1968: 112ff.) next gives a rough timeline of the [w] vocalization process, naming input vowel quality and quantity, and in some cases the dialect, as influencing factors. Table 2-11 (see next page) gives an overview of these factors, with some examples taken from Iglesias-Rábade (2003: 238-244; cf. Table 2-7 above).

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[190] My translation. Original: "Teilweise wird […] dieser Prozess in die altenglische Zeit reichen […]".

[191] Original: "[D]ie Entwicklung von Diphthongen einer neuen Art […] setzte, wenigstens in gewissen Dialekten, sehr früh ein, erstreckte sich aber über die ganze altenglische Periode und fand ihre volle Entfaltung im Mittelenglischen" (Luick 1921: 232).

[192] Jordan (1968: 103) actually uses the symbol *u̯* 'non-syllabic *u*' for [w].

OE input	OE example	Further development eME:	ME:	
[ɑw]	*claƿu* ‘claw’	> [au]		
[ɑːw]	*snaƿ* ‘snow’	Nhb > [au]		
		non-Nhb > [ɔːu]	> [ɔu]	
[oːw]	*floƿan* ‘flow’	Nhb > [ou]	> [ɔu]	> [ɔː]
		non-Nhb > [ou]		
[æːɑw]	*feaƿe* ‘few’		> [ɛu]	
[æːw]	*slæƿþ* ‘sloth’		> [ɛu]	
[eow]	*seoƿian* ‘sew’		> [eu]	> [ɛu]
[eːow]	*cneoƿ* ‘(he) knew’	> [øːu]	> [eu]	> [iu]
[iːw]	*tiƿes dæȝ* ‘Tuesday’		> [iu]	

Table 2-11: The phonological input for [w] vocalization according to Jordan (1968: 102ff.), with some examples taken from Iglesias-Rábade (2003: 251-255)

(vi) As mentioned above, **Fernand Mossé’s *Handbook of Middle English* (1968)** relates the vocalization of postvocalic semivowels to the change in syllable structure between OE and ME caused by the lenition and loss of vocalic word endings, so that in the case of *gloƿan* ‘glow’ he reconstructs what amounts to the sequence OE [gloː.wɑn] > lOE [gloːw.e(n)] > eME [glow.e] (Mossé 1968: 27). He lists examples of changes from the OE inputs [ɑw, ɑːw, oːw, æːw, æːɑw, eːow, iːw] (Mossé 1968: 29).

(vii) **Hans Ernst Pinsker’s (1974)** three chronological “layers” described above (cf. Table 2-9) are conceived for the vocalization of both semivowels (Pinsker 1974: 33-34). To Table 2-9 might be added the forms *stoƿ* > *stou* ‘place’ (layer 1, [w] tautosyllabic with preceding back vowels, OE), *claƿe* [klɑ.we] > *claue* [klau.e] ‘claw’ (layer 2, [w] non-tautosyllabic with preceding back vowels, OE – eME), and *læƿed* [læ.wed] > *leƿ(-e)d* [lɛu(.e)d] ‘lewd’ (layer 3, [w] following front vowels, eME). The crucial factor separating the second and third layers is the OE input vowel quality (vocalization having occurred earlier for [w] after back vowels than after front vowels).

(viii) **Alistair Campbell (1977**: 115**)** may be added to the list of those who use the expression ‘diphthong’ to describe the OE pronunciation of a vowel followed by <ƿ>, and who cite early and/or Nhb spellings with <u> as evidence.

(ix) **Jacek Fisiak’s *Short Grammar of Middle English* (1996**: 48-49**)** distinguishes between short [ɑ] and the other OE input vowels, saying that only in the case of a preceding [ɑ] (again, using the example of ‘claw’) did vocalization of [w] to [u] definitely happen within the OE period. He is undecided about the other inputs: He lists examples of [ɑːw, oːw, æːw, æːɑw, ew, eːow, iːw], which he says became diphthongs “in [e]arly Middle English or earlier” (Fisiak 1996: 49).

(xii) Apart from his aforementioned general skepticism about the explanatory power of spellings in general, **Richard Hogg (1992)** follows along the lines of earlier discussions of [w] vocalization, saying that early and/or non-WS <u> spellings indicate vocalization which was then reversed and resulted in irregular coda [w] “always preceded by a long vowel or diphthong” (Hogg 1992: 25). Lexemes that Hogg (1992: 291) uses as examples and that have not been mentioned yet include OE *ȝiƿ* [jiːw] ‘griffin’, *hlæƿ* [hlæːw] ‘mound’, *iƿ* [iːw] ‘yew’, *mæƿ* [mæːw] ‘mew’, and *sliƿ* [sliːw] ‘mullet’.

(xiii) **Iglesias-Rábade’s *Handbook of Middle English* (2003**: 251-255**)** is mentioned here once more because he too contributes some more lexemes to illustrate the different kinds of vocalic input to the [w] vocalization process, among them *slaƿ* ‘slow’ and *sæƿþ* ‘sloth’.

(xv) As mentioned above, **Donka Minkova’s (2014a**: 152**)** table of lOE vowel phonemes includes the diphthongs [ei] and [æi]; it does not include -[u] diphthongs although Minkova generally (e.g. 2014a: 205-208) treats the vocalization of [j] and of [w] as parallel in theory. Although it does not become immediately apparent in her discussion of semivowel vocalization (Minkova 2014a: 205-208), the reason why the -[i] diphthongs are included in the lOE vowel inventory and the -[u] diphthongs are not has to do with the vocalization of the voiced velar fricative that will be discussed in section 2.4.3.2.

Minkova (2014a: 208) stresses that the different OE vowel quantities were neutralized in the process of vocalization so that “[t]here is no indication in the metrical treatment or the later history to suggest that diphthongs originating in short vowel + glide were treated differently [in regards to their length] from those originating in long vowel + glide”. This statement does not rule out the possibility that the vocalization process e.g. took place at different rates in different regions according to the input vowel quantity; Minkova (2014a: 208) is only implying that the original OE vowel length differences are no longer perceptible in the ME results.

In summary, the accounts (i-xv) do not differ as greatly as they do concerning the vocalization of [j]. Once again, some discrepancies are summarized in Table 2-12 below.

Account	**Dating**	**Influencing factors**
Brunner (1965)	OE (but then usually retracted)	
Kluge (1901)	"partly" in OE / in ME	
Luick (1921-1949)	from preOE to ME, depending on …	dialect tautosyllabicity
Wright and Wright (1928)	ME (with possible lexically conditioned exceptions in OE)	
Jordan (1968)	lOE/eME, depending on …	input vowel quality dialect tautosyllabicity input vowel quantity
Mossé (1968)	OE/lOE	
Pinsker (1974)	OE/eME, depending on …	input vowel quality tautosyllabicity
Campbell (1977)	from OE	
Fisiak (1996)	OE/ME, depending on …	input vowel quality input vowel quantity
Hogg (1992)	ME (and OE but then retracted)	*(phonological template for new diphthongs created through ME breaking)*
Minkova (2014a)	in lOE/eME *(but possibly later than [j] vocalization because resulting [-u] diphthongs are not included in the OE vowel inventory)*	

Table 2-12: Details of [w] vocalization according to different accounts

2.4.3 The voiced velar fricative [ɣ]

2.4.3.1 [ɣ] in the history of English

The voiced velar fricative of OE [193] was a true fricative and not a semivowel. Our reason for including OE [ɣ] in our analysis is that over the eME period its developments became indistinguishable from that of the semivowels. Especially the chronology of [j] vocalization is complicated by the fact that the changing pronunciation of lOE [ɣ], which was being palatalized in certain positions around the eME period (Luick 1940: 944), seems to have led to new instances of [j], which are sometimes referred to as 'secondary palatals' (e.g. Erdmann 1972: 176; Wełna 1988: 423; Dietz 2006: 23; Stenbrenden 2010: 213). The history of this sound will be summarized in the following.

From PGmc through eOE the sound occurred comparatively frequently, being the regular realization of a sound that had been an aspirated voiced plosive (*/gʰ/) in PIE and that was fricativized to *[ɣ] in PGmc as part of the First Germanic Consonant Shift, a.k.a. Grimm's Law (Harbert 2007: 41ff.; March 2012: 3-4). As mentioned in section 2.4.1.2, the traditional notation of the PGmc sound is **g* although it was a fricative in most positions (cf. Ringe 2006: 215). The voiced velar fricative became much less frequent over the course of the OE period, until it only remained unshifted between voiced sounds (as in lOE *niȝon* 'nine', *eaȝe* 'eye', *boȝa* 'bow', or *sorȝa* 'sorrow'). As we have seen above, most occurrences of the semivowel [j] in lOE, and particularly those that stood in a postvocalic position, were actually palatalized from eOE [ɣ]. Instances of [ɣ] in later OE were thus phonetic 'remnants' which represented the relatively few unshifted instances of a sound that in most phonotactic surroundings had shifted towards other places and manners of articulation over the OE period.

Systematic overviews of the phonology of ME (e.g. Burrow and Turville-Petre 2005: 12-13; Kemmler and Rieker 2012: 9-11) usually make no mention of the sound because according to most accounts the voiced velar fricative no longer existed as such by the ME period.

193 The voiced velar fricative does not occur in PDE; students of historical English are often pointed towards Modern German for reference (e.g. Mitchell and Robinson 2012: 16) although even in German the sound can at best be found as an infrequent allophone of /g/ in casual speech (cf. Moosmüller 2007: 6).

The diagram in (12) illustrates this development schematically:

(12) lOE [j] > eME [i]
(in words like *niᵹon* ‘nine’, *eaᵹe* ‘eye’)
lOE [ɣ]
(in words like *boᵹa* ‘bow’, *sorᵹa* ‘sorrow’)
lOE [w] > eME [u]

All instances of the lOE voiced velar fricative were vocalized in this way in or around the eME sub-period, which can be paraphrased as the fricative having ‘joined’ or ‘taken part in’ the ongoing vocalization of the two OE postvocalic semivowels. For this reason alone the lOE fricative [ɣ] needs to be featured in a comprehensive discussion of the development of medieval English semivowels.

However, as the dotted arrows in (12) are meant to convey, the phonetic details surrounding the voiced velar fricative and its vocalization are uncertain; it seems especially unclear whether actually ‘semivocalic’ pronunciations (such as [nijon ~ nijen] for ‘nine’ or [bowɑ ~ bowe] for ‘bow’) were in existence for any stretch of time. In light of what has been said about the general nature of lenition and of consonant vocalization above (see section 2.3.2), it would seem that the semivowel stage (grade 6 in Table 2-6) is one that cannot easily be skipped, especially considering that vocalization entails nuclearization, i.e. the reanalysis of a VC sequence as a VV sequence, and for this to work the consonant must first be plausibly similar to the resulting vowel sound. It seems well-established that the voiced velar fricatives which became vocalized to [i] underwent a palatal semivowel stage ([ɣ > j > i]) so that they are often referred to as ‘secondary palatals’, as mentioned above. For now we will hypothesize that such instances of the lOE voiced velar fricative as were ultimately vocalized to [u] underwent an analogous development ([ɣ > w > u]), and we will thus correspondingly refer to these instances as ‘secondary labial-velars’ for lack of a better term.

Another source of uncertainty is the question of which lexical items are actually meant when we speak of ‘instances of the voiced velar fricative in lOE’. In order to answer this question it will be helpful to distinguish instances of [ɣ] according to their vocalic outcome in ME, as will be done in the following.

In lOE, the voiced velar fricative was preserved in cases in which we find <ᵹ> following [r] or [l] within the same morpheme and preceding a back vowel, e.g. *sorᵹa* [sorɣa] ‘sorrow’, *folᵹode* [folɣode] ‘(he) followed’. Another unambiguous, and actually the most frequent case, is that in which we find <ᵹ> surrounded by two back vowels, e.g. *saᵹa* [sɑɣɑ] ‘say’ (imperative), *boᵹa* [boɣɑ] ‘bow’, *utlaᵹa* [uːtlɑɣɑ] ‘outlaw’, or later in the name of the poet Laȝamon (spelled

<Laweman> in some manuscripts; e.g. British Museum, MS Cotton Otho C.XIII [Oxford Text Archive 1993, l. 1]).[194] Since [ɣ] no longer occurred at word boundaries in lOE, having shifted to the plosive [ɡ] word-initially and to unvoiced [x] word-finally, the simplest way of putting it is to say that in lOE word-internal <ᵹ> corresponded to [ɣ] if directly preceded, followed or surrounded by back vowels, but with no intervening morpheme boundary, as is the case with *aᵹyltan*, which is morphologically {a}{ᵹylt}{an} and hence phonetically [ɑːɡyltɑn] 'offend, become guilty' (as corroborated by later spellings and the modern pronunciation). Most of the instances of the voiced velar fricative that conform to this description (in other words, the 'secondary labial-velars') were probably lenited to [w] around the eME period. The beginnings of this change are attested through lOE manuscript spellings showing <ƿ> 'wynn' (e.g. <boƿa>, <utlaƿa>; Brunner 1951: 179).

On the other hand, situations in which neighboring front vowels come into play lead to different results in ME. It seems likely that lOE [ɣ] was palatalized and weakened to [j] in words such as *eaᵹe* and *niᵹon* as soon as the main conditioning factor for the velar value, i.e. a directly preceding or following back vowel, had ceased to be present (Luick 1940: 944). This happened for two different reasons:

– Vowels in unstressed syllables were reduced to [e] or [ə] in lOE/eME, yielding e.g. OE *niᵹon* [niɣon] > eME *niȝen* [nijen] 'nine', and
– the diphthongs [æ(ː)ɑ] and [e(ː)o] were monophthongized in lOE/eME, meaning that their second, less prominent element lost its distinctiveness, yielding e.g. OE *eaᵹe* [æːɑɣe] > lOE *eaᵹe* [æː(ə)je][195] > ME *eȝe* [ɛːje] 'eye'.

It is generally thought that the new instances of post-frontvocalic [j] that thus emerged (i.e. the 'secondary palatals') were initially distinct from the older ('primary') instances of the palatal semivowel [j] (Luick 1921: 416), behaving differently in the subsequent vocalization: E.g. Luick (1940: 945) dates the vocal-

194 As Laȝamon flourished around 1200 (Hall 1920: 466; Treharne 2000b: 369), how his name would have been pronounced while he was alive is precisely the question (cf. Frankis 2004).

195 Minkova (2014a: 156) assumes monophthongization to have taken place fairly early, reconstructing [æᵊ] for eOE and [æ] for lOE in the case of the vowel spelled <ea>.

ization of the newer (‘secondary’) palatals to the twelfth and thirteenth centuries in all dialects except Ke, in which it is supposed to happened even later.

It seems especially unclear whether cases in which <ȝ> followed a front vowel but preceded a yet unshifted back vowel (at least for a time) still preserved the voiced velar fricative or not in lOE, e.g. in words such as *niȝon* ‘nine’, *stiȝan* ‘ascend’, *meniȝu* ‘multitude’, *pleȝa* ‘play’ (noun), but also in inflected forms such as the weak masculine nominative singular forms of adjectives (e.g. *modiȝa* ‘brave’,[196] *eadiȝa* ‘blessed’, *ælmihtiȝa* ‘almighty’). Some textbooks and grammars say or suggest that the voiced velar fricative was preserved in lOE in such cases (e.g. Bähr 2001: 29; Barber, Beal, and Shaw 2009: 118-119; Baker 2012: 19; also cf. Campbell 1977: 21, whose spelling <plega> with undotted <g> suggests a voiced velar fricative) while others say that it was not, but that the voiced velar fricative only occurred *after* back vowels in lOE (Mitchell and Robinson 2012: 16; Minkova 2014a: 205). Occasional alternative spellings such as <meniȝeo> (Bosworth and Toller 1898: 678, s.v. “menigu”) with silent <e> used as a “palatalization diacritic” (Lass and Anderson 1975: 137) seem to point into the latter direction, indicating that by the lOE period the fricative had already been fronted to [ʝ] and possibly lenited to [j] in such cases.

The decision about whether to interpret lOE forms such as *niȝon* as containing a velar or a palatal consonant hinges on how early one believes the reduction of adjacent vowels to have taken place: When unstressed vowels such as the <o> in *niȝon* can no longer be taken to represent back vowels, but rather [e] or [ə], the velar quality of [ɣ] for <ȝ> becomes increasingly implausible. E.g. Minkova’s (2014a: 205) view that such words were already pronounced with a palatal/front [ʝ ~ j ~ i] in lOE is informed by her theory that vowels in unstressed syllables had already been reduced to the point of no longer being contrastive by the lOE sub-period (Minkova 2014a: 181; see section 2.4.3.2 [xv] below for more on Minkova’s [2014a] treatment of the secondary palatals).

In light of what has been said about the secondary palatals, i.e. such instances of the OE voiced velar fricative as ultimately became vocalized to [i] in ME, and their distinctiveness from the ‘primary’ palatal semivowels, it is surprising that similar comments on the relationship between [ɣ] > [w] (i.e. the ‘secondary labial-velars’) and etymological [w] are nowhere to be found. For now it remains an open question whether any differences are to be found in the diachronic or di-

196 The allophony of cognates of these words in Modern German (*mutig* [muːtɪç] ~ *mutige* [muːtigə]) demonstrates that alternations like [j ~ ɣ] are conceivable.

atopic details of the vocalization from the two different sources that both yielded ME [u].

2.4.3.2 Accounts of [ɣ] vocalization in medieval English

In the following, the sources already scrutinized in sections 2.4.1 and 2.4.2 will again be taken into consideration.[197]

(i) **Brunner (1965**: 176**)**[198] does little more than to give a few examples of relevant OE lexemes, e.g. *laȝu* 'sea', *belȝan* 'swell, be angry', etc. A potential complication for the present study is to be seen in a fact reported by Brunner (1965: 176): It seems that in some OE lexemes [ɣ] or [j] alternated with [w] for reasons ultimately connected with the phonological properties of these lexemes in PIE (cf. Hogg 1992: 71). Brunner (1965: 176) lists the following examples: *mæȝ(e)ð* ~ *meople* 'girl' (both classical OE), eOE *briiȝ* ~ lWS *brip* 'porridge', non-WS *breȝ* ~ WS *bræp* 'brow', *hpeoȝol* ~ *hpeopol* 'wheel' (both lWS). It is hard to posit a definite original 'input consonant' value[199] for such lexemes. Since this only concerns a handful of lexemes, they will not be included in the analysis.

(ii) **Kluge (1901**: 997**)** confirms the suspicion raised above (see section 2.4.3.1) that "[j] and [ɣ] must often have alternated in inflectable words",[200] e.g. *dæȝ* [dæj] – *daȝas* [dɑɣɑs], *byrȝ* [byr(i)j] – *burȝum* [burɣum], etc. Kluge (1901: 999) also states that word-internal [ɣ] may have existed until about 1250 CE if adjacent to back vowels, but adds that an exact dating is impossible. The important fact seems to be that the sounds that were [j] and [ɣ] in lOE were kept distinct in eME (Kluge 1901: 999), the palatalization of [ɣ] having taken place only "long after [the 'primary palatals'] had been vocalized".[201] He cites Orm's

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[197] Again, not all sources add anything new to the discussion, which is why Mossé (1968), Campbell (1977), Erdmann (1972), Hogg (1992), and Fulk (2012) will be left out. – As an interesting side note, Hogg (1992: 35) mentions that the voiced velar fricative occurred as a geminate, but that these occurrences are "restricted to small group of forms" (35). The word forms that he mentions do not occur in the LAEME CTT at all, so that the question of how geminate [ɣː] developed in eME cannot be investigated in the present study.

[198] As above (see fn. 149), "Brunner" should be read as shorthand for "Sievers (1882) as revised by Brunner" in what follows.

[199] 'Input consonant' is the name that will be given to the formalized variable that answers the question of whether we are dealing with a reflex of lOE [j], [w], or [ɣ] (see sections 2.4.4 and 3.2.1.1.2).

[200] My translation. Original: "[…] dass vielfach ɣ und ȝ in flektierbaren Worten wechseln mussten".

[201] My translation/interpretation. Original: "[…] nachdem das alte ȝ längst vokalisiert war".

spellings such as <eȝhe>, <diȝhel> (< OE *eaȝe* [eːɑɣe], *dieȝol* [dɪːɣol]) to as evidence for the presence of a non-vocalized sound, adding that Orm renders post-vocalic reflexes of OE [j] as <i>. Kluge (1901: 999) dates ‘new ȝ’ [i.e. the ‘secondary palatals’] to c. 1100 to 1300, adding slightly confusingly that its vocalization to [i] happened after the remaining instances of [w] had been vocalized to [u], a shift which he in turn dates to c. 1250-1350.

(iii) **Luick (1921**: 416**)** dates the vocalization of [ɣ] (to both [i] and [u]) to c. 1200 and stresses the fact that it happened at different times in different areas. The first graphical indications, e.g. <w> in words with earlier [ɣ], date from late twelfth-century Worcester (Luick 1921: 429); Kent, on the other hand, seems to have been the most conservative region in preserving a fricative until 1350 (Luick 1921: 416; 421). The vocalization of [ɣ] seems therefore to have spread from west to east. Luick (1921: 416-417) goes into some detail in describing the OE inputs and ME results, which are summed up in Table 2-13 below (and continued on the next page).[202] Luick (1921: 416-417) adds that in Northumbria the change affected fewer cases than in other regions because here more instances of lOE [ɣ] had become word-final and had therefore been devoiced to [x].

OE input	**OE example**	**Further development** **eME:**	 **ME:**
[iɣ]	*niȝon* ‘nine’	> [iːj]	> [iː]
[iːɣ]	*stiȝan* ‘climb’	> [iːj]	> [iː]
[eɣ]	*treȝa* ‘pain’		> [ɛi]
[eːɣ]	*preȝan* ‘bewray’		> [ɛi]
[æːɑɣ]	*eaȝe* ‘eye’		> [ei]
[æːɣ]	*hnæȝan* ‘neigh’		> [ei]
[ɑɣ]	*draȝan* ‘draw’	> [au]	
[ɑːɣ]	*aȝen* ‘own’	Nhb > [au]	
		non-Nhb > [ɔːɣ]	 > [ɔu]
[oɣ]	*floȝen* ‘flown’	NWML > [ɔu]	 > [au]
		non-NWML > [ɔu]	

[202] Cases in which newer sources contradict Luick (1921) are marked as such in Table 2-13.

OE input	OE example	Further development eME:	 ME:
[oːɣ]	*ploȝas* 'plows'	Nhb > [yu]	 > [iu]
		non-Nhb > [ɔu] (Iglesias-Rábade 2003)	
		> [ou]	> [uː] (Luick 1921)
[uɣ]	*muȝon* '(they) may'		> [uː]
[uːɣ]	*buȝan* 'bow'		> [uː]

Table 2-13: The phonological input for [ɣ] vocalization according to Luick (1921: 416-417) and Iglesias-Rábade (2003: 242-246)

(iv) **Wright and Wright (1928**: 53**)** do not comment on the change [ɣ] > [i],[203] but only consider such instances of the voiced velar fricative as were vocalized to [u], i.e. instances in which [ɣ] followed liquids or back vowels. Wright and Wright (1928: 53) are the first to assume an intermediate semivocalic stage, which we have referred to as 'secondary labial-velars' above. They date the beginning of the shift [ɣ > w > u] to roughly the end of the twelfth century, except for Kent, where the shift is said not to have happened until c. 1400 (Wright and Wright 1928: 128).

(v) **Jordan's (1968)** chronological details for the vocalization of [ɣ] conform to those put forth by Wright and Wright (1928). Jordan (1968: 116) contradicts Luick's (1921: 419; 431) assessment that [ou]/[ɔu] (< [o(ː)ɣ]) generally became [uː] in ME, allowing for this monophthongization to have taken place only in the case of [oː] being surrounded by [w]s, as e.g. is the case with eME *wowen* 'woo'.

(vii) In **Pinsker's (1974)** chronology described above (cf. Table 2-9) the vocalization of the voiced velar fricative is part of the third and final "layer" which he dates to the twelfth to thirteenth century, i.e. roughly one century after the vocalization of non-tautosyllabic semivowels (Pinsker 1974: 34). His chronology implies that the vocalization of [ɣ] to [u] and to [i] happened roughly simultaneously.

(ix) As mentioned above (see section 2.1.4), **Fisiak (1996**: 47**)** defines [ɣ][204] as an allophone of the phoneme /x/ in OE. In eME [ɣ] "changes into [w], thus joining the /w/ phoneme" and its further development including vocalizations

[203] The reason for this might be that Wright and Wright (1928) consider the vocalization of secondary palatals to have been completed by the beginning of the ME period, which they are focusing on.

[204] Fisiak (1996: 47) actually uses the symbol [g̱].

(Fisiak 1996: 47). The absence of references to the shift [ɣ] > [i] implies that Fisiak (1996) takes this shift to have taken place within the OE period, i.e. outside the temporal boundaries of his *Short Grammar of Middle English*.

(xi) In their theory-driven work on OE phonology, **Lass and Anderson (1975**: 158**)** touch upon the subsequent development of OE [ɣ] only briefly, giving the OE word *aȝan* 'own' as an example of a word which demonstrates what they call "lenition by sonorization and opening". They reconstruct the pronunciations [ɑːɣɑn][205] for OE, [ɔːwen] for ME [*sic*], and [ɔːn] for lME, adding that the change from [w] to nothing (∅) "perhaps" went "via [u]" (Lass and Anderson 1975: 158). In other words, Lass and Anderson (1975) seem to consider the possibility that eME [ɣ] > [w] was not vocalized to [u] but simply deleted in words like 'own'.

(xiii) **Iglesias-Rábade (2003**: 242; 244-246**)** gives an overview of vocalic surroundings in which lOE [ɣ] occurred and was subsequently vocalized:

– Between a front vowel and a back vowel (e.g. in *niȝon*): palatalized in the thirteenth century (Iglesias-Rábade 2003: 239) and subsequently vocalized;
– following the back vowels [ɑ(ː), o(ː), u(ː)] (e.g. in *draȝan* 'draw', *boȝa* 'bow', *fuȝol* 'fowl'): vocalized to [u] in the early thirteenth century, and in the fourteenth century in Kent (Iglesias-Rábade 2003: 244).

Iglesias-Rábade (2003: 244ff.) provides a number of relevant lexemes which have not been mentioned in the literature reviewed so far, e.g. *ȝnaȝan* 'gnaw' or *cuȝele* 'cowl'.

(xv) As mentioned above, **Minkova (2014a**: 180ff.**)** dates the general reduction of vowels in unstressed syllables to fairly early within the OE period, so that from c. 800 CE, unstressed vowels coalesced into indeterminate schwa [ə] with only few exceptions. The unstressed vowels are said to have reached this state of indeterminacy by the end of the OE period at the latest (Minkova 2014a: 181). In accordance with this time line, [ɣ] must already have shifted to [j ~ i] in words such as *niȝon* by lOE, given the absence of a back vowel. Indeed, Minkova (2014a: 205, my emphasis) says that the OE voiced velar fricative "was always *preceded* by a back vowel". The vocalization of the secondary palatals ([ɣ] > [j] > [i]) is thus placed firmly into the OE period; the reasons for Minkova's (2014: 152) setting an even earlier date for the vocalization of the *primary* palatals (see

[205] Lass and Anderson (1975: 158) actually use double symbols for long vowels, e.g. "OE [aaɣan]".

section 2.4.1.3 above) therefore now becomes more apparent: In order to be kept distinct from the secondary palatals, the vocalization of the primary palatals must have taken place even earlier, which is why Minkova (2014a: 152) considers the resulting diphthongs such as [ei] to have been part of the OE vowel inventory (/ei/).

About the vocalization of [ɣ] to [u] Minkova (2014a: 205) writes that the shift was "under way in late OE/early ME", and that the sound definitely merged with the labial-velar semivowel around this time. For our purposes this leads to the hypothesis that the vocalization of [w] to [u] ran absolutely parallel in cases such as eME *stowe* 'spot' and eME *bowe* 'bow' (the former word with etymological [w], the latter with etymological [ɣ]), so that there were no 'secondary labial-velars'.[206]

The factors mentioned in these accounts as having influenced the vocalization of the voiced velar fricative are summarized in Table 2-14:

Account	**Dating**	**Influencing factors**
Kluge (1901)	in eME / ME	result ([i] vs. [u])
Luick (1921-1949)	c. 1200	dialect input vowel quality
Wright and Wright (1928); Jordan (1968)	c. 1200 (only [ɣ] > [w])	dialect
Pinsker (1974)	$12^{th}/13^{th}$ century	
Iglesias-Rábade (2003)	$13^{th}/14^{th}$ century, depending on …	result dialect input vowel quality
Minkova (2014a)	before lOE: [ɣ] > [j] in lOE: [ɣ] (> [ɰ]) > [w]	result input vowel quality

Table 2-14: Details of [ɣ] vocalization according to different accounts

206 Interestingly, Minkova (2014a: 103) suggests that the (intervocalic) voiced velar fricative's general lenition (though not its labialization) began even before the lOE sub-period, and posits the sound value of [ɰ] (velar approximant; cf. IPA 2015) for "pre-c. 950" and of "[ɰ] or [w]" for classical OE.

2.4.4 Summary

2.4.4.1 Factors mentioned in secondary literature

As already mentioned, the influencing factors given in Tables 2-9, 2-11 and 2-13 will be coded as variables that will form the basis of the analysis. Two of these factors (viz. time and space) can be called ‘extra-linguistic’ in that they do not describe linguistic properties of given word forms but concern the temporal and spatial details of manuscript composition. The first of these two (i.e. time) is the most straightforward variable in any given diachronic analysis: It will not surprise us to find that the spellings of the relevant word forms have moved from more ‘consonantal’ to more ‘vocalic’ over time, since this is the most basic assumption. For this reason we will be much less interested in the direct effects of time than in the way in which time interacts with other variables. The second variable is the one we have called ‘dialect’ in the Tables above.

Linguistic factors that are frequently listed as having had a bearing on the vocalization of semivowels include the following:

- The consonant sound we are dealing with ([j], [w], or [ɣ]): This variable will be referred to as the ‘input consonant’,
- in the case of the input consonant [ɣ], whether the sound became [i] or [u] in later ME: This variable will be called ‘result’,
- the question of whether or not the sound belonged to the same syllable as (i.e. was tautosyllabic with) the preceding vowel,
- the preceding vowel’s quality,
- the preceding vowel’s quantity, and
- the accentuation of the syllable in question (i.e. the syllable of which the preceding vowel is the nucleus).

Three of these factors (viz. input consonant, vowel quality and vowel quantity) are sometimes combined, e.g. Fulk (2012: 41) visualizes the developments leading to the ‘new’ diphthongs of ME in a chart which is the basis of Figure 2-6 on the following page. Each of the thirteen rows in this chart contains a different OE phonological input type that can be seen as a unique combination of the factors input consonant, vowel quality and vowel quantity. We will also combine these three factors in Chapter 4.

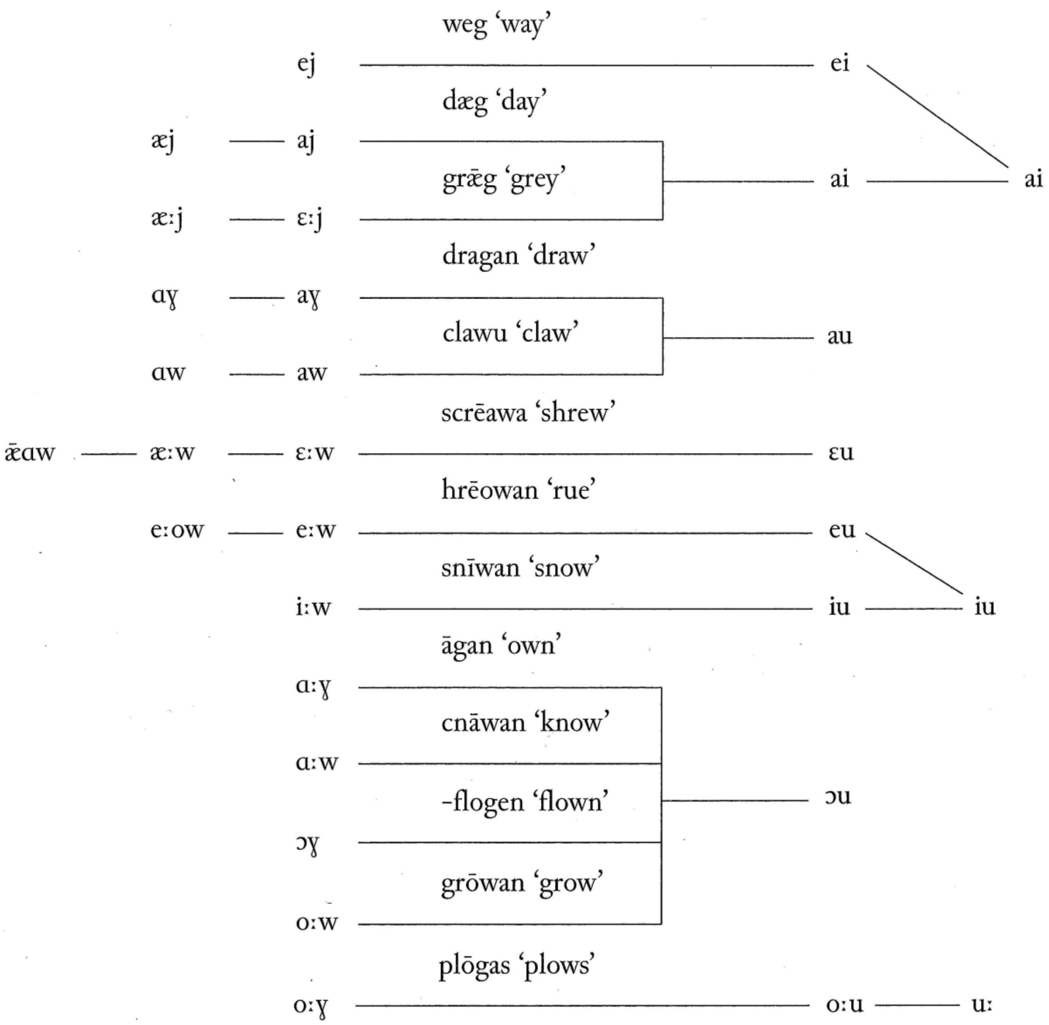

Figure 2-6: OE phonological input types that became diphthongs in ME (adapted from Fulk 2012: 41) [207]

The last of the potentially relevant factors listed above (viz. syllable accentuation) is mentioned surprisingly seldom (actually only once, cf. Table 2-10) in the literature reviewed. We will nevertheless include it as a variable in the present study.

In addition to these factors, we will also include some variables relating to the idea of lexical diffusion, although these were not found in the discussions of semivowel vocalization in the literature surveyed. The following section will briefly introduce and explain the rationale behind the inclusion of these factors.

2.4.4.2 Factors not mentioned in secondary literature

Joan Bybee (2007c: 952, 2012: 212) cites Hugo Schuchardt’s (1885: 25) verdict that “very infrequently used words lag behind; very frequently used words take

[207] Fulk (2012) bases his chart on Lass (1992: 50).

the lead" in sound changes [208] as a fairly early example of an expression of the theory that would later be known as lexical diffusion (cf. Wang 1969: 12ff.; Chen and Hsieh 1971; Khrishnamurti 1978; Phillips 1984, 2015). Much evidence for the tenets of lexical diffusion has been accumulated in recent decades (Millar and Trask 2015: 273). A variation of the idea is based on word class rather than actual frequency, viz. the idea that it is function words which take the lead in sound changes and lexical words which follow suit (cf. Phillips 1983: 488). Since the most frequent words *are* usually function words (Dinkin 2008: 102; Lindquist 2009: 27), we may suspect that the two factors are essentially interchangeable, but cases have been found in which word class and word frequency acted independently (Phillips 1983: 494).

Interestingly, factors such as word class or lexeme frequency have been conspicuously absent from past discussions of semivowel vocalization, as our survey of historical-linguistic literature (sections 2.4.1 through 2.4.3) has shown. Indeed, the concept of lexical diffusion has never taken much hold in historical linguistics (cf. Campbell 2013: 196). It is true that the concept has been challenged – most comprehensively by William Labov's (1994) counter-examples gathered from his studies of ongoing sound changes in American English. However, it has since been found (Bybee 2007c: 980; Dinkin 2008: 104) that the principle of frequent words leading sound changes evidently holds true in cases of sound reduction (lenition). [209] Aaron J. Dinkin's (2008) articulation- and perception-based explanation of this is very convincing:

> Lenition has the effect of reducing the amount of articulatory effort required to produce a word, at the expense of rendering it phonetically less distinct – that is, closer, in phonetic terms, to other, similar words – and therefore more prone to misundertanding [*sic*]. Since less-frequent words are likely to be less familiar to

[208] My translation. Original: "Sehr selten gebrauchte Wörter bleiben zurück, sehr häufig gebrauchte eilen voran".

[209] Of course, the fact that the most frequent lexical items appear in the 'leading' position of lenition-involving changes might be seen as a reflection of the fact that, from the point of view of synchronic linguistics, at any given point in time high-frequency words are typically phonetically reduced to a higher degree than low-frequency words, which implies that if there is a general development towards more reduced forms, the high-frequency items must appear as 'leaders' of the change. Much depends on the point of view one is a adopting. – Also cf. Phillips's (2015: 361ff.) warning that in some cases it is actually the *least* frequent words that are affected first. The present study will only test for the most basic assumption made in lexical diffusion theory, i.e. that high-frequency items are generally prone to be affected by sound changes first.

> the hearer, and therefore less expected and less easily remembered, they too may be more prone to misunderstanding than more frequent words. Under these assumptions, it seems reasonable that less frequent words should be less apt to undergo lenition, since they are more in need of the extra phonetic clarity afforded by distinct, non-lenited articulation than are more frequent, easily recognizable words. (Dinkin 2008: 103)

Given the theoretical lucidity of the idea as well as the large amount of evidence for frequency-based lexical diffusion,[210] it seems odd that the concept of lexical diffusion has so far taken the back seat in discussions of particular sound changes by historical linguists. The quantitative nature of the present study will facilitate the inclusion of such neglected yet potentially significant factors: The data for the analysis will be retrieved from the tagged LAEME corpus via searches for relevant lexemes, which conversely means that each retrieved finding will have a corresponding 'lexeme' value. To this will then be added the following variables:

– The word class that the lexeme belongs to, and
– The frequency of the lexeme in the corpus.

The technicalities of the variable-coding and data retrieval procedures will be dealt with in chapter 3.

2.4.5 Spellings of the relevant sounds

The final issue to be addressed from a theoretical viewpoint is the spelling of the relevant sounds (i.e. [j, w, ɣ] and their further developments) in the eME data. The relationship between the relevant sounds and their spellings might be approached from two directions: We might either ask

– which spellings were used to represent the relevant sounds, or
– which sounds individual spellings can be thought to have represented.

Attempting to answer the second question only makes sense once we have gathered an inventory of spellings from the data; we will approach the first question, i.e. gather an inventory of spellings for the relevant sounds, by retrieving from

[210] Millar and Trask (2015: 273) even say that since the early studies by Wang (1969), Chen and Hsieh (1971) and others "[evidence for] lexical diffusion has been uncovered so frequently that it has begun to be recognized in some quarters as constituting virtually the paradigm mechanism of phonological change".

the tagged corpus such word forms as are known to have contained the relevant sounds in lOE (see section 3.2.2). However, one does encounter lists and summaries of common (e)ME sound-to-spelling correspondences in historical linguistic literature (e.g. Bennett and Smithers 1968: lviii-lix; Kuhn 1970: 41ff.; Fulk 2012: 23ff.), and surely our re-mapping of spellings to sounds after data retrieval (see especially section 4.1.1.2) should be informed by these assessments.

In the linguistic preface to their anthology of eME texts Bennett and Smithers (1968: lviii-lix) provide the following list (complete with examples) of spellings for the two semivowels:[211]

(13) [j]: "*i* (early), *ȝ*, *y*: *iaf*, *ȝelden*, *yelden*"
[w]: "*ƿ* (up to *c*. 1200), *u*, *uu*, *w*: *ƿolde*, *uylle*, *uuolle*, *wenden*"
(Bennett and Smithers 1968: lviii-lix)

The first thing to note is that Bennett and Smithers (1968) provide only examples in which the semivowels occur syllable-initially, and indeed even word-initially; a list of coda semivowel spellings would have been more relevant to the present study and would probably have looked different, but is not to be found.

The list provided by Bennett and Smithers (1968) implies a small warning against interpreting every <i>-spelling in words relevant to [j] vocalization as indicating a vocalized pronunciation of the former palatal semivowel, since there seems to have been a time at the beginning of the sub-period of eME (cf. the remark "early") in which <i> was a favored spelling for the semivowel.[212] A slight problem with the list provided by Bennett and Smithers (1968) is that their inventory of spellings for [j] contains some simplifications, as will be made clear in the following.

While the spellings representing the labial-velar semivowel are fairly limited (viz. <ƿ, w>; <uu> is actually very rare, as we will see in section 4.1.1.2), the situation concerning the various spellings that were used to represent velar and palatal consonants (e.g. <ᵹ, ȝ, g>) is especially complex in eME. For one thing, the OE *littera* called 'insular *g*' <ᵹ>, which in lOE had represented all allophones of /ɡ/, i.e. [ɡ, j, dʒ, ɣ], continued to be used for about the first hundred years of the ME period, in some cases representing the whole range of previously associated sound values, and in other cases reserved for the fricatives. In the later cases the Carolingian or 'continental *g*' <g> was now used for the plosive [ɡ] (Frankis 2004: 3). Around 1250 CE <ᵹ> was replaced by 'yogh' <ȝ>, which had devel-

211 A similar list is to be found in Kuhn (1970: 41ff).
212 The LAEME data actually corroborates this, as will be shown in section 4.1.1.2.

oped out of <ᵹ> and could now be used for the non-plosive sound values that had earlier been represented by <ᵹ> and their developments (i.e. [j, ç, ɣ, x]),[213] but not for the plosive [g] (Frankis 2004: 3).[214] 'Yogh' <ȝ> is then in turn said to have dropped out of use by c. 1300 CE (Fulk 2012: 24; 26),[215] and its associated sound values (i.e. palatal and velar fricatives) were increasingly represented by combinations involving what has been called 'diacritic *h*', especially <gh, ch>. This new spelling habit, which is still reflected in many ModE spellings (e.g. <light>),[216] became the general norm with the spread of 'Chancery English' (Dietz 2006: 22ff.; see section 2.2.2.1 above) in later centuries. However, since by this time the sounds that the present study focuses on were probably already vocalized, spellings with 'diacritic *h*' will only rarely be encountered in our data (see Figure 4-6 in section 4.1.2.2).

For the purposes of the present study, all the spellings mentioned above will be taken into consideration, but the analysis will show that it will make sense to treat different spellings as equivalent and subsume them under certain 'spelling types' (e.g. GTYPE, including <ᵹ, ȝ, g>, or GHTYPE, including <ᵹh, ȝh, gh>, see the explanations in section 3.2.1.2). The most important distinctions made, however, will not be those between certain spellings or even certain spelling types, but those between the presence and the absence of any consonantal spelling types at the relevant places (i.e. the binary variable called VOCALIC, see section 3.2.1.2).

Bennett and Smithers's (1968) list of [j] and [w] spellings leads to a number of further questions, e.g. whether the [j] – <y> correspondence (for which they provide the example of *yelden*) also holds true for postvocalic semivowels. A 'vocalic' interpretation of <y> in forms of words such as 'day', 'may' or 'any' would seem more feasible, and indeed, the steadily increasing proportions of <y> spellings at the relevant places in the forms retrieved from the LAEME CTT (cf. Figure A-1 in Appendix F) suggest that <y> can safely be interpreted as 'vocalic' in the word forms relevant to the present study (see fn. 252).

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213 The representation of the range of unvoiced fricatives [ç, x] was now shared between <ȝ> and the more conservative (OE-inherited) spelling <h>.

214 This difference in the range of values is the reason that the two forms <ᵹ> and <ȝ> are theoretically distinguished in this way (Frankis 2004: 3).

215 The LAEME data will provide a counterexample to this generalization (see section 4.1.1.2).

216 The spelling <gh> achieved such "popularity" in the EModE period that it was even applied to some words of French or Latin origin which had no connection to the sounds that <gh> had represented in lME, resulting in unetymological spellings such as <delight> (Upward and Davidson 2011: 119).

Another, more general, question is how the eME reflexes of lOE [ɣ] were spelled. As this sound was changing and beginning to ‘join’ or recapitulate the developments of postvocalic [j] and [w] in eME (see section 2.4.3.1), lists and overviews of eME sound-to-spelling correspondences generally do not include the sound. These questions will be returned to in section 4.1.1.2.

In summary, dealing with sound-to-spelling correspondences in theory before data retrieval has raised a number of questions and issues that are best to be tackled empirically. In this respect, it is important to stress that the inventory of spellings used to represent the sounds involved in the sound change will be arrived at through a data-driven process: The lexeme-based approach adopted in the present study (see section 3.2.1) will ensure that the inventory of spellings of the relevant sounds can be easily gleaned from the data once all occurrences of the relevant lexemes have been retrieved. Manuscript spellings will not be directly searched for at all, but retrieved via lexeme-based searches. For practical purposes, this means that we do not need to try and answer beforehand the question of whether or not, say, <uu> is a spelling that was used for postvocalic [w] or not. We can simply retrieve forms of lexemes that contained a postvocalic [w] in lOE, then look for <uu> in the retrieved forms, and see for ourselves which role it played in the spellings of words with a postvocalic semivowel.

3. Data and methods

3.1 Corpus data

The most important parts of the analysis in Chapter 4 will be based on the LAEME Corpus of Tagged Texts (LAEME CTT), which contains roughly 650,000 words of early Middle English text (Laing 2013-; Alcorn 2017: 3).[217] It is currently the corpus that is the best suited for the analysis of sound changes that happened in the eME sub-period, as will become apparent in the present chapter (see especially sections 3.1.1 and 3.1.2). In addition, the newest release of the *Dictionary of Old English Corpus* (DOEC, diPaolo Healey et al. 2009) will be consulted occasionally for rough overviews of Old English data. The DOEC is known as the largest and most comprehensive electronic corpus of OE, containing roughly three million words of OE text (cf. CoRD Team 2011).

The following sections will evaluate the relative usefulness of different kinds of text corpora for historical-phonological studies. More specifically, we will recount reasons for rejecting edition-based corpora (3.1.1) and concentrating on the LAEME CTT as the main data source in the present study (3.1.2).

3.1.1 Problems with edition-based corpora

The texts in the LAEME CTT have been closely transcribed from original manuscripts or facsimile editions (cf. Laing and Lass n.d.c; cf. Studer-Joho 2014: 60). This is not true of many other corpora of historical English, most of which are directly or indirectly[218] based on modern text editions and will henceforth be referred to as 'edition-based corpora'. Of course, electronic corpora compiled from originally handwritten material must always consist of transcribed data (cf. Emiliano 2011: 159ff.). More importantly, however, electronic corpora based on *modern printed editions* of medieval texts are even removed a step further from their object: As the LAEME corpus compilers Laing and Lass (2006: 426) point out, with modern printed editions "it is often the case that the original is modified in a number of ways [that] may render it suspect for linguistic study".

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[217] A purged version of the corpus (de-tagged and with non-English text removed), however, amounts to a total of 540,869 tokens.

[218] 'Indirectly' because e.g. some files in the *York-Toronto-Helsinki Parsed Corpus of Old English Prose* (YCOE; Taylor et al. 2003) are in turn based on files from the *Helsinki Corpus of English Texts* (Rissanen et al. 1991; Kytö 1996).

Most crucially, such modifications include what should truthfully be called normalizations and transliterations, i.e. substitutions of characters (Emiliano 2011: 161): Modern editions of medieval English texts, and especially OE textbooks, invariably regularize the material they present to some degree, as is to be seen e.g. in Peter S. Baker's (2012) *Introduction to Old English*, which anthologizes a selection of the *Exeter Book* riddles with "eccentric spellings removed" (Baker 2012: 224). While in the case of Baker's *Introduction* the normalization of the original spellings has justifiably been undertaken on didactic grounds,[219] all modern editors of medieval English texts are heirs of a long tradition of various changes at the level of spelling that have conventionally been made during the transcription process (cf. Emiliano 2011: 159; Studer-Joho 2014: 60), such as the replacement of original <p> or <uu> by <w>, silent emendations of what seem to be scribal errors, or expansions of abbreviations. These changes, as conventionalized as they may be,[220] in themselves constitute interpretations (cf. Robinson 1994: 9; also qtd. in Emiliano 2011: 159). Electronic text corpora that are compiled from modern printed editions (such as the DOEC, or the Helsinki Corpus and its derivatives) take over these changes made by modern editors.

In general, modern editions of OE and ME texts follow a number of more or less rigorous rules for the typographical transcription of their material. An example from the Penn-Helsinki Parsed Corpus of Middle English (henceforth PPCME2; Kroch and Taylor 2000), will serve as an illustration of the kinds of editorial interference that are to be expected from edition-based corpora: The following is the beginning of the *Ayenbite of Inwyt*, a devotional text translated from French and penned by a monk called Michael of Northgate in Kent around 1340 (Scahill 2002: 189). The PPCME2 file begins as follows:

(14) .I.
+TE UORE-SPECHE.
Almi+gti god <slash> yaf ten hestes <slash> ine +te la+ge of iewes <slash>

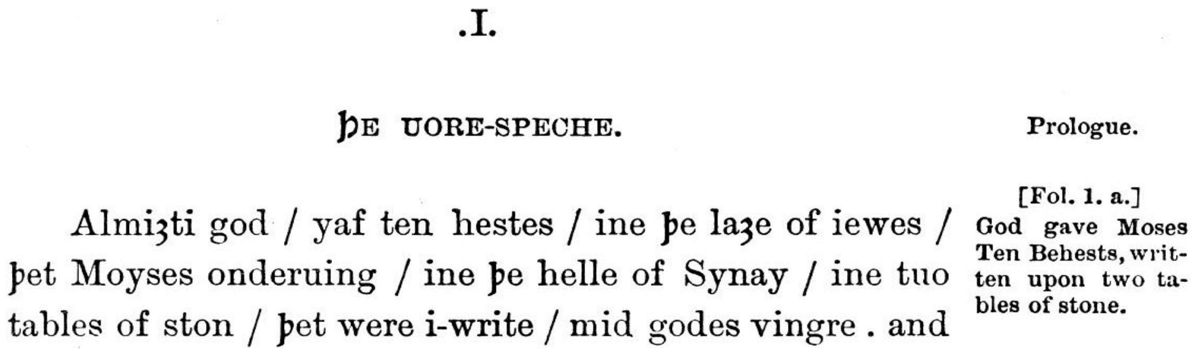
---

219 After all, Baker (2012: 10, my emphasis) makes it clear early on in his textbook that "West Saxon […] is […] the dialect that this book will *teach* you".

220 Cf. Da Rold (2010: 34ff.) for an overview of the different opinions and procedures current among modern editors of medieval English texts. – Some of these changes, e.g. the substitution of certain letters, have become so conventional that editors themselves at times seem unaware of the degree of their interference: Emiliano (2011: 161) laments that "[m]ost editors in fact transliterate their texts when they state that they are transcribing them. This common misunderstanding stems […] from the fact that philologists and historians […] fail to recognize that medieval character sets *are* different from their modern counterparts".

+tet Moyses onderuing <slash> ine +te helle of Synay <slash> ine tuo tables of ston <slash> +tet were i-write <slash> mid godes vingre.
(PPCME2, file cmayenbi.m2: *Ayenbite of Inwyt*, some tags removed)

A comparison to the edition by Richard Morris (1965, Figure 3-1 below) yields only few differences.



.I.

Þe uore-speche. Prologue.

[Fol. 1. a.]

Almiȝti god / yaf ten hestes / ine þe laȝe of iewes / þet Moyses onderuing / ine þe helle of Synay / ine tuo tables of ston / þet were i-write / mid godes vingre . and

God gave Moses Ten Behests, written upon two tables of stone.

Figure 3-1: An excerpt from the edited text on which PPCME2 file cmayenbi.m2 is based (Morris 1965: 5)

The first thing to note is that the corpus text (14) is based on Morris's (1965) main text and leaves out Morris's (1965) marginal notes. Most other differences between the edition and the corpus file (e.g. the use of <+g> for <ȝ>, or the use of similar tags for punctuation) follow conventional encoding practices for historical corpora (cf. Claridge 2008: 253; Emiliano 2011: 162ff.) and need no further comment. A glance at the manuscript shows that a great number of changes to the text have actually been made between the manuscript version and the printed edition. Figure 3-2 below shows an excerpt from a digitized version (British Library 2017) of the original manuscript:

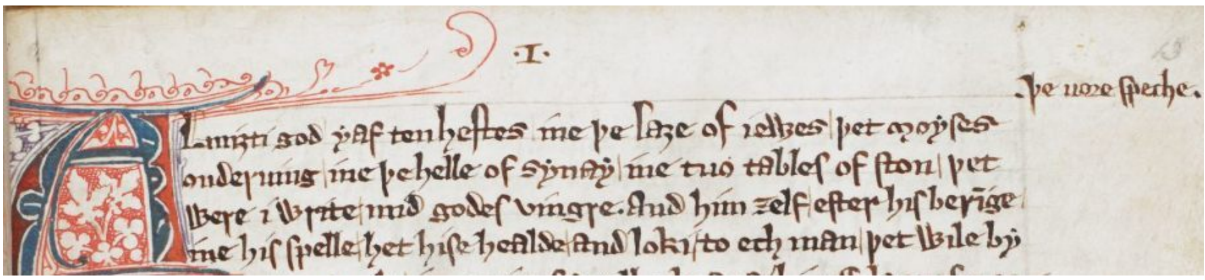


Figure 3-2: The beginning of the *Ayenbite of Inwyt* – London, British Library, Arundel 57, fol. 13r (British Library 2017)

A comparison of the manuscript and Morris's (1965) printed edition shows the following differences:

– The elaborate decorations of initials are ignored in the printed edition.
– The structuring marginal gloss that reads *.þe uore speche.* in the original is not only set above the text like a modern headline, but also rendered in capital letters.
– Some manuscript punctuation is transcribed rather diligently: The *punctus* (period) following the word *vingre* and the thin strokes are present in the edition. However, the use of </> (as well as the tag <slash> in the corpus) for marks that should be called *virgula* or *obelus* (cf. Laing and Lass n.d.c, §3.5.1) is an accommodation to modern punctuation practice. Indeed, further down on the same page Morris (1965: 5) begins inserting his own commas and quotation marks into the text.
– Word and morpheme division follows modern rules (e.g. hyphens are added to yield forms such as *UORE-SPECHE* and *i-write* in the edition).[221]
– Unusual or variant letter-shapes (as in this case the dotted *y*, or the different *s*-shapes) are normalized to conventional text editing practices.

Table 3-1 summarizes some of the conventions for the rendition of medieval characters that are followed by most modern editors. The table lists only characters that are relevant to the sound changes to be analyzed.

[221] Medieval scribes typically made use of spaces of different widths between morphemes, words and word groups; modern scripts do not accommodate for spaces of different widths, so that it can be difficult for editors to make decisions about the present or absence of a space (cf. Campbell 1977: 14; Baker 2012: 162). The form *i(_)write* in line 3 of the manuscript (Figure 3-2) is a good example of such an ambiguous case. Hyphenation might be a good solution if it were explicitly used for such cases. – The implications of different widths of spaces (in OE manuscripts) have been studied most closely by Robert D. Stevick (e.g. Stevick 2004).

	Manuscript spelling	**Conventional rendition in modern editions**
OE:	<ᵹ>	<g>
	<ƿ>	<w>
ME:	<g>	<g>
	<ȝ>	<ȝ>
	<y>	<y>
	<w>	<w>
	<ƿ>[222]	<w>

Table 3-1: Some conventional renditions of medieval characters in modern editions

Although such changes are conventionally made and can probably mostly be seen as “cosmetic” (Hanna 2013: 30) in that they are made to enhance the texts’ readability for modern audiences, they do represent interpretations and conceal any potentially meaningful contrasts between these spelling variants that may have existed in the original manuscripts. A study that takes spellings into consideration thus cannot be based on corpora that take over such changes (Laing and Lass 2006: 426).

In addition, even the language of a contribution by a single scribe[223] might be somewhat ‘mixed’ because the scribe might have been writing or copying out pre-existent texts. The OE *Vercelli Homilies* (YCOE, file: coverhom) are an ex-

[222] Hector’s (1966: 40) statement that following the Norman Conquest the letter ‘wynn’ <ƿ> quickly became “very rare indeed” seems very wrong indeed considering that it is still used more frequently than <w> (27,629 hits vs. 24,841 hits) in the LAEME CTT. Modern editors still prefer to render eME <ƿ> as <w>, e.g. in the *Ormulum*: PPCME2, file “cmorm.m1” (= edition-based) has <Wallterr> where LAEME CTT, file “ormt” (= manuscript-based) has <wALLTer> – lower-case <w> standing for <ƿ>.

[223] Alternatively, modern text editions might contain what is called a “synthetic text” (Hanna 2010: 202) or a ‘best text’, i.e. a critical text which does not exist as such in any single manuscript, but which represents an ‘ideal’ version of the text that has been conflated by a modern editor from various different originals (cf. Calle Martín and Moreno Olalla 2013: 19; Horobin 2016: 112). Such texts are occasionally included in electronic corpora; an example would be the Wulfstan homily found in the DOEC, file T04070: “An Outline of History”, which is based on the main text found in the edition by Bethurum (1957). The main text in this edition was created from five different manuscript versions. The aim of such a critical edition that is based on more than one original is essentially to create an “imaginary ‘best text’ that never existed in any time or place”, as Laing and Lass (n.d.c: §3.3.1) put it.

treme case: Although the text of the homilies in the *Vercelli Book* was produced by a single scribe, the homilies themselves are actually a rather heterogeneous collection of texts with very complicated individual histories (cf. Scragg 1992: xxxvii-xlii). There is no satisfying solution to this problem; however, it should be mentioned that the ‘mixedness’ resulting from scribal copying activity is generally to be found at the lexical and syntactical levels rather than at the level of spelling. George L. Brook (1965: 56) put it quite memorably when he wrote that “as a rule a Middle English scribe would no more try to preserve the spelling of his original than a modern copyist would try to imitate the handwriting of his original”; J. R. R. Tolkien (1934: 5) even once remarked that medieval scribes “would usually have thought no more of altering a spelling or a form than of brushing a fly off the nose”. Once again, we may conclude that there is good hope that eME scribes used spellings which closely reflected their own pronunciations.

An additional complication arises when the original manuscript is not a completely homogeneous text, but contains contributions from different ‘hands’, or scribes (cf. Schneider 2009: 100-101). This means that even corpus files that are based on one original manuscript are not necessarily based on the output of a single scribe in a single place at a single time. As we will see in section 3.1.2.3, the LAEME CTT is innovative in that it treats every “scribal contribution to a manuscript” as an “independent witness” in its own right (Laing and Lass n.d.c, §3.2).

In conclusion, corpora such as the DOEC, the YCOE or the PPCME2 are based on modern text editions and are therefore virtually unusable for linguistic analyses at the level of spellings. As the close comparison between an original manuscript and its rendering in a modern edition (Figures 3-2 and 3-1) has shown, spellings are often silently changed in ways that obliterate potentially meaningful contrasts.

3.1.2 The LAEME Corpus of Tagged Texts (LAEME CTT)

Appendix A contains a complete list of the LAEME text files and the manuscripts in which they are contained. As already mentioned, the fact that the LAEME CTT is not an edition-based corpus, but a corpus based on original manuscripts, makes it eminently suitable for studies of spelling and pronunciation; in the following, a short description of the features of the LAEME CTT that are relevant to this study will be given.

3.1.2.1 Corpus markup

The LAEME CTT markup includes a high level of descriptive detail. Since it aims at representing the exact textual contents of eME manuscripts, a large part of the structural markup (set off in curly brackets { }) describes such features as the pagination, lineation and decoration of the manuscripts. The descriptions within curly brackets also contain commentaries and remarks on the texts (cf. Laing and Lass n.d.c, §3.5). The linguistic material itself (i.e. that which will interest us) is contained in lines that are not enclosed in curly brackets and that almost always begin with a dollar symbol <$>; proper names and place names are the only exception to this rule (Laing and Lass n.d.d, §4.4.1.6; cf. the extract below), but these will not concern us.

The following LAEME CTT extract (15) represents the text of the manuscript shown in Figure 3-2 above, viz. the beginning of the *Ayenbite of Inwyt*:

(15)
```
{~f13r~}
{>.1.>}
{=ins, medieval folio number in top margin=}
{>}
{=ins, in right margin=}
{.}
$/TN_yE
$forespeech/n_UORE-SPECHE $fore-/xp-v_UORE-
{.}
{>}
$almighty/aj_*A*L+MIzT+I $mighty/aj-k_+MIzT+I $-ig/xs-aj_+I
{=large illuminated initial capital=}
$god/n_GOD
{,}
$give/vSpt13_YAF
$10/qc_TEN
$hest/nplOd_HEST+ES $/plnOd_+ES
{,}
$in{p}/pr_INE
$/T<pr_yE
$law/n<pr_LAzE
$of/pr_OF
$jew/npl<pr_IEW+ES $/pln<pr_+ES
{,}
```

```
$/RTIplOd_yET
'_*MOYSES
{\}
$underfo:n/vSpt13_ONDER+UING $under-/xp-v_ONDER+
{,}
$on{p}/pr_INE
$/T<pr_yE
$hill/n<pr_HELLE
$of/pr_OF
;_SYNAY
{,}
$on{p}/pr_INE
$2/qc<pr_TUO
$table/npl<pr_TABL+ES $/pln<pr_+ES
$of/pr_OF
$stone/n<pr_STON
{,}
$/RTIpl_yET
{\}
$be/vpt23_WERE
$write/vSpp-pl_I-WRIT+E $ge-/xp-vpp_I- $/vSpp-pl_+E
{,}
$mid{w}/pr_MID
$god/nG_GOD+ES $/Gn_+ES
$finger/n<pr_VINGRE
{.}
```

(LAEME CTT, file ayenbitet: *Ayenbyte of Inwyt*, London, British Library, MS Arundel 57)

As can be seen from this excerpt, the relevant linguistic material in the corpus files is given in mostly capital letters and preceded by different tags in the following way:

(16) $lexel/grammel_FORM

For instance, the form *laȝe* 'law' around the middle of the excerpt is rendered as "LAzE" and preceded by the tag combination "$law/n<pr_" in the corpus file. The lexicogrammatical tag that precedes each word form consists of two parts that are referred to as the 'lexel' (in this case "law") and the 'grammel' (in this case "n<pr").

The LAEME *lexels* (enclosed by <$> and </>) are basically what in general corpus-linguistic practice are called lemmas (Laing and Lass 2006: 427-429; Alcorn 2017: 5; cf. Lindquist 2009: 37ff.; Weisser 2016: 131). They are meant to identify lexical items, taking the form of ModE words or, if the word is not extant in ModE, of the OE, ON or Old French (OF) words they derive from. The lexels are conceived in order to be practically functional for eME, and not to unambiguously identify different etymons. This is why in some cases several different OE (or ON, or OF) words have been conflated into one lexel (cf. Laing and Lass n.d.d, §4.3). E.g. the LAEME CTT conflates the reflexes of OE *beᵹen* and ON *báðar* into one lexel "both". Similarly, the lexel "each" is allotted to forms actually deriving from three different OE words (cf. OED, s.v. "each, *adj.* and *pron.*").[224] In the vast majority of cases, however, the term *lexel* can be understood as essentially synonymous with the term *lexeme*.

The *grammels* (i.e. that which stands between the slash </> and the underscore <_>) are made up of codes that identify the grammatical functions of the word forms that follow (Alcorn 2017: 5). In our case "n<pr", the "n" stands for 'noun' (Laing and Lass n.d.f, §1.1), and the "<pr" stands for the fact that this noun is syntactically governed by a preposition (Laing and Lass n.d.f, §1.4): "INE yE LAzE" (= *ine þe laȝe*) 'in the law'.[225]

The information contained in the LAEME lexels and grammels will play an important part in the extraction of data from the corpus (see section 3.2.3). We will now turn to the material following the underscore <_>, i.e. the manuscript spellings themselves, and the transcription practices employed by the LAEME compilers.

3.1.2.2 Transcription practice

In the transcribed forms, capital letters stand for ordinary (lower-case) letters in the original manuscript.[226] The lower-case transcriptions stand for other things,

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224 The present study will take care to avoid the use of lexels that merge different lexemes; in some cases this has meant that some findings had to be manually deleted (e.g. a few instances with the lexel *50* were not forms of *fifty* but forms literally meaning 'half-hundred').

225 Noun forms governed by adpositions in eME were mostly "reflexes of either dative or accusative" cases (Laing and Lass n.d.f, §1.4), but since case distinctions were being reduced (cf. Fulk 2012: 56-57), it is often hard to tell, so that the use of the label "n<pr" instead of an "accusative/dative" label is a good choice for eME.

226 Actual upper-case letters in the original are marked with a preceding asterisk in the transcription, e.g. in the form "*MOYSES" in (15) above (cf. line 1 in Figure 3-2).

e.g. in the example quoted above the lower-case <z> in <LAzE> stands for a 'yogh' <ȝ> in the original (*laȝe*, cf. line 1 in Figure 3-2). As Laing and Lass (n.d.c, §3.4.2) explain, the "transcription of non-Roman letters" is one of the functions that lower-case fulfill in their corpus:[227]

y = 'thorn'<þ> *þus* is transcribed yUS
d = 'edh'<ð> *seið* is transcribed SEId
ae = 'æsc'<æ> *æfter* is transcribed aeFTER
z = 'yogh'<ȝ> *niȝt* is transcribed NIzT
w = 'wynn'<ƿ> *ƿiþoute* is transcribed wIyOUTE
g = insular 'g'<ᵹ> *ᵹeu* is transcribed gEU

(Laing and Lass n.d.c, §3.4.2)

It needs to be pointed out that the very close transcription practice employed in the LAEME CTT does entail a certain amount of spelling interpretation. Using the medieval terminology, Laing and Lass (n.d.c, §3.3.3; see section 2.2.7 above) say that they transcribe at the litteral and not the figural level.[228] This makes sense and conforms to what others have suggested about the transcription of medieval English. In his handbook on digitizing primary sources Peter Robinson (1994: 7) says that, while "[o]ne may argue that no two handwritten characters are quite alike" and that theoretically "each character should have a separate representation within the computer", this maximally exact approach would introduce a large amount of unnecessary detail. Much rather, any person digitizing a handwritten text always "needs to translate the potentially limitless range of signs in the primary text to a defined alphabet, a character set the computer can store, display, sort and search" (Robinson 1994: 8). This 'need to translate', as Robinson (1994: 8) terms it, is not to be confused with the sort of conscious or half-conscious traditional normalization of characters mentioned in section 3.1.2 above, i.e. the kind of interpretive action that would e.g. normalize word divisions, or render both original <w> and original <ƿ> as <w>. As an illustration of

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227 In addition to representing extinct characters, lower-case letters are also used for the expansion of abbreviations (Laing and Lass n.d.c, §3.4.5.1) and for diacritics (Laing and Lass n.d.c, §3.4.9). Laing and Lass (n.d.c, §3.3.3) characterize their transcription policy as "'semi-diplomatic', since abbreviations are in most cases expanded […], though the expansions are always differentiated as such". In other words, the main difference to the edition-based corpora described in section 3.1.1 is that spellings are transcribed much more closely; abbreviations may be spelled out, but they are never *silently* expanded into full forms.

228 They actually do transcribe at the figural level in certain rare cases, e.g. when in certain spelling systems the *figurae* for 'þ' and 'y' overlap in a complicated manner (cf. Laing and Lass n.d.c, §3.3.3).

the ‘need to translate’ handwritten texts, Robinson (1994: 8) gives the example of minims (see section 2.2.7 above), which make up various different letters in laME texts. E.g. three consecutive minims <ııı> might be read as ‘m’ or as the sequence ‘in’, among other possibilities (Robinson 1994: 8). The minim sequences are always interpreted in the very act of reading the text. Not to interpret them (e.g. as the word ‘in’) in a digital transcription of the text would be an unnecessary precaution that would render the resulting digital text barely usable for linguistic analyses.[229]

There is a fine line between necessary and unnecessary interpretation in transcribing texts. Nevertheless, it seems safe to assume with Robinson (1994), Laing and Lass (n.d.c) and others that the distinction between necessary and unnecessary kinds of interpretation can confidently be made in most cases. The ultimate touchstone is whether or not is seems plausible to assume that the medieval scribes themselves made certain distinctions or not. This is what is aimed at by Laing and Lass’s (n.d.c, §3.3.3) general practice of transcription “at the level of *littera*”. E.g. it seems viable that a given scribe might have been consciously distinguishing between <w> and <ƿ> (i.e. actually keeping apart the *litterae* ‘w’ and ‘ƿ’), or perhaps even between different *figurae* of ‘s’ in a text, but to assume that e.g. the scribe of Arundel 57 intentionally produced two slightly different ‘e’-shapes within the word *speche* (the second one rounder, darker, and with a larger head than the first one – see Figure 3-3 below), would hardly seem tenable.

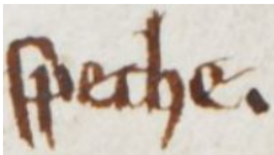

Figure 3-3: The word *speche* in the top right margin of the *Ayenbite of Inwyt* – London, British Library, Arundel 57, fol. 13r (British Library 2017)

A safe way to distinguish between meaningful and non-meaningful differences between letter-shapes would be to determine whether there are statistically measurable differences in their distribution (e.g. cf. Russ 1986: 170ff.).

[229] Following the conventions established by Benskin (1997: 91n.), single quotation marks ‘ ’ are used here in order to distinguish *litterae* from *figurae*, which are given in pointed brackets < > (see section 2.2.7). – Robinson (1994: 8) provides a further example: “In Chaucer manuscripts, ‘i’ often appears with a dot over it, to the right or left, or without a dot; often the vertical stroke descends below the base-line similar to modern ‘j’. In theory, one could distinguish all these; in practice, this way madness lies”.

In summary, the LAEME CTT is unique in that any spelling-altering changes to its texts have been kept to a minimum; at the same time, in most cases the interpretation and transcription of letter shapes was undertaken in recourse to the more abstract ‘letters’ (the *litterae*) that the scribes had in mind rather than recording every detail of the actual letter shapes (the *figurae*). The corpus is therefore highly suitable for an analysis of spellings and, by inference, of pronunciations.

3.1.2.3 Sampling and text division

The LAEME CTT aims at including every extant eME source at least in part, and particularly sources that are datable and localizable (Laing 1993: 1ff.). Thus the corpus is remarkable in that it does not contain a *representative* sample of a larger population, but what could be called a *contingent* sample of an otherwise unknown population:[230] Quite simply, the texts included in the corpus are the texts from this period that have survived. Thus, in a way the corpus is highly representative, but what it represents is not the entirety of historical early Middle English, but rather the entirety of “known and accessible written records” of early Middle English (Wegera 2013: 65; also see section 2.2.2 above). As a result, some of the corpus files are very small, containing e.g. short English comments and explanations found in manuscripts consisting of mostly Latin and French texts (Laing 1993: 3).

As mentioned above (see section 3.1.1), a potential problem with edition-based corpora concerns their division of the sometimes heterogeneous material into corpus files. The LAEME CTT differs from the edition-based corpora in that it ensures that each corpus file contains text material written by only one hand, so that each file represents material produced by one person at one date and in one place (Laing and Lass n.d.c, §3.2),[231] which makes each individual text potentially datable and localizable. The LAEME CTT contains 166 text files of various

[230] Cf. Laing and Lass n.d.a, §1.1: “[O]ur data are limited by the contingent survival of texts”. – Mukherjee (2009: 51) writes something along the same lines about the DOEC.

[231] Of course, there might still be uncertainties in keeping hands, i.e. scribes, apart – Hanna (2013: 125-126) finds that a No ME text in which two different hands are to be found (viz. Oxford, Bodleian Library, MS Rawlinson poet. 175) is mistakenly treated as the product of a single scribe in the LALME. However, Hanna (2013: 125-126) does concede that the two hands are “scarcely distinguishable” and that the two scribes who wrote so similarly “must, almost certainly, have been taught to write together”: Thus the ‘material from one date and one place’ maxim can still be said to hold true for this LALME file.

lengths, all of which are given a time span within which they were likely produced (see section 3.1.2.4 below). 119 of the texts are localized. The following sections will briefly describe the dating and localization of LAEME texts.

3.1.2.4 Dating the texts

Dating medieval texts is generally much more problematic than dating modern texts.[232] Cases in which eME manuscripts contain explicit statements about when they were produced are very rare, as Pamela R. Robinson (1988: 5) points out: “From the twelfth century onwards the [scribal] practice of dating books began slowly to grow, but it never became a widespread habit”.[233] It was not until the lME sub-period that scribes began using colophons regularly for “professional advertisement” (Robinson 1988: 11; also cf. Horobin 2010 for more on the commercialization of writing in the later Middle Ages). In most cases, therefore, texts need to be dated on the basis of other clues.

Concerning the vast majority of texts which are not explicitly dated (cf. Robinson 1988: 5), the extent to which they are datable by other means varies. Cases in which the names and biographical details of scribes are known are exceptional; most extant texts are products of anonymous scribes. Changing styles in handwriting over time provide important clues (Löffler and Milde 1997: 80ff.; Knödler 2014a: 142ff., 2014b: 154ff.). However, as Robinson (1988: 4) points out, handwriting alone does not make for any high precision in dating a text because “[an individual] scribe’s handwriting may remain more or less unchanged over the whole of his working life which could extend to fifty years”. Most manuscripts are therefore datable to time spans of a few decades. According to Watson’s (1979; 1984) *Catalogue*[s] *of Dated and Datable Manuscripts* in Oxford

[232] E.g. the fact that a copied text might contain a ‘mixed bag’ of older and newer features decreases the text’s potential datability. However, as pointed out in section 3.1.1, this is much truer for, say, a copied text’s syntactical features than for features connected with spelling. The level of spelling was much more liable to be updated and adapted by copying scribes.

[233] P. R. Robinson (1988) also lists a number of problems with such colophons as do exist in early texts: For one thing, it is not always clear whether a given date refers to the production of the copy or to the composition of the original, as colophons were often copied verbatim (Robinson 1988: 1); the date might refer only to part of a (composite) manuscript (Robinson 1988: 3); and finally, colophons might even have been intentionally altered to make texts appear older than they were (Robinson 1988: 2). – Also cf. Watson 1984: xv on the increase in datability of manuscripts around 1200 CE.

and London, a ME manuscript counts as “datable” if its date of production can be assigned to a stretch of twenty-five years (Watson 1984: xv).

The rough manuscript datings are provided in each LAEME CTT file header in the form of codes, most of which refer to quarter centuries (cf. Table 3-2, left column; cf. Sawyer 1968: ix on formal manuscript dating conventions). For the present study these codes have been translated into a *terminus post quem* and a *terminus ante quem* in order to make them operationable, with twenty-five years as the most frequently resulting time span.[234]

LAEME date format	Numerical equivalent	Length of time span
C13	1200-1300	100 years
C13a	1200-1250	50 years
C13a2-C13b1	1225-1275	50 years
C13a1	1200-1225	25 years
C13a2 (1240-50)	1240-1250	10 years
1154	1154	1 year

Table 3-2: Interpretation of conventional datings for LAEME CTT files (examples)

3.1.2.5 Localizing the texts

Medieval texts are generally as hard to localize as they are to date. It is especially true for the eME sub-period that there are very few texts which explicitly provide spatial details of their production (i.e. documents; Laing and Lass n.d.a, §1.5.3). In addition, manuscripts as well as scribes are mobile and not tied to one place (cf. Hough 2012: 43).

The LAEME compilers have attempted to solve the problem through an approach called ‘linguistic profiling’ (cf. Laing and Lass n.d.a, §1.5.3, 1.5.5; Hough 2012: 42): Such texts as are localizable “more or less confidently” (Laing 1991:

234 87 of the LAEME texts are datable to twenty-five year spans. The longest occurring time span in the corpus is one hundred years (this is true for nine texts), e.g. 1200-1300 CE in the case of the file “culhht” (i.e. Cambridge University Library Hh.6.11, fol. 70v: “Pater Noster and Ave Maria”). A substantive number of texts (viz. 54) are datable to fifty years. A few texts, however, are datable with a precision exceeding the most common twenty-five-year span, in which cases the *terminus post quem* and *terminus ante quem* can be taken over directly from the corpus markup, e.g. in the file “titusart” (i.e. British Library Cotton Titus D xviii, fols. 14r-105r: *Ancrene Riwle*) the approximate dating is given as “C13a2 (1240-50)”, resulting in a ten-year span.

28) on extra-linguistic grounds were used as 'anchor texts',[235] based on which maps showing the spread of linguistic features were created. Previously unlocalized texts could then be placed on the map on account of their linguistic features reasonably well.[236] General knowledge concerning the later development of ME dialects derived from the previous project *A Linguistic Atlas of Late Medieval English* (McIntosh, Samuels and Benskin 1986; Benskin et al. 2013) provided additional help in localizing the LAEME texts (Laing and Lass n.d.a, §1.5.3). As the result, 119 of the 166 texts in the LAEME CTT are localized to counties of England, leaving 47 texts unlocalized (Laing and Lass n.d.e, n.d.g). With the unlocalized texts it is usually the case "that the language is mixed, or that the text is too short to provide enough linguistic information for a confident placing" on the map (Laing and Lass n.d.e).

235 Cf. the list of eME manuscripts "with local associations" in Laing 1991: 47-49.

236 As Nicole Studer-Joho (2014: 9) points out, this procedure has to assume "that there are no clear-cut dialect boundaries but rather dialect continua from location to location of these anchor texts".

A map showing all localized LAEME texts ('survey points') is given below.

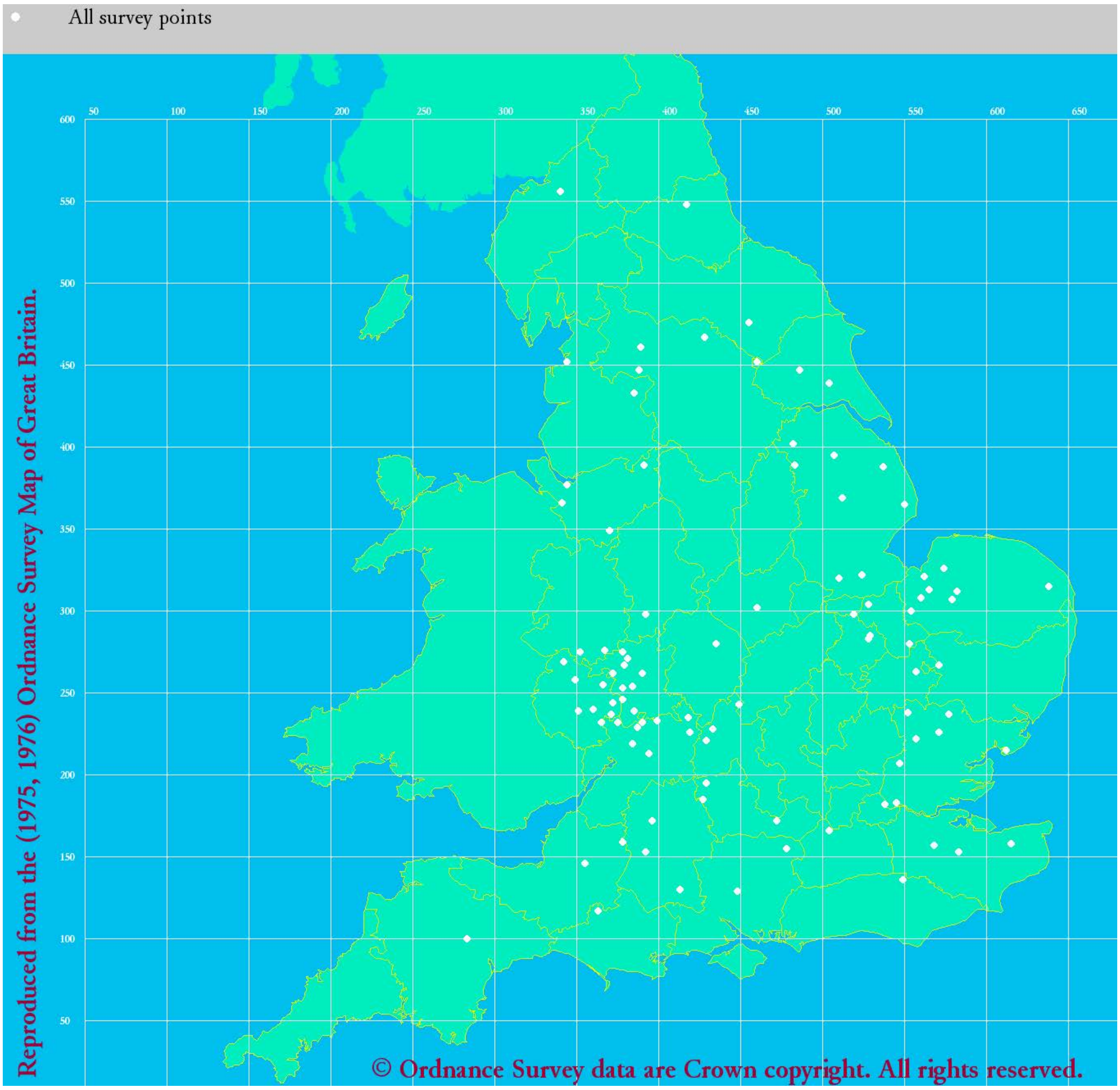

Figure 3-4: Map of LAEME survey points (Laing and Lass n.d.h).

For the present analysis, the local information provided in the LAEME CTT markup will be coded into different variables, which can then be used for the classification of findings at different levels of granularity (ranging from county name to broad dialectal area). The resulting 'local' variables will be introduced in section 3.2.1.1.

3.2 Methods

3.2.1 Coding variables

In the present study, the occurrence of spelling variants is the phenomenon under scrutiny, since pronunciations are not directly observable; therefore, spelling is the ultimate outcome variable[237] which will be broken down into several variables in practice (see section 3.2.1.2 below).

The general object of the present study is to take empirical data, i.e. spellings of word forms retrieved from the LAEME CTT, and to quantify the effects of different predictor variables on these spellings. In order to achieve this, the following software tools will be made use of, listed here in the order of their deployment:

– The corpus-linguistic research software AntConc (Anthony 2014; cf. Weisser 2016: 69ff.) for searching the corpus and retrieving data,
– the text-editing and spreadsheet tools Notepad++ (Ho 2014) and Microsoft Excel for transforming the retrieved data and creating additional spreadsheets of variables, and
– the statistical language R (R Core Team 2014; cf. Baayen 2008; Field, Miles and Field 2012; Gries 2013) and the RStudio development environment (RStudio 2014; cf. Adler 2012: 15-16) for tabulating the retrieved data (cf. a) with the coded variables (cf. b), as well as for the statistical processing and presentation of results.

The methods employed in data retrieval are outlined in Table 3-3. In order to be able to measure the effects of the predictor variables on the outcome variables, all variables need to be collected in a single table (called "Spreadsheet #4" in Table 3-3; the variables themselves are here called "Variable 1", "Variable 2", etc. for simplicity's sake). This table must therefore contain not only information retrieved from the corpus directly ("Spreadsheet #1", including such information as the fact that e.g. the genitive singular form of the word *day* is spelled <daies> in a certain file), but also further lexicogrammatical information ("Spreadsheet #2", including such information as the fact that the lOE genitive singular form of *day* had the vowel [æ] preceding the semivowel in question), and information about

[237] 'Predictor' and 'outcome' variables are the expressions to be used for what is sometimes also referred to as 'independent' and 'dependent' variables, or 'stimulus' and 'response' variables (cf. Field, Miles and Field 2012: 7; Adler 2012: 401).

the corpus texts ("Spreadsheet #3", including such information as the fact that the form occurs in a text written in Northamptonshire). Spreadsheets #2 and 3 are created manually and then automatically merged with Spreadsheet #1 in order to align all potentially relevant predictor variables. Thus, the outcome variables are essentially based on the actual spellings of words already retrieved in the first step, while most of the predictor variables are coded manually and then cross-tabulated with the retrieved forms.

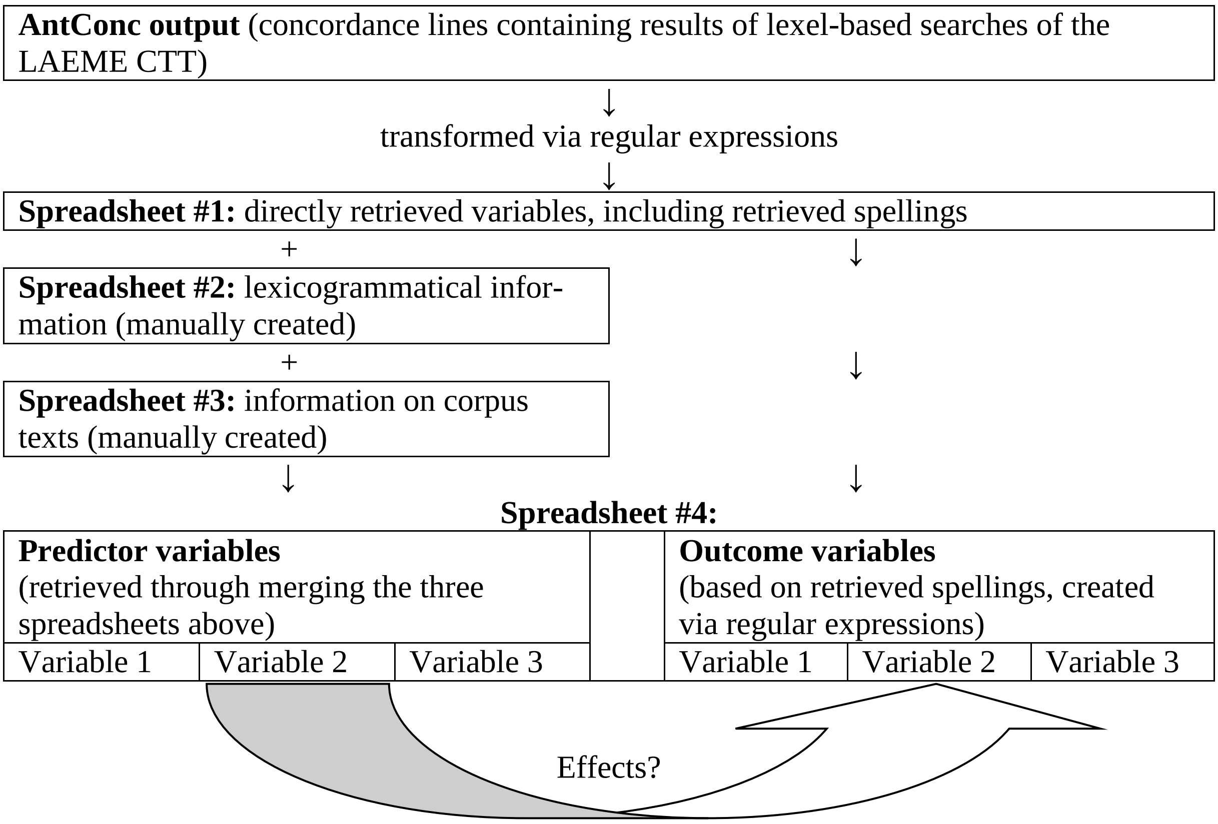

Table 3-3: Data retrieval and variable coding

The large curved arrow at the bottom of Table 3-3 represents the main research question: How do the respective predictor variables, i.e. dialect, vowel length, tautosyllabicity, and the other potentially influential factors summarized in section 2.4, affect the outcome variables?

The following sections will provide an overview of how the various predictor variables (3.2.1.1) and outcome variables (3.2.1.2) are operationalized.

3.2.1.1 Predictor variables

As we have seen in comparing previous research on medieval semivowel vocalization, there are several predictor variables whose potentially significant effects need to be taken into account (see Tables 2-10, 2-12, and 2-14). These variables can be classified into different categories.

On the one hand, there are factors that are of a purely language-internal nature, such as the one that has been referred to as "input vowel quantity" above (cf. Table 2-10), and which encapsulates a question that could be phrased as, "Was the semivowel in question preceded by a long or a short vowel in OE?" – In order to answer this question, we need to investigate the linguistic properties of certain lexemes or word forms in OE. Because the LAEME CTT provides both grammels and lexels (see section 3.1.2.1 above), such variables can further be subdivided according to whether they refer to general facts about a lexeme (these will be called 'lexically bound variables') or to properties of particular word forms only (these will be called 'lexicogrammatically bound variables'). The "input vowel quantity" variable mentioned above is an example of the latter type.

On the other hand, there are factors that have to do with extra-linguistic, or language-external, circumstances, such as the variable that was simply called "dialect" in Tables 2-10, 2-12, and 2-14. In this case the question raised does not concern properties of a particular word form, but of an entire text: The question could be phrased as, "In which geographical region was the text in question most likely produced?" Such variables will be called 'text-bound variables'.

In summary, the values of all predictor variables derive either from the lexicogrammatical properties of the occurrences in the corpus or from information about the corpus texts. Since the LAEME CTT assigns a lexel and a grammel to each word form, the lexicogrammatical properties of each form occurring in the corpus are specified in the corpus itself. In addition, corpus analysis tools such as AntConc (Anthony 2014) are specifically designed to align the corpus-retrieved data – in the case of the LAEME CTT, lexel-grammel-form combinations – with such information as the names of the corpus files in which they are contained. This means that all relevant predictor variables can be deduced from concordance lines yielded by searches of the LAEME CTT using AntConc. Section 3.2.2 will deal with the technicalities of data extraction; it will suffice here to look at the example of a single concordance line in order to see how the predictor variables can be gleaned from it.

The lexeme *day* first occurs in the LAEME CTT [238] in the expression *neyþer day ne nyt* 'neither day nor night'. In the tagged corpus this expression takes the following form:

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[238] The 'first' occurrence in this case means the first occurrence in the first file from the top if the files are ordered alphabetically.

(17) $neither/cj>=_NEYyER
$day/n-av_DAY
$nor/cj<=_NE
$night/n-av_NYT
(LAEME CTT, file "adde6at": "Sayings of St Bernard", Oxford, Bodleian Library, Additional E.6)

The program AntConc produces KWIC concordances (cf. Lindquist 2009: 5ff.; Weisser 2016: 68ff.), which tabulate all occurrences of search terms with some context to the left and to the right and the names of the corpus files in which the occurrences are contained:

Context (left)	Lexel-grammel-form	Context (right)	Source file
$neither/cj>=_NEYyER	**$day/n-av_DAY**	$nor/cj<=_NE	adde6at.txt

Table 3-4: The first result of a search for the regular expression node `\$day/\S*_\S*` in the LAEME CTT

As far as predictor variables are concerned, we know from the second column that we are dealing with the lexel *DAY*, and that this occurrence is an ungoverned singular noun within an adverbial noun phrase (which is what the grammel "n-av" means, cf. Laing and Lass n.d.f, §1.4), and thus an accusative or dative singular form. All other lexicogrammatical variables can be deduced from this lexicogrammatical information. E.g. we can say that

- the lOE input consonant was most likely [j],
- the preceding vowel that would have been found in lOE was a short [æ], and
- the consonant may or may not have belonged to the same syllable as the vowel in lOE, since the grammels do not distinguish between accusative (< OE *dæȝ*) and dative (< OE *dæȝe*).

As far as the text-bound variables are concerned, we know from the fourth column combined with the corpus file's meta-information that this occurrence of *day* comes from a text written in Essex in the final quarter of the thirteenth century.

In the remainder of this section, the relevant predictor variables will be introduced and briefly explained.

3.2.1.1.1 Directly retrieved variables

Directly retrieved variables are such variables whose values as are already included in the AntConc concordance output. They include four quite straightforward variables:

- LEXEL,[239]
- GRAMMEL,
- FORM, and
- FILENAME.

The variable levels, or variants, of LEXEL are basically a pre-defined list of relevant lexemes (see section 3.2.2.2); the levels of the other three variables are then, quite simply, the lists that come together via LEXEL-based AntConc searches. The results of all these searches are stored in one file (referred to as "Spreadsheet #1" in Table 3-3 above). The values of the variables in this file are generally given in the form in which they appear in the LAEME CTT. One LEXEL (viz. the second person plural pronoun *YE*) will be added to the search results because in the corpus personal pronouns have empty lexels and are identified via grammels only. More details on the data extraction process will be given in section 3.2.2.

Of the four directly retrieved variables, LEXEL, GRAMMEL, and FILENAME will be used as the basis for coding the predictor variables, while the variable FORM, which collects all retrieved spellings, is the basis for the outcome variables.

3.2.1.1.2 Lexically and lexicogrammatically bound variables

The lexically and lexicogrammatically bound variables are the first set of additional variables whose values are first created manually based on the list of relevant LAEME lexels and grammels (see section 3.2.2) and then added to the table of findings (this was described as the merging of "Spreadsheet #2" with "Spreadsheet #1" in Table 3-3 above). The values of these variables are mostly determined based on the linguistic properties of classical (lWS) OE, and not on the actual spellings retrieved from eME texts. E.g. the value TAUTOSYLLABICITY: *NO* means that the word form in question originally had a postvocalic semivowel that belonged to the following syllable, as in lOE *peȝes* 'way's' (genitive), notwith-

[239] Henceforth we will adhere to Stefan Th. Gries's (2013: 9n.) formal practice of giving variables in small caps with the first letter capitalized (e.g. LEXEL) and giving their variants in italicized small caps (e.g. *DAY*). When mentioned together, variable names and variant names will be separated by a colon (e.g. LEXEL: *DAY*).

standing the fact that most eME corresponding forms (e.g. *peis*) have only one syllable due to vowel reduction ([e] > [ə] > [∅]) having taken place in the unstressed second syllable, and the sound in question has actually become tautosyllabic with the preceding vowel in eME. In other words, the information contained in this variable relates to whether or not the semivowel occurring in the lexico-grammatical form in question would have been tautosyllabic with the preceding vowel around the time when the sound change is likely to have begun, i.e. in lOE.

The following are lexically bound variables:

- RESULT: Is the sound that resulted from semivowel vocalization *I* (i.e. the monophthong [i] or a diphthong ending in -[i]) or *U* (i.e. the monophthong [u] or a diphthong ending in -[u])? This binary variable will be of importance only for instances of [ɣ] vocalization, the result of which was either [i] or [u], depending on the phonological surroundings (see section 2.4.3). Later ME, not eME, is referred to here as the source language for the variants of RESULT because in eME there still were cases in which one lexel could have several different results, e.g. the relevant sound in some eME plural forms of *day* (< OE [dɑɣɑs]) was still different from the relevant sound in singular forms (e.g. the form *dawes* in LAEME CTT file “edinc-mbt”, i.e. Edinburgh, Royal College of Physicians, MS of *Cursor Mundi*, “Northern Homily Collection”), only to be replaced by forms with [i] by analogical leveling later on.
- FREQUENCY: How frequently does the lexeme in question occur in the LAEME CTT? This is a numeric variable, i.e. one whose values are numbers. This variable is exceptional in that its values are based on the eME situation and not on the lOE situation. If lexeme frequency is assumed to have had an effect, it is the contemporary frequency of the lexemes that is expected to influence the change, and not the frequency of respective lexemes in the lOE corpus. This difference might seem trivial, but it can actually be very large, as e.g. with eME words recently borrowed from OF or ON, or OE lexical items that quickly became very rare in ME. Thus, the values of this variable (i.e. the frequencies of lexels) were attained through searches of the LAEME CTT using AntConc.

RESULT and FREQUENCY are the only variables that are truly lexically bound, i.e. dependent on the values of the variable LEXEL, meaning that e.g. the lexeme/lexel *DAY* will always have the values RESULT: *I* and FREQUENCY: *1027*.

The following variables, on the other hand, have values that are dependent on the combinations of lexels and grammels in the LAEME CTT:

– CLASS: Which word class is the form in question a member of? Two alternative versions of this variable are included in the data: The first version is binary (*OPEN* vs. *CLOSED*) and reflects the traditional division of word classes into the two major categories 'closed' and 'open' (e.g. cf. Leech, Deuchar and Hoogenraad 2006: 49ff.). The second version is more detailed, having six levels that correspond to the word classes (also called 'parts of speech') to which the respective lexels belong, viz. adjective (*AJ*), adverb (*AV*), noun (*N*), pronoun (*PN*), numeral (*Q*),[240] verb (*V*).

Theoretically, the 'class' variables should be lexically bound. However, for practical reasons they are treated as lexicogrammatically bound variables: As already mentioned, the LAEME lexels are not designed to unambiguously identify lexical items, so that some lexels represent more than one lexeme, which, however, can be kept apart with the help of grammels.[241] The same situation holds true for the next variable because it is partly dependent on CLASS:

– ACCENTED: Is the syllable to which the preceding nucleus belongs stressed, i.e. is it the stressed syllable of a CLASS1: *OPEN* lexical item (cf. Minkova 2014a: 299; also cf. Kuhn 1933 and Blockley and Cable 2000)? For the sake of simplicity, the variable ACCENTED is binary (*YES*/*NO*), which means that (a) secondary word-stress phenomena (as postulated for OE noun compounds, cf. Mitchell and Robinson 2012: 13-14) will not be accounted for, and (b) no difference will be made between a syllable in a typically unstressed word (e.g. *mæȝ* 'may') and an unstressed or weakly stressed syllable in a typically stressed word (e.g. *sunnandæȝ* 'Sunday').

The following are truly lexicogrammatically bound variables, i.e. variables whose values can only be determined based on the combinations of lexels and gram-

[240] The names of the variable levels are taken from the LAEME grammels, which is why numerals (also called "enumerators"; cf. Leech, Deuchar and Hoogenraad 2006: 50) are (rather confusingly) labeled *Q* for 'quantifiers' (Laing and Lass n.d.f, §7.2).

[241] E.g. the lexel *MAIN* represents both the adjective and the noun (< OE *mæȝen* 'might, strength').

mels. The pronunciations reconstructed for lWS OE are used as the values of these variables.

- INPUTCONSONANT: Which consonant of lOE has been vocalized? – This variable is very straightforward: Depending on the lexeme, we are dealing with instances of the vocalization of lOE [j], [ɣ], or [w]. These variable levels are coded as: *J*, *G*,[242] and *W*. This variable has already been implicitly used to divide up the treatment of the relevant sounds into sections 2.4.1, 2.4.2, and 2.4.3 above. In some cases, opinions voiced in the relevant literature are divided between positing [ɣ] or [j] as the default value for lOE because the palatalization of [ɣ] was in progress (cf. the examples of *eaȝe* and *niȝon* mentioned in section 2.4.3.1). Such cases are treated as missing values.
- INPUTVOWELQUALITY: Which vowel preceded the relevant sound in lOE? – Variants are formalized as *A* [ɑ], *AE* [æ], *AEA* [æɑ], *E* [e], *EO* [eo], *I* [i], *IE* [ɪ], *O* [o], *U* [u], *Y* [y], and *C* for 'consonant'; the last level is reserved for cases in which the preceding sound was not a vowel at all in lOE, such as lOE *sorȝa* 'sorrow' or *folȝian* 'follow' (see section 2.4.3.1), in which the sound in question originally followed a liquid, and the later [o] sound (as in the second syllables of PDE *sorrow*, *follow*) is epenthetic.
- INPUTVOWELQUANTITY: Was the preceding vowel *LONG* or *SHORT* in lOE? – As we have seen, some accounts (e.g. Jordan 1968: 104ff.) take the factor of vowel length into consideration, and others do not. Contrary to what one might expect, this variable is best coded as binary. As Stockwell and Barritt (1951: 4ff.) point out, the fact that there were short and long monophthongs as well as short and long diphthongs in OE means that theoretically it would be possible to distinguish between up to four different OE vowel quantities.[243] However, it has been shown that the OE vowel system is best described as having only two different vowel lengths, with short diphthongs

[242] The letter *G* is used because the character <ɣ> is not easily available in the R environment.

[243] Stockwell and Barritt's (1955: 375) own solution, viz. the idea that the OE short diphthongs were not diphthongs at all, has since been rejected (cf. the overviews of the discussion in Wełna 1987: 44-56 and Hogg 1992: 16-24). OE short diphthongs were indeed short, and yet they were indeed diphthongs (Ringe and Taylor 2014: 5-6), although some (e.g. Minkova 2014a: 176ff.) reconstruct them as 'diphthongoids' well on their way towards becoming monophthongs (also see fn. 321).

and short monophthongs in one category and long diphthongs and long monophthongs in the other (Lass 1992: 39ff.; Murray 2012: 260).[244]

In practice, INPUTVOWELQUANTITY and INPUTVOWELQUALITY will often be considered together or even combined with INPUTCONSONANT and RESULT to form the auxiliary variable INPUTTYPE (see section 4.1.7.3).

– TAUTOSYLLABICITY: Was the affected lOE semivowel part of the same syllable as the preceding vowel (*YES*), or did it begin a new syllable (*NO*)? – This variable will help distinguish between cases such as OE *peȝ* and its plural form *peȝes* (cf. Luick 1921: 234). As we have seen in chapter 2, it is one of the most frequently mentioned factors that had a bearing on semivowel vocalization.

As mentioned in section 2.3.3.2 above, it may have been possible for intervocalic consonants to be ambisyllabic in eME. Although this idea is controversial (cf. Minkova 2015a: 139-140), we will include an additional variable that will be helpful to single out potentially ambisyllabic cases in the data, and test for the significance of this factor:

– SYLLABICITY: Assuming ambisyllabicity in eME, is the affected semivowel most likely to have been *TAUTO*syllabic with the preceding vowel, *HETERO*-syllabic (i.e. belonging to the following syllable), or *AMBI*syllabic (i.e. belonging to both syllables)?

This variable is an alternative version of TAUTOSYLLABICITY that includes the third level SYLLABICITY: *AMBI*. It was coded on the basis of the following theory: Fran Colman's (1983: 34) statement that "OE does not accept word-final short stressed vowels" leads her to assume that the respective semivowels in forms like *dæȝes* and *cneopes* were ambisyllabic because treating them as the onsets of the second syllables would leave us with the respective first syllables [dæ] and [kneo], which are unacceptable as OE stressed syllables. Thus, the value of

[244] As the analysis of the results will show (see section 4.1.7), short diphthongs never actually preceded semivowels in OE. The LAEME findings will all have followed either a short monophthong, a long monophthong, or a diphthong with the same quantity as a long monophthong.

SYLLABICITY is set to *AMBI* in all cases which have the values TAUTO-SYLLABICITY: *NO*, INPUTVOWELQUANTITY: *SHORT*, and ACCENTED: *YES*.

This concludes our overview of the more ‘linguistic’ variables. Table 3-5 on the following page provides a few examples of the above-mentioned variables and the values that they are set to as the lexel *DAY* combines with a number of different grammels. The total number of lexel-grammel combinations, and thus the number of rows in what has been called “Spreadsheet #2” in Table 3-3, amounts to 1,576.

LEXEL	GRAMMEL	INPUTCONSONANT2	INPUTVOWEL-QUALITY	INPUTVOWEL-QUANTITY	TAUTOSYLLABICITY
DAY	*N*	*J*	*AE*	*SHORT*	*YES*
DAY	*N<PR*	*J*	*AE*	*SHORT*	*NA*
DAY	*N<PR-K*	*J*	*AE*	*SHORT*	*NA*
DAY	*N-AV*	*J*	*AE*	*SHORT*	*NA*
DAY	*NG*	*J*	*AE*	*SHORT*	*NO*
DAY	*NG-AV*	*J*	*AE*	*SHORT*	*NO*
DAY	*NOD*	*J*	*AE*	*SHORT*	*YES*
DAY	*NPL*	*G*	*A*	*SHORT*	*NO*
DAY	*NPL<PR*	*G*	*A*	*SHORT*	*NO*
DAY	*NPL-AV*	*G*	*A*	*SHORT*	*NO*
DAY	*NPLG*	*G*	*A*	*SHORT*	*NO*
DAY	*NPLOD*	*G*	*A*	*SHORT*	*NO*

Table 3-5: Examples of grammels and lexicogrammatically bound variables for the lexel *DAY*[245]

[245] *NA* (i.e. 'not available') in the data signifies missing, or empty, values (cf. Adler 2012: 55; Hatzinger et al. 2014: 92).

3.2.1.1.3 Text-bound variables

The text-bound variables are coded manually for each of the 166 LAEME CTT texts based on information provided in the corpus markup. This information (i.e. "Spreadsheet #3" in Table 3-3) is then merged with both the AntConc search results and all previously coded information. Six of the LAEME CTT texts do not yield any results: They are automatically deleted in the merging process. As a result, the text-bound variables in "Spreadsheet #3" have 160 levels.

A number of the text-bound variables have no diagnostic value, but are there merely for auxiliary purposes, e.g. for quick access to a text's title and manuscript designation (cf. Appendix A):

- TITLE
- MANUSCRIPT

Text-bound variables that will be used in the analysis include the following:

- DIALECT: Which regional dialect is the text/finding (if localized) thought to belong to?

Four versions of this variable are created: At the most fine-grained level (a variable called DIALECT1D) the allotment of localizable LAEME CTT texts to counties (cf. Fulk 2012: 121; see Figure 3-4 above) is taken over from the corpus file headers, yielding thirty-one different variants which are the names of counties. With so many variants, this variable will hardly be usable as it is, as many of the counties will be represented by only a few texts, and thus analyzing the data according to DIALECT1D will really mean comparing very small groups of texts against each other.

The next version, DIALECT1C, takes over the allotment of counties to nine broader regions from Laing and Lass (n.d.e): North (*N*), North-West Midlands (*NWML*), Central Midlands (*CML*), East Midlands (*EML*), Essex and London (*ESS&LON*), South-West (*SW*), South-West Midlands (*SWML*), South Central (*SC*), and South-East (*SE*).

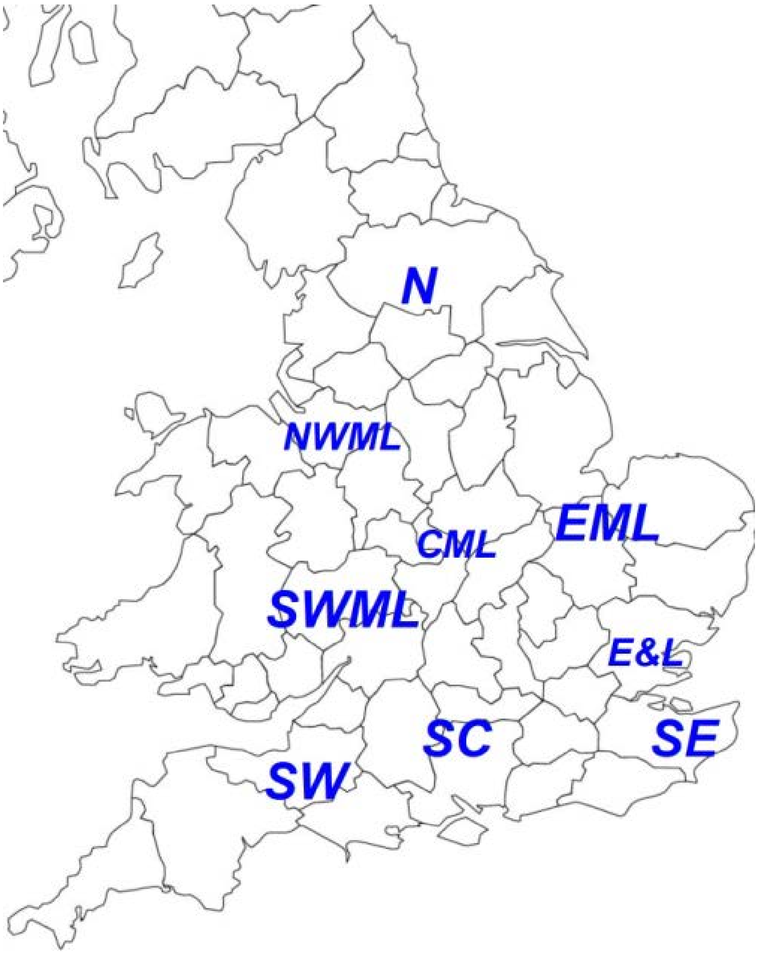

Figure 3-5: Early Middle English dialect areas (DIALECT1C)[246]

Figure 3-5 shows the approximate locations of the centers of these dialect regions on a map of England. The reason for choosing this nine-fold distinction rather than, say, a more canonical list of broad ME dialects (viz. Northern, West Midlands, East Midlands, Southern, Kentish; cf. Balmuth 1982: 98; Upward and Davidson 2011: 77; Baugh and Cable 2013: 186) is that the nine-fold distinction as undertaken by the corpus compilers seems to capture the spatial dispersion of localized eME texts better (cf. Figure 3-4 above). A case in point is Laing and Lass's (n.d.e) non-canonical South-West Midlands region, which shows the highest density of localizable surviving texts from the eME period, and is therefore justifiable as a region of its own. Serjeantson (1927: 57) observes in this area "a dialect-unity, or group of related dialects, shading gradually from north to south, but still homogeneous, and possessing features which distinguish it from the dia-

[246] For economic reasons the area called 'Essex and London' has been abbreviated to *E&L* on the map although the name of the variable level will usually be given as *ESS&LON*. – Map is courtesy of FreeUSandWorldMaps.com / Bruce Jones Design Inc.

lects of adjoining areas”. As mentioned in section 2.2.2.3 above, this variety is to be seen neither as a direct descendant of Mercian OE (which is what its allotment to the traditional West Midlands area would imply) nor as the heir of WS OE, but as something in between.[247]

Finally, the alternatives with the broadest levels of dialect classification are represented by the variables DIALECT1A and DIALECT1B, which divide the data into three and four large areas, respectively. These variables take their names from the large OE dialectal areas[248] known from textbooks (e.g. cf. Baker 2012: 10; Baugh and Cable 2013: 49): Northumbrian (*NO*), Mercian (*ME*), West Saxon (*WS*), and Kentish (*KE*), with Northumbrian and Mercian merged into ‘Anglian’ (*AN*) at the broadest level (i.e. DIALECT1A).

It is certainly worthwhile at this point to critically consider the diagnostic value that any DIALECT variable, no matter how broad or precise, can have: The fact that e.g. the canonical dialect areas given in textbooks are themselves largely a product of analyses of linguistic features of texts potentially makes the whole argument circular: E.g., certain linguistic features found in reasonably localizable texts have made possible the drawing of isoglosses, bundles of which then form hypothetical dialect boundaries. If the resulting dialects are then in turn treated as ‘predictors’ of certain linguistic ‘outcome’ features, one is quite simply reverse-engineering the process of dialect allotment. It is therefore important to note that the DIALECT variables should theoretically only be applied to texts which are localizable on extra-linguistic grounds. Bearing this *caveat* in mind, we will place trust in the success of the ‘linguistic profiling’ undertaken by the corpus compilers (cf. Laing and Lass n.d.a, §1.5.3; see section 3.1.2.5 above), and all spatial information given in the LAEME will be taken over into the DIALECT variables.

In addition to the local variables, all files receive a value according to a basic ‘time variable’:

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247 This is Tolkien’s (1929) ‘AB language’ (see section 2.2.2.3). Brook (1965: 68) and the map in Freeborn (1998: 164) imply a closer association of this dialect with Southern than with Midland ME dialects; in Thomason and Kaufman’s (1988: 269ff.) division of Britain according to “ethnolinguistic regions”, they call this region “Southmarch” and assign in to the “West Mercian” dialect of OE, but (without much explanation) to the “southwestern subdivision” of ME. On the other hand, Mossé (1968: xxvi, transl. Walker) takes over a number of isoglosses from Moore, Meech and Whitehall (1935) which set off the Southwest Midlands as a sub-region, but along with other textbooks on ME he treats the area as generally belonging to the “West-Midland dialect” (Mossé 1968: 2, transl. Walker).

248 The local provenances of the major OE dialects are largely equivalent to the ME dialect areas (cf. Balmuth 1982: 98; Fulk 2012: 127).

– MsDate: This is the approximate date of the finding/manuscript, calculated by taking the mean of the *terminus post quem* and *terminus ante quem* values according to the LAEME CTT file descriptions. It is a numeric variable given in year numbers.

However, as pointed out earlier (see section 3.1.2.4 and especially Table 3-2), not all files are datable with the same degree of precision. E.g. if one text is dated to "C13a1", i.e. between 1200 and 1225 CE, and another is dated to "C13a", i.e. between 1200 and 1250 CE, the variable MsDate will set the date of the first text to *1212*[249] and the date of the second text to *1225*, meaning that the second text will be treated as being later than the first, which is, however, not necessarily the case.

For this reason, additional 'time variables' are added in order to provide alternative ways of dating the texts in the corpus:

– QuarterCent: Which quarter century is the finding/manuscript datable to? – Of course, this only works for texts unambiguously datable to one of eight quarter centuries, i.e. texts whose time spans of likely composition do not exceed twenty-five years and are not spread over two different pre-defined quarter centuries; all other texts are treated as missing data points.
– HalfCent: Which half century is the finding/manuscript datable to? – This only goes for the fifty-four texts that are datable to pre-defined time spans of fifty years; however, the six fifty-year spans that occur in the data overlap, which recapitulates the problem of sequentiality that occurs with the MsDate variable: If one text is dated to 1200-1250 and another text to 1225-1275, there is no way to be sure that the second text is actually younger than the first. This is why the number of variable levels will be reduced from six to three for this variable: *1200-1250*, *1250-1300*, and *1300-1350*. All texts whose temporal boundaries do not lie within these categories are treated as missing values.

All variables described so far were coded manually using spreadsheet software. We have now reached the point (cf. Table 3-3) at which the "Spreadsheet #2" and "Spreadsheet #3", which contain the manually coded predictor variables, are

249 The actual numerical mean is 1225.5, which R rounds to 1225 according to the principles of the Institute of Electrical and Electronics Engineers (Gries 2013: 72).

merged with the LAEME CTT findings to create “Spreadsheet #4”.[250] This new spreadsheet now aligns actually retrieved manuscript spellings (see section 3.2.2) with all available meta-information (such as e.g. dating, location, or which form derives from an OE short vowel). Before the analysis can begin, however, a number of outcome variables have to be made operational.

3.2.1.2 Outcome variables

As already mentioned, the outcome that would interest us most are historical pronunciations not accessible to direct observation; the empirical data that the present study is based on are the spellings of the lexemes that participated in the sound changes in question. The actual spellings retrieved through searches of the corpus are stored in a variable called FORM (see section 3.2.1.1.1 above). FORM has a potentially infinite number of variants. E.g. a search for forms of ‘law’ in the LAEME CTT yields a large number of different forms, a selection of which is given in Table 3-6 for demonstration.

FORM	**Form (MS)**	**FILENAME**
LAWE	*lawe*	arundel248t
LAGE	*lage*	buryFft
LAGE	*laȝe*	trhomAt
LAGWE	*laȝƿe*	vvat
LAGHE	*laȝhe*	vvbt
LAHE	*lahe*	titusart
LAZ	*laʒ*	edincmct
LAWCH	*lawch*	edincmct
LACH	*lach*	edincmct
LAUH	*lauh*	edincmbt
LAU	*lau*	cotvespcmat

Table 3-6: Selected spellings of ‘law’ retrieved from the LAEME CTT

[250] Merging spreadsheets, or ‘data frames’, as they are called in R jargon (Teetor 2011: 122; Gohil 2015: 15), is surprisingly easy: The R command executed in order to merge “Spreadsheet #1” and “Spreadsheet #2” (cf. Table 3-3) is: `merge(r, lg, by = c("LEXEL", "GRAMMEL"))`, i.e. ‘merge the data frames `r` (containing LAEME CTT search results) and `lg` (containing lexicogrammatical information) by the two shared columns/variables LEXEL and GRAMMEL’.

The directly retrieved variable FORM contains the ‘raw’ spellings found in the corpus.[251] However, it would not make much sense simply to use FORM as a many-leveled variable in the analysis: As a result there would be almost as many variable levels as there are instances of any lexeme in the corpus. Therefore a certain amount of careful classification and interpretation of the different spellings is now in order.

For this reason we will need a number of additional variables that specify that e.g. the forms *LAGE* and *LAGHE* have something in common (viz. both have an ‘insular *g*’ at the relevant place in the word, although this does not sufficiently describe the relevant place in the second form), or that e.g. the forms *LAWCH* and *LACH* have something in common (viz. both have at least the combination <ch> at the relevant place). First a number of variables with such names as G, H, or W are created,[252] whose purpose is to specify in binary (*YES*/*NO*) terms whether the respective letter is present or not at the relevant place in the word (e.g. the form *LAGE* (*laȝe*) will receive the values G: *YES* but H: *NO* because it features the letter <ȝ>, but it does not feature the letter <h>). These variables are coded within the R environment using a combination of regular expressions (henceforth ‘regexes’; cf. Friedl 2006; Goyvaerts and Levithan 2012; Weisser 2016: 82ff.)[253] and conditional operations based on R’s `ifelse()` function (cf. Field, Miles, and

[251] For the sake of clarity a column (labeled “Form (MS)”) that includes ‘re-transcribed’ manuscript spellings has been added to Table 3-6.

[252] The selection of letters for which to code variables proceeds on the basis of the forms actually retrieved from the corpus: E.g., only eighteen instances of the letter <j> were found in the retrieved forms. Some of these are graphotactically conditioned variants of <i> occurring when <i> is doubled, e.g. the form *lijth* ‘(he) lies’, which occurs four times in the file laud108at (Oxford, Bodleian Library, MS Laud Misc 108). Only about a dozen of the occurrences of <j> in the entire LAEME CTT (in forms of *ye* in the file trincleoDt and forms of *yet* in the file vvbt) permit its interpretation as a (prevocalic!) semivowel spelling. The letter <j> itself is therefore to be seen as a marginally occurring feature in eME spelling systems, and can be left out of the analysis. – Similarly, the spelling <y> is not to be interpreted as a ‘consonantal’ spelling in the context of the present study: <y> was a ‘vocalic’ letter in OE, and when it came to be used again in ME (viz. after c. 1250), it was mostly used interchangeably with <i> (Upward and Davidson 2011: 168ff.; Minkova 2014a: 187). Medial <y> can stand for the semivowel [j] only in words of OF origin (Upward and Davidson 2011: 169), which are not relevant to the present study. A search for <y> at the relevant positions in the forms extracted from the LAEME CTT suggests that from about 1250 <y> increasingly replaced <i> (see Figure A-1 in Appendix F), so that we may treat all instances of <y> as ‘vocalic’.

[253] Cf. Karttunen (2003: 345ff.) on the basic theory behind the regular expressions language.

Field 2012: 198; Hatzinger et al. 2014: 116-117). The binary variables added to the data in this way are:

- G (i.e. the presence or absence of a <g>)
- G (i.e. the presence or absence of a <ᵹ>)
- Z (i.e. the presence or absence of a <ȝ>)
- W (i.e. the presence or absence of a <w>)
- W (i.e. the presence or absence of a <ƿ>)
- H (i.e. the presence or absence of an <h>)
- C (i.e. the presence or absence of a <c>)

The binary variables specifying the presence or absence of single ‘consonantal letters’ are then used in order to create a number of more abstract ‘spelling type’ variables (named GTYPE, WTYPE, HTYPE, GHTYPE, etc.), which are also binary, but whose purpose is to group together certain spellings in a meaningful way and treat them as essentially equivalent in terms of the (ranges of) phonetic values they most probably represented. The addition of these ‘spelling type’ variables will allow us e.g. to subsume <ƿ> and <w> under one easily accessible variable WTYPE while still retaining the possibility of treating the two *litterae* separately. Of course, a fairly large amount of testing and of interpretation is necessary to arrive at these more abstract ‘spelling types’. Coding these variables therefore proceeds in recourse to the actually retrieved data, which is why we will return to this step at the beginning of Chapter 4. The variables added to the data in this way are:

- GTYPE: Does the spelling[254] include nothing but a <g>, <ᵹ>, or <ȝ>?
- WTYPE: Does the spelling include nothing but a <ƿ>, <w>, or <uu> (see section 2.4.4)?
- HTYPE: Does the spelling include nothing but an <h>?
- CTYPE: Does the spelling include nothing but a <c>?
- CHTYPE: Does the spelling include both a <c> and an <h>?
- GHTYPE: Does the spelling include both a <g>, <ᵹ>, or <ȝ> and an <h>?
- WHTYPE: Does the spelling include both a <ƿ>, <w>, or <uu> and an <h>?
- GWTYPE: Does the spelling include both a <g>, <ᵹ>, or <ȝ> and a <ƿ>, <w>, or <uu>?

254 The phrase “the spelling” in this list should be taken as shorthand for “the spelling at the relevant places in the respective lexical items”.

Unlike the simpler binary variables such as G, these ‘spelling type’ variables are mutually exclusive, so that e.g. WHTYPE is *YES* if the form contains *both* a <ƿ> or <w> *and* an <h> at the relevant place, whereas WTYPE is *YES* only if the form contains *nothing but* a <ƿ> or <w> at the relevant place. For purposes of illustration, Table 3-7 below adds the values of the ‘spelling type’ variables to the selected forms of *law* already presented in Table 3-6:

Form (MS):	**GTYPE**	**WTYPE**	**HTYPE**	**CTYPE**	**CHTYPE**	**GHTYPE**	**WHTYPE**	**GWTYPE**
lawe	*NO*	***YES***	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*
lage	***YES***	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*
laȝe	***YES***	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*
laȝƿe	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	***YES***
laȝhe	*NO*	*NO*	*NO*	*NO*	*NO*	***YES***	*NO*	*NO*
lahe	*NO*	*NO*	***YES***	*NO*	*NO*	*NO*	*NO*	*NO*
laʒ	***YES***	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*
lawch	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*
lach	*NO*	*NO*	*NO*	*NO*	***YES***	*NO*	*NO*	*NO*
lauh	*NO*	*NO*	***YES***	*NO*	*NO*	*NO*	*NO*	*NO*
lau	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*

Table 3-7: Illustration of abstract ‘consonantal spelling type’ variables (example)

Table 3-7 highlights various facts about the ‘spelling type’ variables: No row may contain more than one *YES* because the variables are mutually exclusive; the fact that two rows (i.e. the one for *lawch* and the one for *lau*) contain no *YES* at all shows that not all retrieved forms fall into one of the ‘spelling type’ categories. The form *lawch* is actually the only occurrence of a combination of <w> and <ch> in the retrieved data, so that the addition of a variable WCHTYPE is not justified.[255] In the case of the form *lau*, we are dealing with a form that shows the complete absence of any of the consonantal letters used in the coding of the

[255] Likewise, the combination <wgh> occurs only once among the retrieved forms. The spelling <chʒ> occurs nineteen times, but only in spellings of *eye*, and only in one text (file cleoarat, i.e. *Ancrene Riwle*, London, British Library, MS Cotton Cleopatra C vi). These combinations will also be disregarded.

'spelling type' variables. It is thus a form that shows a 'vocalic' spelling, and will be coded as such in an additional binary variable.

– VOCALIC: Does the spelling include none of the 'consonantal' spellings <g, ᵹ, ʒ, ƿ, w, uu, h, c>, or relevant combinations thereof?

Together with VOCALIC, the 'spelling type' variables cover about 99.85% of the data, with only a negligible twenty-seven findings (c. 0.15%) remaining unclassified.

Since these abstract 'spelling type' variables (including VOCALIC) are mutually exclusive, they can be transformed into a single variable with multiple levels:

– SPELLTYPE: Which of the mutually exclusive 'spelling type' variables has been set to *YES*?

This variable comes in two versions: One version using all 'spelling types' as defined above, and one with a few more levels, which does not conflate <g, ᵹ, ʒ> and <ƿ, w, uu>, respectively, but treats them as separate levels (SPELLTYPE2).

Finally, after data retrieval, the variable VOCALIC can be used to generate a further outcome variable, which specifies the percentage of VOCALIC: *YES* spellings per text. This is a continuous variable whose possible values range from 0 to 1; we will call this variable PERCENTAGE.VOCALIC. Since this variable describes a property of text files and not of individual findings, it can be added to the list of text-bound variables ("Spreadsheet #3" in Table 3-3).

All variables to be used in the analysis (except for PERCENTAGE.VOCALIC), and their dependencies on one another, are schematically summarized with the help of a concrete example in Table 3-8: The first row of variables represents those retrieved via AntConc corpus searches (cf. "Spreadsheet #1" in Table 3-3); the values of all other variables are mapped to these findings, and are ultimately dependent on the four directly retrieved variables, which is what the arrows (↓) signify. The example given in this table is the genitive singular form *daies* 'day's' as it occurs in a thirteenth-century version of the *Proverbs* of Alfred (Maidstone Museum, MS A.13).

Directly retrieved variables:			
Lexel: *day*	Grammel: *nG*	Form: *DAIES*	Filename: *maidspat*
↓		↓	↓
Lexically bound variables:	↓	**Form-bound variables:**	**Text-bound variables:**
Result: *i* Frequency: *1354*		G: *no* g: *no*	Title: *Proverbs of Alfred*
Lexicogrammatically bound variables:		z: *no*	Manuscript:
Class1: *open* Class2: *n* Accented: *yes* InputConsonant1: *g* InputConsonant2: *j* InputVowelQuality: *ae* InputVowelQuantity: *short* Tautosyllabicity: *no* Syllabicity: *ambi*		W: *no* w: *no* H: *no* C: *no* GType: *no* WType: *no* HType: *no* CType: *no* CHType: *no* GHType: *no* WHType: *no* GWType: *no* Vocalic: *yes* Spelltype: *vocalic* Spelltype2: *vocalic*	*Maidstone, Maidstone Museum, A.13* Dialect1A: *an* Dialect1B: *me* Dialect1C: *cml* Dialect1D: *northampton-shire* MsDate: *1225* QuarterCent: *(na)* HalfCent: *1200-1250*

Table 3-8: Schematic overview of all variables

3.2.2 Extracting data

3.2.2.1 Preliminary steps

In order to make the LAEME CTT easily searchable with AntConc, the corpus files have been shortened to the effect that they contain nothing but the lexel-grammel-form combinations that will be used for data retrieval. Example (18) is a version of the text also given in example (15) in section 3.1.2.1, but with all structural markup, non-English words, morpheme repetitions, morpheme boundary markers,[256] etc. removed.

256 As can be seen in the excerpt from the *Ayenbite of Inwyt* (example 16) in section 3.1.2.1, the corpus renders morphologically complex forms in such a way that some morphemes are repeated and provided with separate grammels and lexels, so that

(18) {.} $/TN_yE $forespeech/n_UORESPECHE {.} {>} $almighty/aj_*A*LMIzTI $god/n_GOD {,} $give/vSpt13_YAF $10/qc_TEN $hest/nplOd_HESTES {,} $in{p}/pr_INE $/T<pr_yE $law/n<pr_LAzE $of/pr_OF $jew/npl<pr_IEWES {,} $/RTIplOd_yET '_*MOYSES {\} $underfo:n/vSpt13_ONDERUING {,} $on{p}/pr_INE $/T<pr_yE $hill/n<pr_HELLE $of/pr_OF ;_SYNAY {,} $on{p}/pr_INE $2/qc<pr_TUO $table/npl<pr_TABLES $of/pr_OF $stone/n<pr_STON {,} $/RTIpl_yET {\} $be/vpt23_WERE $write/vSpp-pl_IWRITE {,} $mid{w}/pr_MID $god/nG_GODES $finger/n<pr_VINGRE {.}
(LAEME CTT, file ayenbitet: Ayenbyte of Inwyt, London, British Library, MS Arundel 57, some tags removed)

All of these changes were made with the help of regexes; Appendix B contains a documentation of all regexes used to shorten the LAEME CTT files.

3.2.2.2 Identifying and extracting relevant lexemes

As the preceding sections have pointed out, many of the predictor variables (e.g. INPUTCONSONANT, CLASS1, ACCENTED, etc.) that are to be taken into account in the present study are directly based on linguistic properties of particular lexemes or word forms, so that the entire process of data extraction hinges on the search for lexemes relevant to the sound changes in question. Thus, the first question to ask in the data extraction process is how to gather relevant lexemes.

At least three different approaches could be taken for the retrieval of relevant lexemes:

- Lists of relevant lexemes could be compiled from secondary literature, particularly from the philological and historical-linguistic sources discussed in sections 2.4.1 through 2.4.3 above.
- The LAEME CTT itself could be searched for potentially relevant letter combinations (e.g. post-frontvocalic <g, ᵹ, ȝ>, post-vocalic <w, ƿ, uu>, etc.).
- A different corpus, preferably one containing lOE texts, could be searched for potentially relevant ‘input’ letter combinations.

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e.g. the form *iwrite* ‘written’ in the example is represented by not one, but three consecutive lexel-grammel-form combinations, “$write/vSpp-pl_I-WRIT+E $ge-/xp-vpp_I- $/vSpp-pl_+E”, only the first of which will be retained (without the morpheme boundary markers - and +) for the analysis, to ensure that each semivowel occurring in the data might be counted only once.

The first of these approaches, viz. gleaning relevant lexemes from literature, would be the most conservative. It would yield a list of relevant lexemes, all of which certainly took part in the sound change in question. However, this approach alone would probably not yield a very complete list of relevant lexemes – in quantitative-linguistic terms, this approach would result in a perfect precision while potentially yielding a problematic recall. We will therefore use secondary literature only in a complementary way (see below).

The second approach on the list, i.e. deciding on which lexemes to extract on the basis of the LAEME CTT itself, is conceptually problematic: E.g., a search for post-frontvocalic <g> in the corpus might yield a list of forms from which relevant lexemes could be gleaned, but by searching for <g> in an eME corpus we would be making sure that this list would contain conservative (i.e. 'consonantal') eME spellings, so that we might be missing out on such lexemes as would have already been typically spelled 'vocalically' in eME. In other words, basing our decision about which lexemes to extract from a particular corpus on a list of word forms found in the very same corpus is out of the question for conceptual reasons. However, due to the corpus design which uses lexels to lemmatize each form, there is a way to retrieve relevant lexemes using the corpus itself which will cause no such harm (see section 3.2.2.2.2). This method too will be applied only for purposes of complementation.

In general we will opt for the third alternative and compile a list of potentially relevant lexemes using a corpus containing OE texts; as already mentioned, the other two approaches will then be used cautiously to complement the data. The facts that (a) most OE manuscripts were produced in Wessex in the lOE period and can therefore be expected to contain spellings that adhere to the 'focused' variety of lWS to some degree (see section 2.2.2.2), and (b) all available text corpora containing OE are edition-based corpora and therefore the spellings found in the corpora will tend to be somewhat idealized or standardized from the original manuscript spellings, are not to be seen as problems but as advantages at this stage: The less variability there is in the spellings, the more useful a frequency table of unprocessed, corpus-retrieved OE word forms will be (as long as we are searching for lexemes and not spellings). The details of this procedure will be given in section 3.2.2.2.2; the following section 3.2.2.2.1 will briefly sum up the preliminary procedure of using yet another corpus, this one containing even more highly standardized spellings than usual, in order to verify the phonological surroundings generally thought to have conditioned the sound value [j] in lOE.

3.2.2.2.1 Identifying OE [j] in the Baker mini corpus

As a preliminary step towards finding lexemes that show [j] vocalization, we will make use of a heavily edited corpus of OE texts: Peter S. Baker's online *Old English Aerobics Anthology* (Baker n.d.). This is a collection of short texts and text excerpts targeted at students of OE, and can therefore be expected to contain homogeneous, normalized spellings. What makes this collection special is that it is the only electronic OE corpus that uses modern diacritics such as vowel length marks and dots over <c> and <g>[257] with almost complete consistency. This fact will be made use of in order to assess which 'V + <g>' combinations to search for in the DOEC in order to find instances of <g> pronounced as [j].

Several text excerpts from Baker (n.d.) were copied into text files to make them searchable; only texts that actually use the dotted <ċ, ġ> spellings for [tʃ, j] were included. A list of all twenty-eight texts used is to be found in Appendix C. The resulting corpus of edited OE text files contains 19,465 words (tokens) and will henceforth be referred to as the "Baker mini corpus".

Table A-3 in Appendix C sums up the findings: The front vowel spellings most likely to precede <ġ> in the Baker mini corpus are <i, æ, ǣ, ī, ē, e, ēa, y>.[258] We will therefore use the combinations <ig, eg, æg, yg> as nodes for a first search in the DOEC.

3.2.2.2.2 Collecting lexemes containing post-frontvocalic [j]

For the following data extraction, the DOEC was de-tagged and shortened so that it contained only OE words. This was achieved with the help of regex-based search and replacement routines using the program Notepad++ (Ho 2014), as done previously with the LAEME CTT. Appendix D documents of all regex replacements applied the DOEC files. Next, all word forms containing a post-frontvocalic <g> were retrieved via the program AntConc using the regex node `\S*(i|e|&ae;|y)g\S*`.[259] The resulting list of 106,513 hits (tokens) was then

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257 The spellings in this corpus are transcribed in the conventional manner (see Table 3-1), so that <g> replaces original <ʒ>, etc.

258 Out of these eight vowels <ēa> [æːɑ] is the only one not mentioned as a vocalization-conditioning input vowel in the literature; as its small number of absolute occurrences indicates, it is an exceptional case: All hits but one are instances of the verb *smeaʒan* 'ponder, meditate', which contained a 'secondary palatal', but for whose lOE infinitive Baker apparently already reconstructs the palatalized pronunciation [smæːɑjɑn].

259 Henceforth all regexes created for data extraction, data processing and data analysis will be given in Appendix D.

turned into a word frequency list: The full list of OE words containing post-frontvocalic <g> contains 19,832 different word forms (types). For purposes of illustration the 20 most frequent types are given in Table 3-9 below. [260]

#	Form	Frequency (DOEC)	Notes
1	hig	2,948	(‘they’; OE <hi ~ hig> not with semivowel, but reverse spelling; LAEME conflates *they* and *hi* forms)
2	d&ae;ge	2,638	‘day’ (inflected form)
3	m&ae;g	2,525	mostly ‘may’
4	d&ae;g	2,426	(‘day’, see above)
5	&ae;nig	1,333	‘any’
6	m&ae;ge	1,177	(‘may’, see above)
7	weg	1,051	‘way’
8	halige	910	‘holy’ (inflected form)
9	halig	905	(‘holy’, see above)
10	byrig	889	‘fortress, town’; OE / LAEME <burg> ~ <byrig>
11	wege	873	(‘way’, see above)
12	ege	872	‘fear’
13	twegen	751	(‘two’; unusable: LAEME conflates reflexes of *oþer*, *twa* and *tweȝen*)
14	m&ae;gen	652	mostly ‘main’ (noun)
15	&ae;g&d;er	638	LAEME ‘either’ ~ ‘other’
16	d&ae;ges	611	(‘day’, see above)
17	&ae;lmihtig	531	‘almighty’
18	haligra	503	(‘holy’, see above)
19	manega	497	‘many’
20	lege	453	mostly ‘lay’

Table 3-9: The twenty most frequent word forms containing post-frontvocalic <g> in the DOEC

[260] It is important to emphasize that these results are not lemmatized – most if not all lexemes in the corpus will be represented by more than one form, and in turn many forms in this list will be forms of more than one lexeme. Due to the rough nature of our present query (viz. scouting for relevant lexemes using the most frequent surroundings of postvocalic semivowels), using raw word forms will be sufficient.

The first fact to take note of is that not every line in this list contains a useful form: First of all, there are many repetitions of the same lexemes (cf. lines 2, 4, and 16 in Table 3-9). Other forms prove unusable due to the LAEME CTT design, e.g. some LAEME lexels conflate forms deriving from several different OE words (cf. line 13). In some rare cases, the retrieved OE ‘V + <g>’ spellings did not contain a semivowel at all, but are actually reverse spellings. Surprisingly, this is true for the most frequent occurrence of ‘V + <g>’, namely in the third-person plural nominative pronoun (cf. line 1), but not for many more items.

The two hundred[261] most frequent word forms containing post-frontvocalic <g> from the DOEC were now scrutinized and matched against Bosworth and Toller’s *Anglo-Saxon Dictionary* (Bosworth and Toller 1898; Toller 1921), the glossary in Baker (2012: 283-386) and, occasionally, against forms given in the OED in order to identify the lexemes they most likely represent. Next, it was tested whether the lexemes occurred (as lexels) in the LAEME CTT. The resulting fifty-six lexemes/lexels were collected in a spreadsheet, and the lexically bound features were manually added and assigned values as described in section 3.2.1.1.2. Four examples of such lexemes are given in Table 3-10 below.

LEXEL	**RESULT**	**FREQUENCY**
DAY	*I*	*1,027*
MAY	*I*	*3,104*
HOLY	*I*	*1,135*
SCYLDIG	*I*	*11*

Table 3-10: Examples of lexels and lexically bound features

The lexemes entered in the spreadsheet are treated as levels of the variable LEXEL, i.e. they are entered in the form of the lexels that occur in the LAEME CTT. This has required test searches of the LAEME CTT in each case because (a) not all lexels take a ModE form (*SCYLDIG* is an example of a lexel that takes an OE form because the word does not survive in ModE, but has been supplanted by *guilty*), and (b) not all potentially relevant lexemes gleaned from the OE data actually occur in the LAEME CTT. Only lexels that occur at least twice in the LAEME CTT have been included.

[261] The search through the list of OE forms was ended after two hundred items because at this point on the list only about every tenth form was usable; most other forms were repetitions of earlier lexemes. The last form actually used is # 186 on the list, viz. *iȝland* ‘island’.

As mentioned at the beginning of section 3.2.2.2, the list of relevant lexemes will now be augmented using additional strategies. Firstly, some additional lexemes were gleaned from historical-linguistic literature, especially from Iglesias-Rabáde (2003: 238ff.), who presents the most comprehensive list.[262] Next, regexes were used to search the LAEME CTT lexels for OE-derived lexemes containing long front vowels before <g>, i.e. for cases in which a front vowel was followed by a colon (:) and a <g>.[263] Several further lexels were then added based on successful LAEME CTT searches motivated by analogy with the lexels already retrieved, such as more lexels containing -*DAY*- (e.g. *DOOMSDAY*, *DAYLIGHT*), or the lexels *80* and *90* by analogy with the DOEC-derived numerals ending in –*ty*. Such words were mostly retrieved via regex-based searches.[264]

3.2.2.2.3 Collecting lexemes containing postvocalic [w]

Next, the DOEC was searched for all instances of <w> following the relevant vowels <a, æ, o, i> using the regex given in Appendix D. Once again, for purposes of illustration, the twenty most frequent OE word forms relevant to [w]-vocalization are given in Table 3-11 (see next page).

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262 The addition of relevant lexemes mentioned in literature also means that our list of lexemes will be more balanced: The majority (32) of lexical items relevant to [j] vocalization that were retrieved from the DOEC in the first step are cases in which the OE input vowel was normally [i]. An even greater majority (47) of the lexemes usually have a short input vowel. On the other hand, writers of historical-linguistic literature strive to produce lists that cover many different cases, which is why the lexemes taken from these lists typically have all different kinds of vowel qualities and quantities even if these will rarely occur in the actual data.

263 Whenever the colon occurs in lexels, it is to mark OE input vowel length.

264 Such regexes generally took the form `\$(\S+day|day\S+)/\S*_\S*`, i.e. "any lexel-grammel-form combination in which the string `day` constitutes part of the lexel, but not the whole lexel". – The yield of these searches, particularly for compounds containing lexemes already retrieved, is not to be underestimated. It is the best way of elucidating forms that are not often quoted as examples in linguistic literature (e.g. words like *day* or *gray* will frequently be used as examples, but compounds like *Saturday* or *grayhound* will not). The more complex lexical items retrieved in this way are generally relatively infrequent compared with the more simple base words, but the occurrences of the many complex items also add up. Even more importantly, this complementation of the data through the addition of such compounds and derivations as could be found leads to more linguistic diversity: E.g. because of OE word-stress patterns the relevant syllable in compounds meaning 'Saturday', 'doomsday', or 'lifeday' did not carry the primary stress that the base form *dæᵹ* did. The resulting total number of different lexemes found for [j]-vocalization is 124.

#	Form	Frequency (DOEC)	Notes
1	eow	3,648	‘you’
2	sawle	2,234	‘soul’
3	stowe	1,565	‘place’
4	feower	789	‘four’
5	eower	645	(see ‘you’ above)
6	gesawon	621	‘saw’ (past plural form of *ȝeseon*)
7	eowre	606	(see ‘you’ above)
8	awriten	524	‘written’ (past participle of *aƿritan*)
9	sawla	501	(see ‘soul’ above)
10	sawl	460	(see ‘soul’ above)
11	lareow	403	‘teacher’
12	eowrum	387	(‘your’, see above)
13	iow	336	(‘you’, see above, non-WS form)
14	treow	306	‘tree’ or ‘truth’ (homographs)
15	aweg	299	(‘away’)
16	awrat	270	(‘wrote’; past form of *aƿritan*)
17	feowertig	255	‘forty’
18	&t;eow	252	‘servant’
19	gesawe	232	(‘saw’, see above)
20	niwe	232	‘new’ or ‘newly’

Table 3-11: The twenty most frequent word forms containing <w> following relevant vowels in the DOEC

The two hundred most frequently attested OE word forms containing postvocalic <w> thus attained were then sorted through in the same way as described above. Again, not every item on this list has turned out to be useful; in addition to many repetitions, in a number of cases a morpheme boundary lies between the vowel and the following [w] (e.g. lines # 8, 15, and 16 in Table 3-11 above); these are not examples of words in which the vocalization took place. Roughly forty relevant lexemes were found through comparing this list with LAEME CTT lexels. As with the lexemes containing [j], some twenty further examples of relevant lexemes were gleaned from the sources mentioned in section 2.4; some of these occur quite frequently in the eME data, such as the verb SOW (from OE *saƿan*, seventy-four occurrences in the LAEME CTT). A direct search for OE-based

LAEME lexels containing <:> and <w> yielded some fifteen further lexels such as *BEHRE:OWSIAN* (OE *behreopsian* ‘repent’, twenty-eight occurrences in the LAEME CTT). A total number of eighty-seven lexemes relevant to [w]-vocalization were added to the spreadsheet.

An item that deserves some explicit commentary is the one that heads the list of OE-derived forms in Table 3-11, viz. the second-person plural pronoun. In the LAEME data personal pronouns have empty lexels since they are sufficiently described via grammels.[265] The OE forms *eop* (> ModE *you*) and *eoper* (> ModE *your*) contained [w] sounds that were subsequently vocalized, thus these are relevant word forms. In order to make these items more easily searchable in the analysis, a new lexel *YE* was added to the corpus via a regex replacement, so that a tagged form such as that given in (19) appears as (20) in the updated corpus file:

(19) $/P22Oi_zOU
(LAEME, file “adde6bt”: “XV signs before Doomsday; Exposition of the Pater Noster”, Oxford, Bodleian Library, MS Additional E.6.)

(20) $ye/P22Oi_zOU
(same as above, with lexel *YE* added)

3.2.2.2.4 Identifying OE [ɣ] in the Baker mini corpus

As we now turn back to a sound rendered as <ȝ> in OE manuscripts, we will first revert to the compilation of heavily edited texts previously referred to as the “Baker mini corpus”. This time we will search for instances of undotted <g>, which is how [ɣ] is rendered in the Baker mini corpus.

Table A-5 in Appendix C sums up the findings: The vowel spellings most likely to precede undotted <g> in the Baker mini corpus are <io, ēa, ū, a, ā, ō, u, ēo>, all of them representing back monophthongs or diphthongs with back vowels as their endpoints. However, front vowels also feature in the list of vowels preceding undotted <g>, e.g. <ig> occurs forty times. A glance at the results of a search for <ig> in the Baker mini corpus confirms the suspicion that practically all instances of <ig> are word forms in which a back vowel follows the <g>, e.g. <ælmihtiga>.[266] These findings confirm that Baker (2012) postulates [ɣ] as the

265 Cf. Laing and Lass’s (n.d.f., §0) explanation: “Some words have no need of a lexel because the grammel is sufficient to describe them fully, e.g. $/P13NM, where P stands for personal pronoun, 1 for singular, 3 for third person, N for nominative and M for masculine, i.e. *HE*”.

266 The only two cases in which undotted <g> is surrounded by front vowels in the Baker mini corpus (<ligeð> ‘(it) lies’ and <wigena> ‘of the warriors’) turn out to

sound value of <ȝ> after back vowels, and that he interprets cases in which OE <ȝ> was preceded by a front vowel but followed by a back vowel as also generally still having retained the voiced velar fricative.[267]

In the following section we will thus use the spelling combinations <ag, og, ug> in our initial DOEC search for word forms that most probably contained the voiced velar fricative in lOE and later add other spelling combinations.

3.2.2.2.5 Collecting lexemes containing postvocalic [ɣ]

The ‘back vowel + <g>’ combinations were searched in the DOEC with the help of a regex (cf. Appendix D). The twenty most frequent word forms yielded by this search are given in Table 3-12 below (and continued on the next page).

#	Form	Frequency (DOEC)	Notes
1	magon	1,438	‘may’ (pl. form)
2	dagum	967	‘day’ (dat. pl.)
3	dagas	900	(‘day’, nom./acc. pl., see above)
4	eagan	851	‘eye(s)’ (inflected form)
5	daga	564	(‘day’, variant form, see above)
6	agen	496	‘own’
7	agenum	433	(‘own’, see above)
8	eagum	428	(‘eye(s)’, see above, dat. pl.)
9	tog&ae;dere	340	(‘together’)
10	agene	339	(‘own’, see above)
11	magan	336	(‘may’, see above)
12	mage	328	(‘may’, see above)
13	togeanes	309	(‘against’)
14	agenre	269	(‘own’, see above)
15	hagan	246	‘haw, enclosure’ (inflected form)
16	agan	238	(‘own’, see above)
17	leage	205	(inflected form of *leah* ‘lea’ or ‘lye’)

be mistakes, with spellings of the same word forms with dotted <ġ>s showing up more regularly in the corpus.

267 A direct search for dotted <ġ> and undotted <g> in these surroundings (using the regex `(e|i|y|æ)(ġ|g)(a|o|u)`) yields 86 hits for <g> and only 6 hits for <ġ>, all of which are cases in which the presence of the palatal semivowel is obvious from OE spelling variants, e.g. <fetiȝan ~ fetiȝean ~ fetian> ‘fetch’ (Bosworth and Toller 1898, s.v. “fetian”).

#	Form	Frequency (DOEC)	Notes
18	ofslagen	203	‘slain’ (past part.)
19	ofslogon	202	(‘slain’, past form, see above)
20	lage	190	‘law’ (inflected form)

Table 3-12: The twenty most frequent word forms containing <g> following back vowels in the DOEC

Table 3-12 conspicuously contains forms of words that have already been included in the spreadsheet as relevant to [j] vocalization. This is due to the alternation of [j] and [ɣ] among different forms of some lexemes in lOE (e.g. *dæʒ* – *daʒas*; *maʒan* – *mæʒ*) mentioned in section 2.4.3.1. For this reason the variable INPUTCONSONANT is lexicogrammatically bound; lexemes in whose forms [j] alternated with [ɣ] will be assigned varying INPUTCONSONANT levels (*J* : *G*) depending on their grammels. Moreover, Table 3-12 includes more unusable forms than previous tables due to the relative scarcity of the voiced velar fricative in OE: Many lexemes show up repeatedly, and the lexeme *toʒeanes* in line #13 is an example of a word in which a morpheme boundary lies between the vowel and the following [ɣ]. The comparison of the first two hundred items on this list with LAEME CTT lexels led to about thirty relevant lexemes being added to the spreadsheet, not counting the lexemes already included on account of their relevance to [j] vocalization.

Since in lOE the voiced velar fricative probably also still occurred between a liquid and a back vowel (as in *halʒa* ‘hallow, saint’) and possibly also between a front vowel and a back vowel (as in *niʒon* ‘nine’; the so-called secondary palatals mentioned in section 2.4.3.1 above), <g> in such contexts was also searched for with regexes (cf. Appendix D). Again, the results of these searches were complemented by the addition of lexical items mentioned in secondary literature and such items as could be found via explorations of the LAEME CTT lexels themselves (e.g. compounds such as *morrowgift* or *unlawly*). Ninety-two new lexemes were added to the spreadsheet. In addition, forty-three of the lexemes already on the list were found to have had variant forms with a voiced velar fricative.[268]

[268] In one case, a lexel (*SOW*) was found to represent two different lexemes, one with etymological [w] (the verb *sapan* ‘sow’) and one with [ɣ] > [w] (the noun *suʒa* ‘sow’). This does not present a problem; as with the variant forms of *DAY* and *MAY*, the occurrences of the lexel *SOW* will be assigned varying INPUTCONSONANT levels (in this case *W* : *G*) depending on the grammels.

3.2.2.3 The resulting data spreadsheet

A total of 319 relevant lexels were collected (including the added lexel *YE*), which are listed in Appendix E. However, as already mentioned, most linguistic variables are not lexically, but lexico*grammatically* bound, i.e. their values are dependent on more than the question of which lexeme we are dealing with. For this reason the spreadsheet of lexels was extended manually so as to contain all extant lexel-grammel combinations (see Table 3-3).[269] The values of the lexico-grammatically bound variables were then added manually to all 1,576 lexel-grammel combinations.

Next, the spreadsheets containing the corpus-retrieved results as well as all manually coded variables are merged into one spreadsheet, which will be used as the basis for most of the further processing and statistical analyses of the data in Chapter 4. The merger of all spreadsheets in R[270] creates a table with 18,107 rows (i.e. the number of retrieved findings) and fifty-eight columns (i.e. the total number of variables). A small sample of this table (showing ten random findings and the associated values of a few selected variables) is given in Table 3-13.

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269 In most cases 'extant' in this context means 'all lexel-grammel combinations found to exist in the LAEME CTT', but in some cases not all found combinations could be included. An example of this is the lexel *FREE*, which combines with adjective, adverb, and verb grammels. Only a number of verb grammels were included in the spreadsheet, however, since only certain forms of the verb 'free' (cf. the OE infinitive *freoȝan* 'set free') can be said to have taken part in vocalization whereas the forms of the adjective and adverb (e.g. OE *freo*) are not relevant (cf. Bosworth and Toller 1898, s.v. "FREÓ", "FREÓGAN"). Another example is the verb *beorȝan* 'save, protect, shelter', only some forms of which (e.g. the infinitive, or the past participle *borȝen*) are eligible while others (e.g. singular past forms such as *bearȝ*/*bearh*) are not (cf. Bosworth and Toller 1898, s.v. "BEORGAN").

270 The merger of spreadsheets is undertaken with the help of the R function `merge()` (cf. Adler 2012: 178-179).

LEXEL	GRAMMEL	FORM	MSDATE	DIALECT1C	INPUT-CONSONANT	INPUTVOWEL-QUALITY	SPELLTYPE
SAY	*VPS13*	*SEIS*	*1245*	*NWML*	*J*	*E*	*VOCALIC*
A:GAN	*VPS23-APN*	*AHEN*	*1245*	*NWML*	*G*	*A*	*H*
SPEW	*VSJPS13*	*SPEOwE*	*1262*	*SWML*	*W*	*I*	*W*
DRE:OGAN	*VPS13*	*DREGET*	*1200*	*SWML*	*G*	*EO*	*G*
SOUL	*NOD*	*SOULE*	*1288*	*SWML*	*W*	*A*	*VOCALIC*
DAY	*N<PR*	*DEI*	*1275*	*SWML*	*J*	*AE*	*VOCALIC*
SAY	*V-IMP*	*ZAY*	*1338*	*SE*	*NA*	*NA*	*VOCALIC*
LEWD	*AJPLOD*	*LEAWED*	*1325*	*EML*	*W*	*AE*	*W*
MAY	*VPS21-APN*	*MOUWEN*	*1300*	*SC*	*G*	*A*	*W*
NEW	*AJ<PR*	*NEwE*	*1200*	*SWML*	*W*	*I*	*W*

Table 3-13: Ten randomly sampled findings and some selected variables

Now that the data have been collected and the variables have been coded, we can move on to the analysis in the following chapter.

4. Analysis

In this chapter, the effects of the different linguistic and extralinguistic variables that have been coded and aligned with the retrieved data (as described in chapter 3; see the overview in section 2.4.4) will be described and explored individually and in combinations including some of their interactions (section 4.1). Section 4.2 will be devoted to the selection of a statistical model that best sums up the effects of the most significant predictor variables on the outcome variables[271] (i.e. on the observed spellings of the relevant sounds).

4.1 Individual variables

In this section a number of diagnostic tests will be applied to individual variables.[272] In section 4.1.1, we will begin by treating the outcome variables (i.e. the retrieved spellings) in isolation from all predictor variables. This is essentially a description of what in section 4.2 will be called the ‘null model’: A first glance at the retrieved spellings of the relevant sounds before any explanatory predictors are added.

4.1.1 Outcome variables: Spelling types

As mentioned above (see section 3.2.1), spellings constitute the present study’s ultimate outcome variable. All other variables are predictors, meaning that they will be tested mainly for their (individual and combined) effects on the spellings retrieved from the LAEME CTT. It is therefore sensible to begin by looking not at any predictor, but at the outcome variables in isolation, before any predictors are added. The question to be answered by focusing on the outcome variables is simple: Which spellings are used how often within all retrieved forms? This sec-

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[271] As already mentioned (see fn. 237), in the present study the expressions ‘predictor variables’ and ‘outcome variables’ will be preferred for what is also referred to as ‘independent’ and ‘dependent’ variables, or ‘stimulus’ and ‘response’ variables (cf. Field, Miles and Field 2012: 7). The dimension of time (section 4.1.2) is actually represented by a number of continuous as well as discrete variables, which is why this dimension will receive the lengthiest and most complex treatment. Moreover, the text-bound variables (i.e. the time and space variables, essentially) can be either analyzed in relation to the retrieved spellings, or alternatively treated as properties of entire texts. Both will be done in the following.

[272] It is important to point out that not every test is suitable for every variable. For one thing, most of the predictor variables are discrete whereas only a few are continuous – cf. Field, Miles and Field (2012: 9-11) for more on this important distinction.

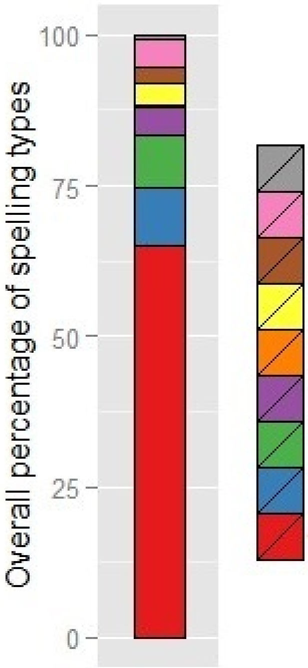
tion therefore also harks back to section 2.4.4, which raised the question of eME sound-to-spelling correspondences relevant to semivowel vocalization.

As was seen in section 2.3, the phenomenon of semivowel vocalization itself can be described in discrete terms from a phonological point of view although phonetically we are dealing with the developments of sounds along a continuum of sonority and articulatory strength. As we turn to the written language of our source texts, we inevitably move into a realm of more discrete units: Spellings on pages. Compared with speech sounds, spellings change more abruptly in a very basic sense: A 'consonantal' letter such as, say, a <ȝ> in a form of *day* is either present or not. We therefore have to generalize in order to make diachronic changes visible and analyzable, viz. by concentrating on relative frequencies, percentages, and proportions of spellings (either per text, which is what the variable PERCENTAGE.VOCALIC achieves, or per time segment, which is what variables such as QUARTERCENT do).

For this reason the present section will summarize overall percentages and proportions of different spelling types to be found among the retrieved forms. After this brief description of the spelling variables (section 4.1.1.1), we will return to individual spelling types and how to interpret them phonetically (4.1.1.2).

4.1.1.1 Description

The most detailed of the abstract 'spelling type' variables, SPELLTYPE2 (see section 3.2.1.2 above) has eight variants that assess the presence of individual 'consonantal' letters or letter combinations and a ninth variant (SPELLTYPE2: *VOCALIC*) that is true only if all 'consonantal' spellings are absent. It will be important to keep in mind that these spelling variables have been created in order to show which letters are used at the relevant places in the relevant lexemes. In other words, these variables show how changes to the postvocalic semivowels in lOE were reflected in the written forms of eME.



SPELLTYPE2	Findings	Percent	SPELLTYPE
GH	125	0.69%	
INSULAR G	867	4.80%	*G*: 11.07%
G	461	2.55%	
YOGH	673	3.73%	
CH	52	0.29%	
H	851	4.71%	
W	1,527	8.45%	*W*: 18.30%
WYNN	1,780	9.85%	
VOCALIC	11,733	64.93%	

Figure 4-1: Number of findings and percentages of abstract 'spelling types' in the data[273]

Figure 4-1 visualizes the proportions of all spelling types in all findings. Most conspicuously, about 65% of all forms retrieved from the corpus are *VOCALIC* (red), which means that in almost two thirds of all retrieved forms there are no 'consonantal' letters at the relevant places. Based on this finding, we might already suspect that the vocalization of semivowels was relatively advanced by the time of the earliest eME texts, and that the period covered by the LAEME CTT (1150 – 1350 CE) testifies to the latter part of the sound change. This ties in well with how most scholars place the vocalization of semivowels within a time frame spanning lOE and eME (cf. especially Tables 2-10 and 2-12 in section 2.4 above).

It should be pointed out that the collected forms include eME developments of the three different lOE input consonants [j, w, ɣ]; in order to make any definite statements about the development of the individual sounds we must take into

273 The variants in Figure 4-1 (and in all other tables and figures henceforth) have been sorted so as to approximate the 'sonority' and 'strength hierarchies' presented in Tables 2-6 and 2-7, with spellings that would seem to be associated with consonantally strong sounds (e.g. <gh, ʒh>) at the top and spellings that are likely to reflect the more sonorous sounds at the bottom. – The colors in this plot and many plots to follow have been taken from the "ColorBrewer" palettes developed by Cynthia A. Brewer (cf. Brewer 2002-2013).

consideration the variable INPUTCONSONANT, which will be done from section 4.1.4.

4.1.1.2 Spelling-sound correspondences

Having gathered an *inventory* of relevant spellings (i.e. "Which spellings were used to represent the relevant sounds?"), we will now turn to the question of the *interpretation* of the relevant spellings (i.e. "How should the individual spellings that we have found be interpreted?").

Most of the letters occurring at the relevant places in the retrieved lexemes (<ƿ, h, ᵹ, ȝ, g, c>) can safely be regarded as 'consonantal' due to their deployment throughout earlier English. Only <w> is sometimes listed as a 'vocalic' spelling (e.g. cf. Stenbrenden 2013: 54ff.), particularly in general overviews of ME spelling conventions:

> [The spellings <ou> and <ow>] represented /o/ + /u/ in such words as *foughten*; but in words now pronounced with /au/, like 'house', they represented /uː/. (Burrow and Turville-Petre 2005: 12)

> [U]ntil the 13th century [the sound /uː/ is] usually written <u, uw, ow> […]. (Kemmler and Riecker 2012: 10)

The implications of such statements could potentially discourage us from interpreting the letter <w> as representing a semivowel in ME by default. The presence or absence of a <w> from a relevant lexeme would have no diagnostic value if <w> was used unpredictably either as a vowel symbol in its own right, or as a vowel-lengthening diacritic throughout the ME period, as was the case in OF.

In order to resolve this dilemma,[274] we will take a brief look at the data: We will leave the already retrieved forms behind for a moment and conduct a tentative search for instances of <w> and <ƿ> in two different kinds of words: (a) words with an etymological [w] that became vocalized (and which therefore can be expected to still have had the semivowel at least for part of the eME subperiod), and (b) words without an etymological [w] in OE (and which therefore can be expected to have been pronounced without a semivowel throughout the ME period).

Among the most frequent lexemes that underwent [w] vocalization in the LAEME CTT are *four* (<OE *feoƿer*), *know* (<OE *cnaƿan*), and *soul* (<OE *saƿol*). A search in the LAEME CTT for the word *four* (i.e. LEXEL: *4*) yields a list of 130 instances from 33 different files, 75 of which (c. 58%) have one or more <w>s or

[274] Stenroos (2002) extensively deals with such questions from a more theoretical point of view.

<p>s in their spelling. The same is true for 200 of 228 forms (c. 88%) of *know*, and for 175 of 582 forms (c. 30%) of *soul*. The reason for the differences between these proportions seems to be that we are dealing with different phonological surroundings, e.g. the majority of forms of *soul* are cases in which the semivowel would have been tautosyllabic with the preceding vowel whereas it was heterosyllabic in OE *feoper* and in most forms of 'know' found in the data. The bar chart in Figure 4-2 below visualizes these proportions, with absolute numbers printed onto the bars.

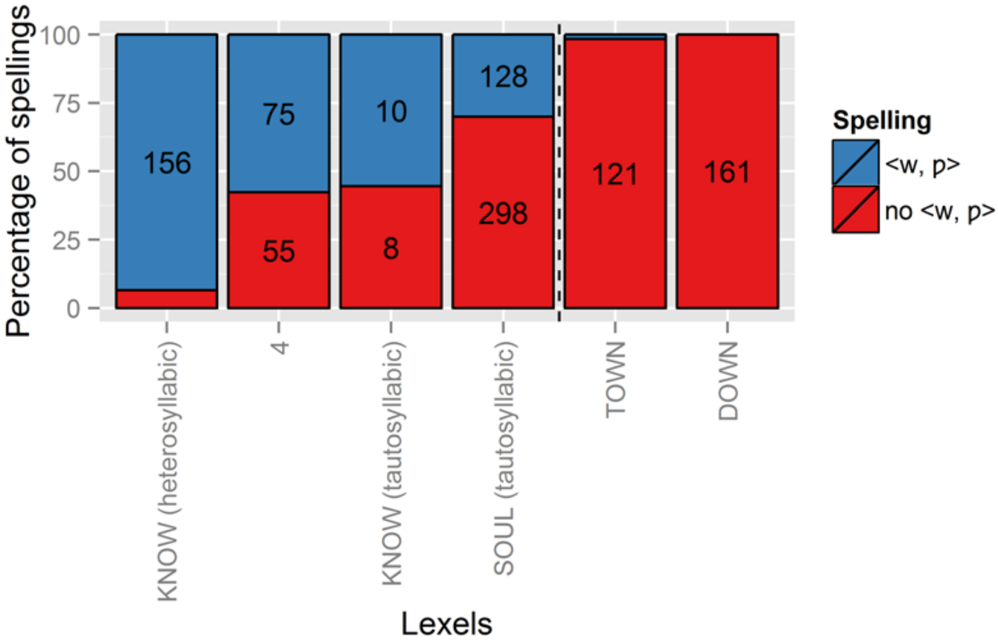


Figure 4-2: Proportion of spellings including <w, p> for selected lexels in the LAEME CTT

By contrast, the words for 'down' and 'town' (represented by the two columns on the right in Figure 4-2) were never pronounced with a semivowel (OE *of dune* 'from the hill' > *adune* > lOE *dun* [du:n] 'down', and OE *tun* [tu:n] 'yard, court'; cf. OED, s.v. "down, *adv.*", "town, *n.*"; Lass et al. 2013-, s.v. "town/n"). A search for the lexeme *down* in the LAEME CTT yields a total of 161 instances from 55 different files, not one of which contains a <w> or a <p>. Similarly, a search for the lexeme *town* yields 123 hits from 35 different files, only two of which (i.e. below 2%) are spelled with a <w>.

In summary, our glance at the LAEME CTT data shows that postvocalic <w> and <p> feature almost exclusively in the spellings of words that were at some point definitely pronounced with a semivowel; it is therefore safe to conclude that

<w>, like <p>, was not regularly used ‘vocalically’, but indeed only ‘semivocalically’, in eME.

4.1.2 Time variables

This section deals with the most basic independent variable in any diachronic study, viz. time. As explained in section 3.1.2.4 above, there are a number of problems inherent in the attempt to date eME manuscripts. For this reason we have coded not one, but three different time variables, as described in section 3.2.1.1.3 above: The continuous variable MSDATE, which assigns a definite but in most cases uncertain date to each text, and the discrete/ordinal variables QUARTERCENT and HALFCENT, which assign texts to broader periods, but with much more certainty.

4.1.2.1 Description

The first fact to note about the data in relation to the time variables is that the LAEME corpus texts are not equally distributed across the time axis:

MSDATE	**Number of findings**
1154	43
1162	14
1188	1,325
1200	954
1212	1,909
1225	376
1238	1,490
1240	56
1245	1,352
1250	372
1258	12
1262	1,707
1275	489
1288	2,153
1300	1,386
1312	1,434
1325	1,586
1338	1,168
1350	281
Sum	**18,107**

Table 4-1: Summary of the variable MSDATE

As pointed out in section 3.1.2.4 above, philologists have traditionally used spans of twenty-five, fifty, or one hundred years for roughly dating medieval texts. The fact that the variable MSDATE was created from these time spans becomes evident in Table 4-1 above, in which e.g. many findings are dated to the years 1300, 1312, 1325, etc., but none are dated to the years in between simply because these numbers represent the means between commonly used *termini post quem* and *termini ante quem.* Statistically speaking, MSDATE is a continuous variable, but one with many tied ranks, i.e. one in which many findings have the same values (cf. Field, Miles and Field 2012: 225). The resulting patchiness of the data coverage along the continuous time axis (according to MSDATE) becomes especially visible in the right panel of Figure 4-3:

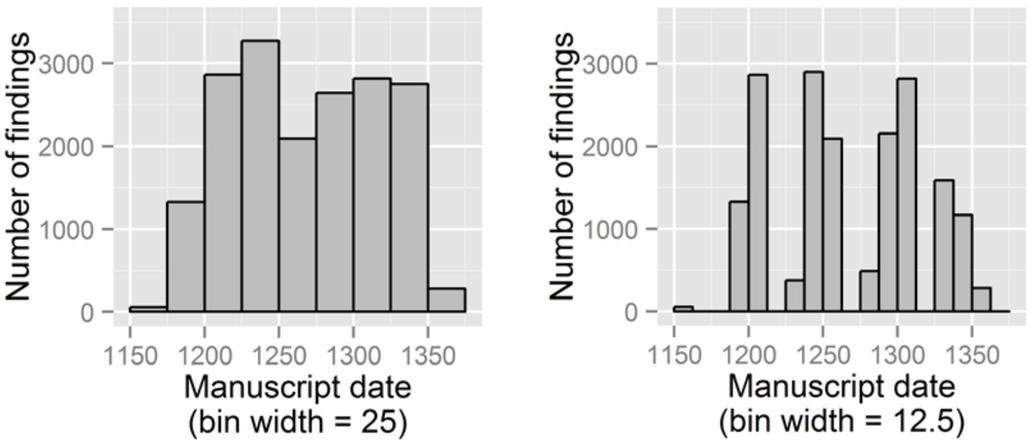


Figure 4-3: Distribution of findings over time (histograms of MSDATE with different bin widths)

Figure 4-3 presents two different histograms of the variable MSDATE. While the data seem reasonably well distributed along the time axis in the left panel, the right panel shows what happens when the bin width (i.e. the width of the bars in the histogram) is set from 25 years down to 12.5 years: The stretches of time represented by little to no data become very evident. It thus seems sensible to revert to the discrete time variables, which will be done in the following.

The discrete time variables, QUARTERCENT and HALFCENT, were described in section 3.2.1.1.3 above. Their addition was motivated *a priori* by the limited degree of precision with which most texts are datable; after the data have been retrieved, this lack of precision has become very noticeable in the data. The major disadvantage of the alternative time variables, however, is that they each capture only parts of the data. The number of findings unambiguously datable to quarter centuries is 12,661 (c. 70% of the total 18,109 findings), and a further 2,451 findings (c. 13.5%) are datable to half centuries. Figures 4-4 and 4-5 below visualize the proportion of covered vs. missing data by the additional white bars labeled "NA" (i.e. "not available") on the right, which represent missing values.[275] It will be important to remember that whenever we trade in the continuous MSDATE variable for one of the discrete time variables, we gain precision, but we do so at the price of losing part of the data.

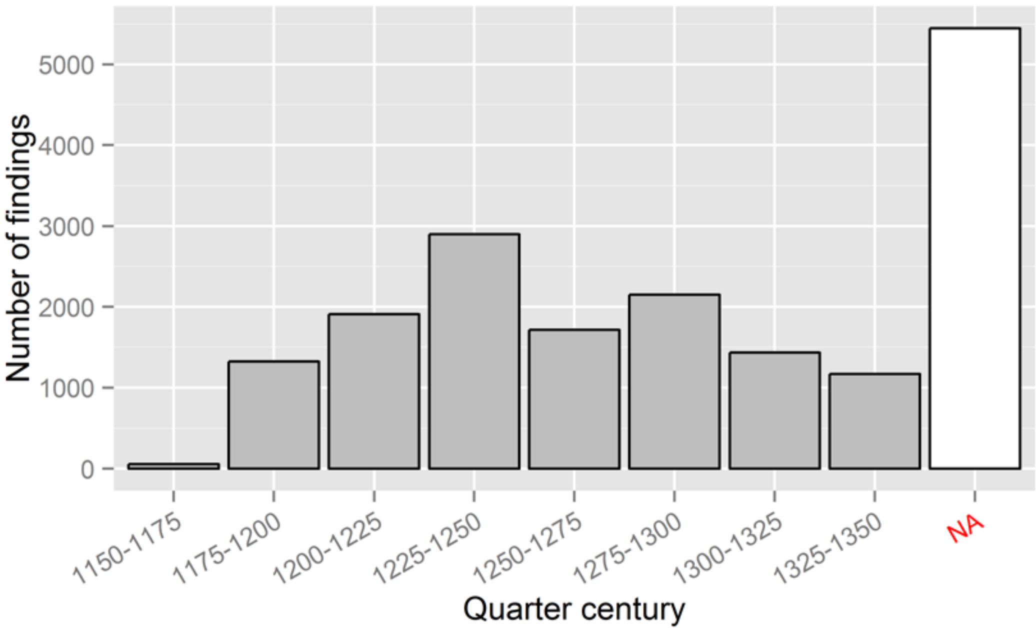


Figure 4-4: Distribution of findings datable to quarter centuries

Figure 4-4 above shows the distribution of findings within all texts that have a QUARTERCENT value, i.e. that are unambiguously datable to one of eight twenty-five-year spans. We might note that the first quarter century (1150-1175) is only poorly attested. Figure 4-5 does the same with HALFCENT.

275 The numbers of texts and of findings per quarter century and per half century are given in Tables A-7 to A-10 in Appendix F.

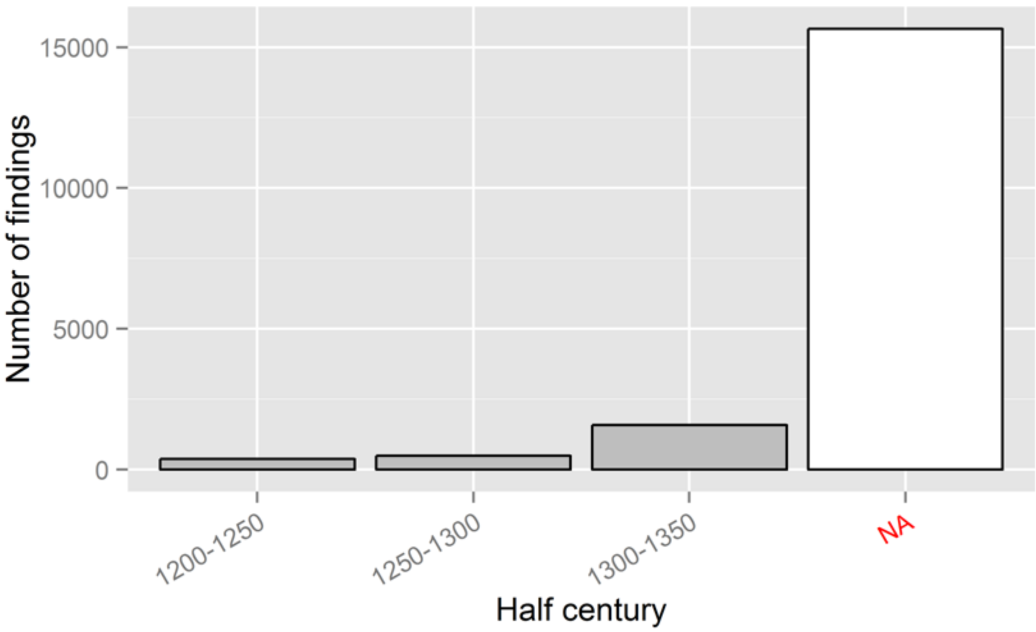


Figure 4-5: Distribution of findings datable to half centuries

It is clear to see that the findings are still unevenly distributed along the time axis if we use the discrete time variables. The inequality of the distribution of *texts* among the eight QUARTER CENTURIES is highly significant (Pearson's $\chi^2(7)$[276] = 78.918, $p < 0.001$).[277] Likewise, the distribution of the number of relevant *findings* (i.e. occurrences of the relevant lexemes, see Figure 4-5 above) among time periods in the data is highly significantly unequal for both QUARTERCENT and HALFCENT ($\chi^2(7) = 3012.73$, $p < 0.001$, and $\chi^2(2) = 1093.545$, $p < 0.001$, respectively).[278]

4.1.2.2 Analysis: Spellings ~ time

In the following, the outcome variables (i.e. spelling types) and the time variables will be combined; the general question that we will address is, "How do spellings vary across time?".

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276 Henceforth, bracketed numbers directly following the chi-squared (χ^2) symbol denote degrees of freedom (cf. Field, Miles and Field 2012: 38; 940).

277 Since 97 of the texts have a QUARTERCENT value, this χ^2 test has a large power (power = 1; cf. Cohen 1992 and Larson-Hall 2010: 104-114 for more on statistical power analysis). The number of texts that have a HALFCENT value (23) is not large enough to enable a meaningful calculation of the significance of their distribution inequality. E.g. a χ^2 test would have an insufficient power of 0.39 (cf. Larson-Hall 2010: 105).

278 Both χ^2 tests have a large power of 1.

4.1.2.2.1 MsDate

The box plot in Figure 4-6 below visualizes the distribution of the different spelling types (according to the variable SpellType2, see Figure 4-1) across time, using the continuous variable MsDate. The nine boxes show the interquartile ranges for the dispersion of the nine different spelling types, i.e. the area that includes 50% of the data from the 25th percentile to the 75th percentile (cf. Adler 2012: 242). The position of the 50th percentile, i.e. the median, is marked with a vertical line within every box. The horizontal 'whiskers' that extend from the boxes show the range of the rest of the data, minus outliers. Outliers are data points that are very different from the rest of the data (here defined as values that lie outside 1.5 interquartile ranges from the edges of the box), and are represented as isolated dots in the plot (cf. Field, Miles and Field 2012: 144).

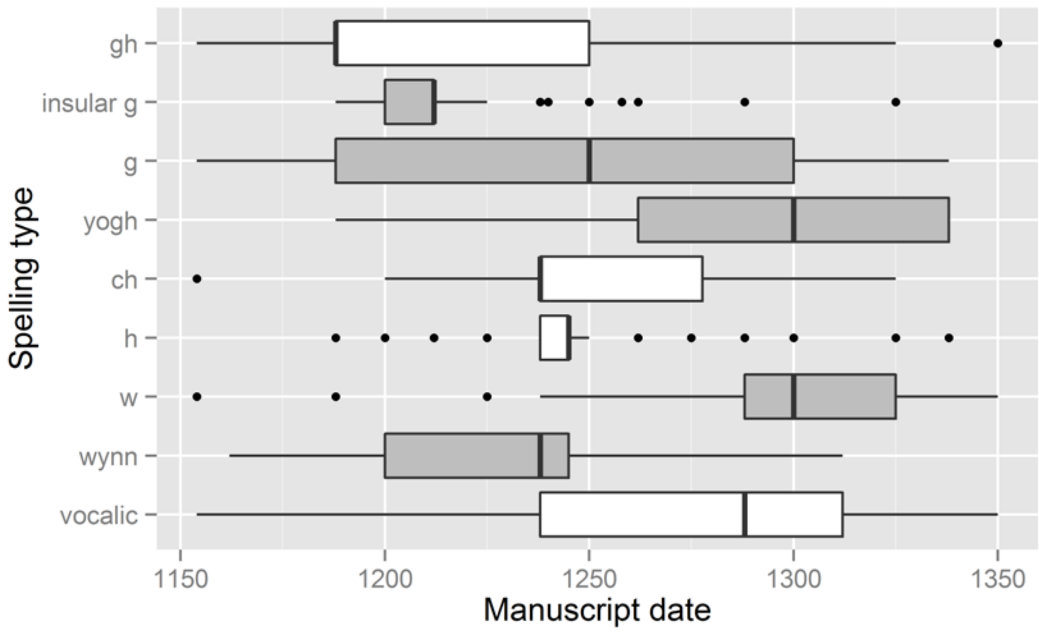

Figure 4-6: Distribution of spelling types (including sub-types) over time (using MsDate)

It is interesting to note that the boxes and whiskers are generally stretched out rather far horizontally, which means that almost all spelling types occur at almost any point in the time period covered by the LAEME. Even 'wynn' <ƿ>, which is often described as an OE letter that did not long survive into the ME period (cf. Hector 1966: 40, also qtd. in fn. 222 above), was still used after 1300 CE.[279] The

[279] It might be recalled that Bennett and Smithers (1968: lix; qtd. in section 2.4.5) claim that 'wynn' <ƿ> was in use "up to *c.* 1200".

fact that the data are 'noisy' in that every spelling type occurs at almost any given point comes as no surprise, as it can be seen as a typical feature of medieval spellings.

SPELLTYPE2	**1st Quartile**	**Median**	**Mean**	**3rd Quartile**
GH	1188	1188	1224	1250
INSULAR G	1200	1212	1211	1212
G	1188	1250	1251	1300
YOGH	1262	1300	1301	1338
CH	1238	1238	1254	1278
H	1238	1245	1245	1245
W	1288	1300	1300	1325
WYNN	1200	1238	1231	1245
VOCALIC	1238	1288	1271	1350

Table 4-2: Summary statistics for the distribution of spelling types (including sub-types) over time

We would expect SPELLTYPE2: *VOCALIC* spellings to come latest on the time axis, and this variant's median is actually fairly late (Table 4-2 above identifies the median as 1288 CE), but the medians of <w> (1300) and <ȝ> (1301) come even later. This, however, is due to the fact that the box plot has been created from the most informative 'spelling type' variable and therefore lists every possible spelling type separately. Adjacent boxes that are shaded gray in Fig. 4-6 mark cases in which it makes sense to merge spelling types: <w, ƿ> and <g, ȝ, ᵹ> have been merged in the alternative version of SPELLTYPE, as outlined in section 3.2.1.2 above. In the case of <ƿ> vs. <w>, Figure 4-6 shows how <ƿ> was replaced by <w>, with their respective interquartile ranges running (very roughly) from 1200 to 1250 and from 1275 to 1325. The medians of the three *GTYPE* spellings <ᵹ, g, ȝ> are also quite distant from one another, but there is considerably more overlap in their dispersion. Especially modern-shaped <g> regularly occurs over a very long period of time and shows considerable overlap with both 'insular *g*' <ᵹ> (which seems to be very typical of the first quarter of the thirteenth century only), and the emerging *littera* 'yogh' <ȝ>.

Figure 4-7 uses the version of SPELLTYPE in which the above-mentioned spelling types have been merged, and are now represented by the *G* and *W* boxes: The positions of the medians along the time axis are now much closer to what one might have expected judging from secondary literature: Although both of the major spelling types temporally overlap to a considerable extent with *VOCALIC* forms, their overall medians now lie at 1238 (*G*) and 1262 (*W*), and therefore earlier than that of *VOCALIC* (see Table 4-3 below the plot). We might also note that <w, ƿ> spellings reach their quantitative peak about a quarter century later than <g, ʒ, ᵹ> spellings.

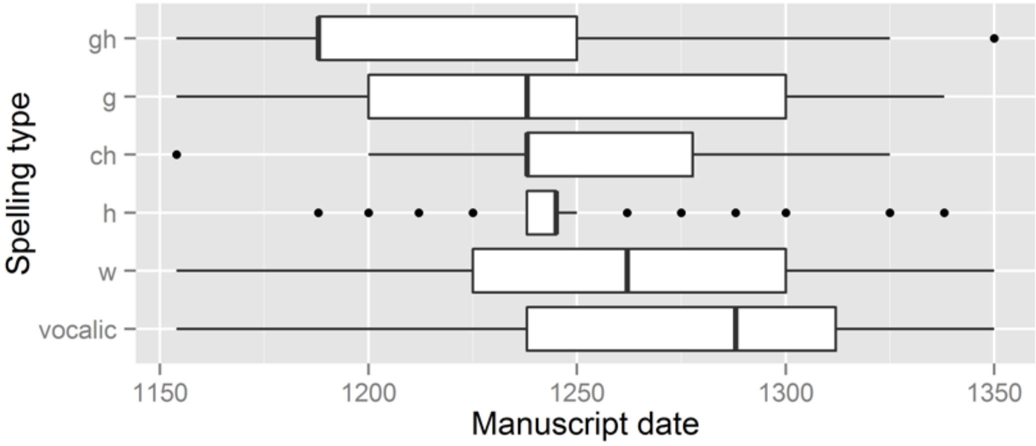

Figure 4-7: Distribution of spelling types over time

SPELLTYPE	1st Quartile	Median	Mean	3rd Quartile
G (i.e. <g, ʒ, ᵹ>)	1200	1238	1250	1300
W (i.e. <w, ƿ>)	1225	1262	1263	1300

Table 4-3: Summary statistics for the distribution of merged spelling types over time

A visually conspicuous spelling type in Figures 4-6 and 4-7 is *H*. Most of the occurrences of <h> are clustered within a very short time period; the fact that there is still an interquartile box means that these findings do not occur in only one text, but were used quite frequently in a number of texts from the same short period. Before and after this peak, the relevant sounds seem to have been rendered as <h> only in rare and isolated cases (cf. the many outliers).

A closer look at the dispersion of *H* spellings[280] reveals that 720 (i.e. c. 85%) of the 851 retrieved *H* spellings occur in texts that use the 'AB language' spelling system (viz. *Ancrene Riwle*, *Ancrene Wisse* and the '*Katherine* Group' of texts; cf. Tolkien 1929; see section 2.2.2.3 above). Moreover, the dispersion of *H* spellings among INPUTCONSONANTS ([ɣ]: 627; [j]: 62; [w]: 35) shows an overwhelming majority of cases which go back to lOE [ɣ]. It is thus safe to conclude

280 In order to analyze the dispersion of *H* spellings, the R function `subset()` was applied to the data with the help of the binary variable HTYPE (see section 3.2.1.2).

that the main reason why <h> spellings feature in the data in any noticeable quantity is that <h> was a common rendering of the voiced velar fricative (or what it had become) within the spelling system of the 'AB language'.

As described in section 3.2.1.2, PERCENTAGE.VOCALIC is a variable that contains the proportion of *VOCALIC* spellings (as opposed to all 'consonantal' spellings) for all LAEME texts (see Table 4-4 for a statistical summary). Since both PERCENTAGE.VOCALIC and MSDATE are continuous variables, we can measure the strength of their correlation directly: Pearson's correlation coefficient *r* is c. 0.21, indicating a weak (or 'small') positive[281] correlation. However, since MSDATE is a variable with many tied ranks (see section 4.1.2.1 above; cf. Field, Miles and Field 2012: 225), it is safer to use Kendall's rank-correlation coefficient τ (tau), which in this case equals only 0.159, indicating an even weaker relationship between the two variables if we make up for the tied ranks.[282] The relationship between the two continuous variables can be depicted as a scatter plot (see Figure 4-8; cf. Gohil 2015: 26):

Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
0%	56.39%	69.58%	69.89%	88.43%	100%

Table 4-4: Summary statistics for the variable PERCENTAGE.VOCALIC

281 *Positive* in this description means, 'the later the text, the more *VOCALIC* the spellings'. – Cf. Field, Miles and Field (2012: 209) for more on correlation and the interpretation of correlation coefficients.

282 The basic difference between Pearson's correlation coefficient *r* and Kendall's rank correlation coefficient τ is that the latter is based on value rankings (cf. Adler 2012: 354) and therefore makes up for the fact that many texts have the same rank (i.e. identical values) on the MSDATE scale.

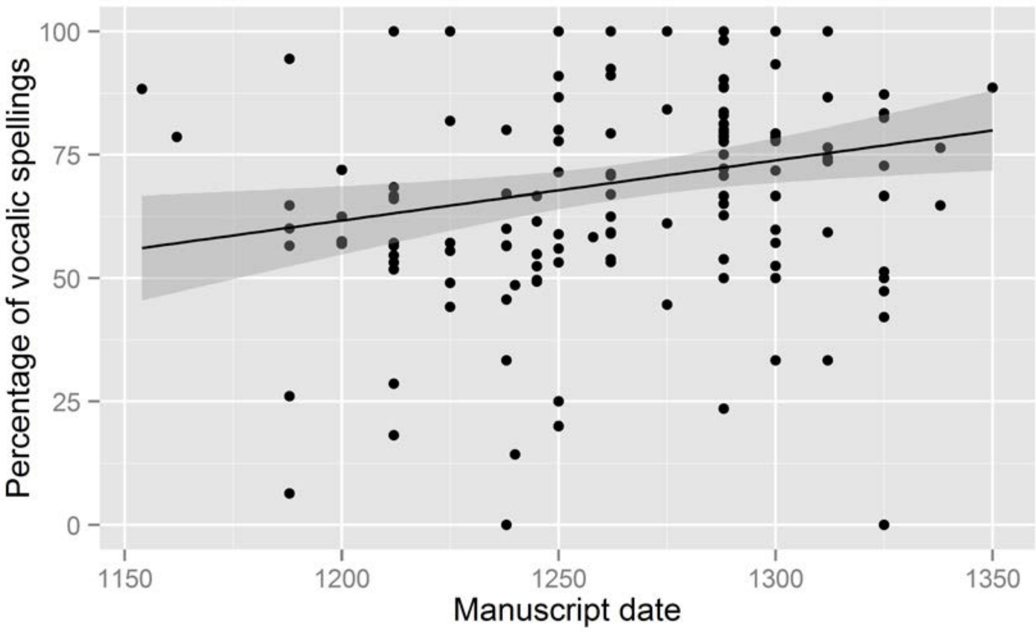

Figure 4-8: *VOCALIC* spellings per text, over time

In Figure 4-8, each dot represents one text. The data are rather widely dispersed over the entire plot, which basically means that almost any percentage of *VOCALIC* spellings, from 0% to 100%, occurs in texts at almost any point in time. Nevertheless, as all other plots in the present section have suggested, there is a slight upwards trend (i.e. a trend towards more *VOCALIC* spellings) in the data: A regression line based on a linear regression model [283] has been fitted to Figure 4-8. The dark gray area represents the 95% confidence region for this regression line. Since the highest point on the left end of the confidence region is still lower than the lowest point on the right end of the confidence region, the slight upwards trend is statistically significant.

A more pronounced and more significant trend towards *VOCALIC* spellings can be observed by focusing only on texts that are datable with a relatively high precision. The version of the scatter plot in Figure 4-9 below divides the data up into texts which are datable to intervals of twenty-five years or less (which gives us essentially all texts that also have a QUARTERCENT value), and texts which are only datable to fifty years or even longer intervals. Since the MSDATE values (and therefore the dots in the scatter plots) are the means of the respective texts' *termini post quem* and *ante quem*, they are expected to be more meaningful for texts with shorter dating spans. Indeed, in Figure 4-9, although the dispersion of

283 This model was created with the help of the R function `stat_smooth()` from the `ggplot2` package (Wickham 2009).

the data has not changed, the two regression lines show that the trend towards *VOCALIC* spellings is far more clearly discernable for the more precisely dated texts (black); in the case of the imprecisely dated texts (gray), we find no statistically significant correlation at all. If we calculate correlation coefficients based exclusively on texts datable to twenty-five years or less, we attain more promising results (Pearson's r = 0.31, indicating a medium positive correlation; Kendall's τ = 0.261, indicating a small positive correlation if we make up for the tied ranks in the data).

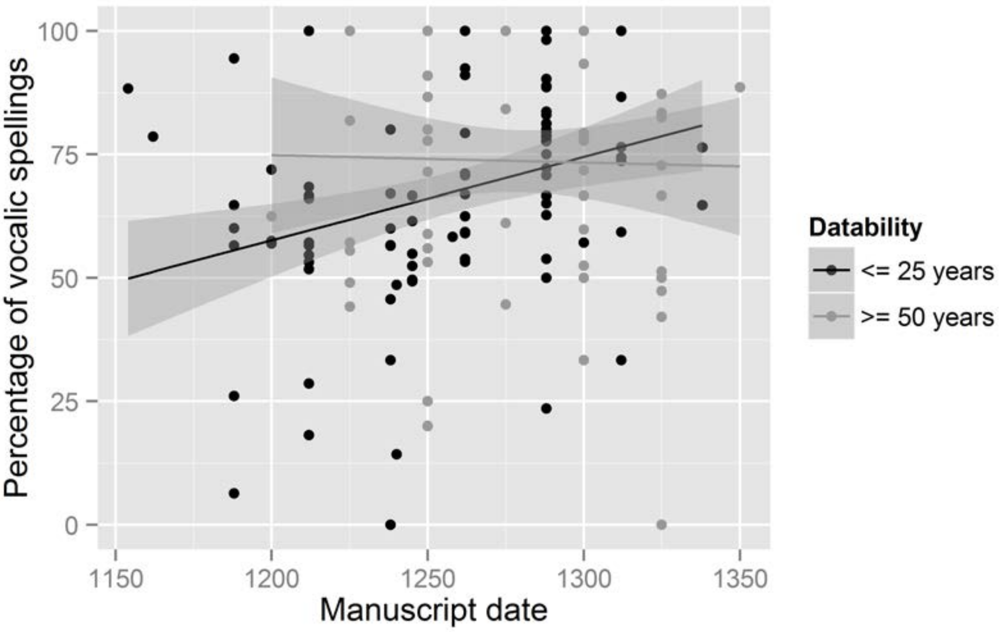

Figure 4-9: *VOCALIC* spellings per text, over time, grouped according to text datability

In summary, focusing on the more precisely dated texts and discarding the more imprecisely dated texts makes the diachronic increase of *VOCALIC* spelling per text much more visible, with a regression line rising from c. 50% to over 75% throughout the period. The same basic trend is observable in the increase of *VOCALIC* findings per quarter century (see Figure 4-11 in section 4.1.2.2.3). In the following section, we will therefore continue filtering out some of the data 'noise' by using a version of MSDATE that includes only the more precisely dated texts.

4.1.2.2.2 MSDATE25

Figure 4-10 shows a 'conditional inference tree' for the variable MSDATE25, made with the help of the `ctree()` function that is part of the `party` package in

R (Hothorn, Hornik and Zeileis 2006). This conditional inference tree is based on an algorithm[284] that estimates a regression relationship between variables (in this case, a logistic regression relationship between MsDate25 and the binary outcome variable Vocalic) by binary partitioning or ‘splitting’ (cf. Hothorn, Hornik and Zeileis 2006). It is important to note that the algorithm does not force any number of ‘splits’ onto the data, so that the very presence of a split within the resulting dendrogram means that the data to the right and to the left of a split are significantly different from one another (hence there are *p*-values associated with each split).

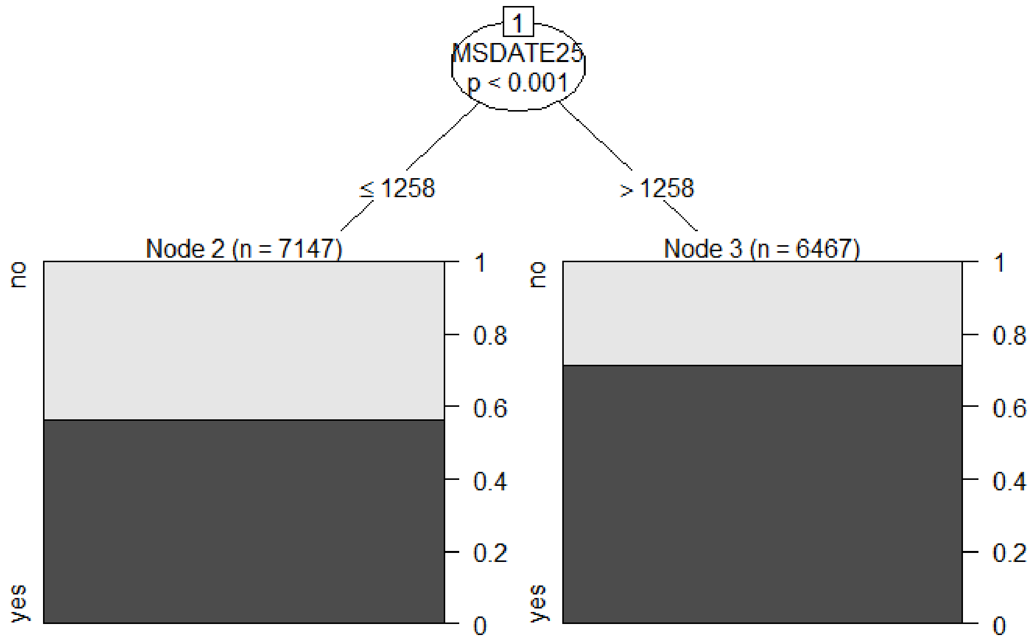

Figure 4-10: Conditional inference tree for Vocalic ~ MsDate25

The `ctree()` algorithm in this case produces a single split, which is highly significant ($p < 0.001$) and is placed at just after 1258 CE, which means that spellings that occur in texts from after 1258 (according to MsDate25) have a significantly higher chance of being *vocalic* than spellings that occur in texts from up to 1258. Interestingly, this year is very close to the temporal midpoint of the period covered by the LAEME CTT as well as being close to the quantitative midpoint of the data with 7,147 observances that date from before the split and 6,467 observances that date from after the split. The respective percentages of *vocalic* spellings in findings from the two resulting sub-periods (up to vs. after 1258) are

284 The function `ctree()` makes use of a framework for conditional inference initially developed by Strasser and Weber (1999).

well below 60% and just above 70%. This increase is thus neither very striking numerically nor visually (in Figure 4-10), but, as explained above, the conditional inference tree algorithm detects it as the one and only highly significant difference along the continuous time axis.

In order to quantify the influence of MsDate on Vocalic, i.e. to describe statistically the way in which the likelihood of a given spelling to be *vocalic* is dependent on its approximate date, we can run a logistic regression model on the data. Logistic regression, which also formed part of the calculations involved in the conditional inference tree presented above, can be defined as "an extension of regression that allows us to predict categorical outcomes based on predictor variables" (Field, Miles and Field 2012: 313; also cf. Johnson 2008: 159f.; Levshina 2015: 253ff.). In other words, because our outcome variables, viz. different spelling types retrieved from eME texts, are not measurable on a continuous scale, but are categorical in nature, we must employ logistic regression methods to quantify their relationship to predictors such as time variables.

A good way to run logistic regressions is via the creation of generalized linear models (GLMs; cf. Teetor 2011: 345; Field, Miles and Field 2012: 329ff.; Crawley 2013: 557ff.; Levshina 2015: 257ff.). A generalized linear model that uses MsDate to predict the occurrence of *vocalic* spellings shows that MsDate is a highly significant predictor ($p < 0.001$); however, the overall fit of this very simple model is not very good, as it explains only c. 3.3% of the variance in the data (Nagelkerke's pseudo-R^2 = 0.033).[285] The outcomes of all such monofactorial GLMs using every potentially relevant predictor in turn will be summarized in Table 4-23 in section 4.1.11.

4.1.2.2.3 Quartercent

Next, we will explore the diachronic development of the use of spelling types with the help of the discrete time variables. Basically, the following plots will enhance the one-dimensional Figure 4-1 (which showed the percentages of

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285 There is no ideal way to calculate the goodness of fit of logistic regression models. The present study will use Nagelkerke's (1991) pseudo-R^2, an adjusted version of Cox and Snell's (1989) pseudo-R^2 (Field, Miles and Field 2012: 317f.) since it is one of the most widely used measures, although it has been criticized for tending to return values that are either higher (Allison 2013) or lower (Levshina 2015: 259) than typical 'real' R^2 values returned for linear models. – The code used to run this model in R is `glm(VOCALIC ~ MSDATE)`; the null deviance is 23,492 on 18,106 degrees of freedom (df); the model's residual deviance is still at 23,052 on 18,105 df.

spelling types, see section 4.1.1 above) by adding the dimension of time on the x-axis. In addition, absolute frequencies are printed onto the bars in the plots.

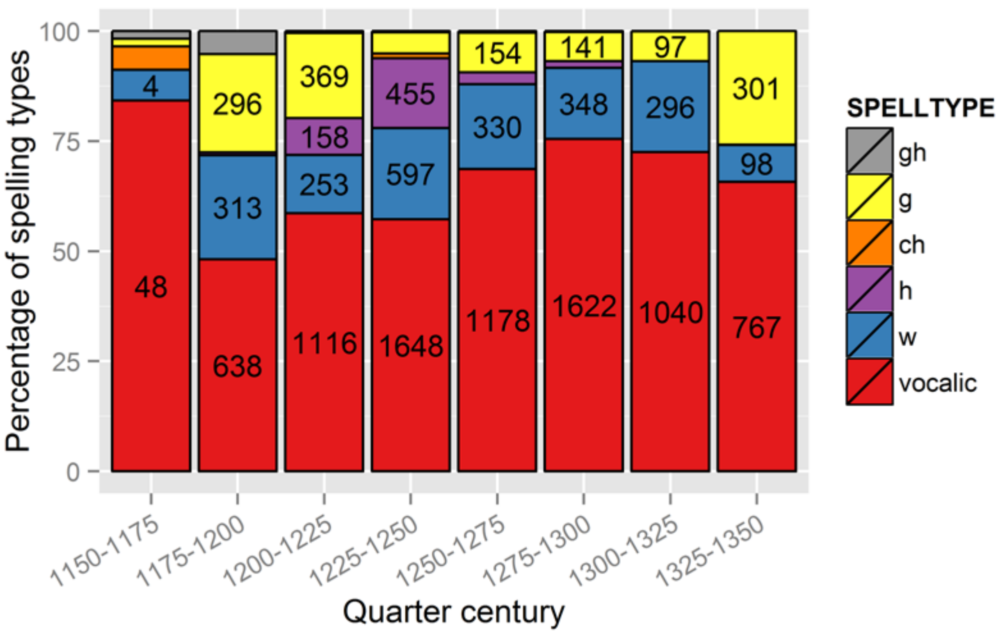

Figure 4-11: Distribution of spelling types by quarter century

In Figure 4-11 we will find the levels of SPELLTYPE (represented by the different colors) showing some of the same characteristics as in Figure 4-7: For one thing, the different major spelling types (most importantly *G*, *W*, and *VOCALIC*, represented by yellow, blue, and red) are each used in every quarter century. A general upwards trend in the use of *VOCALIC* spellings (red) over a large stretch of the data is clearly visible, increasing from just below 50% in the second bar to just above 75% in the sixth bar. We might also note that the proportion of *GTYPE* spellings (yellow) tends to decrease at least from the second to the seventh bar (pointing towards the vocalization of postvocalic [j]), whereas the proportion of *WTYPE* spellings (blue) does not seem to decrease over time.

Figure 4-11 also shows some unexpected irregularities, particularly in the earliest and latest quarter centuries. As the absolute numbers show, the anomalies found within the first quarter century (1150-1175 CE) are partly due to the fact that this quarter century is poorly attested. In fact, it is represented by only two texts (viz. the second continuation of the *Peterborough Chronicle* [Oxford, Bodleian Library, MS Laud Misc 636] and the Berkshire “Sermon on Isaiah” [Cambridge, Trinity College MS B.14.52]), which yield a total of fifty-seven relevant spellings. In addition to being quantitatively underrepresented, the first quarter century is made up of texts that show spellings which are untypical of eME: We might recall the warning issued by Bennett and Smithers (1968: lviii; qtd. in section 2.4.4.1 above) that the sound [j] was often represented as <i> in "early" eME texts.

There are also unexpected effects at the latter end of the time scale, most notably a rapid increase in the proportion of G spellings, from below 7% to above 25% in the final quarter century. Although this quarter century is quite well attested in terms of retrieved spellings, these come from only two texts, viz. Michael of Northgate's *Ayenbite of Inwyt* (London, British Library, MS Arundel 57) and fragments from Oxford, Merton College, MS 248. The more informative 'spelling type' variable SPELLTYPE2 allows us to see which character is suddenly being used so frequently after 1325:

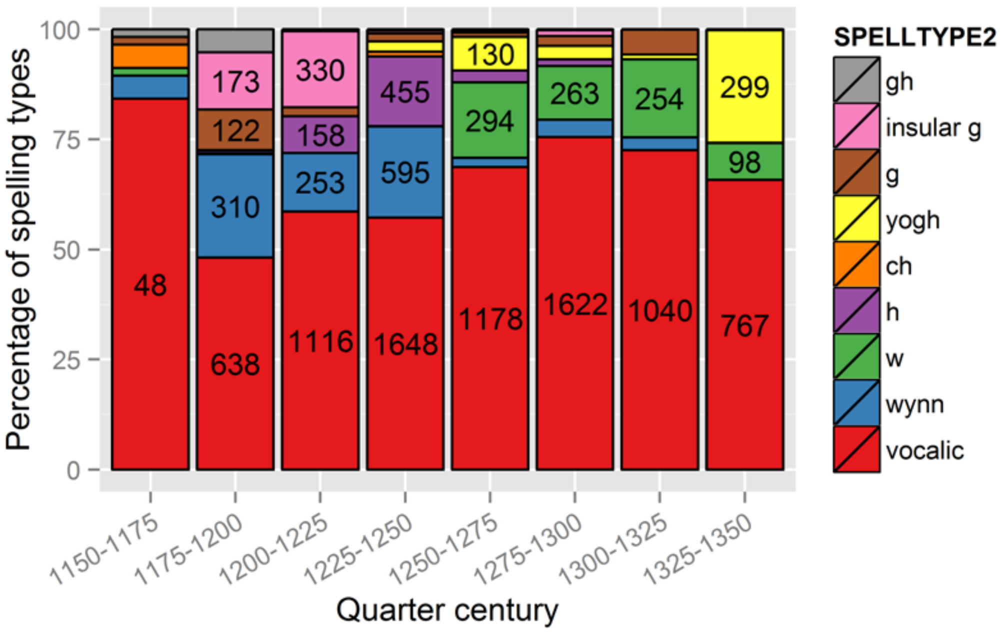

Figure 4-12: Distribution of spelling types (including sub-types) by quarter century

Figure 4-12 shows that in the final quarter century <ʒ> (yellow) begins to be used for the relevant sounds more than ever before. All 299 instances occur in the *Ayenbite of Inwyt* (see section 3.1.1). As with the <h> spellings in the 'AB language' texts mentioned above, a great majority (at least 179 of 299) of these instances of <ʒ> are used in reflexes of words that had the voiced velar fricative in lOE (most frequently in reflexes of OE *boʒ* 'bough', *maʒan* 'may', *halʒa* 'hallow, saint’ and *draȝan* ‘draw’).[286] In other words, in the *Ayenbite of Inwyt* <ȝ> was used as a regular spelling for sounds derived from lOE [ɣ] (cf. Gradon 1979: 45). Since this is one of only three Kentish texts in the entire LAEME CTT and the other two texts from Kent are significantly shorter, this seemingly sudden upsurge of <ȝ> in the final quarter century can probably not be taken as a diachronic change at all; we will return to this question in section 4.1.3.3. Finally, the brief surge of <h> spellings due to the ‘AB language’ texts in the thirteenth century, which was conspicuous in Figures 4-6 and 4-7, is nicely visible in the QUARTERCENT-based plots as well (purple).

We will now deal with the significance of the changes in the proportion of *VOCALIC* spellings over time.

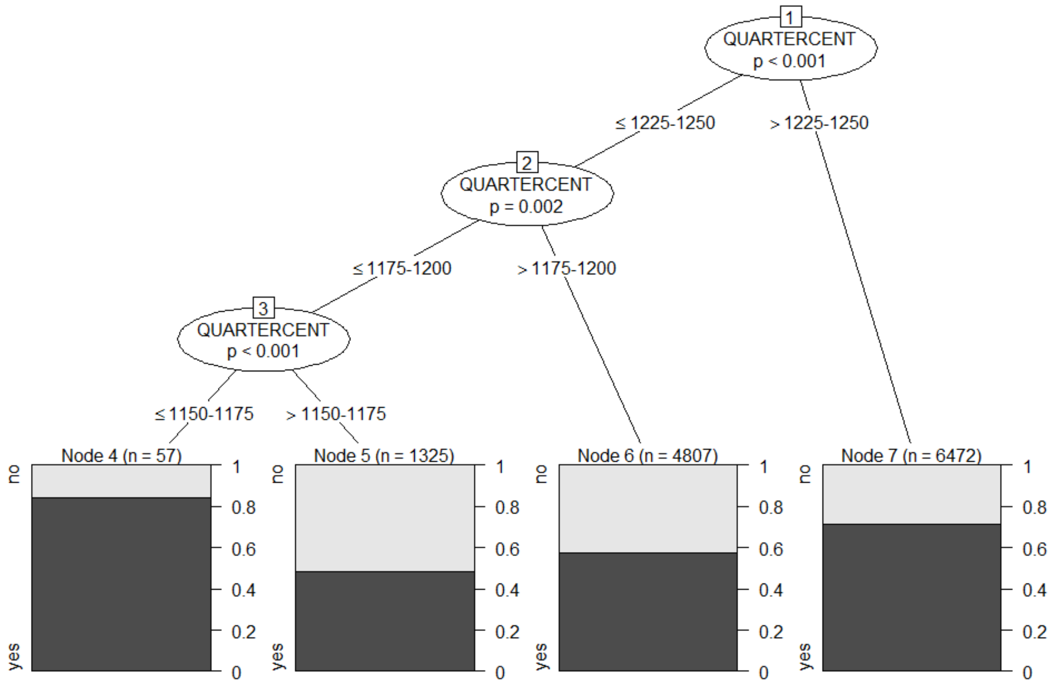

Figure 4-13: Conditional inference tree for VOCALIC ~ QUARTERCENT

Figure 4-13 above shows a ‘conditional inference tree’ that results from applying the `ctree()` function (see section 4.1.2.2.1) to the relationship between VOCALIC and QUARTERCENT. This time more than one significant ‘split’ has been detected in the data: The algorithm works recursively, so that after each split the remaining data to the right and left is searched for further splits, potentially resulting in a

[286] The form LAzE (i.e. *laȝe*) that occurred in the excerpt from the *Ayenbite of Inwyt* LAEME CTT file (example 16) in section 3.1.2.1 is another example. – Dolle (1912: 113-114) points out that <ȝ> is used regularly to represent [x, ç] as well as [ɣ] in the *Ayenbite of Inwyt*, but the fact that only such forms of the word *day* as contained a [ɣ] lOE are spelled with <ȝ> seems to escape him (cf. Dolle 1912: 26).

hierarchical dendrogram (hence the expression ‘conditional inference *tree*’). The QUARTERCENT variable agrees with the continuous MSDATE25 variable (cf. Figure 4-10) insofar as the first (highly significant, $p < 0.001$) split is found at 1250 CE, i.e. at the mid-point of the time period, which means that the texts in the first four quarter centuries are significantly different from the texts in the last four quarter centuries in regards to their proportions of *VOCALIC* spellings. Next, a (very significant, $p = 0.002$) split is detected within the earlier half, at 1200 CE. Both of these splits result from diachronically increasing proportions of *VOCALIC* spellings (from below 50% to just below 60% around 1200, and then to above 70% around 1250). The third (highly significant, $p < 0.001$) split merely reflects what was noted above about the extreme anomaly of the poorly attested earliest quarter century: At 1175, i.e. after the fifty-seven *VOCALIC* spellings (making up more than 80% of all spellings) found in the earliest two texts, the proportion of *VOCALIC* spellings drops dramatically.

A generalized linear model (GLM; see section 4.1.2.2.1) that uses QUARTERCENT to predict VOCALIC explains c. 4.6% of the variance in the data (Nagelkerke’s pseudo-$R^2 = 0.046$), which is not very much, but more than is explained by the model that used MSDATE as a predictor (c. 3.3%).[287] Many pairs of consecutive quarter centuries[288] are significantly different from one another:

- 1150-1175 vs. 1175-1200 $p < 0.001$ *** (drop)
- 1175-1200 vs. 1200-1225 $p < 0.001$ *** (rise)
- 1200-1225 vs. 1225-1250 $p = 0.274$
- 1225-1250 vs. 1250-1275 $p < 0.001$ *** (rise)
- 1250-1275 vs. 1275-1300 $p < 0.001$ *** (rise)
- 1275-1300 vs. 1300-1325 $p = 0.059$.
- 1300-1325 vs. 1325-1350 $p < 0.001$ *** (drop)

---

287 The null deviance is 16,598 on 12,660 df; the QUARTERCENT model’s residual deviance is 16,170 on 12,653 df. All of these values should be taken with caution because the variable QUARTERCENT describes only about half the data, and the two models are therefore run on differently sized data sets. For the same reason the two models cannot be directly compared using parsimony-adjusted measures of fit such as the Akaike information criterion (AIC; cf. Field, Miles and Field 2012: 263). See section 4.2.2 for more about this problem.

288 For this model the contrasts between QUARTERCENT levels were set (using the `contrasts()` function in R) so that each quarter century was compared only against the preceding one (cf. Field, Miles and Field 2012: 419ff.).

The first fact to take note of is that the GLM output, which treats every pair of consecutive quarter centuries in isolation, detects highly significant differences between most pairs of quarter centuries. Three of these highly significant differences constitute rises in *VOCALIC* spelling proportions, while the differences at the beginning and end of the time period are actually significant drops (which have been discussed above). According to this model, no significant changes occur between 1200 and 1250 as well as between 1275 and 1325.

In the following section, we will turn to the other discrete time variable, HALFCENT.

4.1.2.2.4 HALFCENT

Figure 4-14 below summarizes the percentages of spelling types in the texts that are only datable to half centuries:

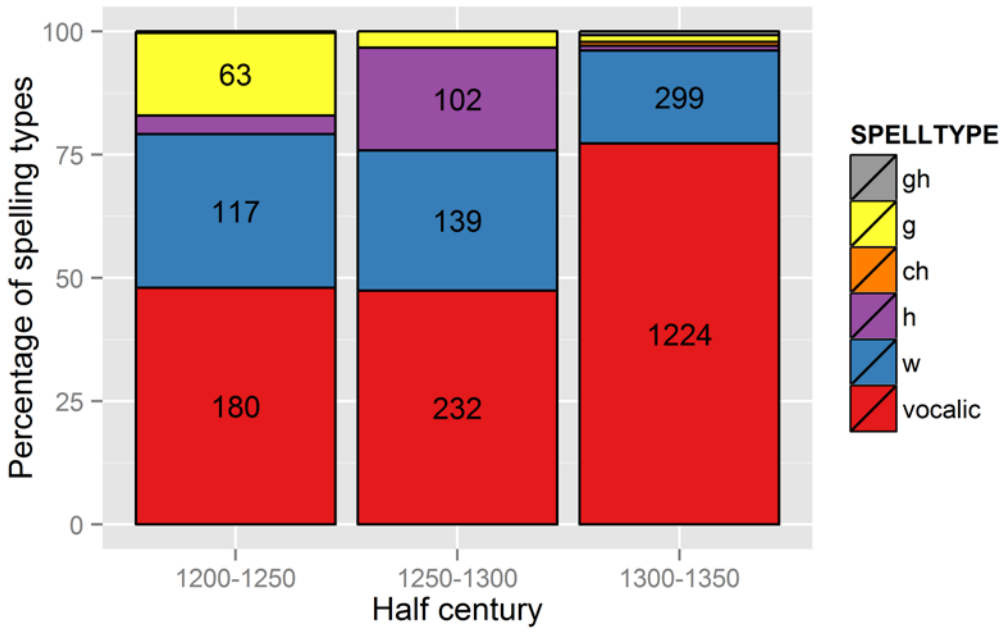

Figure 4-14: Distribution of spelling types by half century

In this visualization of the HALFCENT variable, the first two bars representing the two halves of the thirteenth century look very similar, and what sets off the third bar (i.e. the fourteenth century) most of all is a rise of *VOCALIC* spellings and a decline of all other spellings except *W*. Interestingly, the thirteenth century's characteristic use of <h> is also visible here (purple), while the dramatic increase of the use of 'yogh' <ȝ> towards the end of the period is not; as mentioned in the preceding section, <ȝ> was used very much in the *Ayenbite of Inwyt*, which is datable with more precision and thus not featured in the broader HALFCENT data. The rather steady overall decrease of *GTYPE* spellings already noticed in Figure 4-11 is corroborated in Figure 4-14 (yellow).

Figure 4-15 below presents the results of running the `ctree()` function on the logistic regression relationship between VOCALIC and HALFCENT:

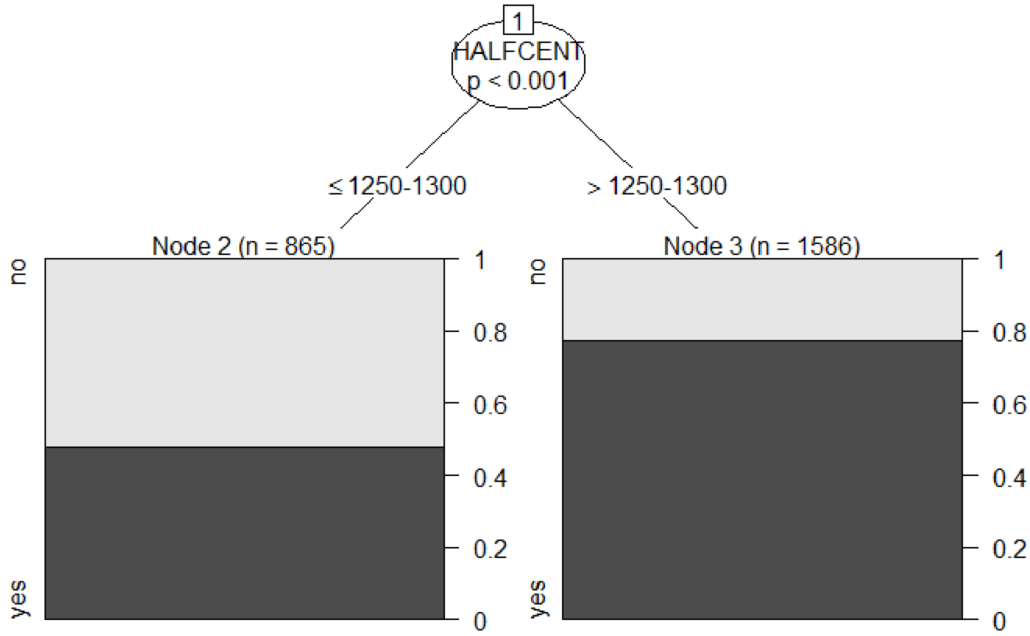

Figure 4-15: Conditional inference tree for VOCALIC ~ HALFCENT

As Figure 4-14 showed, the respective proportions of SPELLTYPE: *VOCALIC* spellings in the first two half centuries are nearly identical. Accordingly, in Figure 4-15 above the `ctree()` algorithm has split the data at 1300 CE and conflated the first two half centuries in the left bar; this split is highly significant ($p < 0.001$). Similarly, a GLM run on the data using HALFCENT as the only predictor for VOCALIC detects a highly significant difference ($p < 0.001$) between the second and third half centuries and no difference ($p = 0.9$) between the first and second half centuries. This model explains c. 11.7% of the variance in its data (Nagelkerke's pseudo-$R^2 = 0.117$).[289]

[289] The null deviance is 3,117.4 on 2,450 df; the HALFCENT model's residual deviance is 2,901 on 2,448 df. Once again, this percentage should not be over-interpreted since HALFCENT has many missing values and describes an even smaller amount of data than QUARTERCENT does.

4.1.2.3 Summary

The descriptions above show that QUARTERCENT is the most useful of the time variables. HALFCENT covers a much smaller part of the data (cf. Figure 4-5) and since it contains only three variants, it is far less informative in terms of diachronic developments (cf. Figure 4-14). The year numbers stored in the continuous variable MSDATE are really far less precise than they might seem; the values of this variable contain a lot of noise. However, the variable gains some predictive power if it is trimmed down to only the more precisely datable texts (i.e. essentially the texts that have QUARTERCENT values), as was seen in Figure 4-9.

Statistical models run with one of the time variables as a predictor generally only explain a small percentage of the variance in *VOCALIC* spellings. However, time is the most basic predictor variable in any diachronic study, which is why it will make sense to analyze all following predictor variables not merely for themselves, but to look into their relationship (i.e. their interaction, cf. Larson-Hall 2010: 108) with time, especially with QUARTERCENT.

4.1.3 Space variables

After focusing on the time variables, the next obvious predictor variables to turn to are the space variables. As we have seen in section 4.2 (cf. especially Tables 2-10, 2-12, and 2-14), many scholars have claimed spatial factors to have played a role in the development of postvocalic semivowels, and indeed, it would be strange if it were otherwise, as language change and language variation, whether spatial or social, naturally co-occur and necessitate each other (cf. Millar and Trask 2015: 257ff.).

Space might come into play in two different ways in our data. For one thing, one lOE linguistic input might have developed to show different resulting forms in different regions by the end of the period covered by the LAEME CTT. The phrase 'one linguistic input' in the preceding sentence necessarily contains a great deal of simplification, and the way we have coded our linguistic predictor variables will not allow for any just treatment of the characteristics of individual dialects in this respect. Variables such as INPUTVOWELQUALITY are rather hardwired to reflect the *status quo* in lWS OE (i.e. the written variety of tenth- and eleventh-century Wessex), and not to capture any of the diatopic variation that was already there (however poorly attested) in the OE period.

More important to the present study will be what could be called the question of spatial diffusion (cf. Studer-Joho 2014: 11ff.): Scholars as early as Karl Luick (e.g. cf. Luick 1921: 228) assume the changes in question to have spread from one geographical region to another. Thus, rather than describing differences between dialectal forms at any given point, the following analysis will treat space as one of many predictors for the change and focus on its relative significance.

While all texts in the LAEME CTT have been given a date of composition (however rough some of them are), it should be recalled that *not* all texts in the LAEME CTT (but only 119, i.e. roughly 70%, see section 3.1.2.5 above) have been localized. This means that using any space variable in the analysis will always mean leaving out at least about a third of the corpus texts. Moreover, most texts have been localized relative to other texts on linguistic grounds, so that their placement on the map (as in Figure 3-4) must always be treated with caution. With these *caveats* in mind, we can move on to analyzing the LAEME CTT findings along spatial dimensions.

4.1.3.1 Description

In a test run of statistical models that use the four space variables to predict the outcome of VOCALIC, the broadest (viz. three-level) space variable DIALECT1A was found to contribute nothing towards explaining the outcome values (cf. Table 4-23 in section 4.1.11). We will therefore leave it out completely and begin by considering the second-broadest variable DIALECT1B. The numbers in Table 4-5 and the histogram in Figure 4-16 below sum up the coverage of broad dialect regions in the LAEME findings. The four variants of DIALECT1B are named after the traditional OE dialect regions (as described in section 3.2.1.1.3 above), viz. *WS* (West Saxon), *NO* (Northern), *ME* (Mercian), and *KE* (Kentish).

DIALECT1B	**Number of findings**
WS	9,121
NO	1,835
ME	4,381
KE	1,303

Table 4-5: Summary of the variable DIALECT1B

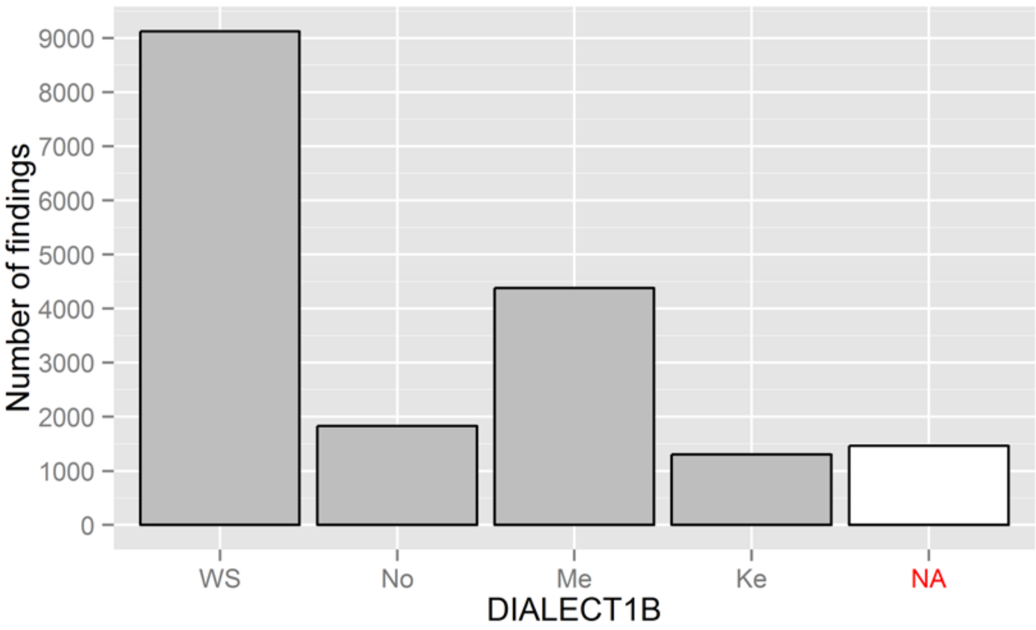

Figure 4-16: Spatial distribution of findings according to broad dialect regions (DIALECT1B)

About half (9,121) of all retrieved findings occur in texts from the Southwest of England (*WS*). By contrast, the North (*NO*), which is also a large geographical region, is poorly represented in the findings (cf. the map of survey points in Figure 3-4). Only a small percentage of the retrieved findings are from unlocalized texts (the white box on the right) because these are rather short on average.

The two better-attested broad areas (*WS* and *NO*) are further subdivided into smaller dialect regions at the next level (DIALECT1C), as the following Table shows:

	WS	***NO***	***ME***	***KE***
SW	10	0	0	0
SWML	38	0	0	0
SC	7	0	0	0
N	0	12	0	0
NWML	0	0	5	0
CML	0	0	3	0
EML	0	0	28	0
ESS&LON	0	0	11	0
SE	0	0	0	5

Table 4-6: Summary of DIALECT1C x DIALECT1B: Number of texts

The 'West Saxon' area consists of the dialect regions South-West (*SW*), South-West Midlands (*SWML*), and South Central (*SC*), and the 'Mercian' area consists of the regions North-West Midlands (*NWML*), Central Midlands (*CML*), East Midlands (*EML*), and Essex and London (*ESS&LON*). However, not all of these regions are equally well attested, as the numbers of texts in Table 4-6 already show. In addition, some texts are rather short, so that e.g. the ten texts from the South-West still do not make the South-West a well-attested region, as Figure 4-17 demonstrates:

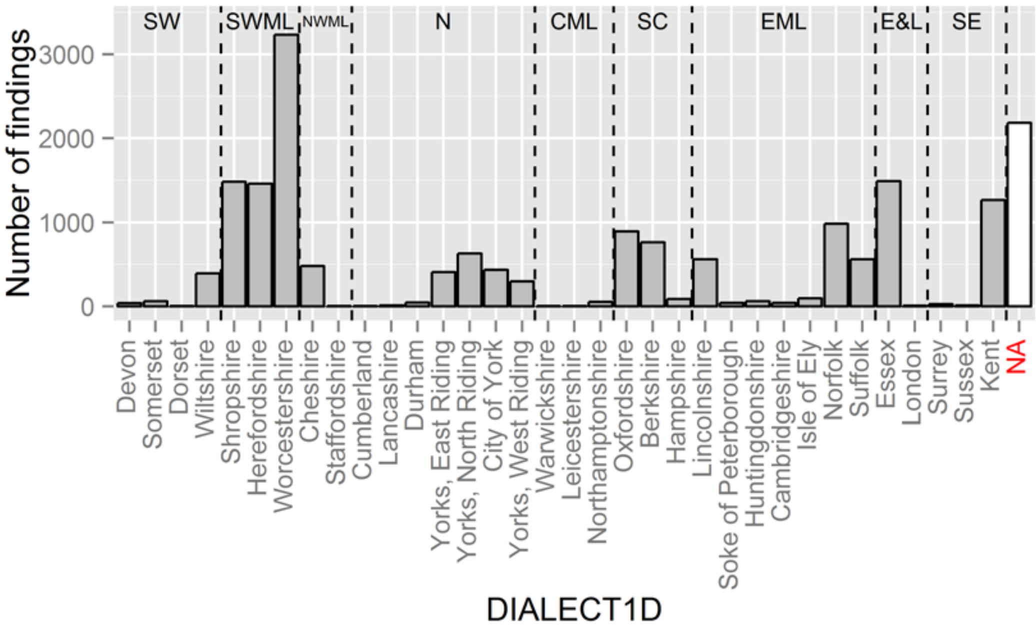

Figure 4-17: Spatial distribution of findings according to fine-grained dialect regions (DIALECT1C and DIALECT1D)

The levels of the variable called DIALECT1C are included at the top,[290] and the individual bars at the bottom represent the levels of DIALECT1D.[291] As with the time variables discussed above (see section 4.1.2.1), the more detailed histograms reveal the general patchiness of the data. E.g. the best-represented broad region ('West Saxon'/*WS*) is hardly represented by texts from the actual South-West of Britain (i.e. Devon, etc.) but to a far greater extent by the South-West Midlands counties. Almost all 'Northern'/*NO* findings are from Yorkshire. The area between the North and the South (called 'Mercia' above) is represented mainly by

290 In this Figure (as well as in Table A-11 in Appendix F) the regions and counties have been roughly sorted from east (left) to west (right), so that the order of DIALECT1C levels differs slightly from that presented in Table 4-6.

291 Table A-11 in Appendix F shows the absolute numbers of findings for DIALECT1D.

texts from the East Midlands and from Essex; there are hardly any findings from the Central Midlands or from London. Lastly, the South-East (i.e. 'Kentish'/*KE* at the level of DIALECT1B) is almost exclusively represented by texts from Kent.

4.1.3.2 Analysis: Spellings ~ space

Numerically, the space variables contribute about as much explanatory power to the data set as the time variables: Statistical models that use the four different space variables respectively to predict the occurrence of *VOCALIC* spellings among the findings explain between 0 and c. 7% of the variance. Theoretically, however, it hardly seems viable to run a monofactorial model with a space variable as its predictor, since the model will lump together findings from any point in time into each dialect category, and we have seen (see section 4.1.2) that *VOCALIC* spelling proportions typically range from about 50% in the early data to above 75% in the late data. In other words, differences over time are greater than differences between dialects, which is why the factor of time should be included.

4.1.3.3 Analysis: Spellings ~ space + time

As announced at the end of section 4.1.2, the space variables will now be set into relation with the time variables. In other words, the question that we are now addressing is, "How well do space and time variables combined account for the changes in spelling types?".

4.1.3.3.1 Broad dialect areas

We will begin by visualizing and analyzing the explanatory power of the variable DIALECT1B, which assigns the texts and findings to broad dialect regions. We will revisit the variable that gives the proportion of *VOCALIC* spellings per text (i.e. PERCENTAGE.VOCALIC) and plot it on a continuous time axis with the help of MSDATE (cf. Figures 4-8 and 4-9 above), but this time highlighting the broad dialect areas according to the variable DIALECT1B.

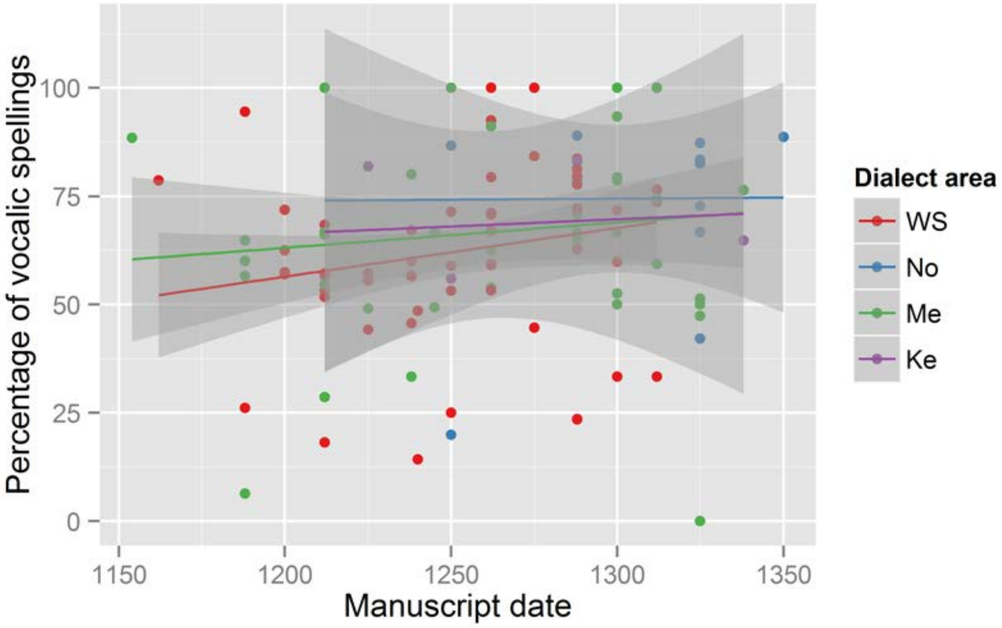

Figure 4-18: *VOCALIC* spellings per text, over time, grouped according to dialect areas

The first thing to note is that most dots in Figure 4-18 above are either green (representing texts from the 'Mercian'/*ME* region) or red (representing texts from the 'West Saxon'/*WS* region), pointing to the fact that these two regions are well-attested in the data, as opposed to 'Northern'/*NO* (blue) and 'Kentish'/*KE* (purple). The linear regression lines are all rather flat, but in general, the better attested a dialect region, the more of an upwards slant is discernable in the regression line. However, none of the regression lines has a slope that significantly differs from 0, as the wide 95% confidence margins show. Interestingly, the red regression line for the *WS* region, which is often claimed to have been the most conservative in terms of sound changes (e.g. Lass 2006: 71), is indeed the lowest one in Figure 4-18, but the wide confidence margins once again call to question whether this difference is significant.[292]

We will now focus on the relative importance of time and space variables in general.

[292] The general problem of the heterogeneity of spellings at any given point in time (which is the reason for the wide confidence margins) has been discussed in the context of time variables in section 4.1.2.2.1.

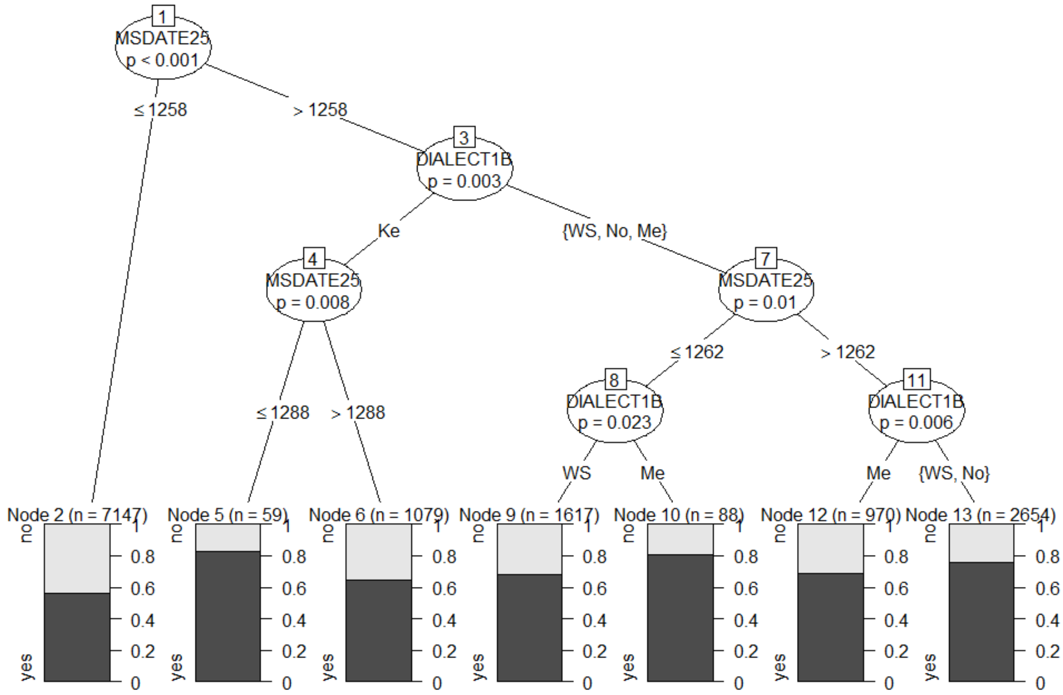

Figure 4-19: Conditional inference tree for VOCALIC ~ MSDATE25 + DIALECT1B

A conditional inference tree resulting from using both space and time predictors in order to detect significant splits in the data is given above. The `ctree()` algorithm detects various significant splits using the two variables: Most importantly, the first (highly significant) split is the same as the one in the dendrogram in Figure 4-10: Findings from up to 1258 CE are highly significantly different from findings from after 1258. No further splits are detected within the earlier half of the data. Within the data from after 1258, the second (very significant, $p = 0.003$) split is made between *KE* and all other dialect areas. It seems that the findings from this region (and especially the large number of hits from after 1288, cf. node 6 – these are from Michael of Northgate's *Ayenbite of Inwyt*) have a relatively low (i.e. lower than 70%) chance of being *VOCALIC*. Indeed, another fact that sets apart 'Kentish' from the other broad dialect regions is that within 'Kentish', the proportion of *VOCALIC* findings actually decreases with time.[293] The further splits in the dendrogram will not be commented on here, particularly because the splits at the next level (nodes 4 and 7) are made on the basis on MSDATE, and the cut-off dates are fairly close to the first one (1258), which means that at this point the splits are cutting the data into short sub-periods and are therefore most probably reflecting the idiosyncrasies of individual texts or small groups of texts more than anything else.

[293] Again, this is due to the low *VOCALIC* spelling proportions in the *Ayenbite of Inwyt.*

A GLM that treats VOCALIC as the outcome variable to the predictors MSDATE and DIALECT1B as well as their interaction[294] shows the predictors' relative significance in the following way:

- MSDATE $p < 0.001$ ***
- DIALECT1B:
  - *ME* vs. *WS* $p = 0.035$ *
  - *ME* vs. *NO* $p = 0.148$
  - *ME* vs. *KE* $p = 0.011$ *
- Interaction:
  - MSDATE :: *ME* vs. *WS*[295] $p = 0.031$ *
  - MSDATE :: *ME* vs. *NO* $p = 0.126$
  - MSDATE :: *ME* vs. *KE* $p = 0.009$ **

The only highly significant ($p < 0.001$) predictor variable is MSDATE (taken as a whole because it is a continuous variable). This corroborates the fact that e.g. the `ctree()` algorithm detected the first and most significant split with the help of this variable. In other words, this confirms the impression that differences (in terms of *VOCALIC* spelling proportions) between dialect regions are not as pronounced as differences throughout time in the data. Turning to the space variable, we can see that both 'West Saxon' and 'Kentish' come out as significantly different from 'Mercian' (which has been set as the reference dialect against which the other dialects are compared because of its location in the middle of England) while 'Northern' does not. The last three items of the list above are the interaction, i.e. the combined effects, of the different dialects with time. Both 'Wessex' and 'Kent' interact with time, i.e. their degree of 'vocality' changes diachronically, in ways which set them apart from the situation in 'Mercia' and the North. The model that uses these two predictors and their interaction explains only c. 4% of the variance in the data (Nagelkerke's pseudo-$R^2 = 0.04$), which is not much,

294 The code used to run this model in R is `glm(VOCALIC ~ DIALECT1B * MSDATE)`. The asterisk between the two predictor variables signifies that three things are to be included in the model as predictors: The first variable, the second variable, and their interaction.

295 Henceforth, for the sake of clarity, interactions between variable levels will be marked with a double colon (::) instead of the more conventional single colon because the latter notation is already used to separate variable names and variant names (e.g. LEXEL: *DAY*).

but slightly more than the model with MsDate as the only predictor explains.[296] A χ^2-test of the deviance statistics of the two models (cf. Field, Miles and Field 2012: 337) shows that the model that includes Dialect1B as well as the interaction indeed describes the data[297] highly significantly better ($\chi^2(6) = 97.37$, $p < 0.001$) than the model based only on MsDate does.

We will now look at the representation of the broad dialectal regions along the time axis with the help of the discrete time variables. Tables 4-7 and 4-8 below present the numbers of findings for the four levels of Dialect1B cross-tabulated with the eight levels of Quartercent and with the three levels of Halfcent, respectively.

	1150–	***1175–***	***1200–***	***1225–***	***1250–***	***1275–***	***1300–***	***1325–***
WS	14	59	723	1,533	1,608	1,392	785	0
No	0	0	2	0	0	9	0	0
Me	43	1,266	1,055	471	88	247	634	89
Ke	0	0	129	0	0	59	0	1,079

Table 4-7: Summary of Dialect1B x Quartercent

	1200–1250	***1250–1300***	***1300–1350***
WS	310	467	0
No	0	0	1,523
Me	53	4	63
Ke	11	0	0

Table 4-8: Summary of Dialect1B x Halfcent

We have so far seen that the LAEME CTT data are very unequally distributed both temporally and spatially; the fact that we find some very small numbers (even 0) in Tables 4-7 and 4-8 bring this problem to a point. We will address this issue further in the context of the more fine-grained space variables in the following. What we can see from the Tables above is that three of the four broad dialect regions (viz. *WS, Me, Ke*) are better represented by texts that are datable to quarter centuries while one region (viz. *No*) is better represented by texts datable to half centuries. We will therefore make use of whichever time variable is more

[296] The null deviance is 21,609 on 16,639 df; the model's residual deviance is 21,120 on 16,632 df.

[297] In order to ensure that the two models actually describe the same data, a new version of the simpler model for Vocalic ~ MsDate was created on the basis of only data points that have a Dialect1B value.

informative for the respective dialect areas in the plots below; Figures 4-20 through 4-23 represent the proportions of different spelling types by broad dialect area and quarter or half century, respectively:

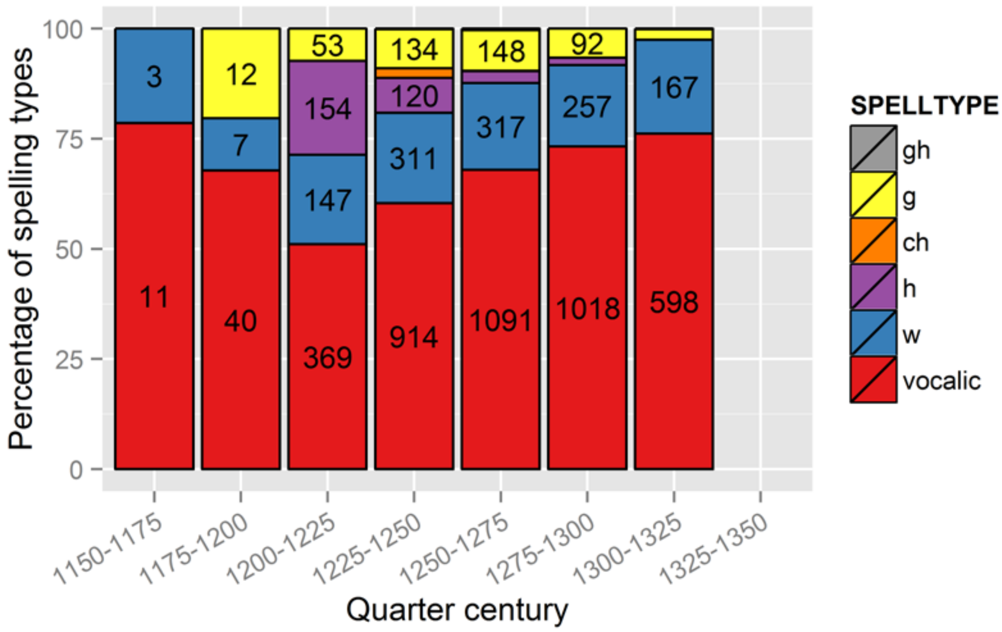

Figure 4-20: Proportion of spelling types by quarter century (DIALECT1B: *WS*)

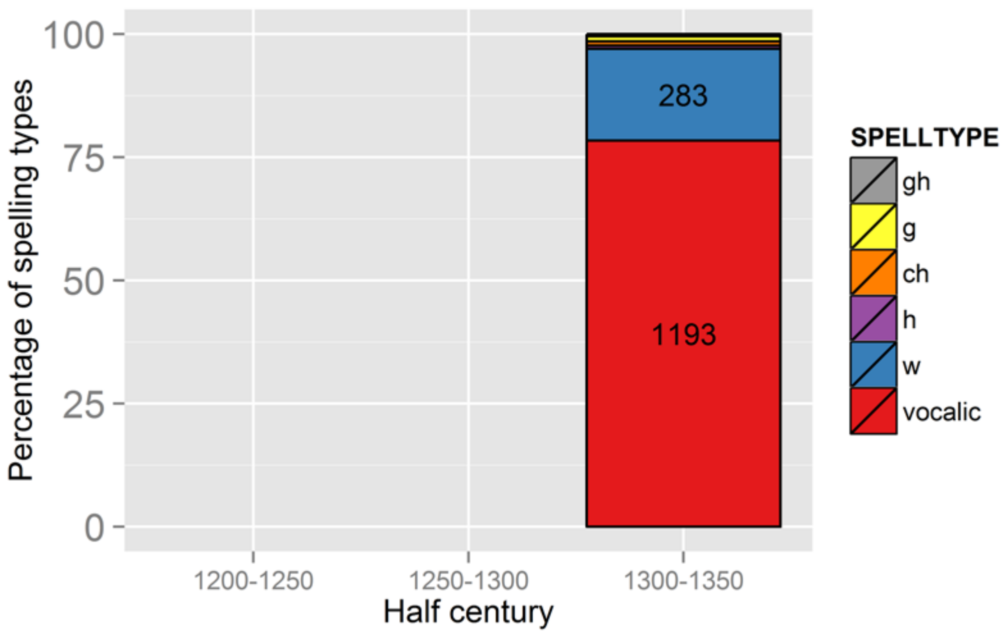

Figure 4-21: Proportion of spelling types by half century (DIALECT1B: *NO*)

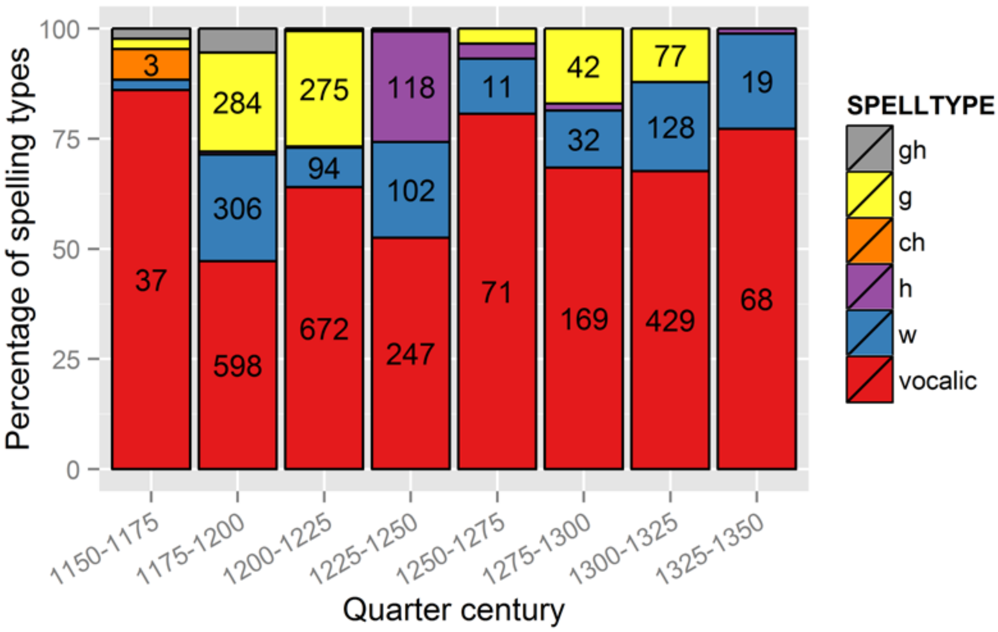

Figure 4-22: Proportion of spelling types by quarter century (DIALECT1B: *ME*)

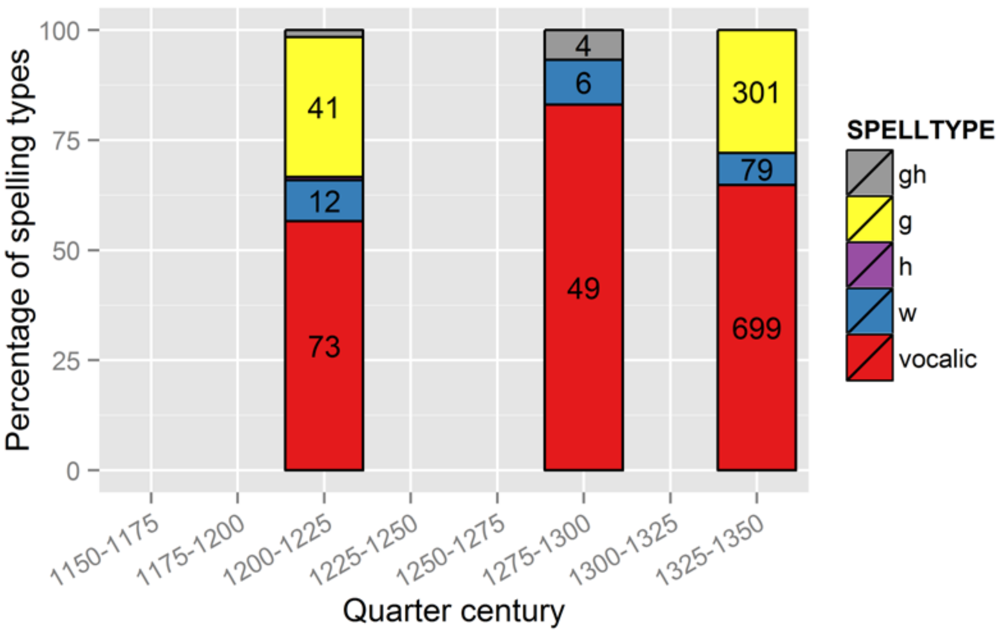

Figure 4-23: Proportion of spelling types by quarter century (DIALECT1B: *KE*)

It is hardly surprising that the most well-attested broad dialect area (viz. Wessex/*WS*, cf. Figure 4-16) is also the one that shows the smoothest increase in the proportion of *VOCALIC* spellings from c. 50% around 1200 to c. 75% around 1325 (see Figure 4-20 above). The next best attested area (viz. Mercia/*ME*; Figure 4-22) shows roughly the same increase over a slightly longer period, but with more fluctuation. The plot for the Northern (*NO*) area (Figure 4-21) shows only one bar (for 1300 to 1350) and therefore includes no information on diachronic developments. The proportion of *VOCALIC* spellings in this bar is roughly the same as with the contemporary *WS* and *ME* bars.

Finally, as already mentioned, the Kentish (*KE*) area is attested by only three texts.[298] The fact that Kentish seems to have the lowest 'late' proportion of *VOCALIC* spellings (c. 65% as opposed to the usual 75%; cf. node 6 in the dendrogram in Figure 4-19 above) is conspicuous once more. The bar on the right represents the *Ayenbite of Inwyt*, whose preference for the new *littera* <ȝ> has already been commented on (see the discussion beneath Figure 4-12 above) and now stands out as somewhat of an anomaly compared to contemporary spellings from other regions (cf. Figures 4-20 through 4-22). The "Kentish Sermons" from about fifty years earlier seem to show higher proportions of *VOCALIC* spellings, which could be taken to imply that the increased use of <ȝ> in the *Ayenbite* is an 'S-feature' (cf. McIntosh 1989b: 47) connected more with etymology rather than with actual pronunciation. However, it is often stressed (cf. Dolle 1912: passim; Gradon 1979: passim; Freeborn 1998: 170ff.; Scagill 2002: 191) that this text displays a very close spelling-to-sound correspondence. As the eME Kentish dialect is not well-attested, it is safest to conclude that semivowel vocalization proceeded at a slower rate in Kent. We will return to the question of how to interpret the large quantity of <ȝ> spellings in the *Ayenbite of Inwyt* in section 4.1.4.

4.1.3.3.2 Smaller dialect regions

We will now turn to the more fine-grained space variables. Figure 4-24 on the following page shows the development of *VOCALIC* spelling proportions per text over time using MSDATE. This time the texts are grouped according to their DIALECT1C region, and linear regression lines are added for each dialect.[299]

[298] These texts are, from early to late, "Poema Morale" (Oxford, Bodleian Library, Digby 4), "Kentish Sermons" (Oxford, Bodleian Library, Laud Misc 471), and the *Ayenbite of Inwyt* (London, British Library, Arundel 57).

[299] Confidence regions for the regression lines (as in Figures 4-9 and 4-18) are not visualized in this plot.

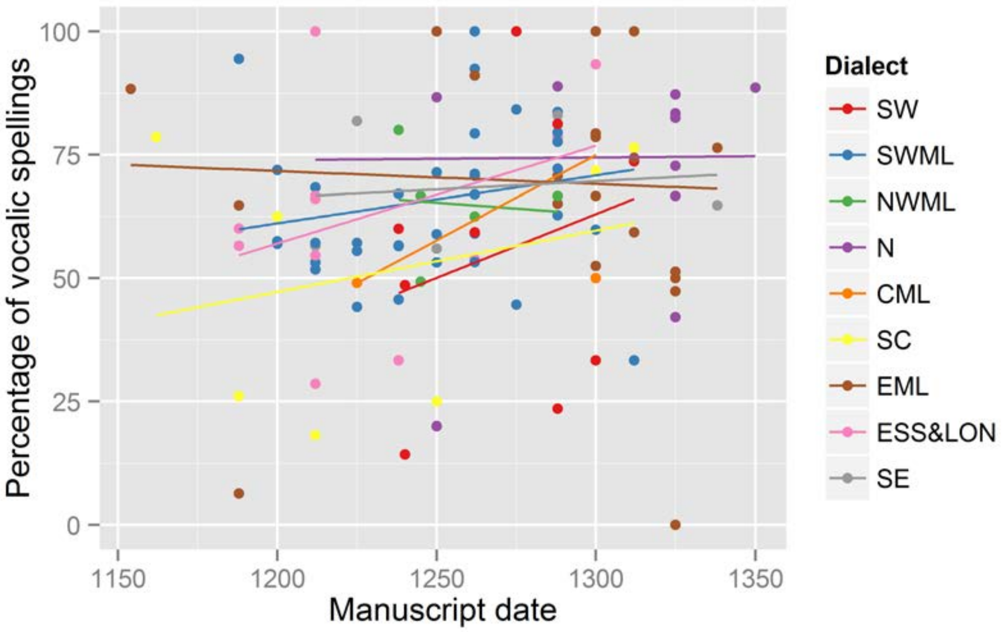

Figure 4-24: *VOCALIC* spellings per text, over time, with linear regression lines, grouped by dialects

Most (but not all) regression lines have an upwards slant, indicating a development towards higher proportions of *VOCALIC* spellings. A number of dialects are quite poorly represented both generally (cf. Figure 4-17 above) and in regards to diachrony (see below), which accounts for a lot of the 'noise' in Figure 4-24 above. Again, the Southwest (red) shows a fairly low average percentage of *VOCALIC* spellings, but the South-West Midlands (blue), which are also part of the conservative DIALECT1B: *WS* region (see above), do not. We will now move on to compare the individual levels of DIALECT1C, i.e. the individual dialects, more closely.

Table 4-9 presents the numbers of findings for the nine levels of DIALECT1C cross-tabulated with the eight quarter centuries.

	1150–	*1175–*	*1200–*	*1225–*	*1250–*	*1275–*	*1300–*	*1325–*
SW	0	0	0	61	337	53	38	0
SWML	0	36	657	1,472	1,271	1,339	3	0
NWML	0	0	0	465	8	12	0	0
N	0	0	2	0	0	9	0	0
CML	0	0	0	0	0	0	0	0
SC	14	23	66	0	0	0	744	0
EML	43	902	0	0	67	193	634	89
ESS&LON	0	364	1,055	6	13	42	0	0
SE	0	0	129	0	0	59	0	1,079

Table 4-9: Summary of DIALECT1C x QUARTERCENT

As described in section 3.2.1.1.3, the variable DIALECT1C is based on the LAEME corpus compilers' own categories and roughly represents the traditional dialect regions of ME. The many zeroes in Table 4-9 show that the further we 'zoom in', i.e. the more fine-grained the local variables that we are using, the more missing values we will have in our data. This has serious implications for the usefulness of these variable levels: It will be impossible to study, say, North-West Midlands spellings in a truly diachronic fashion because almost all DIALECT1C: *NWML* findings are from one quarter century. Even the dialect whose data points seem most evenly spread out over the time axis, viz. South-West Midlands (*SWML*), could at best be studied over a period of roughly one century (1200-1300). Statistically speaking, we are dealing with the problem of multicollinearity, which Levshina (2015: 155) defines as "strong linear dependence between explanatory variables" (also cf. Gries 2013: 264; for a more detailed statistical explanation cf. Cramer 2006): Comparing, say, the North-West Midlands against the Southeast (in terms of the proportions of spelling variants) would amount to almost the same thing as comparing the mid-thirteenth century against the mid-fourteenth century because to a large extent *NWML* texts *are* thirteenth-century texts, and *SE* texts *are* fourteenth century texts.[300] Thus, Figures 4-25 through

300 The collinearity of variables can be assessed by calculating the variance-inflation factors (VIFs) associated with them (Field, Miles and Field 2012: 292f.). In this case, an analysis of multicollinearity reveals that, in general, these two variables (DIALECT1C and QUARTERCENT) are not collinear to a problematic degree: Using the 'generalized' VIFs corrected for the df involved as proposed by Fox and Monette (1992), the value of $GVIF^{1/(2 \times df)}$ (cf. Fox and Monette 1992; Levshina 2015: 160) for the two variables is c. 1.3, which corresponds to c. 1.69 (= 1.3^2) on the more common VIF scale, and which is therefore unproblematic judged by the conventional rule that VIF values of up to 5 are acceptable (cf. Larson-Hall n.d.: 121-

4-28 below only visualize the diachronic developments of spelling types within some of the more informative[301] among these smaller dialect areas. The discrete time variable QUARTERCENT is used throughout because it is the most informative for each of the DIALECT1C variants.

We will first turn to the two best-attested dialect regions within the former kingdom of Wessex, viz. *SWML* and *SC*:

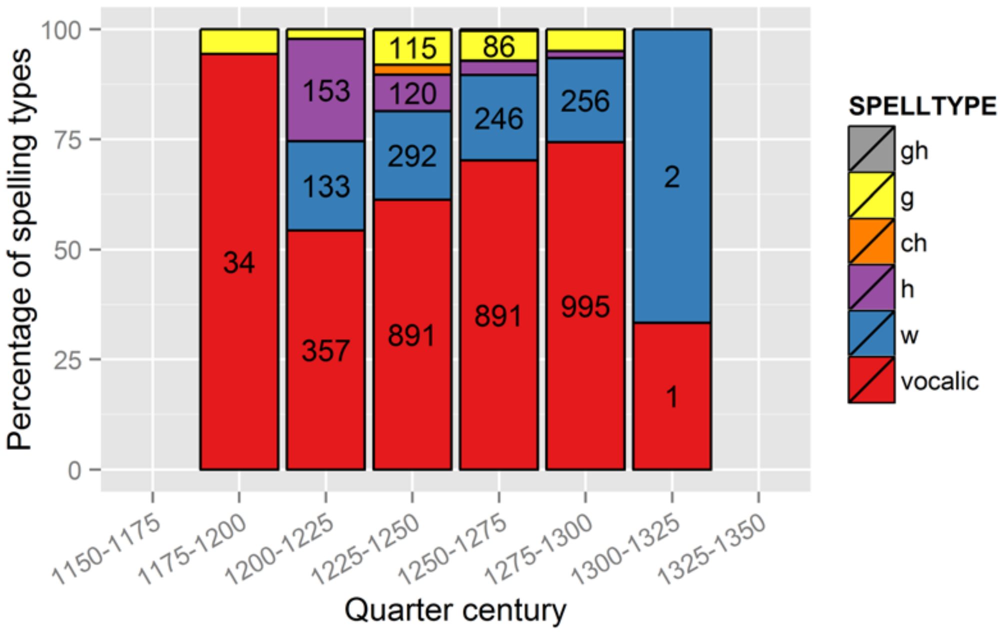

Figure 4-25: Proportion of spelling types by quarter century (DIALECT1C: *SWML*)

The South-West Midlands dialect is by far the best attested variant of DIALECT1C. It represents a large proportion of the DIALECT1B: *WS* area data (cf. Figure 4-20). Many important texts are in this group, including *Ancrene Riwle* and *Ancrene Wisse*, the '*Katherine* Group', *Laȝamon A* (i.e. London, British Library, MS Cotton Caligula A ix), and the *Lambeth Homilies*.

Disregarding the first and last bars in Figure 4-25 above (which are relatively poorly attested, as the absolute numbers show), we can see a gradual increase of the proportion of *VOCALIC* spellings (red) from c. 50% to 75% coinciding with a decrease of *GTYPE* spellings (yellow) as well as *HTYPE* and *CHTYPE* spellings

122; Heiberger and Holland 2004: 243; Levshina 2015: 160). GVIF$^{1/(2 \times df)}$ values were computed using the `vif()` function from the R package `car` (Fox and Weisberg 2011).

301 For the following selection, dialects were considered 'informative' if they were represented by at least 1,000 findings that were spread out over at least two quarter centuries or half centuries.

(purple and orange), which appear at 1200 and gradually dwindle until they are gone at around 1300. It is also interesting that the proportion of *W*TYPE spellings seems fairly constant over the quarter centuries; however, we do not see how many of these *W*TYPE spellings in each bar are cases in which the input consonant is the voiced velar fricative. The question of which sounds these spelling types represent will come up again in the section on the variable INPUTCONSONANT (4.1.4).

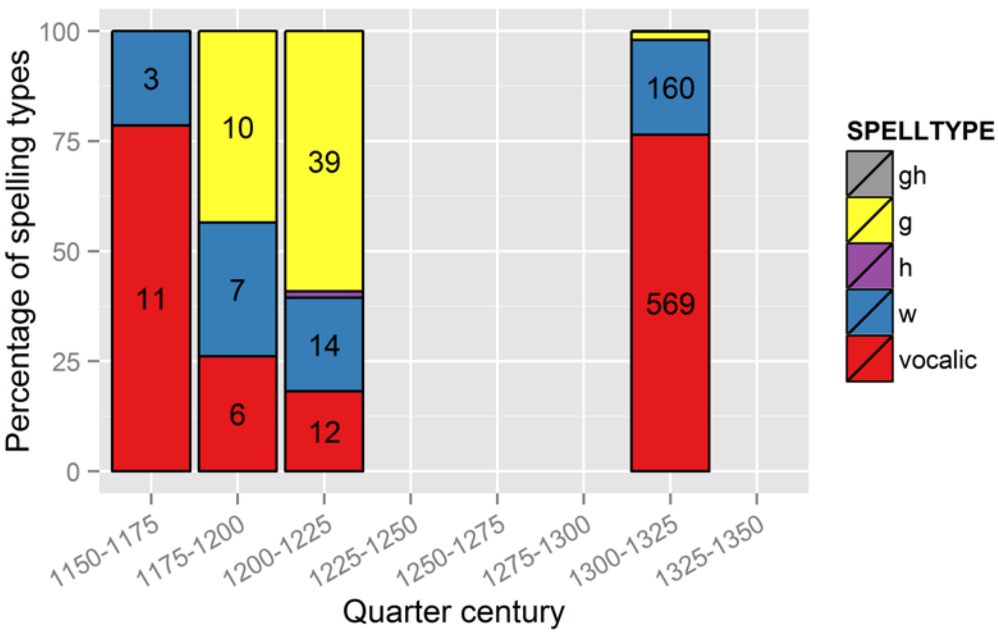

Figure 4-26: Proportion of spelling types by quarter century (DIALECT1C: *SC*)

Like the South-West Midlands, the South Central region also belongs to the DIALECT1B: *WS* area, being the eastern part of the former kingdom of Wessex. The first things to note are the large temporal gap in the data and the fact that 1300-1325 is the only quarter century that is well-attested, which is due to the length of the only text in this quarter century, viz. the *South English Legendary* (Cambridge, Corpus Christi College, MS 145). In the spellings used in this text we find the proportions that are typical of the last decades of the LAEME period (cf. Figure 4-11): *VOCALIC* spellings are at c. 75%, and *W*TYPE is the only other spelling type that occurs in any noteworthy quantity. The three quarter centuries before the great gap are all not very well attested, but if we summarize all pre-gap data, we might carefully state that in the early quarter centuries almost half of all findings (49 of 103) are consonantal (*G*TYPE / yellow) spellings, and that this proportion is both noticeably different from the post-gap situation and noticeably similar to contemporary spelling type proportions in the other dialects (e.g. 1200-1225 in DIALECT1C: *SWML*, Figure 4-25 above).

The following two plots (Figures 4-27 and 4-28) visualize the best-attested dialect regions within the larger ‘Mercian’ area (cf. Figure 4-22 above). As mentioned above, the spelling type plot for the Mercian/*ME* area generally seems to exhibit the same basic features as the West Saxon/*WS* area plot, but with more fluctuation. The plots for the East Midlands and Essex/London areas will corroborate this impression.

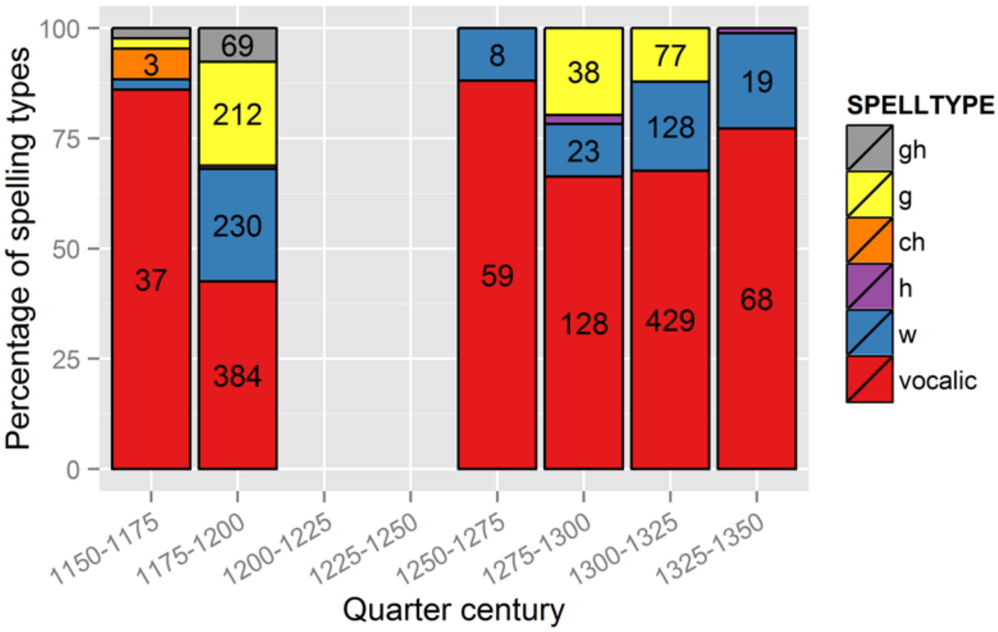

Figure 4-27: Proportion of spelling types by quarter century (DIALECT1C: *EML*)

Like the South Central plot, the East Midlands plot also contains a temporal gap, before which there is a higher overall proportion of *GTYPE* spellings (yellow) and a lower proportion of *VOCALIC* spellings (red) than afterwards. Once again, if we disregard the two most poorly attested quarter centuries, the proportion of *VOCALIC* spellings can be said to rise gradually from below 50% (1175-1200) to about 75% (1325-1350) over the time period covered by the corpus while the proportion of *GTYPE* spellings drops. The proportion of *WTYPE* spellings (blue) can be said to increase slightly over the second half of the period.

A unique feature of the *EML* dialect is the occurrence of *GHTYPE* spellings (gray) in the twelfth century. This spelling type is practically absent from any other dialectal area. A closer look at the data reveals that almost all (66) of the occurrences of *GHTYPE* spellings in the second quarter century (and thus actually more than half of all *GHTYPE* spellings in the entire corpus) are from the *Ormu-*

lum (Oxford, Bodleian Library, MS Junius 1). A random sample of Orm's *GHTYPE* word forms shows that he indeed used the spelling <ȝʰ> consistently for what must have been voiced velar fricatives (cf. Dickins and Wilson 1956: 82):[302]

LEXEL	GRAMMEL	FORM	INPUTTYPE[303]
LE:OGAN	*VPS13*	*LEG^HEYY*	*LIEGTH*
HA:LGIAN	*VPPK2-AJ<PR*	*HALLG^HEDE*	*FOLGIAN*
FOLLOW	*VIK2*	*FOLLG^HENN*	*NA*
LAW	*NPLOD*	*LAG^HESS*	*LAGU*
ENOUGH	*AJPLOD*	*INOG^HE*	*NA*
BU:GAN	*VPS12*	*BUG^HESST*	*BUGAN*
9	*QC*	*NIG^HEN^N*	*NA*
FOLLOW	*VPS13K2*	*FOLLG^HEYY*	*FOLGIAN*
FOLLOW	*VPS12K2*	*FOLL\G^HESST*	*FOLGIAN*
FOLLOW	*VIK2*	*FOLL\G^HENN*	*NA*

Table 4-10: Ten randomly sampled observances of *GHTYPE* spellings in the *Ormulum*

302 The first form on the list, *leȝʰeþþ*, is surprising in this respect. The lOE input form would be expected to have been something like *lieȝ(e)þ* [lɪj(e)θ] and not to have contained a voiced velar fricative; the <ȝʰ> in Orm's form is still surrounded by front vowels. This is the only occurrence of the lexel *LE:OGAN* in this text file, so it is impossible to attempt a satisfying explanation for this unexpected word form.

303 See section 4.1.7.2 for more on the variable INPUTTYPE.

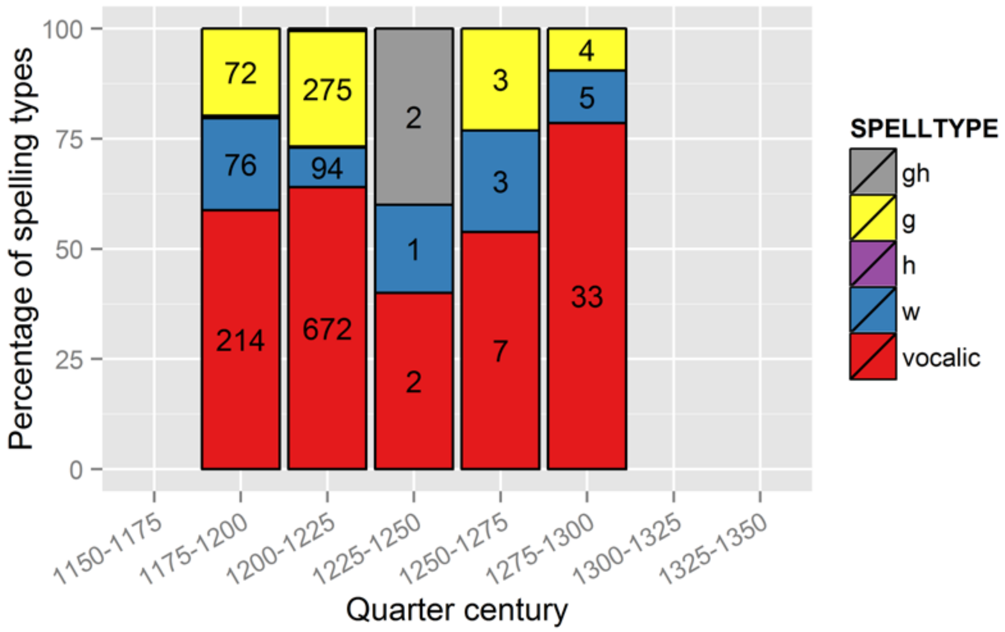

Figure 4-28: Proportion of spelling types by quarter century (DIALECT1C: *ESS&LON*)

Figure 4-28 shows the development of spelling types in the area of Essex and London. As the absolute numbers show, this dialectal area is only well-attested in the fifty years around 1200. From the first to the second bar we can observe a slight increase in the proportion of *VOCALIC* spellings. The rest of the bars are made up essentially of *WTYPE* (blue) and *GTYPE* (yellow) spellings. The proportion of *WTYPE* spellings decreases from the first to the second bar (which is in line with general findings, cf. Figure 4-11) while the proportion of *GTYPE* spellings increases, which is unexpected and seems to be a feature of Essex and London (and possibly South Central, cf. Figure 4-26).[304]

Plots for the North (*N*) and South-East (*SE*) dialect regions are not given here because these are the only regions within the larger 'Northern' (DIALECT1B: *NO*) and 'Kentish' (DIALECT1B: *KE*) areas, and the plots would thus look identical to Figures 4-21 and 4-23, respectively.

4.1.3.4 Summary

This section rounds off our discussion of the extra-linguistic variables. In conclusion, we can say that the retrieved spellings vary significantly both across space

304 No other variables that could account for this temporary increase of *GTYPE* spellings were found: We are dealing with essentially the same words and the same proportions of input consonants in both quarter centuries.

and over time, but apparently more so over time than across space: Diachronic change plays a greater role than diatopic variation in the LAEME CTT. The main problem with the space variables is that the different areas are unequally well attested. Generally, the better attested an area is, the more its behavior in terms of *VOCALIC* spelling proportions over time matches the general impression gained e.g. from Figure 4-11 above. The best-attested areas (*SWML*, *SC*, *EML*, *ESS&LON*) are remarkably similar to one another in terms of the diachronic development of spelling types, although it should be pointed out that these areas are also geographically close together (cf. Figure 3-5). The explanatory power of the space variables might conceivably have been much greater if, say, the North (*N*) were better attested.

4.1.4 Input consonants

The next variable to be scrutinized is INPUTCONSONANT, i.e. the variable whose levels specify whether we are dealing with an instance of a sound that goes back to lOE [j], [w], or [ɣ]. As mentioned in section 3.2.1.1.2, this variable was implicitly used when the three sounds and their developments were treated separately in section 2.4, as it is implicit in the fact that most scholars do speak generally of 'the vocalization of semivowels' but then move on to treat the different lOE inputs individually (e.g. cf. Brunner 1965: 140-143, 143-146; Kemmler and Rieker 2012: 14, 15). It could be argued that by doing this, scholars imply that the question of which of the three consonantal inputs we are dealing with is the most important one to ask. Having introduced and analyzed the extra-linguistic variables of time and space, it is therefore now high time that we include the INPUTCONSONANT variable before moving on to the other linguistic variables: This variable is conceived in order to split the data into three intuitively separate groups *a priori*.

4.1.4.1 Description

The first fact to note is that some lexel-grammel combinations could not be assigned an INPUTCONSONANT value due to there being multiple possibilities in lOE, so that the inclusion of this variable means a slight reduction of the data set (to 14,656 of the total 18,109 findings). Table 4-11 gives a quantitative summary of the variable. The differences in the numbers of findings for the three input consonants reflect the linguistic reality, with [j] being the most frequent and [ɣ] being the least frequent in the OE data (see sections 2.4.1.1 and 2.4.3.1). It might also be recalled that a great number of the lexemes used for data extraction are relevant to [j]-vocalization (see section 3.2.2.2).

INPUTCONSONANT	Number of findings
[j]	7,195
[ɣ]	3,437
[w]	4,024
Sum	**14,656**

Table 4-11: Summary of the variable INPUTCONSONANT

4.1.4.2 Analysis: Spellings ~ input consonants

Splitting up the data according to input consonants allows us to draw more conclusions about which sounds the different spelling types were used for. Table 4-12 below cross-tabulates SPELLTYPE2 and INPUTCONSONANT.[305]

	[j]	[ɣ]	[w]	Sum
GH	12 (14.63%)	70 (**85.37%**)	0	**82**
INSULAR G	232 (34.12%)	447 (65.74%)	1 (0.15%)	**680**
G	68 (18.43%)	301 (**81.57%**)	0	**369**
YOGH	72 (13.9%)	445 (**85.91%**)	1 (0.19%)	**518**
CH	1 (2.04%)	48 (**97.96%**)	0	**49**
H	62 (8.56%)	627 (**86.6%**)	35 (4.83%)	**724**
W	27 (1.89%)	676 (47.44%)	722 (50.67%)	**1,425**
WYNN	9 (0.51%)	146 (8.35%)	1,594 (**91.14%**)	**1,749**
VOCALIC	6,709 (74.34%)	647 (7.17%)	1,669 (18.49%)	**9,025**
Sum	**7,192**	**3,407**	**4,022**	**14,621**

Table 4-12: Summary of SPELLTYPE2 x INPUTCONSONANT

For each spelling type, percentages have been added to show which consonants they were used to represent. Percentages of above 80% have been highlighted.

It turns out that many of the ‘consonantal’ spellings were almost exclusively used in words containing the lOE voiced velar fricative. This is especially true for the spelling <ch>, but <h>, <ȝ>, *GHTYPE*, and <g> also show strikingly high percentages for [ɣ]. We might take note of the fact that in our findings <h> and all spellings including <h> are strongly associated with the sound that was [ɣ] in

305 N.b.: The inclusion of SPELLTYPE2 further reduces the data to 14,621 findings due to the handful of missing values in this variable (cf. the exceptional spellings such as <lawch> mentioned in section 3.2.1.2).

lOE. If we compare the three *GTYPE*s <ᵹ, g, ȝ>, we notice what appears to be a consequence of the different diachronic dispersions of these letters: The Old English *littera* ‘insular *g*’ <ᵹ> was only used fairly early in the eME period (see the second box in Figure 4-6), and in Table 4-12 above it is associated with both ‘primary’ (i.e. < OE [j]) and ‘secondary palatals’ (i.e. [j] < lOE [ɣ]) whereas both <g> and <ȝ> were used later, and above they are closely associated with secondary palatals, which strongly suggests that secondary palatals were vocalized considerably later than primary palatals. Interestingly, none of the ‘consonantal’ spellings can be said to be strongly associated with the primary palatals at all, but 6,709 of all 7,192 (i.e. over 93%; see the left bar in Figure 4-29 on the following page) of all INPUTCONSONANT: *J* findings are *VOCALIC*, i.e. they are marked by the absence of any ‘consonantal’ spelling types. In other words, forms whose relevant sound goes back to lOE [j] show an overwhelmingly high proportion of *VOCALIC* spellings in the corpus, which points to the fact that the vocalization of primary palatal [j] must have taken place fairly early, i.e. largely before the period covered by the LAEME CTT. Conversely, almost three quarters of all retrieved *VOCALIC* spellings are instances of lOE [j], followed by nearly 20% for [w] and only about 7% for [ɣ]. As for the two *WTYPE* spellings <ƿ, w>, the OE *littera* ‘wynn’ <ƿ>, being in use early in the period, is used primarily in [w] word forms whereas the instances of <w> are shared between [w] and [ɣ] forms, indicating that <w> was the symbol used in writing as the former voiced velar fricative was shifting towards [w ~ u].

There are a number of very small percentages in Table 4-12, viz. [w] – <ᵹ>, [w] – <ȝ>, [j] – <ƿ>, and [j] – <w>. These ‘unetymological’ spellings can be assumed to be reverse spellings, which became possible only after [ɣ] had begun to shift to [w] in some surroundings (cf. King 1992: 35 on reverse spellings, or ‘back spellings’) and therefore e.g. <w> could become adopted as a regular spelling for the sound. The earliest instance of such an unetymological spelling is indeed from after 1225, and most of them occur in the late thirteenth and early fourteenth centuries. Table 4-13 (next page) contains a random sample of forms that have *WTYPE* spellings even though they should be primary palatals. The lexel-grammel-form combinations show that we are actually dealing with morphological variation, as the said combination occurs almost exclusively in forms of ‘day’ and ‘may’, i.e. in lexels that show [j] / [ɣ] alternation, but whose lexel-grammel combinations have been coded as INPUTCONSONANT: *J* on the basis of the most common lWS status quo reflected in dictionaries such as Bosworth and Toller (1898) and Toller (1921). E.g. the accusative and dative singular forms of the lexel *DAY* were assumed to be INPUTCONSONANT: *J* forms on the basis of the OE forms *dæʒ* [dæj], *dæʒe* [dæje], but which might conceivably have taken on a form such as [daɣ(ə) ~ daw(ə)] (and hence <dawe>, see line 5 in Table 4-13 below) in eME in analogy with plural forms. In Figure 4-38 (see section 4.1.4.3), which visualizes the developments in [ɣ] word forms, it will become evident that the proportion of SPELLTYPE: *W* (blue) does in fact show the greatest increase.

LEXEL	GRAMMEL	FORM	FILENAME	MSDATE
MAY	*VSJPS12*	*MOWE*	*HAVELOKT*	*1312*
DAY	*N-AV*	*DAW*	*EDINCMCT*	*1325*
MAY	*VSJPS13*	*MAwE*	*EGPM2T*	*1250*
MAY	*VSJPS11*	*MOWE*	*IACOBT*	*1262*
DAY	*N<PR*	*DAWE*	*DIGBY86PAINST*	*1288*
DAY	*N<PR*	*DAWE*	*LAUD108AT*	*1300*
MAY	*VSJPS11*	*MOUWE*	*LAUD108AT*	*1300*
MAY	*VSJPS13*	*MUwE*	*NEROART*	*1238*
MAY	*VSJPS13*	*MUwE*	*NEROART*	*1238*
MAY	*VSJPS13*	*MOWE*	*HAVELOKT*	*1312*

Table 4-13: Ten randomly sampled observances with INPUTCONSONANT: *J* and SPELLTYPE: *W*

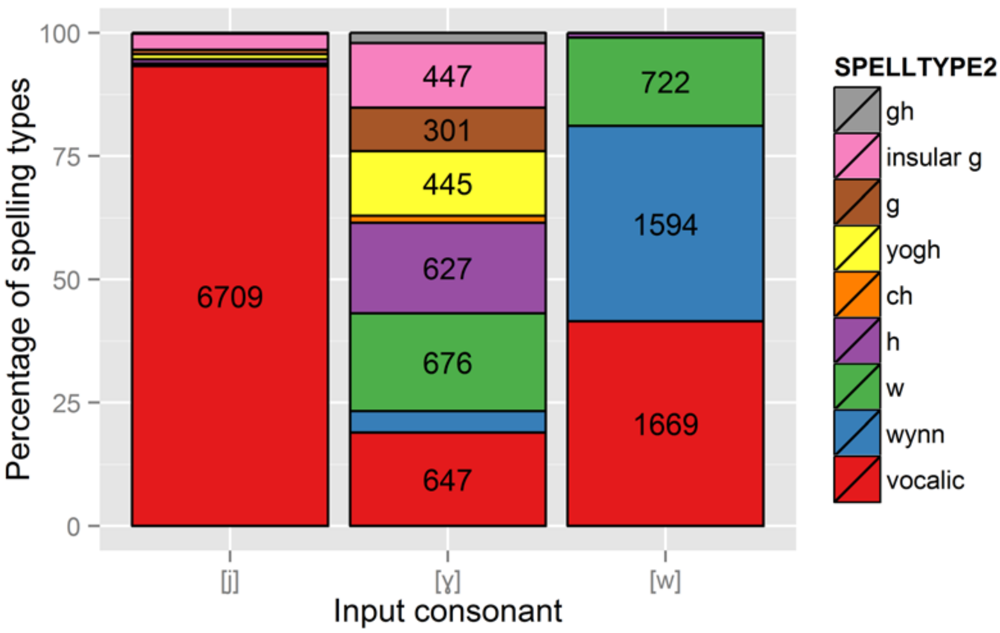

Figure 4-29: Overall distribution of spelling types (including sub-types) by input consonant

Figure 4-29 represents the proportions given in Table 4-12 visually. We might characterize the three InputConsonant levels in regards to the spellings used to represent them in the following way: InputConsonant: *j* forms (i.e. those with primary palatals) are overwhelmingly *vocalic* (red), [w]-associated forms are about equal parts *vocalic*, *wynn*, and *w* (red, blue, and green), and [ɣ]-associated forms are very heterogeneous: Colors such as purple, orange, yellow and gray (<h, ch, ȝ>, *GHtype*) are featured almost exclusively in the central ([ɣ]) bar.

The reasons for this heterogeneous appearance of the [ɣ] bar are twofold: For one thing, the lOE voiced velar fricative joined the development of both semi-vowels (see section 2.4.3.1) and therefore more spelling types are used to represent the reflexes of the sound in eME. This fact will be accounted for when the InputConsonant: *g* findings are further split up according to the variable Result in the following (section 4.1.4.4). In addition, as discussed above, the vocalization of the secondary palatals (lOE [ɣ] > eME [j] > [i]) took place later than the vocalization of the primary palatals (lOE [j] > [i]), so that we find many more of the 'new' *litterae* for eME [j] (viz. <ȝ, g>) being used for the secondary palatals than for the vocalized primary palatals.

As the very different-looking bars in Figure 4-29 above demonstrate, the distinction between the three lOE input consonants actually acts as a very good predictor variable, producing more heterogeneous groups of spelling types than the time and space variables do (e.g. cf. Figures 4-11, 4-12, 4-14 above). A GLM with InputConsonant as the only predictor for Vocalic indeed explains 52.6% of the variance in the data (Nagelkerke's pseudo-$R^2 = 0.526$).[306]

It therefore comes as no surprise that a plot produced with the help of the `ctree()` function (Figure 4-30) detects highly significant splits ($p < 0.001$) between all three input consonants: In regards to the proportion of *vocalic* spellings,[307] the difference between [j] (over 93% *vocalic*, as mentioned above) and the other consonants is the most extreme (node 1 in Figure 4-30), but the difference between [ɣ] and [w] is also still highly significant ($p < 0.001$).

---

306 The code used to run this model in R is `glm(VOCALIC ~ InputConsonant)`; the null deviance is 19,524 on 14,655 df; the model's residual deviance is reduced to 12,344 on 14,653 remaining df. All three InputConsonant levels differ highly significantly ($p > 0.001$) from one another according to the model's summary output.

307 Applying the `ctree()` function to the multi-level Spelltype variable leads to essentially the same output as Figure 4-30.

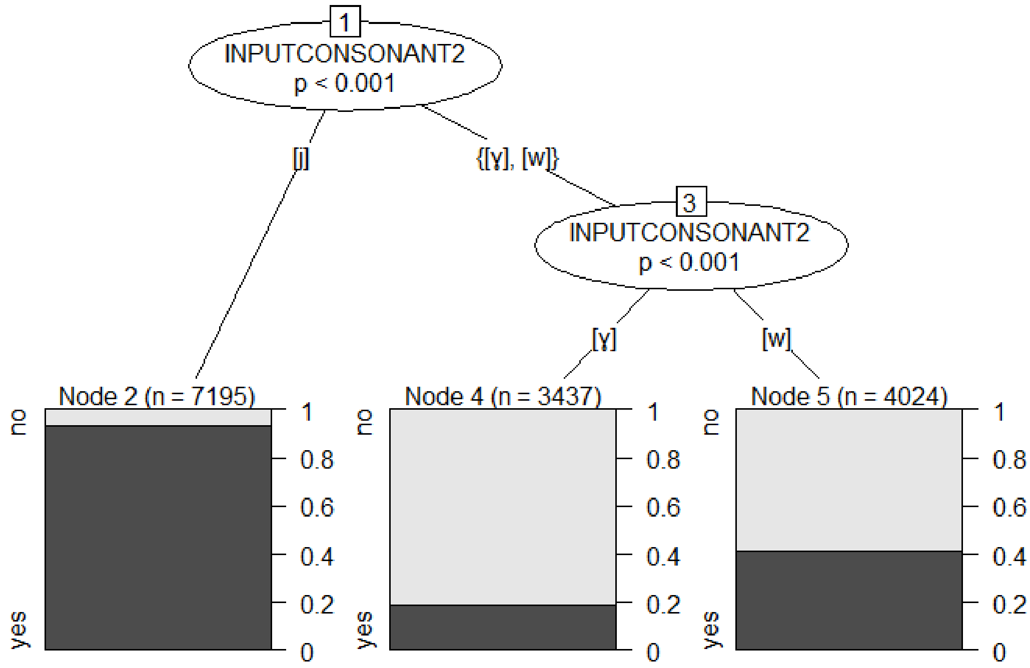

Figure 4-30: Conditional inference tree for VOCALIC ~ INPUTCONSONANT

4.1.4.3 Analysis: Spellings ~ input consonants + time

In this section, the influence of time will be added to the equation, allowing us to see how spellings changed diachronically for the three different sounds. The following plots and regressions will recapitulate the analytical steps presented in section 4.1.2.2 (spellings ~ time), but with the findings separated according to the three input consonants.

Figures 4-31 through 4-33 are variations of the box plot presented as Figure 4-6 above (see section 4.1.2.2.1), but with the findings split up by input consonants. Once again, the various boxes depict the interquartile ranges for the diachronic dispersion (according to MSDATE) of the different spelling types (according to SPELLTYPE2), the whiskers extending from the boxes show the range of the rest of the data, and extreme temporal outliers are represented as single dots. In addition, the color red is used to set off unetymological spelling types for the respective sounds (e.g. <w, p> for the input consonant [j]).

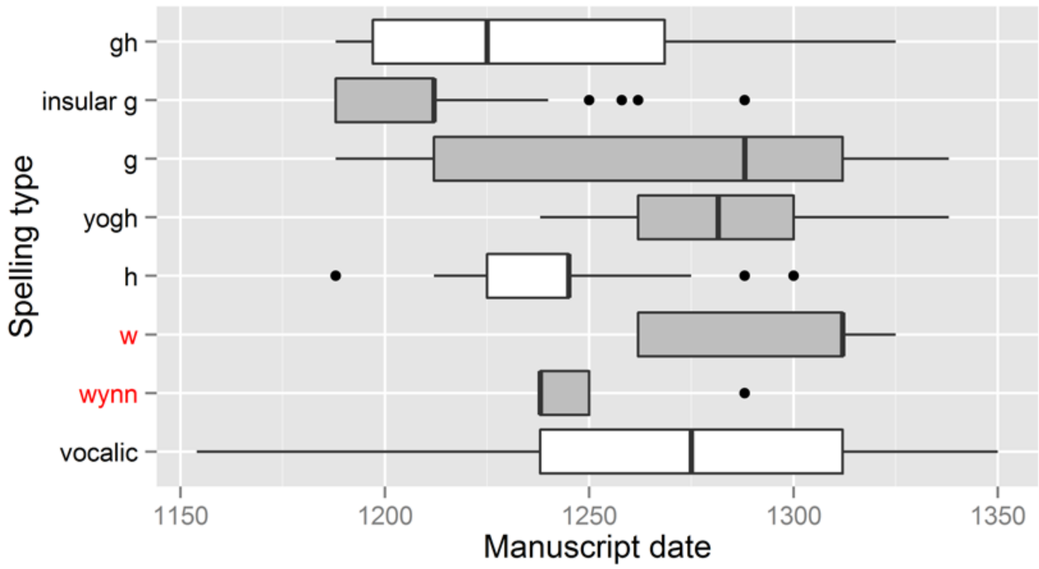

Figure 4-31: Distribution of spelling types (including sub-types) over time (INPUTCONSONANT: [j])

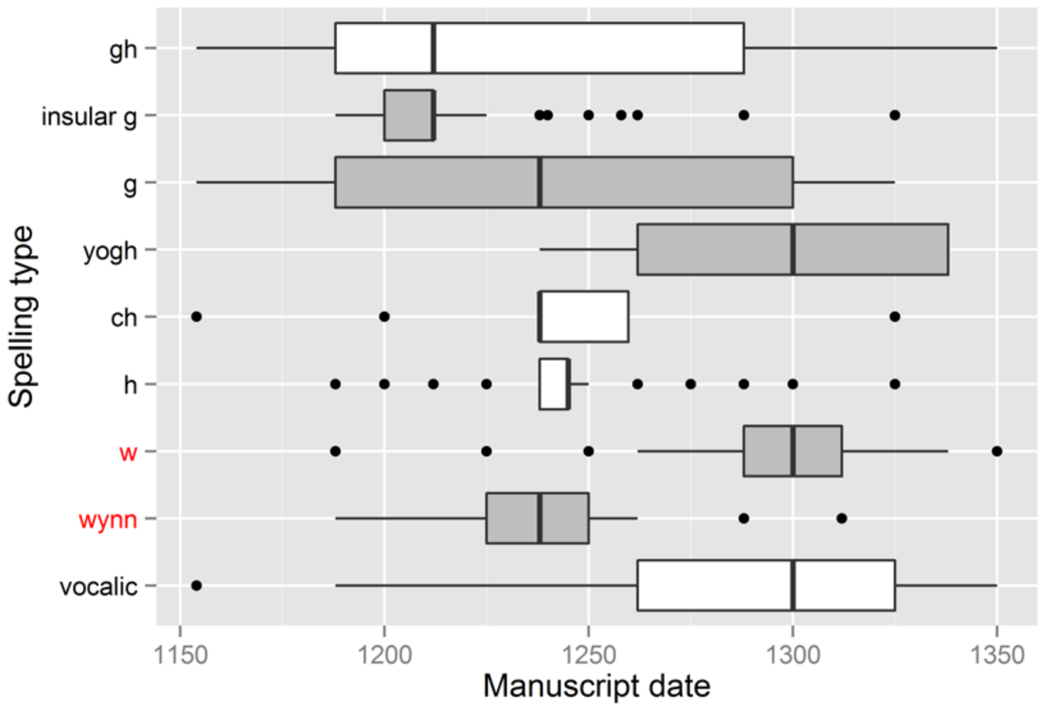

Figure 4-32: Distribution of spelling types (including sub-types) over time (INPUTCONSONANT: [ɣ])

Figure 4-33: Distribution of spelling types (including sub-types) over time (INPUTCONSONANT: [w])

Although *VOCALIC* is the spelling variant with the greatest temporal dispersion (*VOCALIC* forms being present at almost any given time) in all three consonants, the *VOCALIC* boxes in the three plots do show some conspicuous differences: With both semivowels (Figures 4-31 and 4-33) the first quartile is reached well before 1250 while with the voiced velar fricative (Figure 4-32) it is not reached until c. 1260. The median of the vocalic box lies earliest with the primary palatals (at c. 1275) and latest with the voiced velar fricatives (c. 1300), indicating that on average [j] was vocalized first, [w] next and [ɣ] last.

Moreover, the plots for palatal semivowels (Figure 4-31) and voiced velar fricatives (4-32) show some conspicuous differences: ‘Yogh’ <ʒ> was used for palatals predominantly in the second half of the thirteenth century, but as we have seen (see section 4.1.2.2.3), the sudden increase of <ʒ> use in the fourteenth century is due to its being regularly used for sounds deriving from lOE [ɣ] in the Kentish *Ayenbite of Inwyt*. Accordingly, the yogh interquartile box stretches far into the fourteenth century for [ɣ] but not for [j]. The unetymological *WTYPE* spellings (marked red) also seem to show interesting differences; however, these should not be over-interpreted since, as we have seen (cf. Table 4-12), these dispersions rely on rather small numbers of findings in the case of [j]. In fact, as indicated in the following box plots, in which spelling variants generally used for the same sounds (marked gray in the plots above) have been merged using the variable SPELLTYPE, [j] and [ɣ] do not exhibit any marked difference in regards to the diachronic dispersion of *WTYPE* spellings (but certainly in regards to the number of occurrences of such spellings, cf. Table 4-12). The most noticeable difference in these box plots (Figures 4-34 and 4-35) is that on average *GTYPE* spellings are used later in [ɣ] forms (with the median around 1245) than in [j] forms (with the median around 1210).

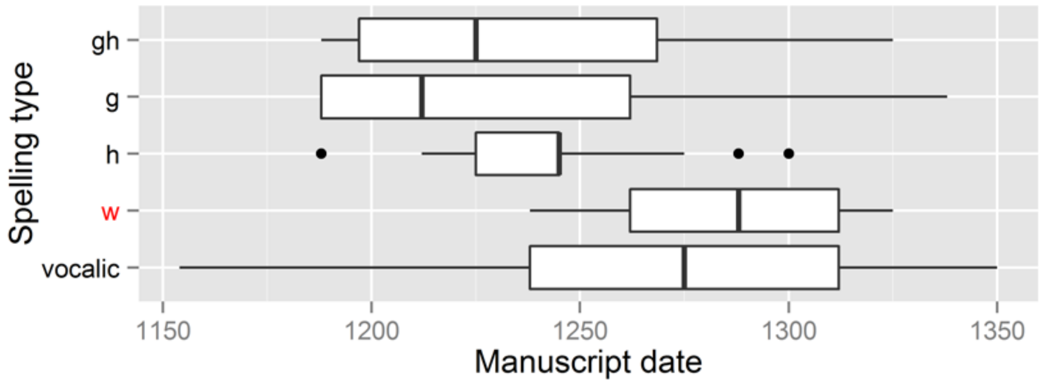

Figure 4-34: Distribution of spelling types over time (INPUTCONSONANT: [j])

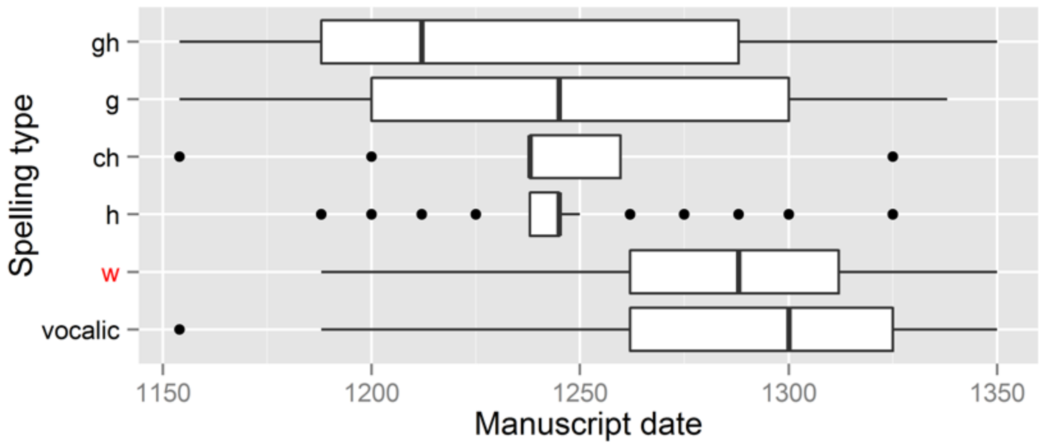

Figure 4-35: Distribution of spelling types over time (INPUTCONSONANT: [ɣ])

Figure 4-36: Distribution of spelling types over time (INPUTCONSONANT: [w])

The bar plots in Figures 4-37 through 4-39 will recapitulate the distribution of spelling types according to the discrete time variable QUARTERCENT (see Figure 4-11 in section 4.1.2.2.3) with the findings split up according to input consonants. Another way to put it is to say that the three following plots represent the three bars of Figure 4-29, but with the diachronic dimension added.

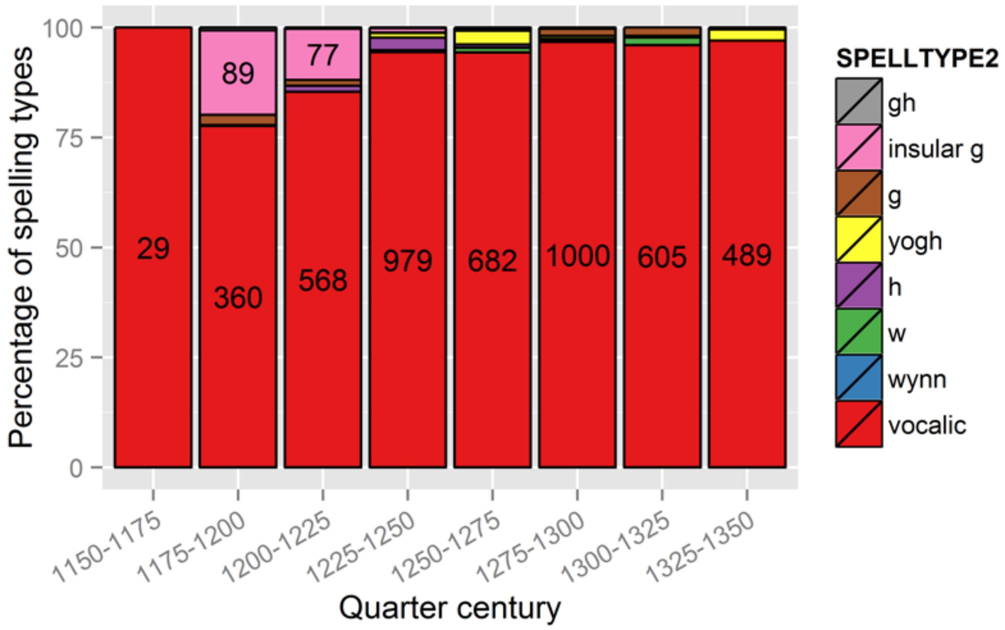

Figure 4-37: Distribution of spelling types (including sub-types) by quarter century (INPUTCONSONANT: [j])

Once again, the overall visual impression of INPUTCONSONANT: *J* findings is that the vocalization was already very far advanced at the beginning of the period. We can now see that the proportion of *VOCALIC* findings (red) begins at around 75% (once again disregarding the poorly-attested first quarter century) and quickly increases to above 90%, almost completely replacing <ᵹ> (pink), by c. 1225 CE. Indeed, the `ctree()` algorithm run with the formula `VOCALIC ~ MSDATE` on INPUTCONSONANT: *J* findings detects the highest-order split at 1225 CE; using only more precisely dated texts with MSDATE25 slightly corrects this number to 1212 CE.[308]

Other 'consonantal' spellings are all very rare. Among these are <h> (purple), which shows up briefly in the first half of the thirteenth century (see section 4.1.2.2.1), the very occasional <ȝ> (yellow) throughout the second half of the period, and unetymological <w> (green), which, however, is very rare and shows up rather late (e.g. in the penultimate bar).

308 Similarly, a GLM run with QUARTERCENT as the only predictor variable for VOCALIC on all findings with original palatal semivowels (INPUTCONSONANT: *J*) returns only the differences in *VOCALIC* spelling proportions between the second and third, and the third and fourth quarter centuries as highly significant ($p < 0.001$) and the proportional differences among the surrounding bars as insignificant.

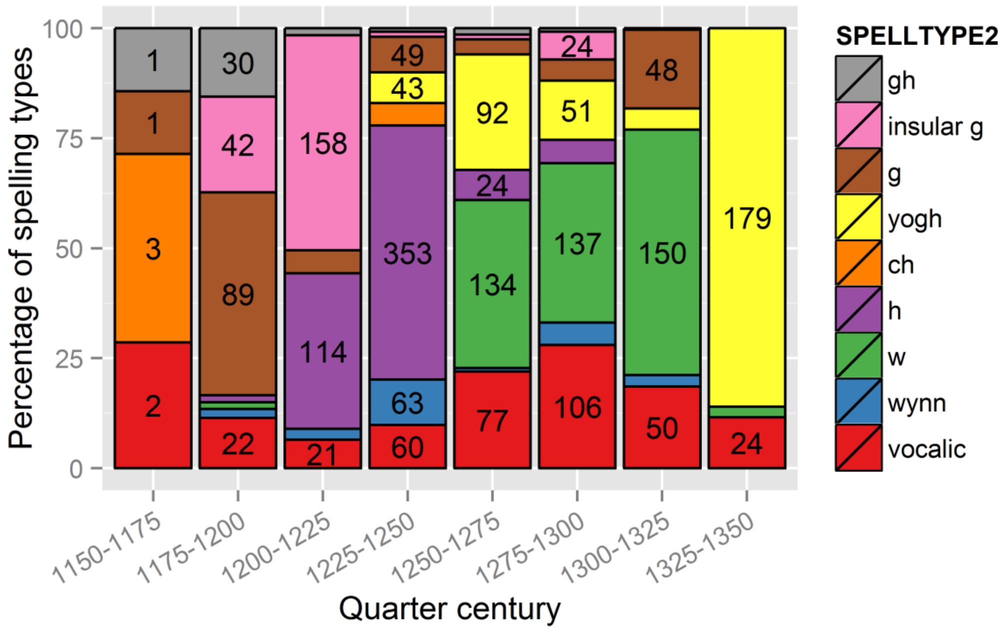

Figure 4-38: Distribution of spelling types (including sub-types) by quarter century (INPUTCONSONANT: [ɣ])

Figure 4-38 once again presents the heterogeneous assortment of spelling types found in word forms that had had a voiced velar fricative at the relevant place in lOE.

We now can see much better when the individual spelling types were typically used. As mentioned above, all spelling types that include an <h> are strongly associated with this sound. In particular, we see *GHTYPE* (gray) being used in the first few quarter centuries (and practically not at all for [j] and [w] forms). The spelling <h> (purple), which basically comes into use in the first half of the thirteenth century and then quickly disappears again (see Figure 4-11), takes up a far greater proportion in this plot than in the plots for the inputs [j] and [w], peaking at 1225-1250 with a about 60% of all [ɣ]-associated spelling types. *WTYPE* spellings (blue and green) trickle throughout the first half of the period and then rise to more substantial proportions (between 30% and 60%) after 1250. The final bar in Figure 4-38 once again visualizes the fact that in the *Ayenbite of Inwyt* (i.e. the only long text in this quarter century) 'yogh' <ʒ> (yellow) is the letter predominantly used to render sounds deriving from lOE [ɣ] (cf. the very small proportion of 'yogh' in Figure 4-37). An extreme difference to the primary palatals can be seen in the fact that the proportion of *VOCALIC* spellings (red) hardly ever rises above 25% in Figure 4-38.

Once again, it is important to remember that lOE [ɣ] joined the development of both semivowels (see section 2.4.3.1) and therefore displays very heterogeneous spellings in Figure 4-38 above. The variable RESULT will be used to treat the group of secondary palatals ([ɣ > i]) and the group of what will be called 'secondary labial-velars' for lack of a better term ([ɣ > u]) separately in section 4.1.4.4 below. We will first compare the development of the lOE labial-velar semivowel with that of the two preceding sounds:

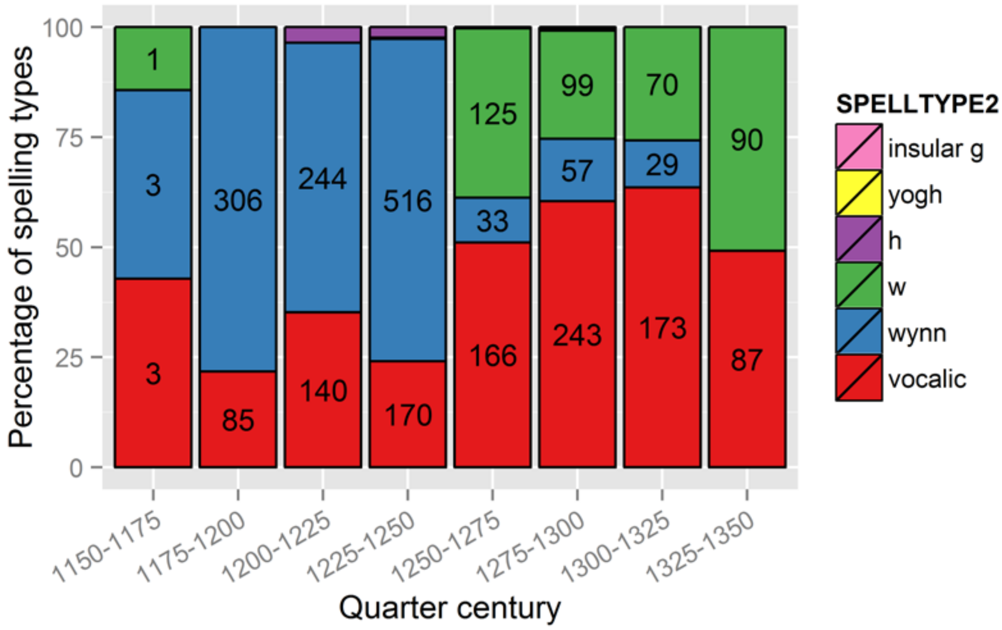

Figure 4-39: Distribution of spelling types (including sub-types) by quarter century (INPUTCONSONANT: [w])

Like the right bar in Figure 4-29, Figure 4-39 above is largely dominated by only three colors: red, blue, and green. If we were using the more abstract SPELLTYPE variable, there would only be two colors, for *VOCALIC* and *WTYPE*. As with the other sounds, <h> spellings do occur in the first half of the thirteenth century, but the percentages are negligible here. The shift from <p> to <w>, which seems to be a 'W-feature' unrelated to pronunciation (cf. McIntosh 1989b: 47ff.), begins around 1250 CE. The proportion of *VOCALIC* spellings rises from about 25% to above 60% in this plot, which means that the ongoing vocalization of postvocalic [w] as reflected in the spellings is captured by the LAEME time frame better than the developments concerning the other two sounds.

4.1.4.4 Analysis: Spellings ~ input consonant [ɣ] + vocalic result + time

Figures 4-40 and 4-41 represent the fact that the reflexes of lOE [ɣ] joined the development of both semivowels. They present the same data as Figure 4-38, but the findings are divided up according to their vocalic results ([i] and [u]). It is here that the variable RESULT comes into play. This is a variable that once again slightly reduces the number of findings, since not all relevant lexel-grammel combinations could unambiguously be assigned a vocalic result.[309]

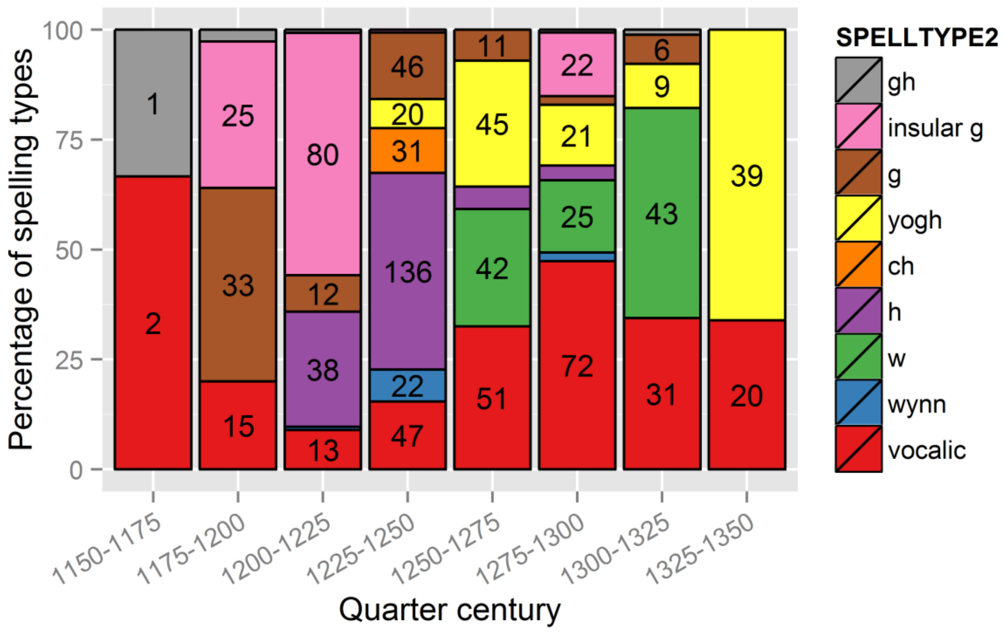

Figure 4-40: Distribution of spelling types (including sub-types) by quarter century ([ɣ > i], 'secondary palatals')

309 A good example of an ambiguous case is the lexel *BURH* (from OE *burȝ* 'fortress, castle'), whose reflexes show up in ModE as *borough*, *burgh*, *berry*, *-bury* (in place names), and (probably) *burrow* (OED, s.v. "borough, *n.*"; Lass et al. 2013-, s.v. "burh/n"). – In addition, it should be pointed out that the variable RESULT has been coded on the basis of the most common ME or ModE form of the lexeme (depending on how long the word in question survived) regardless of any diatopic variation that there might have been within eME. E.g. some words that are commonly classified as containing 'secondary palatals' might actually show traces of a development of [ɣ] towards [u] in some LAEME texts.

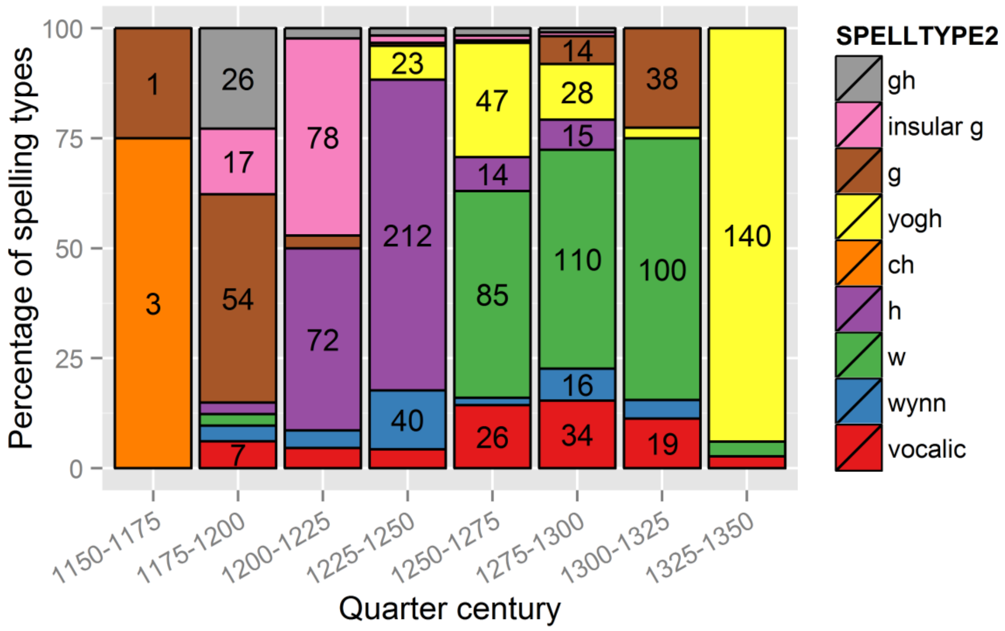

Figure 4-41: Distribution of spelling types (including sub-types) by quarter century ([ɣ > u], 'secondary labial-velars')

Figures 4-40 and 4-41 differ remarkably. First of all, the percentage of *VOCALIC* spellings (red) is higher throughout for [ɣ > i]: It increases from about 10% in 1200 to almost 50% in 1300. By contrast, the plot for [ɣ > u] shows the lowest proportions of *VOCALIC* spellings that we have seen so far: The maximum of only 15% is reached at 1275-1300. Over the first half of the LAEME time span (i.e. from 1150 to 1250), the proportions of spelling types look very similar in both plots; from c. 1250 there are noticeably greater proportions of *VOCALIC* as well as *GTYPE* spellings (yellow, brown, and pink) for [ɣ > i], and of *WTYPE* spellings (blue and green) for [ɣ > u]. Thus, 1250 seems to be point at which the secondary palatals and the 'secondary labial-velars' noticeably begin to grow apart in most dialects.[310] It is notable that *WTYPE* spellings are very present in Figure 4-41 (at least from 1250 to 1325; see below) for the rendering of [ɣ > u], so that the characterization of these cases as 'secondary labial-velars' seems justified, especially since we know that the letters <w> and <ƿ> were used only 'semivocalically' in eME (see section 4.1.1.2).

<h> spellings, which peaked in the second quarter of the thirteenth century, are present with similar proportions in both plots. This might be seen as an indication that around this time we are still dealing with what was perceived as the same

310 However, the split is not complete, so that *WTYPE* spellings also continue to be used for the secondary palatals, as do *GTYPE* spellings for the 'secondary labial-velars'.

speech sound, and not as two different sounds. The persistence of all types of spellings in both plots (albeit with increasingly different proportions over time) also points into a similar direction. The differences between the two plots never become as marked as, say, those observable between the spellings of primary palatals (Figure 4-37) and labial-velars (Figure 4-39). We might conclude that the split between secondary palatals and ‘secondary labial-velars’ began happening rather late, i.e. from around 1250.

The final quarter century (1325-1350) is remarkable once more due to the spellings in the *Ayenbite of Inwyt*. The facts that ‘yogh’ <ȝ> is used exceptionally frequently in this text, and that it is used predominantly for the input consonant [ɣ] (see Figure 4-38), have already been commented on. It is surprising to see in Figure 4-41 (the plot for the ‘secondary labial-velars’) that <ȝ> (yellow) is used fairly consistently as a rendering of ‘secondary labial-velars’ in the Kentish *Ayenbite of Inwyt*. This corroborates the suspicion uttered above (see section 4.1.3.3.1) that Kentish must indeed have lagged behind in terms of the development of the lOE voiced velar fricative (cf. Luick 1921: 416, 421; see section 2.4.3.2 (iii) above), and we might tentatively conclude from the similarity of the final bars in Figures 4-40 and 4-41 that the split between secondary palatals and ‘secondary labial-velars’ had only just begun in the Kentish dialect as put down around 1340 by Michael of Northgate.

4.1.4.5 Summary

This section has presented the most extreme findings so far. When divided up according to INPUTCONSONANT (and in addition, RESULT in the case of the lOE voiced velar fricatives) the diachronic plots for all retrieved spellings (Figures 4-37 through 4-41) exhibit vastly different characters. In summary, an overwhelming majority of forms going back to lOE [j] shows *VOCALIC* spellings in eME; on the other hand, forms deriving from lOE [w] retain many more *WTYPE* spellings, reaching only about 60% *VOCALIC* spellings by the end of the LAEME period. This means that there is a temporal difference of about two hundred years between the vocalization of the two lOE semivowels. The vocalization of lOE voiced velar fricatives took place even later, with *VOCALIC* spellings of secondary palatals reaching c. 40% and of ‘secondary labial-velars’ c. 15% toward the end of the time scale (which, however, is partly due to the fact that the final quarter century is prodominantly represented by the conservative Kentish dialect). The split between [ɣ > i] and [ɣ > u] seems likely to have generally begun around

1250, and significantly later in Kentish, judging by the fact that the spellings for both are still relatively similar in Michael of Northgate's *Ayenbite of Inwyt*.

4.1.5 Tautosyllabicity

As laid out in section 2.4.1.3, the factor of tautosyllabicity, i.e. question of whether a given OE postvocalic semivowel belonged to the same syllable as the preceding vowel or not, is very frequently mentioned as potentially relevant (e.g. cf. Luick 1940: 945; Pinsker 1974: 33-34; also see the repeated mentions of this factor in Tables 2-10, 2-12, and 2-14). The general consensus is that vocalization took place earlier in cases in which the sound was tautosyllabic with the preceding vowel. As we have seen, especially Pinsker (1974: 33-34) makes it clear that he assumes non-tautosyllabic cases to lag behind by about one century. The present section will visualize and quantify the measurable impact of this factor on the LAEME CTT findings.

As explained in section 2.3.3.2, there is an additional, minor problem connected with this factor, viz. the question of whether TAUTOSYLLABICITY is best thought of as a binary (*YES*/*NO*) variable, as has traditionally been the case, or as a three-way choice between *TAUTO*-, *AMBI*- and *HETERO*syllabic. Therefore, in section 4.1.5.4 this question will also be addressed with the help of the alternative version of the variable, which has all three variants.

4.1.5.1 Description

Like the other lexicogrammatically bound variables, the SYLLABICITY variables have been coded on the basis of lWS OE input forms. A number of lexel-grammel combinations could not be unambiguously assigned SYLLABICITY values, so that only about two thirds (12,061) of the retrieved findings have values. Thus, using SYLLABICITY variables automatically trims down the amount of observations by about one third. Table 4-14 and Figure 4-42 summarize and visualize the amount of data covered by these variables.

SYLLABICITY	**Number of findings**		**TAUTOSYLLABICITY**
TAUTO	5,281		*YES*
AMBI	2,511	6,780	*NO*
HETERO	4,269		

Table 4-14: Summary of the variables SYLLABICITY and TAUTOSYLLABICITY

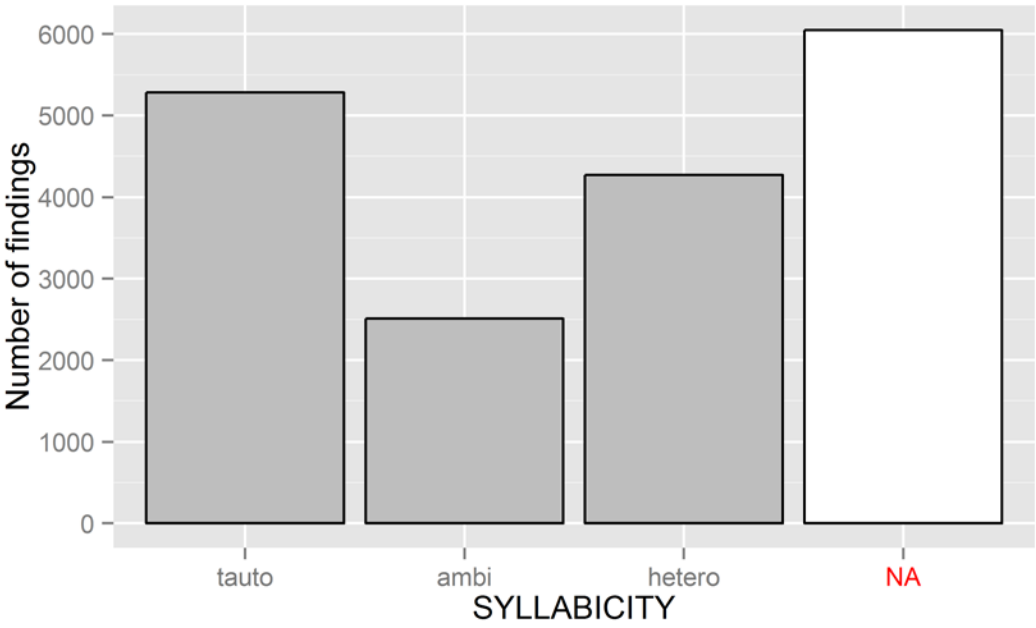

Figure 4-42: Types of SYLLABICITY in the data

Cases in which the relevant sound was tautosyllabic with the preceding vowel make up the largest proportion.[311]

4.1.5.2 Analysis: Spellings ~ tautosyllabicity + time

A GLM that uses SYLLABICITY as a predictor for VOCALIC shows that the VOCALIC: *YES* spelling proportions of all three SYLLABICITY levels are highly significantly different from one another ($p < 0.001$). The model `glm(VOCALIC ~ SYLLABICITY)` explains c. 38.1% of the variance (Nagelkerke's pseudo-R^2 = 0.381).[312] Adding time as a further predictor (as per QUARTERCENT and interactions) changes this proportion to 46.1%, but this is an unfair comparison if we recall that adding time variables reduces the size of the data set the models are dealing with (thus making it easier for them to explain larger proportions of variance simply because there is less variance to explain). Nevertheless, we want to consider how the values of the linguistic variables changed over time, and so the following plots will include a 'time' axis.

311 The differences between the heights of the gray bars in Figure 4-42 are highly significant (Pearson's $\chi^2(2) = 977.3326$, $p < 0.001$). Over 12,000 findings have a SYLLABICITY value, which is more than enough to give this χ^2 test a large power (power = 1).

312 The null deviance is 16,627 on 12,060 df; the model's residual deviance is 12,577 on 12,058 df.

The results of dividing up the data by TAUTOSYLLABICITY/SYLLABICITY levels and visualizing the effects of time (using the variable QUARTERCENT) are given in the following Figures. As in similar plots above, absolute numbers of findings are given on the bars.

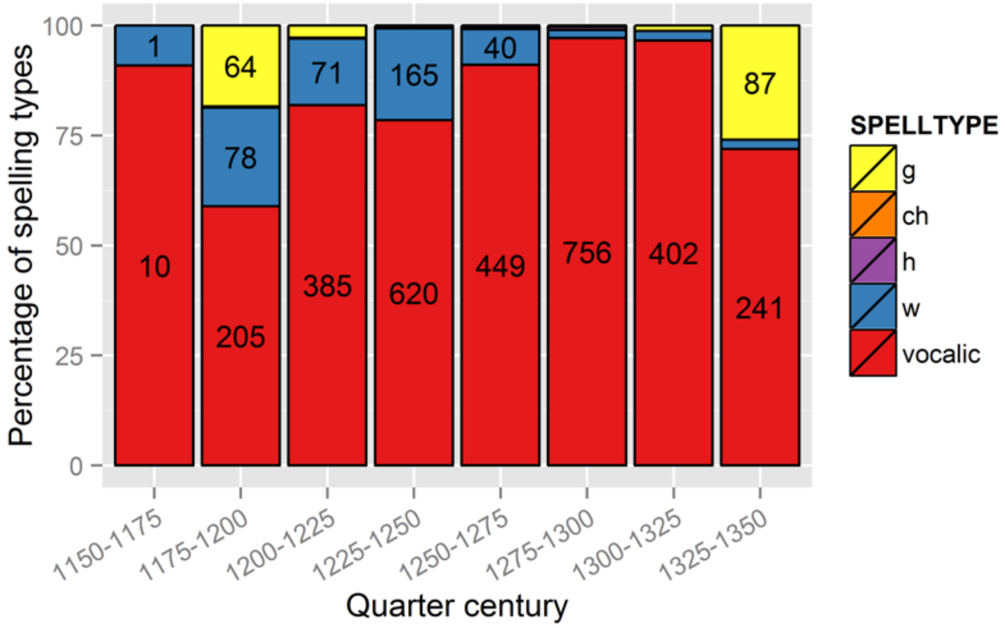

Figure 4-43: Proportion of spelling types by quarter century (tautosyllabic)

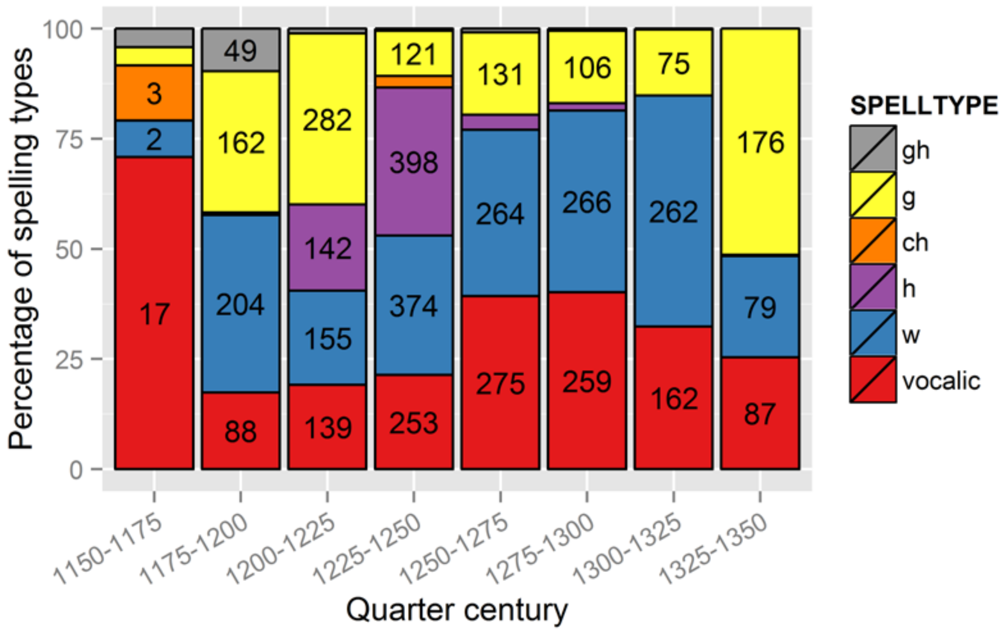

Figure 4-44: Proportion of spelling types by quarter century (non-tautosyllabic)

The two plots above visualize the general difference between tautosyllabic (i.e. TAUTOSYLLABICITY: *YES*) and non-tautosyllabic (TAUTOSYLLABICITY: *NO*) cases very clearly: In the tautosyllabic data the proportion of *VOCALIC* spellings (red) is already above 75% around 1200 CE, and especially *GTYPE* spellings (yellow) are rare and practically nonexistent after 1225 (with the final quarter century standing out as the only well-attested exception once more due to the emergence of the 'late <ȝ>' spellings already mentioned). By contrast, the non-tautosyllabic findings are marked by a wide variety of different spelling types; *GTYPE* spellings are a lot more frequent and occur in every quarter century, and *HTYPE*, *GHTYPE*, and *CHTYPE* spellings, which peak in the second quarter of the thirteenth century, are practically only observable within the non-tautosyllabic findings. The general time lag between tautosyllabic and non-tautosyllabic findings so far seems to be more than a century: In the TAUTOSYLLABICITY: *NO* cases, the proportion of *VOCALIC* spellings begins at around 60% in the second quarter century (1175-1200) and quickly rises to above 90% by c. 1250, while the TAUTOSYLLABICITY: *YES* cases the proportion of *VOCALIC* spellings stays beneath 25% until about 1250, and never rises beyond 40%, which is still lower than the lowest percentage that we ever see for the tautosyllabic data. This difference is very much in line with the emphasis that scholars such as Luick (1921: 233-234) or Jordan (1968: 169) have placed on the factor of tautosyllabicity (see section 2.4.1.3 (iii, v) above).

However, there is a slight problem with this general interpretation: The plots above do not include any information drawn from the variable INPUTCONSONANT (i.e. they lump together all three input sounds). This is problematic because for historical reasons[313] the different SYLLABICITY variants are not evenly spread out among the three input sounds.[314]

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313 As we have seen in Chapter 2, the labial-velar fricative did not regularly occur syllable-finally in earlier OE, but this position only became possible due to sound changes in OE (see section 2.4.2.2), and the voiced velar fricative only occurred between certain voiced sounds in lOE (see section 2.4.3.1), which also decreases the sound's liability to occur syllable-finally in eME.

314 An analysis of collinearity (squared $GVIF^{1/(2 \times df)}$ = c. 1.26) shows that INPUTCONSONANT and SYLLABICITY are not collinear to a significant degree. These and all following $GVIF^{1/(2 \times df)}$ values (cf. Fox and Monette 1992) were computed using the `vif()` function from the R package `car` (also see fn. 300).

	[j]	[ɣ]	[w]
TAUTO	3,713 (71.45%)	29 (0.56%)	1,455 (28%)
AMBI	561 (25.18%)	1,562 (70.11%)	105 (4.71%)
HETERO	139 (3.75%)	1,660 (44.83%)	1,904 (51.42%)

Table 4-15: Summary of SYLLABICITY x INPUTCONSONANT

The cross-tabulation in Table 4-15 shows that the tautosyllabic data on which Figure 4-43 is based consists of many (over 70%) instances of lOE [j], some (just below 30%) instances of [w], and indeed only very few (less than 1%) instances of the voiced velar fricative. The proportions of input sounds are very different for the non-tautosyllabic findings (Figure 4-44), the largest part of which are instances of lOE [ɣ], and in which the primary palatals play a comparatively marginal role.

It will therefore make sense to cross-validate our findings on the basis of smaller data sets that share the same INPUTCONSONANT. As Table 4-15 demonstrates, [w] is the only input sound that is well-represented in the tautosyllabic data (1,455 findings) as well as within the non-tautosyllabic data (2,009 findings). We will thus concentrate on this sound in the following.

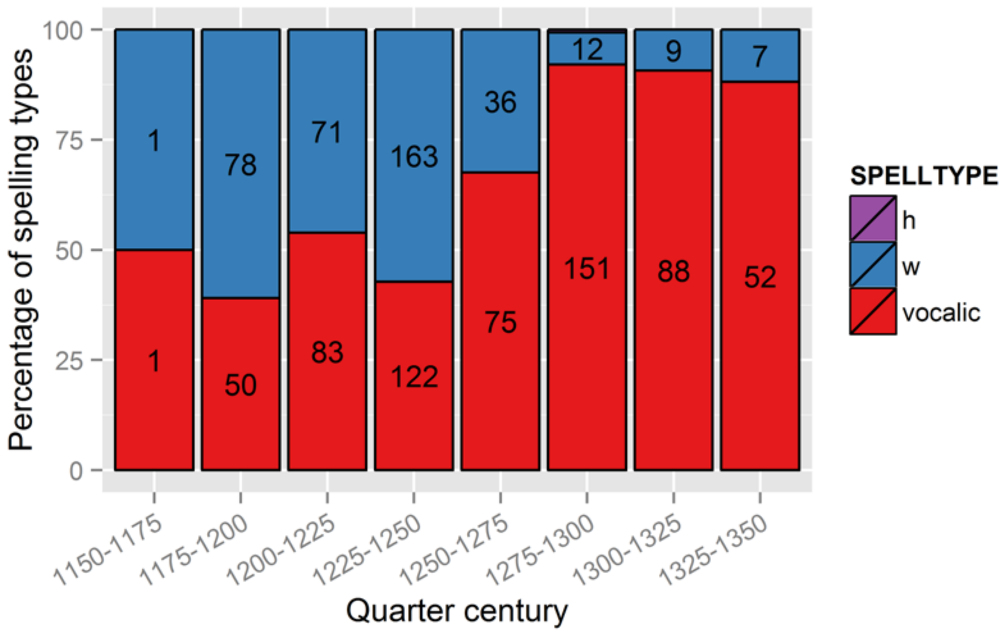

Figure 4-45: Proportion of spelling types by quarter century (tautosyllabic, INPUTCONSONANT: [w])

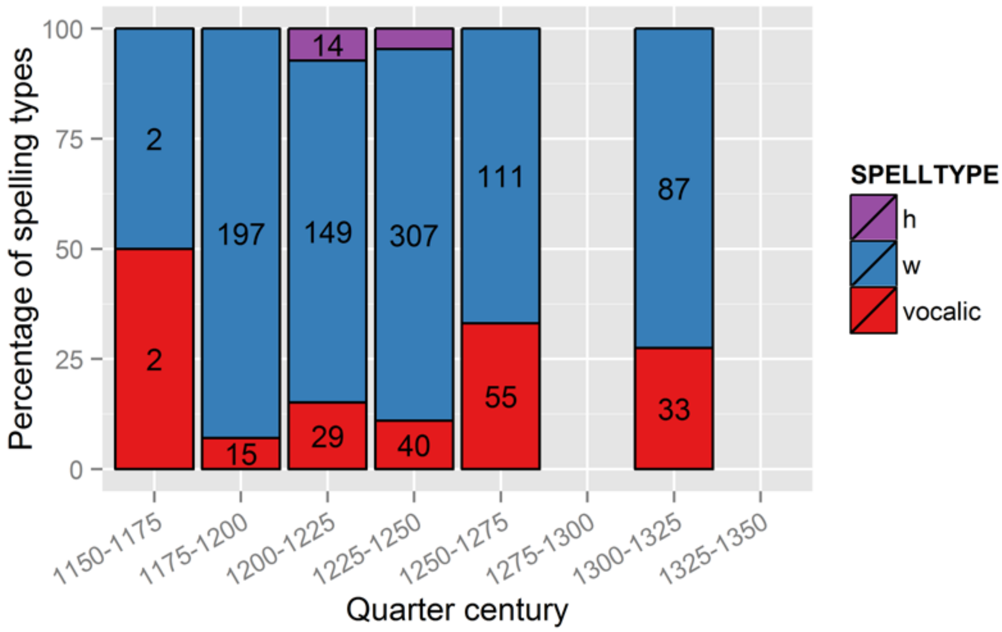

Figure 4-46: Proportion of spelling types by quarter century (non-tautosyllabic, INPUTCONSONANT: [w])

The visible differences between Figures 4-45 and 4-46 above are rather pronounced: In every well-attested quarter century the proportion of *VOCALIC* spellings (red) is substantively higher for the tautosyllabic [w] findings than for the non-tautosyllabic [w] findings. While the proportion of *VOCALIC* spellings generally increases from c. 40% to c. 90% in Figure 4-45, it increases from only a few percent to around 30% after 1250 in Figure 4-46. The proportions are therefore all slightly lower than those in Figures 4-43 and 4-44, respectively, but they lead to the same conclusion.

4.1.5.3 Summary

In summary, we might say that the LAEME findings exhibit a clear trend in terms of the frequently mentioned factor of tautosyllabicity, corroborating the frequently found claim that the vocalization of semivowels happened significantly earlier in cases in which the sound in question belonged to the same syllable as the preceding vowel. The differences found between tautosyllabic and non-tautosyllabic findings (in regards to *VOCALIC* spelling type percentages) are rather more extreme than expected, with the non-tautosyllabic findings lagging behind by what seem to be at least two centuries. In the next section, we will address the minor question of whether or not the addition of the concept of ambisyllabicity is useful for eME, and see whether there is an observable difference between findings coded as SYLLABICITY: *AMBI* and findings coded as SYLLABICITY: *HETERO*.[315]

4.1.5.4 Excursus: Ambisyllabicity

Figure 4-47 below contains a conditional inference tree for VOCALIC ~ SYLLABICITY. It is conspicuous that both splits detected by the `ctree()` function (viz. tautosyllabic vs. non-tautosyllabic, node 1; ambisyllabic vs. heterosyllabic, node 3) are made out to be highly significant (*p* > 0.001).

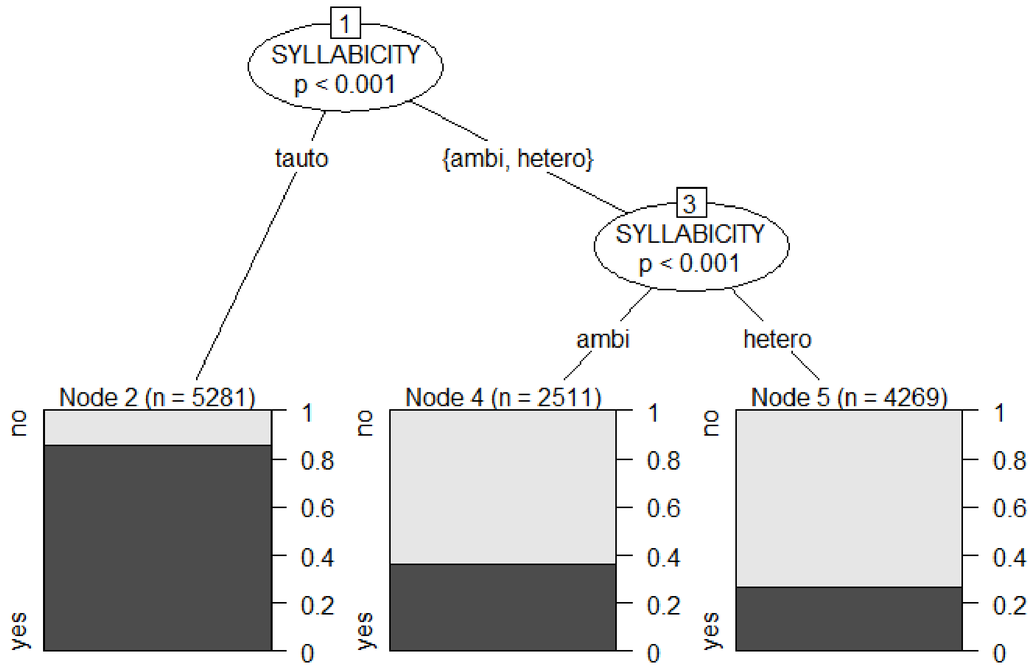

Figure 4-47: Conditional inference tree for VOCALIC ~ SYLLABICITY

This result would in fact suggest considering 'ambisyllabic' to be a meaningful third variant in terms of eME syllable structure. However, we need to delve deeper into the data and add more variables in order to make a more informed judgment on the matter.

Figures 4-48 and 4-49 present the same data as Figure 4-44 above, but divided up according to the SYLLABICITY levels *AMBI* and *HETERO*.

315 See section 3.2.1.1.2 on the theory and principles behind the coding of the variable SYLLABICITY.

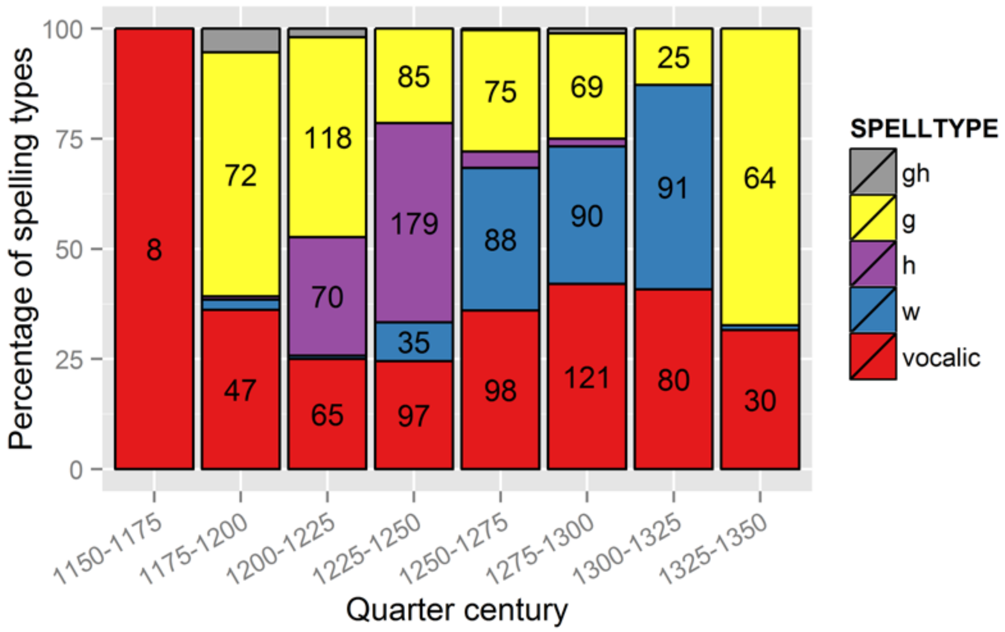

Figure 4-48: Proportion of spelling types by quarter century (SYLLABICITY: *AMBI*)

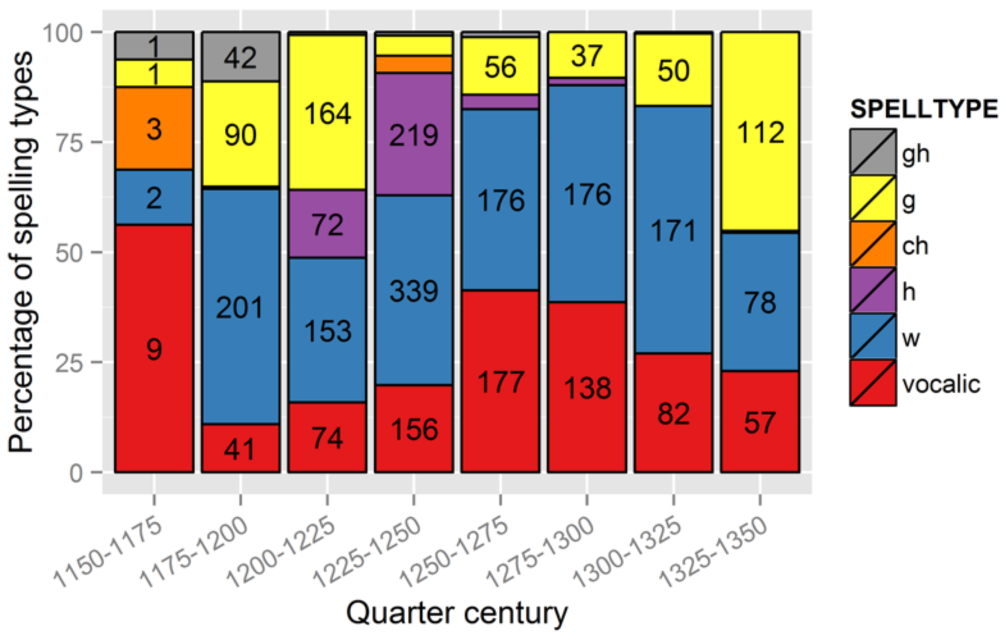

Figure 4-49: Proportion of spelling types by quarter century (SYLLABICITY: *HETERO*)

At first sight, the two plots above seem to differ substantively (which again would corroborate the suspicion that the distinction between ambisyllabic and heterosyllabic generally makes a significant difference): The proportions of *VOCALIC* and *GTYPE* spellings (red and yellow) seem to be smaller while there seem to be proportionately more *WTYPE* spellings within the heterosyllabic findings

(Figure 4-49) than within the ambisyllabic findings (Figure 4-48). However, since we know that the three different input consonants are not equally represented in the different SYLLABICITY types (see Table 4-15), we might suspect the difference between Figures 4-48 and 4-49 (and thus also the significant second split in Figure 4-47) to be due to the higher proportion of INPUTCONSONANT: *w* cases among the heterosyllabic data. We will therefore generate new versions of the two Figures above, based on data sets that share the same INPUTCONSONANT makeup, as was done in section 4.1.5.2. Table 4-15 shows a substantial number of the non-tautosyllabic findings to have the input consonant [ɣ], so we can simply concentrate on this sound.

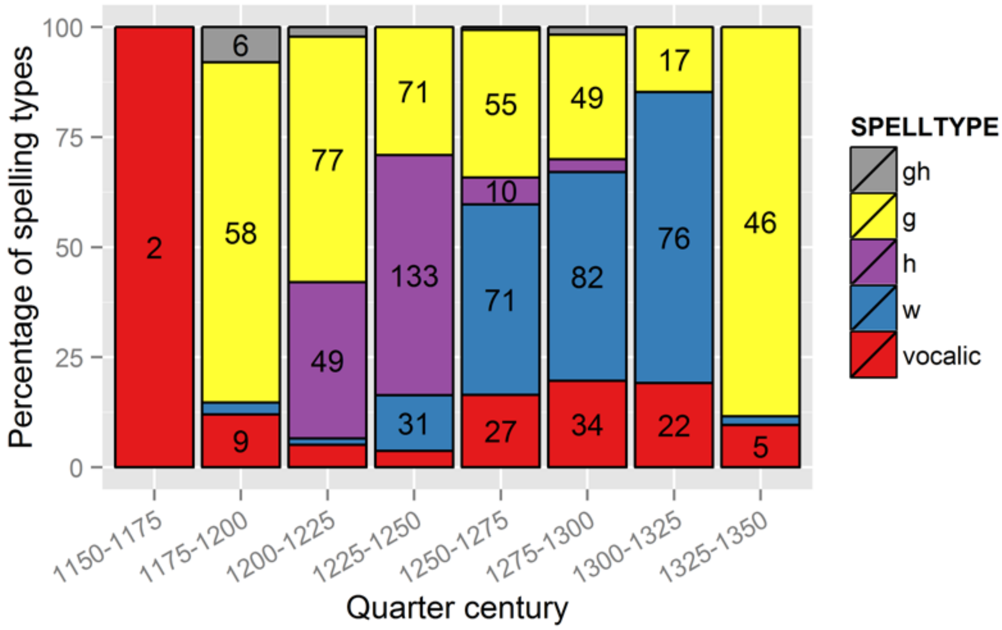

Figure 4-50: Proportion of spelling types by quarter century (ambisyllabic, INPUTCONSONANT: [ɣ])

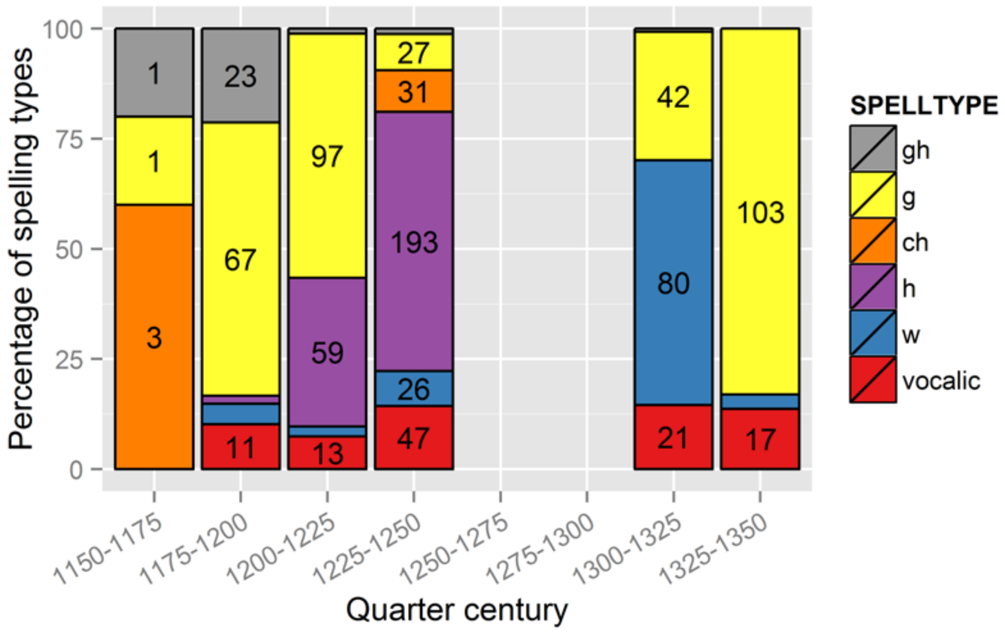

Figure 4-51: Proportion of spelling types by quarter century (heterosyllabic, INPUTCONSONANT: [ɣ])

Figures 4-50 and 4-51 above, which visualize the differences between ambisyllabic and heterosyllabic findings for cases which derive from lOE [ɣ], look strikingly similar; the proportions of the major spelling types *G*, *W*, and *VOCALIC* (and even of <h>), are nearly the same in all attested quarter centuries. Indeed, the function `ctree(VOCALIC ~ SYLLABICITY)` run only on the INPUTCONSONANT: *G* (i.e. [ɣ]) data detects no significant splits at all (the *VOCALIC* proportions are very low throughout).[316]

Applying the `ctree()` algorithm to *VOCALIC* using both INPUTCONSONANT and SYLLABICITY as predictors produces the most striking evidence against assuming a significant distinction between ambisyllabic and heterosyllabic cases:

316 Similarly, the same function run on INPUTCONSONANT: *J* data splits only tautosyllabic from non-tautosyllabic ($p < 0.001$), and there are too few ‘ambisyllabic’ cases for the `ctree()` algorithm to function meaningfully with INPUTCONSONANT: *W* data.

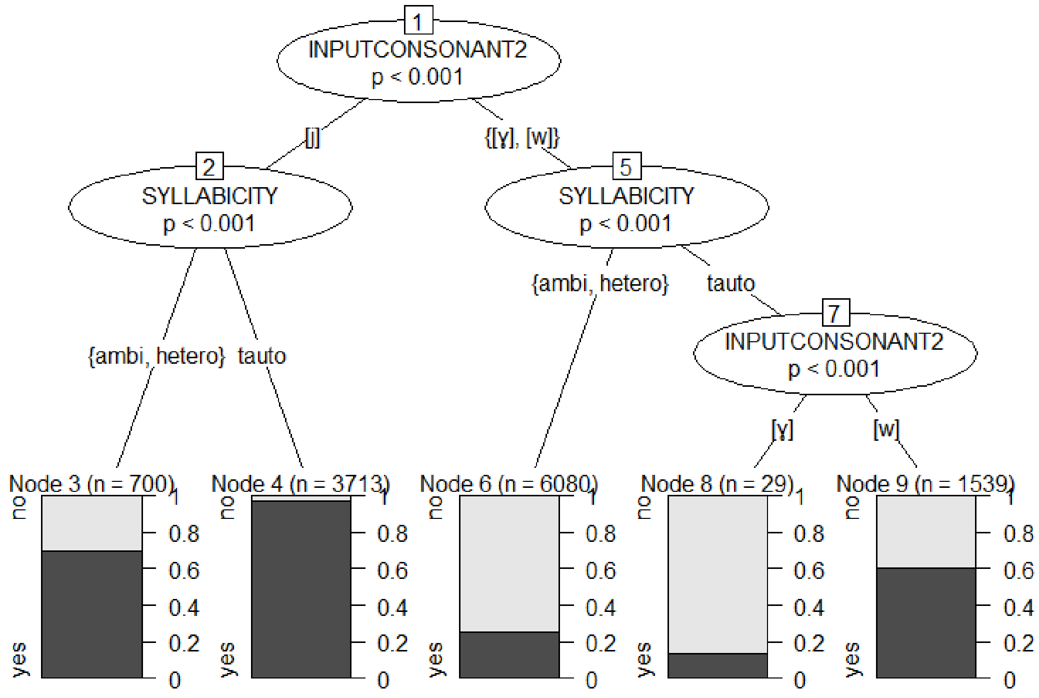

Figure 4-52: Conditional inference tree for VOCALIC ~ SYLLABICITY + INPUT-CONSONANT

As we can see, the recursive algorithm has detected four highly significant ($p <$ 0.001) splits in the data, none of which single out the ‘ambisyllabic’ category. The highest-order split (node 1) is detected between [j] and the other INPUT-CONSONANTs because of the very high overall proportions of *VOCALIC* spellings for the primary palatals (see the color red in Figure 4-37). Within the [j] data, the only significant split (node 2) is found between tautosyllabic (close to 100% *VOCALIC*) and non-tautosyllabic cases (below 70% *VOCALIC* on average). Within the [ɣ, w] data, the same split based on tautosyllabic vs. non-tautosyllabic is found (node 5), though the overall percentages are lower (c. 60% and 25% on average). Another split is detectable within the tautosyllabic [ɣ, w] data, viz. the fact that [ɣ] cases seem to have much lower *VOCALIC* spelling proportions than [w] cases (node 7), but considering the low number of absolute findings (see node 8), this should not be overinterpreted.

Especially what can be gathered from Figures 4-50 to 4-52 above allows us to draw the conclusion that, at least regarding the vocalization of postvocalic consonants, it does not seem necessary to introduce the notion of ambisyllabicity (cf. the discussion in Minkova 2015a: 139-140), but that the more traditional binary distinction tautosyllabic vs. non-tautosyllabic is sufficient to describe what is happening in the data.

4.1.6 Quality of the preceding vowel

After the question of tautosyllabicity, the quality of the preceding vowel is the next frequently mentioned influencing factor for the vocalization of postvocalic semivowels. This factor is listed in all three tables summarizing the various accounts (Tables 2-10, 2-12, and 2-14). As described in section 3.2.1.1.2, the variable INPUTVOWELQUALITY is lexicogrammatically bound and has therefore received its values based on the quality of the vowel most likely to have preceded the sound in question in lWS OE.

The common two-dimensional representations of the vowel space (e.g. cf. Giegerich 1992: 15; Hall 2011: 28) attest to the fact that 'vowel quality' is actually a combination of two different factors, viz. frontness and height. Thus, theoretically it could have been coded as two variables; however, since we are actually not dealing with pronunciations at all, but with written representations, there is no way to know which frontness or height values in terms of phonetic formants (Gut 2009: 144ff.) certain vowels had. It has therefore been deemed safest to simply code INPUTVOWELQUALITY as a single categorical variable whose values represent lWS spellings and, by implication, the sounds most commonly posited in the corresponding word forms. Moreover, we can still access the dimensions of frontness and height by grouping the variable levels accordingly. We know that frontness will certainly come into play in connection with the three different INPUTCONSONANTS [j, ɣ, w] (since we are dealing with palatal and velar sounds), and we also know (especially from scanning previous literature in section 2.4) that vowel height will come into play, since semivowels are phonetically close to high vowels (see section 2.3.1) and semivowel vocalization is often said to have taken place first in the vicinity of high vowels (e.g. cf. Kluge 1901: 997).

4.1.6.1 Description

Like the other lexicogrammatically bound variables, the variable INPUTVOWELQUALITY also has missing data points, so that its use automatically reduces the size of the data set. However, in Figure 4-53 it can be seen that the proportion of missing cases is fairly low (it is 391 in absolute numbers).

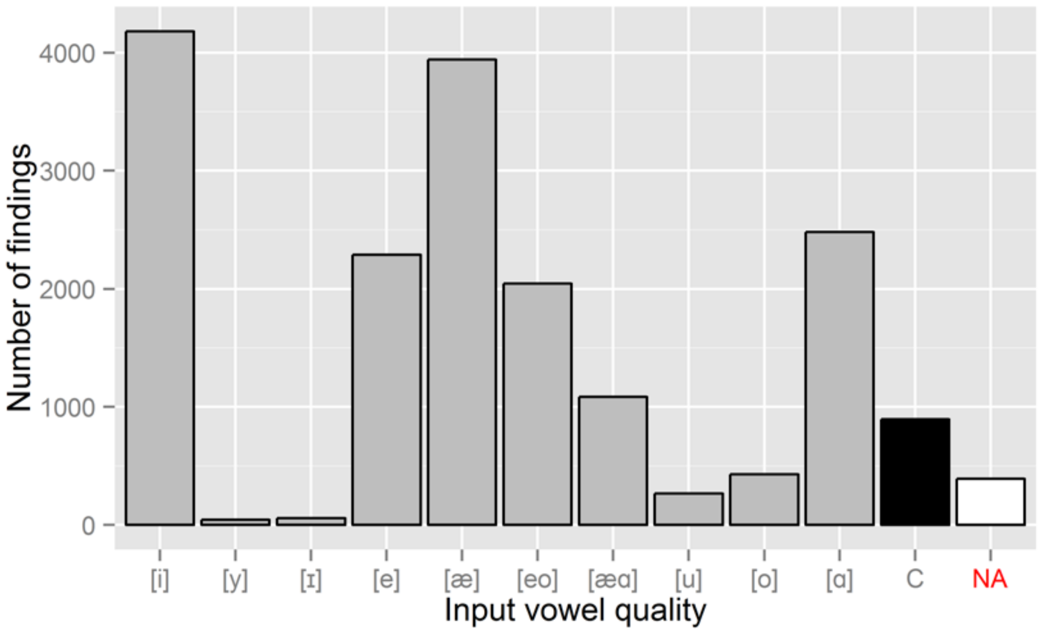

Figure 4-53: Types of INPUTVOWELQUALITY in the data

Among the pure front vowels (the first five bars in Figure 4-53), high [i], mid [e] and low [æ] are well-represented; [y] and [ɪ] (the latter of which is taken to be the regular realization of OE <ie>, cf. Baker 2012: 13) are only poorly attested. The two OE diphthongs [eo] and [æɑ] are moderately well attested. Among the back vowels, low [ɑ] is by far the best attested quality.

A GLM with INPUTVOWELQUALITY as the only predictor for VOCALIC indeed explains 50.3% of the variance in the data (Nagelkerke's pseudo-R^2 = 0.503).[317] Since this value is relatively high, we will consider this variable in isolation before moving on.

317 The code used to run this model in R is `glm(VOCALIC ~ INPUTVOWELQUALITY)`; the null deviance is 22,840 on 17,715 df; the model's residual deviance is reduced to 14,809 on 17,705 df.

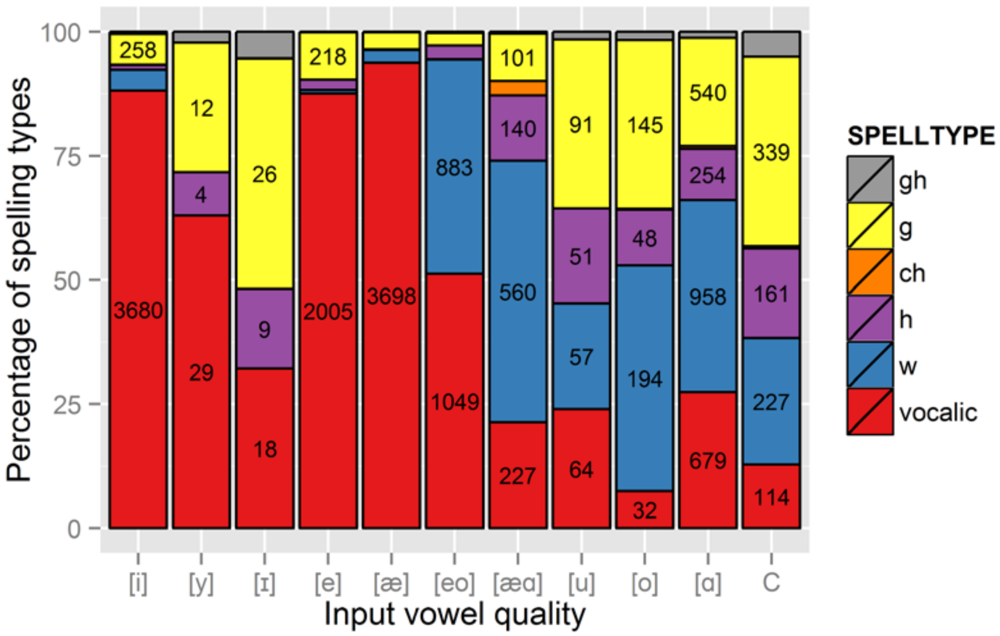

Figure 4-54: Overall distribution of spelling types by input vowel quality

Figure 4-54 shows the proportions of spelling types for the different input vowels. If we disregard the poorly attested vowels [y, ɪ], the front vowels clearly show similar patterns to one another, as do the back vowels. The diphthongs (the original end points of whose trajectories were back vowels) seem more similar to the back vowels that to the front vowels.

However, the theoretical usefulness of thus treating INPUTVOWELQUALITY in isolation can be disputed: E.g. a preceding [i] will definitely be expected to have different effects on a palatal sound than on a non-palatal sound. Even more importantly, we already know that certain input consonants only occurred after certain vowels (see section 3.2.2.2.1; Appendix C, Tables A-3 and A-5). This means that the front vowels in Figure 4-54 above are associated with similar spelling type distribution patterns because they almost invariably precede instances of [j]. We should therefore add the variable INPUTCONSONANT to the equation.[318] In addition, vowel quality should be discussed in connection with vowel quantity, particularly since the latter was phonemic in OE (cf. Baker 2012: 12; Kohnen 2014: 29; also see section 2.3.3.3 above), so that e.g. [iː] must have been perceived as a different sound than [i] in OE. We therefore also need to include the variable INPUTVOWELQUANTITY, which will be done in section 4.1.7.

318 With a squared GVIF$^{1/(2 \times df)}$ of around 2.2, the variables INPUTCONSONANT and INPUTVOWELQUALITY show some overlap, but they are not collinear to a problematic degree (cf. Larson-Hall n.d.: 121-122).

4.1.6.2 Analysis: Input vowel quality + input consonant

As hinted at above, it will make sense to treat the findings separately for the three input consonants [j, ɣ, w]. Table 4-16 presents a cross-tabulation of the findings according to the variables INPUTVOWELQUALITY, INPUTCONSONANT, and additionally (in the case of INPUTCONSONANT: *G*), RESULT.

	[j]	[ɣ > i]	[ɣ > u]	[w]	Sum
[i]	**1,301**	6	0	**194**	**1,501**
[y]	**42**	4	0	0	**46**
[ɪ]	**39**	7	0	0	**46**
[e]	**1,911**	**217**	2	**111**	**2,241**
[æ]	**3,793**	0	0	**111**	**3,904**
[eo]	2	**87**	**102**	**1,855**	**2,046**
[æɑ]	6	**410**	15	**653**	**1,084**
[u]	0	17	**250**	0	**267**
[o]	0	12	**173**	**120**	**305**
[ɑ]	0	**698**	**878**	**895**	**2,471**
C	0	0	**478**	0	**478**
Sum	**7,094**	**1,458**	**1,898**	**3,939**	**14,389**

Table 4-16: Summary of INPUTVOWELQUALITY x (INPUTCONSONANT & RESULT) [319]

It is clear to see that lOE postvocalic [j] (as it has been interpreted for the present study) occurred almost exclusively following front vowels, [ɣ] occurred predominantly after [ɑ] and other back vowels, but also after diphthongs, consonants, and [e], and [w] occurred predominantly after diphthongs, but also after back vowels except [u] as well as after front vowels. It is conspicuous that lOE [j] frequently occurs after the phonetically close [i], but [w] does not occur after [u]. However, this incongruence is to be interpreted as an indication of the fact (mentioned in section 2.4.2.2 above) that originally [w] did not regularly occur postvocalically in OE, but only as a result of developments within the OE period.

Of course, comparing the values of INPUTVOWELQUALITY with those of INPUTCONSONANT and RESULT entails a high degree of theoretical circularity: Since these variables are all predictors whose values were coded manually on the basis of reconstructed lOE pronunciations (e.g. a <ʒ> next to a high front vowel, as in

319 N.b.: Missing data points in the variables INPUTCONSONANT and RESULT reduce the number of hits so that the numbers given in the right column do not necessarily correspond to the heights of the bars in Figure 4-53.

OE *haliᵹ*, will be interpreted as [j] and not [ɣ]), it does not surprise us to find, say, large numbers for [i] + [j] and much smaller numbers for [i] + [ɣ] in the findings. As always, we need to measure the influence of these predictors on the outcome variables, but in this case, it will make sense to first include InputVowelQuantity, which will be described briefly in the following.

4.1.7 Quantity of the preceding vowel

4.1.7.1 Description

As described in section 3.2.1.1.2, InputVowelQuantity is a binary variable whose variants are called *long* and *short*. The variable itself does relatively little to explain proportions of *vocalic* spellings in the data, as a GLM (Vocalic ~ InputVowelQuantity) shows: The model thus formalized explains 22.2% of the variance in the data (Nagelkerke's pseudo-R^2 = 0.222).[320]

4.1.7.2 Description: Input vowel quantity + input vowel quality + input consonant + result = input type

As mentioned in the preceding section, vowel length and quality are best treated together. Theoretically, every OE vowel quality can be associated with either length, but apparently the relevant sounds did not follow short [i] or short diphthongs[321] in OE. Combining the ten different vowel qualities with the two quantities thus gives us seventeen different vocalic inputs that are attested in the data (see Table 4-17, next page).

320 Once again, missing data points slightly reduce the actual data set on which the model can be run; the null deviance is 21,679 on 17,183 df; the model's residual deviance is 18,694 on 17,7182 df.

321 The reconstruction of the OE short diphthongs is surrounded by "great[…] uncertainties" (Minkova 2014a: 178); e.g. Roger Lass (1992: 39) interprets them as truly 'short' (i.e. of the same length as short monophthongs) and truly diphthongal (e.g. [æ͡ɑ]) while Donka Minkova (2014a: 156) interprets them as short 'diphthongoids' such as [æᵊ]. However the lOE short diphthongs are to be interpreted phonetically, it seems to be clear that they existed as phonemes at least for some time and in some varieties (Minkova 2014a: 179), that they "pattern[ed] with the short [monophthongs]" (Lass 1992: 39) and later merged with them (Minkova 2014a: 178-179), and that they only occurred in a restricted set of phonetic surroundings (Minkova 2014a: 178), obviously not including the position before semivowels.

INPUTVOWELQUALITY:	INPUTVOWELQUANTITY:	
	SHORT	***LONG***
I	[i]	[iː]
Y	[y]	[yː]
IE		[ɪː]
E	[e]	[eː]
AE	[æ]	[æː]
EO		[eoː]
AEA		[æɑː]
U	[u]	[uː]
O	[o]	[oː]
A	[ɑ]	[ɑː]

Table 4-17: Vocalic inputs attested in the data

Figure 4-55 below shows the proportion of INPUTVOWELQUANTITY: *SHORT* vs. *LONG* for each vowel quality.

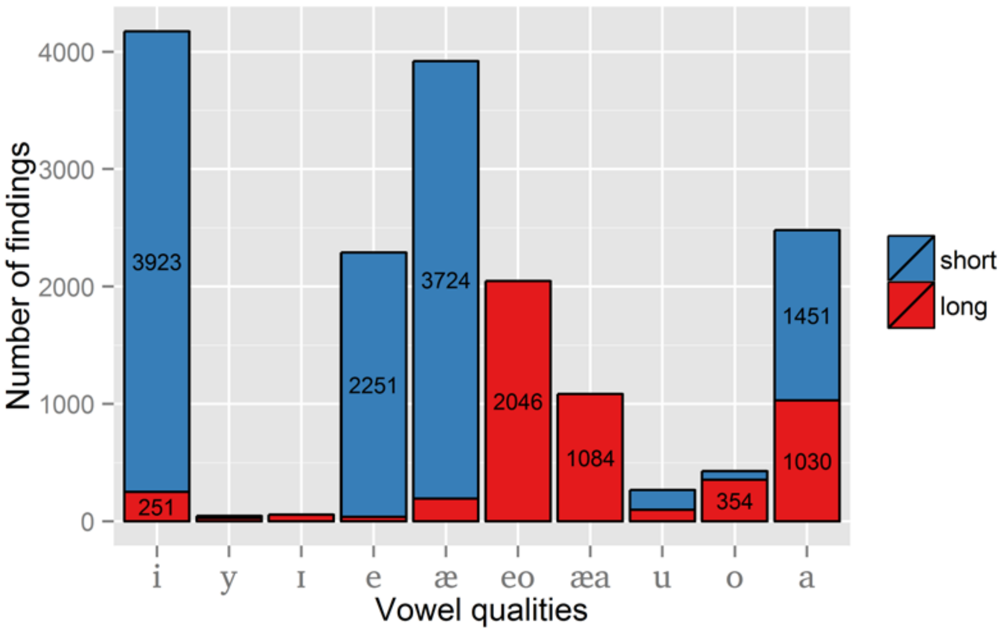

Figure 4-55: Number of findings per vocalic input (vowel qualities and quantities)

The seventeen vocalic inputs (plus *C* for when the preceding sound is a consonant) are cross-tabulated with the four different consonantal inputs (resulting from the combination of INPUTCONSONANT and RESULT, as in Table 4-16 above) in Table 4-18 (which continues on the next page). In the following, all combinations that occur in any substantial number in the data will be given labels in capital letters for easy reference. E.g. cases in which a primary palatal semivowel followed a short high front vowel (i.e. the combination of INPUTVOWELQUALITY: *I*, INPUTVOWELQUANTITY: *SHORT*, and INPUTCONSONANT: *J*) will be referred to as '*BODIG* forms'. All labels for these phonological input types are adapted from OE-based lexels. The result can be seen as a new variable with thirty different variants.

	[j]	[ɣ > i]	[ɣ > u]	[w]
[i]	*BODIG* (*bodiȝ* 'body')			
[iː]	*TIGAN* (*tiȝan* 'tie')			*NIWE* (*niƿe* 'new')
[y]	*BYGTH* (*byȝþ* '(he) buys')			
[yː]	*DRYGE* (*dryȝe* 'dry')			
[ɪː]	*LIEGTH* (*lieȝþ* '(he) lies')			
[e]	*WEG* (*weȝ* 'way')	*WITEGA* (*witeȝa* 'prophet')		*GESEWEN* (*ȝeseƿen* 'seen')
[eː]	*SWEG* (*sweȝ* 'sound')			*EWE* (*eƿe* 'ewe')
[æ]	*DAEG* (*dæȝ* 'day')			
[æː]	*CLAEG* (*clæȝ* 'clay')			*LAEWEDE* (*læƿede* 'lewd')
[eːo]		*FLEOGAN* (*fleoȝan* 'fly')	*DREOGAN* (*dreoȝan* 'suffer')	*TREOW* (*treoƿ* 'tree')
[æːɑ]		*EAGE* (*eaȝe* 'eye')		*SCEAWIAN* (*sceaƿian* 'look')
[u]			*FUGOL* (*fuȝol* 'bird')	
[uː]			*BUGAN* (*buȝan* 'bend')	

	[j]	[ɣ > i]	[ɣ > u]	[w]
[o]			*BOGA* (*boȝa* 'bow')	
[oː]			*BOG* (*boȝ* 'bough')	*FLOWAN* (*flopan* 'flow')
[ɑ]		*DAGAS* (*daȝas* 'days')	*LAGU* (*laȝu* 'law')	*AWEL* (*apel* 'awl')
[ɑː]			*AGAN* (*aȝan* 'own')	*SAWOL* (*sapol* 'soul')
C			*FOLGIAN* (*folȝian* 'follow')	

Table 4-18: Overview of phonological input types (i.e. relevant INPUTVOWELQUALITY / INPUTVOWELQUANTITY / INPUTCONSONANT / RESULT combinations)

We have already seen that the different vocalic inputs are represented to very different degrees in the corpus findings (cf. Table 4-17). It therefore comes as no surprise that the same is true of the even more narrowly defined phonological input types in Table 4-18: E.g. forms of the *SWEG* type are featured only 17 times while the *DAEG* type is represented by a total of 3,724 forms.[322]

4.1.7.3 Analysis: Spellings ~ input type

A GLM that predicts VOCALIC using all four variables that were used to determine the thirty different phonological input types explains around 60% of the variance in the data (Nagelkerke's pseudo-R^2 = 0.597).[323] The `ctree()` algorithm run with all four predictors detects too many splits for the resulting tree to be of much use, but it is interesting to note that the highest-order split (which is highly significant, $p < 0.001$) is made between all front monophthongs except [ɪ] (which is poorly attested) and all other input vowels, the former group showing significantly higher *VOCALIC* spelling rates than the latter group. Of course, it can be argued that this result once again merely reflects the fact that the primary pala-

322 Counts of all input types are given in Table A-12 in Appendix F.

323 The null deviance of a model run with the command `glm(VOCALIC ~ INPUTVOWELQUANTITY * INPUTVOWELQUALITY * INPUTCONSONANT * RESULT)` is 18,110 on 13,901 df; the model's residual deviance is 10,562 on 13,888 remaining df. Coding INPUTTYPE as a separate variable with 30 variants and using it directly as a sole predictor for VOCALIC brings up the Nagelkerke pseudo-R^2 value to 0.606 (null deviance: 18,877 on 14,305 df; residual deviance: 10,470 on 14,276 df).

tals (which largely co-occur with front vowels, cf. Table 4-16) were vocalized earlier than the other sounds, but it is still interesting that the most important split is found using the variable INPUTVOWELQUALITY and *not* on the basis of INPUT-CONSONANT.[324] The split between [j] and the other input consonants (also highly significant, $p < 0.001$) is then made at the next level, within the 'front vowels' data.

4.1.7.4 Analysis: Spellings ~ input type + time

In the following, we will concentrate on some of the better attested phonological input types, and plot their respective diachronic development (with the help of discrete time variables) in terms of spelling types associated with them. First we will have a look at the primary palatals (lOE [j]): Bar plots generated for the different vowel inputs preceding lOE [j] all look remarkably similar, which is due to the very high overall proportion of SPELLTYPE: *VOCALIC* spellings (red) in the INPUTCONSONANT: *J* data (see section 4.1.4.3 and especially Figure 4-37). This is why they will be represented by only one plot: Figure 4-56 shows the developments of spelling types for the best-attested vocalic input type associated with primary palatals, viz. forms of words such as *dæᵹ* > *day*.

[324] The four variables are actually collinear to a degree that verges on being problematic; most of their squared $GVIF^{1/(2 \times df)}$ values (viz. 1.3, 4.88, 4.61, and 6.99) exceed or lie just beneath the conventional threshold value of 5 (cf. Larson-Hall n.d.: 121-122; Heiberger and Holland 2004: 243).

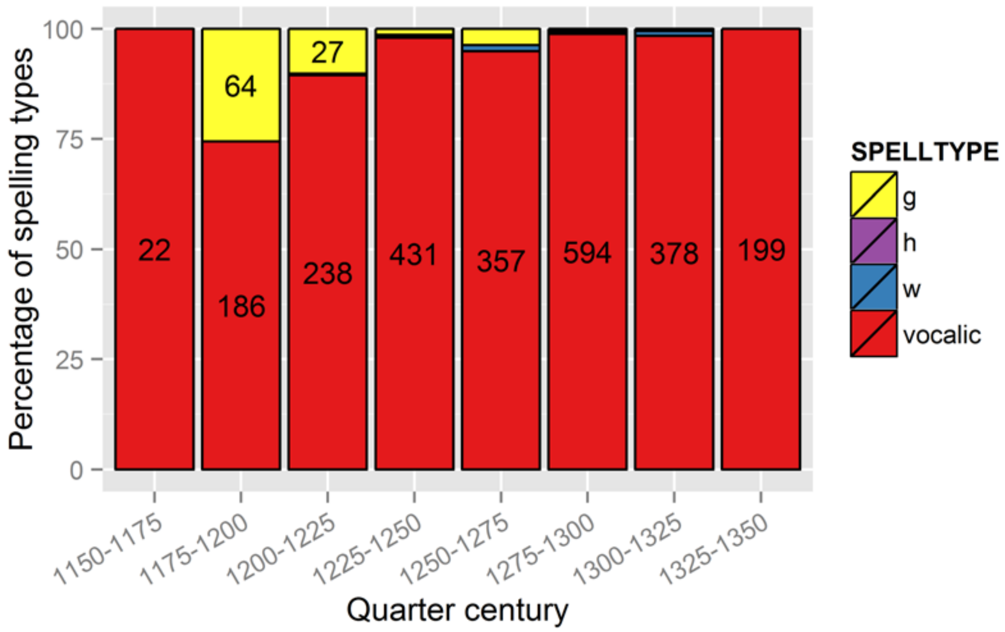

Figure 4-56: Proportion of spelling types by quarter century (INPUTTYPE: *DAEG*)

In comparison, the respective plots for the secondary palatal types (lOE [ɣ] > ME [i]) do show considerable differences, which is why three are given in the following:

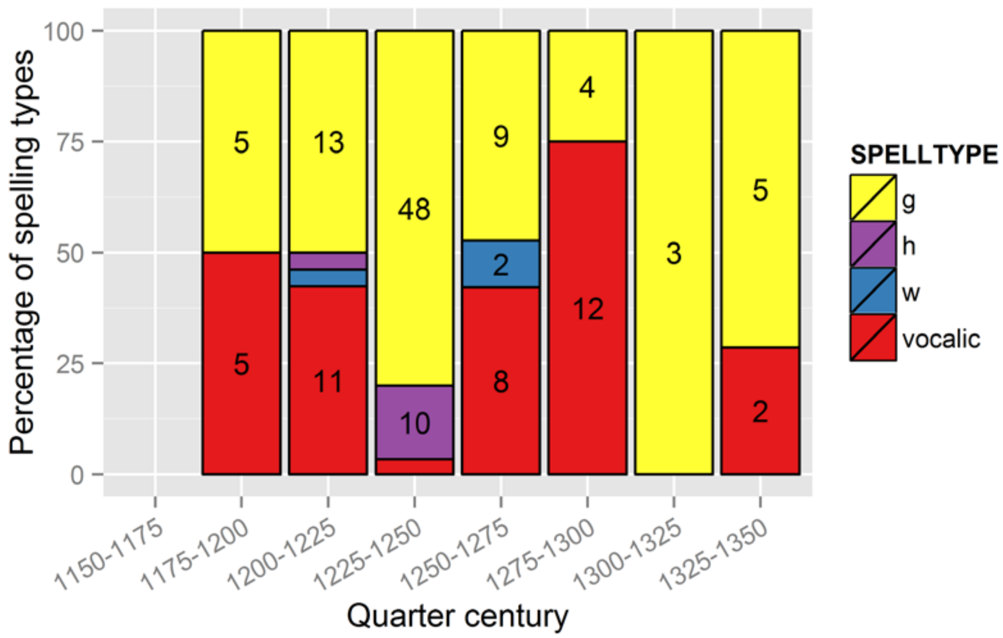

Figure 4-57: Proportion of spelling types by quarter century (INPUTTYPE: *WITEGA*)

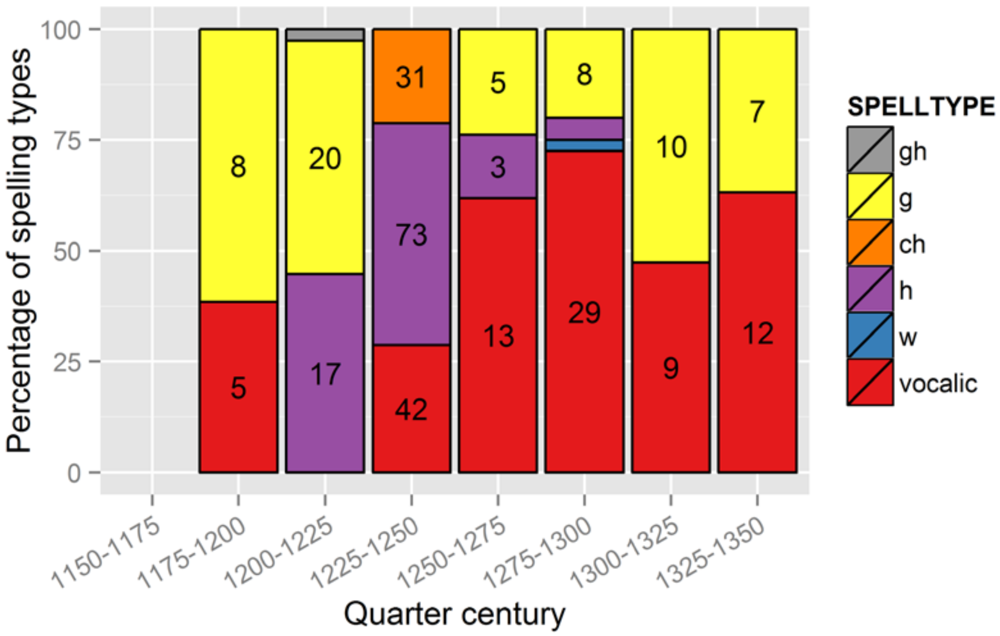

Figure 4-58: Proportion of spelling types by quarter century (INPUTTYPE: *EAGE*)

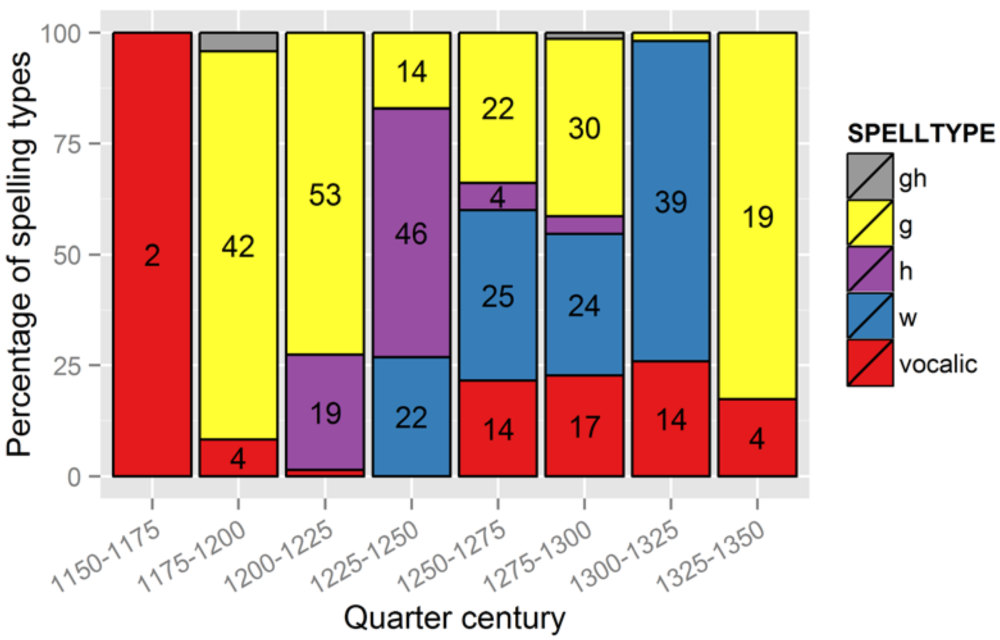

Figure 4-59: Proportion of spelling types by quarter century (INPUTTYPE: *DAGAS*)

The most obvious differences between these three ‘secondary palatal’ input types can be summed up as follows: While *GTYPE* and *VOCALIC* spellings (yellow and red) seem to be featured in almost equal proportions in the *WITEGA*-type forms (see Figure 4-57, although the later quarter centuries are rather poorly attested), the plot for *EAGE*-type forms additionally features conspicuously more fricative-associated spellings throughout (viz. <h>/purple and *CHTYPE*/orange). This suggests that *EAGE*-type forms (containing [æːɑɣ] in lOE) retained the voiced velar fricative longer than *WITEGA*-type forms (containing [eɣ] in lOE).

The third plot (Figure 4-59) is different again: <h> spellings are also present in the *DAGAS*-type forms, suggesting a retention of the fricative quality, but in addition, there is a significant presence of *WTYPE* spellings (blue) among the *DAGAS*-type forms. It seems that, at least throughout the eME period, many if not all *DAGAS*-type forms were not yet secondary palatals at all, but on their way to becoming 'secondary labial-velars' (cf. the very similar-looking Figures 4-60 through 4-62 below), but then shifted to [i] on the analogy of other word forms. The example of eME forms like *dawes* 'days' was already brought up in section 4.1.4.2 (also cf. Table 4-13).

We will now turn to the 'secondary labial-velars' and compare two different vocalic input types ([uɣ] and [ɑɣ] found in words like *fuȝol* > *fowl* and *laȝu* > *law*) and the one consonantal input type (C + [ɣ] found in words like *folȝian* > *follow*).

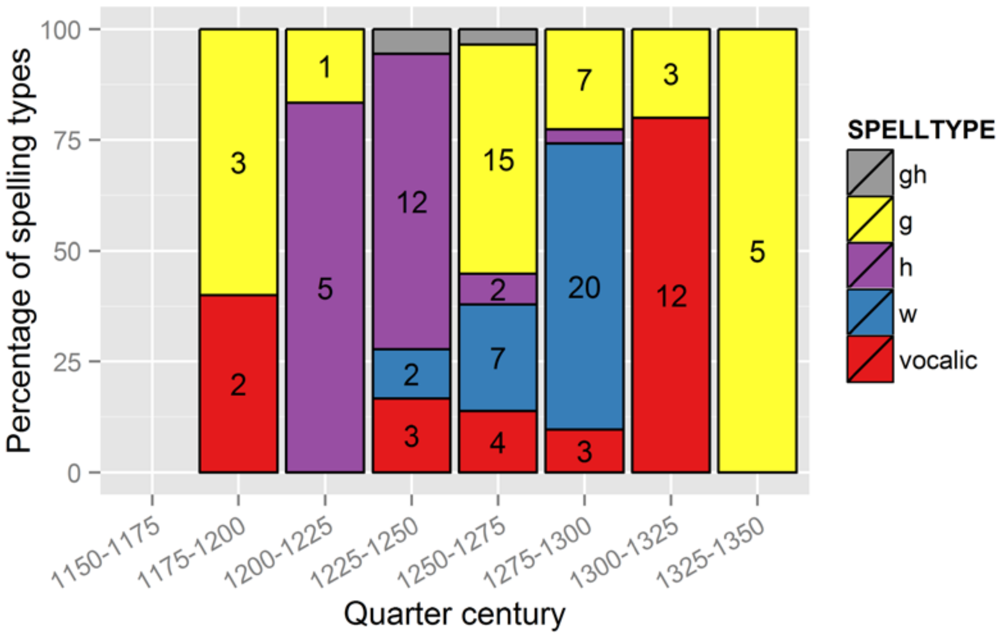

Figure 4-60: Proportion of spelling types by quarter century (INPUTTYPE: *FUGOL*)

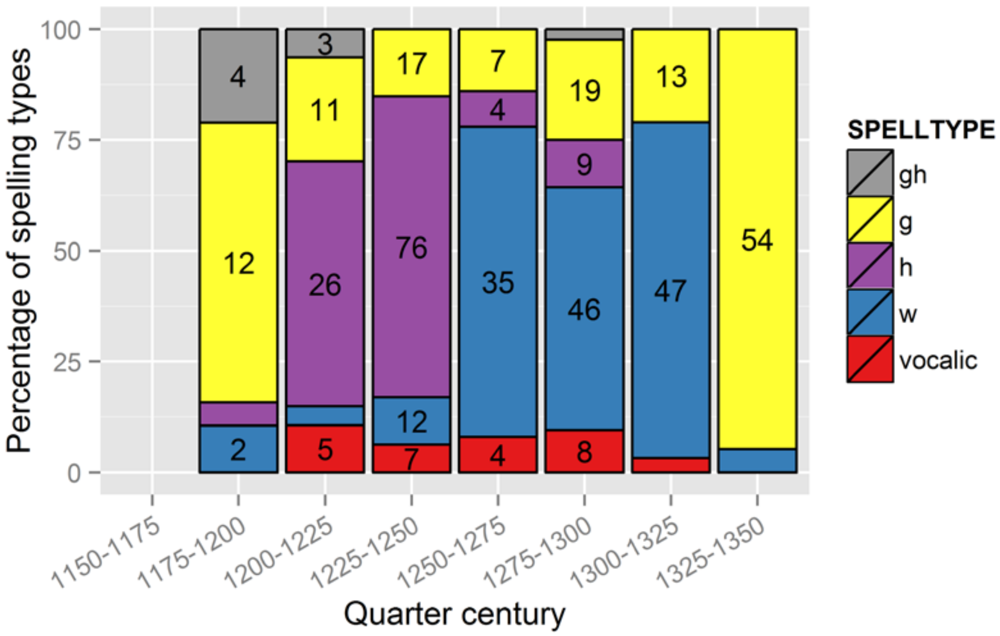

Figure 4-61: Proportion of spelling types by quarter century (INPUTTYPE: *LAGU*)

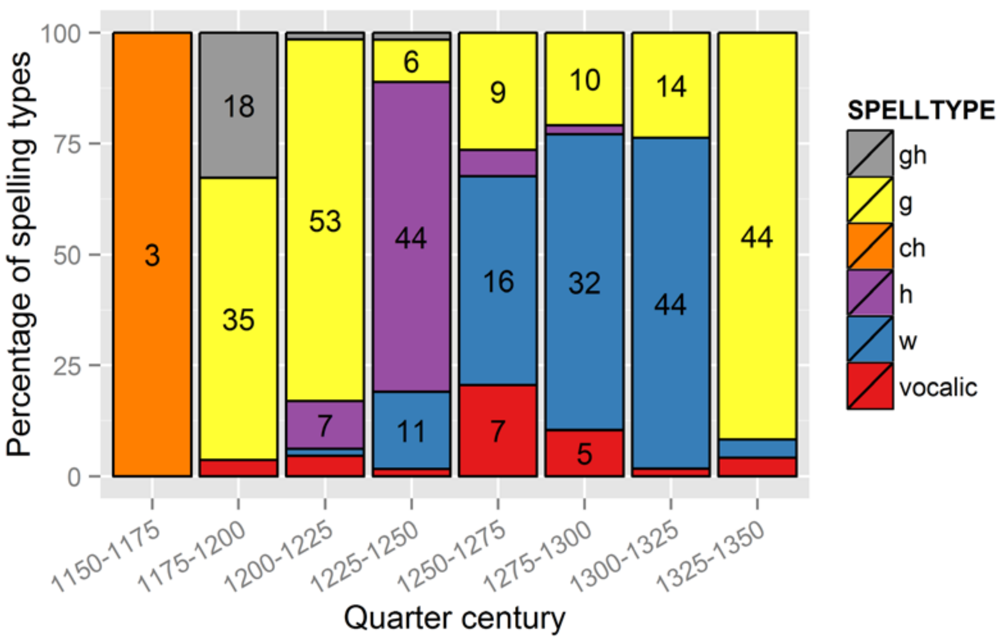

Figure 4-62: Proportion of spelling types by quarter century (INPUTTYPE: *FOL-GIAN*)

The first thing to note about the ‘secondary labial-velars’ is that *VOCALIC* (red) spelling proportions are comparatively low throughout. The large proportions of *GTYPE* spellings (yellow) in the final quarter century once again illustrates the fact that Michael of Northgate was using the newly emerged *littera* <ȝ> for all sounds that derived from lOE [ɣ]. This effect is visible in all three plots, regardless of the surrounding sounds.

Cases in which the sound in question originally followed a consonant (i.e. *FOLGIAN*-type forms) do not seem exceptional: Figures 4-61 (*LAGU*) and 4-62 (*FOLGIAN*) look very similar. If anything, it is Figure 4-60 (*FUGOL*) that is somewhat exceptional due to the slightly higher overall proportions of *VOCALIC* spellings, especially in the bar for 1300-1325. This could mean that the change [ɣ > u] happened faster following a high back vowel; however, the rather low numbers of absolute findings speak against over-interpreting these proportions.

Finally, we will consider the development of spellings in cases that derive from lOE [w]. It should be recalled (see section 2.4.2.3 [vii]) that Pinsker (1974: 33-34) claims input vowel quality to have been a decisive factor for the chronology of [w] vocalization, to the effect that the vocalization took place about a century later if [w] followed a front vowel (i.e. his 'third layer'). The four well-attested vocalic input types are *NIWE*, *TREOW*, *SCEAWIAN*, and *SAWOL*. Incidentally, all four of these types contain long vowels. In two of them (*TREOW*, *SCEAWIAN*), the [w] was preceded by a diphthong in lOE. *NIWE* forms can be said to have contained a 'near-diphthong': The labial-velar semivowel, which is phonetically close to a high back vowel, is preceded by a high front vowel, so that the sound sequence can be said to have a trajectory similar to that of an OE diphthong.[325] Nevertheless, forms of the *NIWE* type belong to Pinsker's (1974) 'third layer', while forms of the *SAWOL* type belong to his 'second layer'.

325 The vowels in most words that contained [iːw] in OE have since undergone a shift in prominence (*Akzentumsprung*, see fn. 131 in section 2.3.3.3, and cf. Minkova 2014a: 177), as the most frequent *NIWE* lexels (*NEW*, *HUE*, *SPEW*, *STEWARD*) and their modern pronunciations show. This is another feature typical of words that had OE diphthongs.

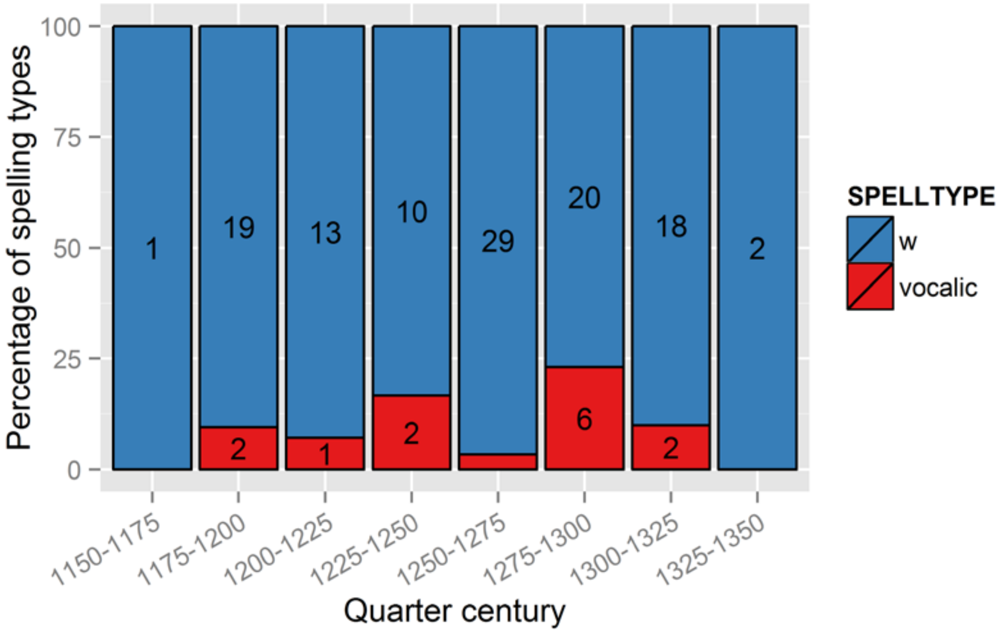

Figure 4-63: Proportion of spelling types by quarter century (INPUTTYPE: *NIWE*)

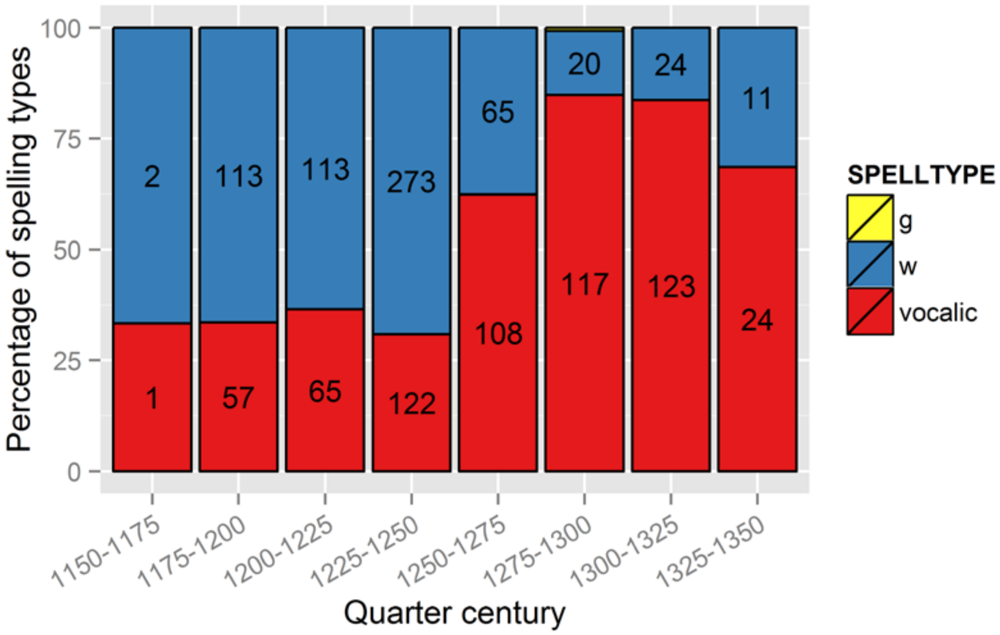

Figure 4-64: Proportion of spelling types by quarter century (INPUTTYPE: *TREOW*)

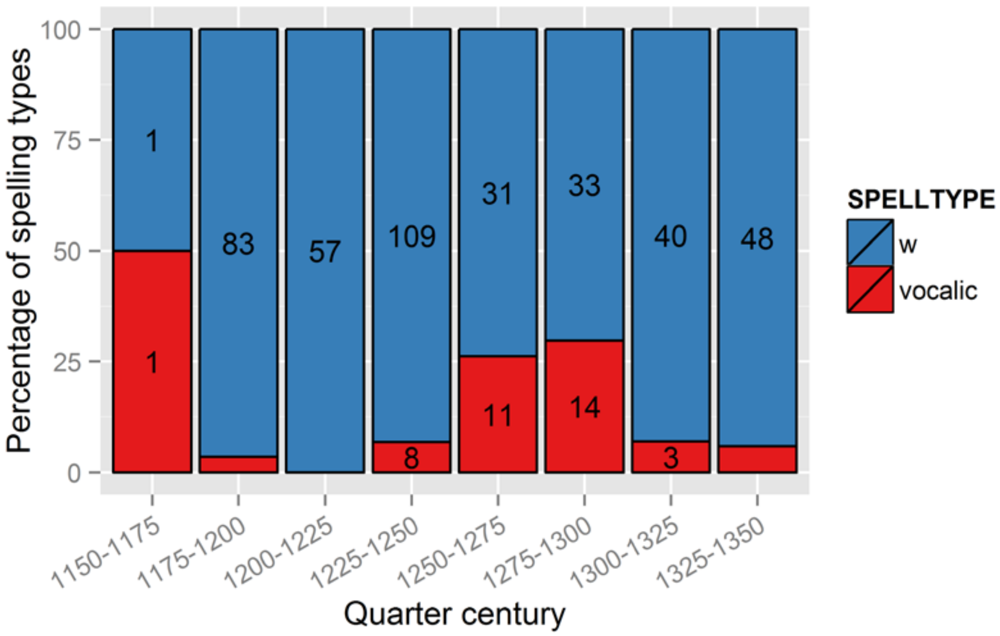

Figure 4-65: Proportion of spelling types by quarter century (INPUTTYPE: *SCEAWIAN*)

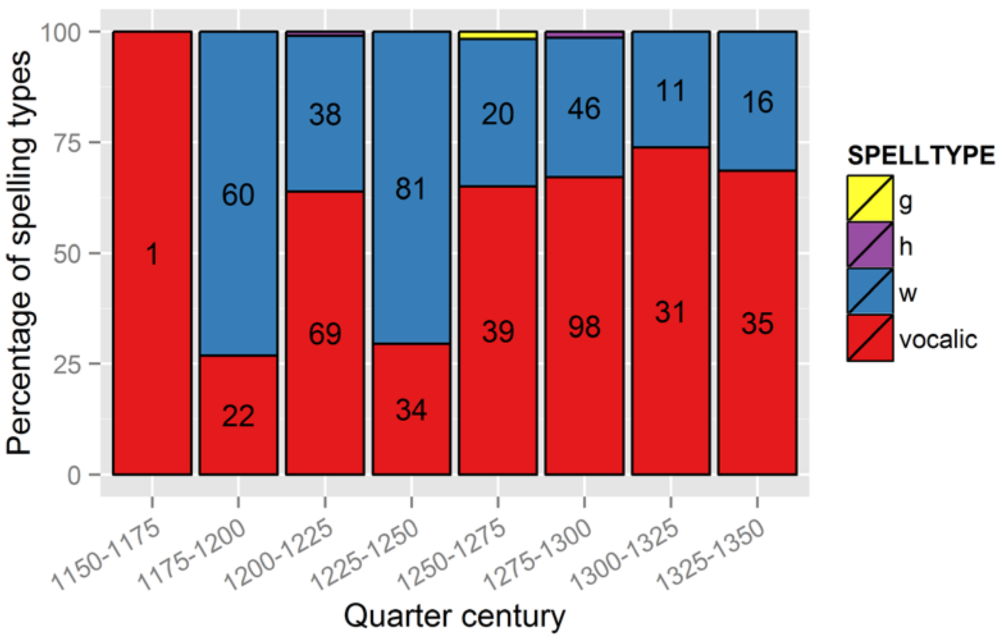

Figure 4-66: Proportion of spelling types by quarter century (INPUTTYPE: *SAWOL*)

The first fact to take note of is that Pinsker (1974: 33-34) generally seems to have been right, at least about the temporal difference: *SAWOL*- (and *TREOW*-)type forms show a relatively high propensity for [w]-vocalization in the LAEME CTT, with *VOCALIC* spelling proportions reaching up to c. 75% or more by the end of the period (although according to Pinsker's (1974) chronology they should have reached 100% in the first half of the period). By contrast, *NIWE*-type and *SCEAWIAN*-type forms remain fairly unvocalized throughout (although according to Pinsker (1974) they should be vocalized in the course of the eME period).

However, a close look at the actual word forms suggests that this difference might just as well be due to the factor of tautosyllabicity: In *TREOW*- and *SAWOL*-type forms the [w] was frequently tautosyllabic with the preceding vowel (e.g. *fopre*, *vour* 'four', *eou* 'you', *treo* 'tree', *kneolinde* 'kneeling'; *knau* 'know', *saule*, *soule*, *zaule* 'soul') while in *NIWE*- and *SCEAWIAN*-type forms the [w] was more frequently non-tautosyllabic (e.g. *neope*, *nipan* 'new', *hepe* 'hue', *steward* 'steward'; *fewe* 'few', *sseawynges* 'showings', *shæpest* '(you) show', *schrewe* 'shrew').[326]

4.1.8 Accentuation

As we saw in section 2.4, the accentuation, i.e. the relative phonetic prominence, of the syllable to which the preceding vowel belonged is one of the less-mentioned factors influencing the vocalization of lOE semivowels. In fact, within the literature surveyed in section 2.4, this factor is mentioned only once (Campbell 1977: 114; see section 2.4.1.3 [viii]).

Nevertheless, in the present section the influence of this factor on the change will be quantified and visualized. As described in section 3.2.1.1.2 above, the variable ACCENTED has been kept simple, i.e. binary (*YES*/*NO*), even though word stress is a relative phenomenon, so that it is possible to speak of secondary and even tertiary stresses in words (cf. Minkova 2014a: 286).[327] The variable levels are coded so as to answer the question of whether or not the syllable to which the preceding vowel belonged was the primary-stressed syllable of a lexical item in lOE.

4.1.8.1 Description

The ratio of ACCENTED: *YES* to ACCENTED: *NO* cases is relatively balanced in the retrieved data: 9,744 of the findings represent lexel-grammel combinations that

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326 This is the result of a purely qualitative evaluation of lists of forms; the four [w]-relevant INPUTTYPES and the variable TAUTOSYLLABICITY are not closely correlated, as their fairly low squared $GVIF^{1/(2 \times df)}$ values (~ 1.1) show. – It remains to be seen in section 4.2.3.3 whether INPUTVOWELQUALITY turns up as a significant predictor in multivariate regression models for the INPUTCONSONANT: *W* data.

327 Cf. Mitchell and Robinson (2012: 13-14) and Minkova (2014a: 294-314) on word stress in OE and ME.

have been coded as ACCENTED: *YES*; 7,356 of the findings have been coded as ACCENTED: *NO*. Only about a thousand findings do not have an ACCENTED value. Figure 4-67 below visualizes these proportions.

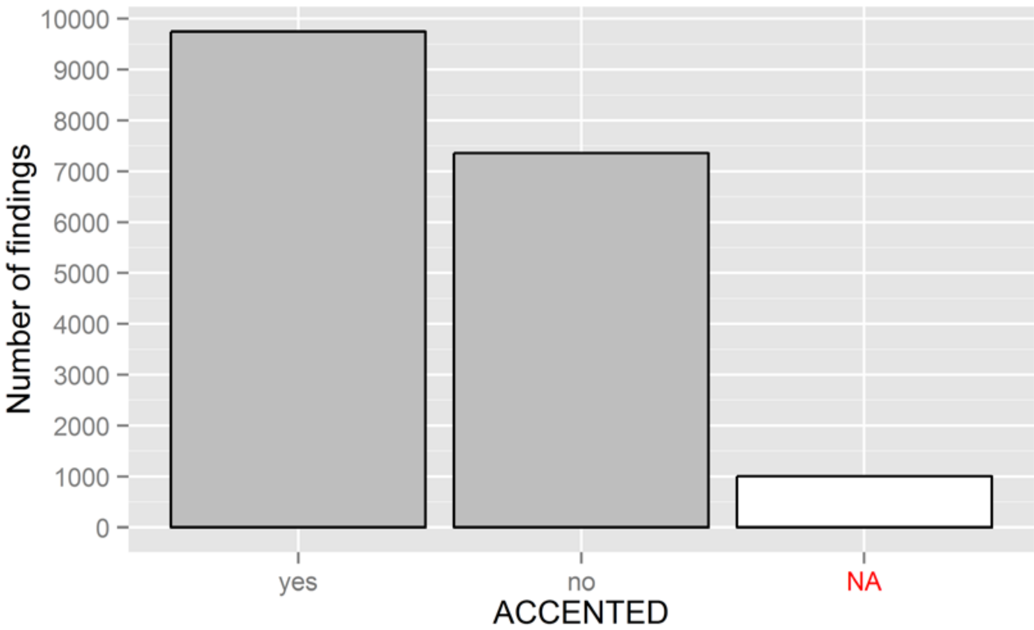

Figure 4-67: Accented vs. non-accented cases in the data

Collinearity (cf. Backhaus et al. 2011: 93ff.; Field, Miles and Field 2012: 274ff.; Gries 2013: 264) of ACCENTED with (TAUTO-)SYLLABICITY and INPUT-CONSONANT was tested for, but no significant collinearity with either of these variables was found.[328]

4.1.8.2 Analysis: Spellings ~ accentuation

The proportion of *VOCALIC* spellings is highly significantly ($p < 0.001$) larger for non-accented cases (c. 78%) than for accented cases (c. 59%), as the `ctree()` dendrogram in Figure 4-68 demonstrates.

[328] Variance-inflation values are relatively low (all squared $GVIF^{1/(2 \times df)} < 1.1$).

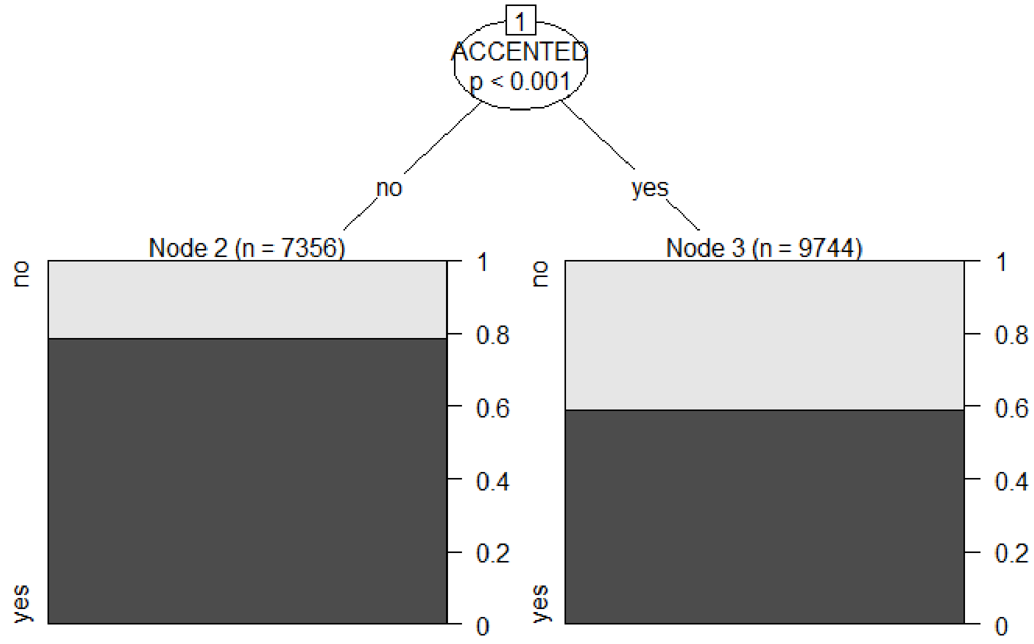

Figure 4-68: Conditional inference tree for VOCALIC ~ ACCENTED

Similarly, a GLM that uses ACCENTED as the only predictor variable for VOCALIC detects a highly significant influence of the variable although the model explains only 6% of the occurring variance in *VOCALIC* spelling proportions (Nagelkerke's pseudo-$R^2 = 0.06$).[329]

However, we cannot conclude that the vocalization of semivowels took place any earlier in connection with unstressed syllables than it did in connection with stressed syllables. It is hard to draw any safe conclusion regarding the influence of the factor ACCENTED on the *process* of semivowel vocalization from these differences without the inclusion of a time variable. Should we find that the same basic relationship between spellings in stressed syllables and spellings in unstressed syllables remains proportionately similar at any given point in time in the data, the difference would illustrate little more than the synchronic-linguistic fact that unstressed syllables tend to be phonetically reduced. In order to find out whether this factor plays a significant role in influencing the process of vocalization, we need to investigate its interaction with time.

329 The code used to run this model in R is `glm(VOCALIC ~ ACCENTED)`; the null deviance is 21,615 on 17,099 df; the model's residual deviance is at 20,865 on 17,098 df.

4.1.8.3 Analysis: Spellings ~ accentuation + time

The variables ACCENTED and QUARTERCENT combined with their interaction account for c. 11.6% of the variance in *VOCALIC* spelling proportions (i.e. the model `glm(VOCALIC ~ ACCENTED * QUARTERCENT)` has a Nagelkerke pseudo-R^2 value of 0.116).[330] Figures 4-69 and 4-70 visualize the results of dividing up the findings according to ACCENTED values and showing their associated spelling types over time (using the QUARTERCENT variable).

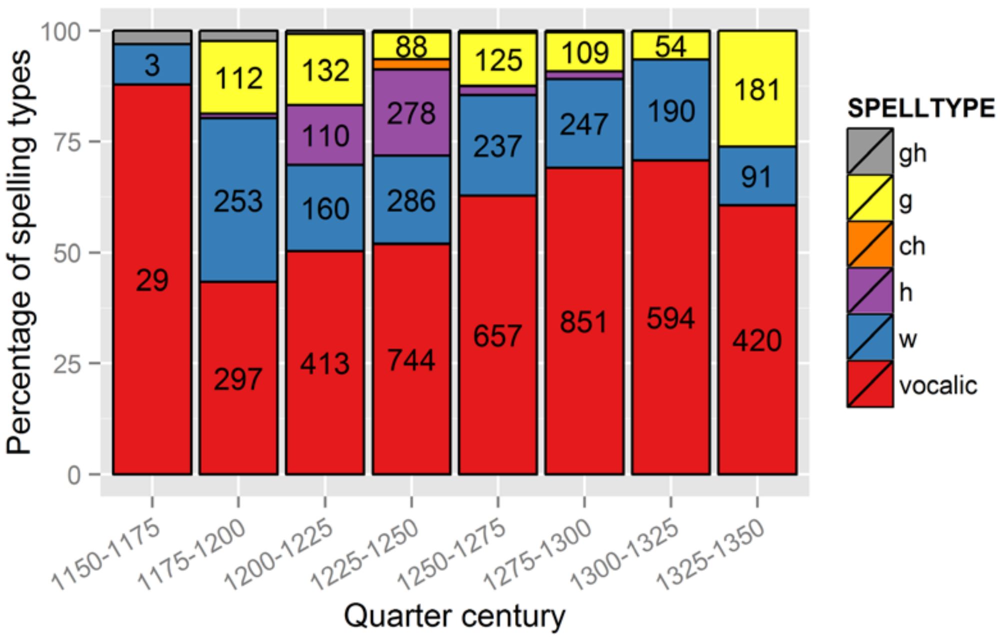

Figure 4-69: Proportion of spelling types by quarter century (ACCENTED: *YES*)

330 The null deviance is 15,134 on 11,907 df; the model's residual deviance is still as high as 14,098 on 11,892 df.

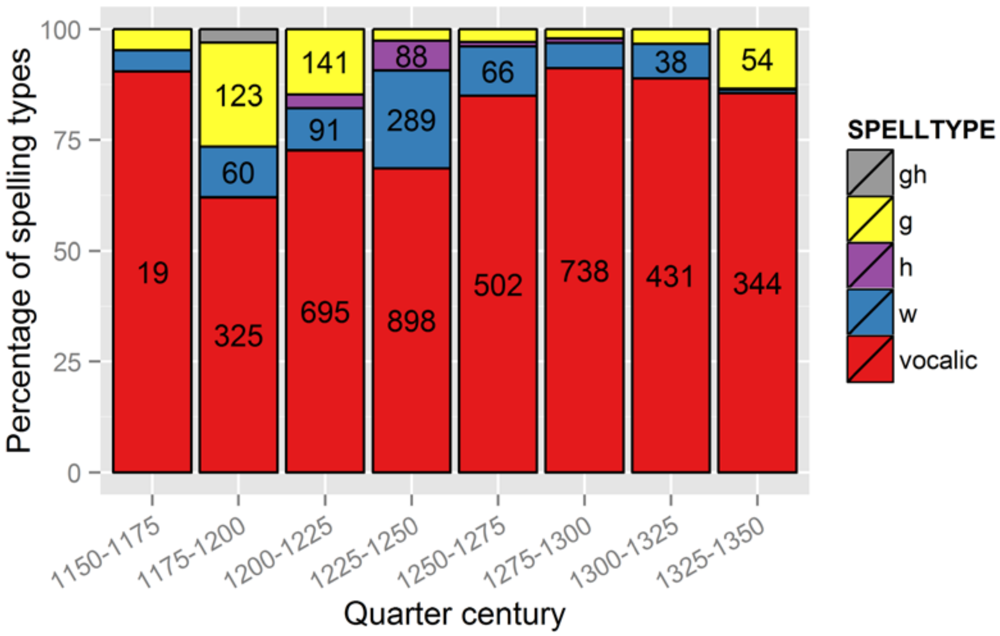

Figure 4-70: Proportion of spelling types by quarter century (ACCENTED: *NO*)

Figures 4-69 and 4-70 corroborate the finding that the proportion of *VOCALIC* spellings is generally higher in the non-accented cases (see section 4.1.8.2 above), and, more importantly, that this is true for every single quarter century. There seem to be no other significant differences between the two plots; almost all other spelling types just seem proportionately smaller in Figure 4-70 than they are in Figure 4-69, with no notable exceptions.

In regards to the question of whether or not the variable ACCENTED interacts with time in any way, we might note that the increase of *VOCALIC* spelling proportions seems fairly linear in the accented cases (Figure 4-69), but in the unaccented cases (Figure 4-70) there seems to be a more sudden increase between the fourth and the fifth bar (i.e. around 1250 CE). In the better-attested quarter centuries before this increase *VOCALIC* spelling percentages generally lie between c. 60% and 70%, whereas they lie between c. 80% and 90% after 1250. Whether or not this difference is significant will be seen in the following.

We will first inspect two QUARTERCENT-based `ctree()` dendrograms, run on accented and non-accented data, respectively:

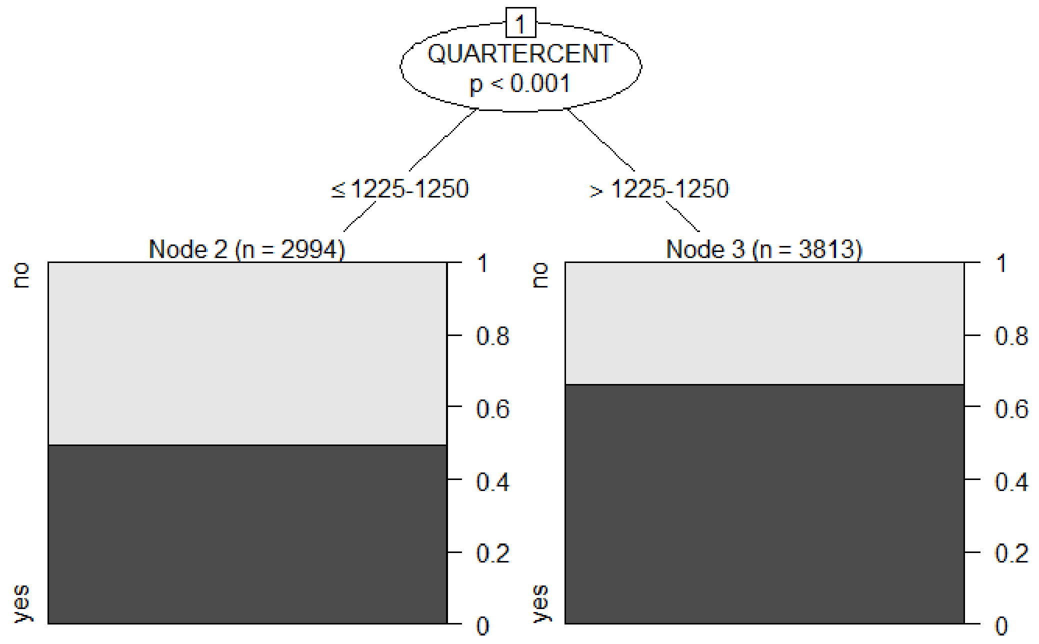

Figure 4-71: Conditional inference tree for VOCALIC ~ QUARTERCENT (ACCENTED: *YES*)

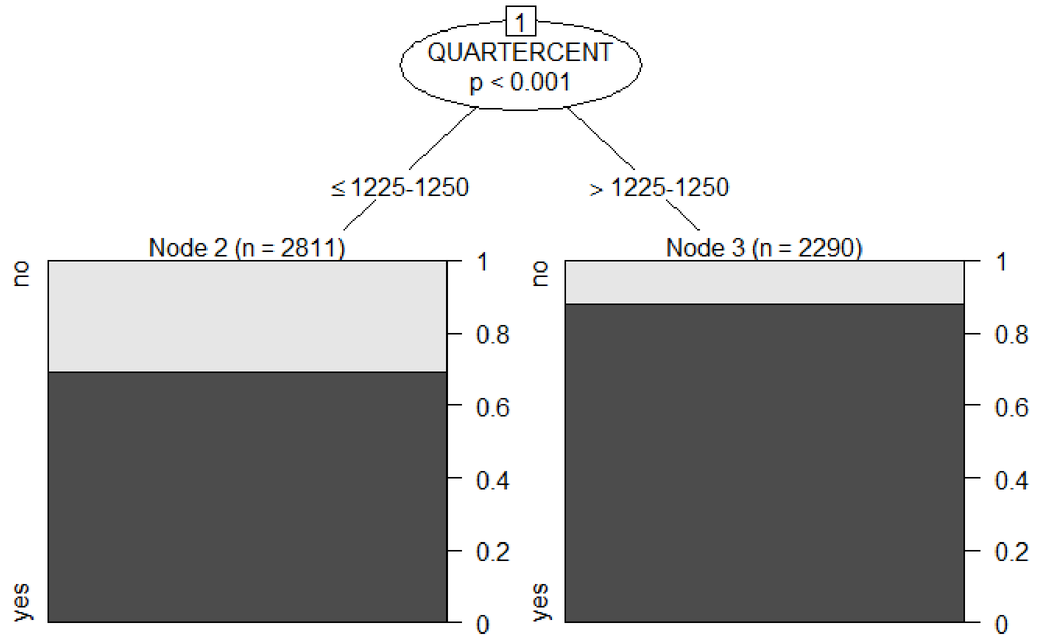

Figure 4-72: Conditional inference tree for VOCALIC ~ QUARTERCENT (ACCENTED: *NO*)

Figures 4-71 and 4-72 show two different conditional inference trees for VOCALIC as predicted by QUARTERCENT, with the data split up according to the two ACCENTED levels. The striking fact is that in both cases the `ctree()` algorithm detects only one split among consecutive quarter centuries, namely at 1250 CE, and that this split is highly significant ($p < 0.001$) for both accented and non-accented cases.[331] This means that, according to the `ctree()` plots, the ACCENTED: *YES* data and the ACCENTED: *NO* data behave the same in regards to their development over time (as manifested in *VOCALIC* spelling proportions).

On the other hand, in a GLM that includes the interaction of the two predictors ACCENTED and QUARTERCENT, and for which the contrasts have been set so as to compare all pairs of consecutive quarter centuries, the contrast between the fourth and the fifth quarter centuries is the only one which shows a (very significant, $p < 0.01$) interaction with QUARTERCENT. According to this model, the difference between the levels of the variable ACCENTED is highly significant, and most differences between consecutive QUARTERCENT levels are at least very significant, whereas the interaction between the two variables is mostly non-significant, except for the above-mentioned contrast between the fourth and the fifth quarter centuries. The significance levels of the variables and their interaction are summarized in the following:

- ACCENTED (*YES* vs. *NO*) — $p < 0.001$ ***
- QUARTERCENT:
  - 1150-1175 vs. 1175-1200 — $p < 0.001$ ***
  - 1175-1200 vs. 1200-1225 — $p < 0.01$ **
  - 1200-1225 vs. 1225-1250 — $p = 0.639$
  - 1225-1250 vs. 1250-1275 — $p < 0.001$ ***
  - 1250-1275 vs. 1275-1300 — $p < 0.01$ **
  - 1275-1300 vs. 1300-1325 — $p = 0.372$
  - 1300-1325 vs. 1325-1350 — $p < 0.001$ ***
- INTERACTION:
  - ACCENTED :: 1150-1175 vs. 1175-1200 — $p = 0.597$
  - ACCENTED :: 1175-1200 vs. 1200-1225 — $p = 0.176$

[331] In fact, explicitly running the algorithm on a single model that uses both QUARTERCENT and ACCENTED as predictor variables also detects this highly significant split between the fourth and fifth quarter centuries, making the variable ACCENTED show up as insignificant in comparison, and thus leading to an output that is very similar to Figures 4-71 and 4-72.

- ACCENTED :: 1200-1225 vs. 1225-1250 $p = 0.067$.
- ACCENTED :: 1225-1250 vs. 1250-1275 $p < 0.01$ **
- ACCENTED :: 1250-1275 vs. 1275-1300 $p = 0.110$
- ACCENTED :: 1275-1300 vs. 1300-1325 $p = 0.129$
- ACCENTED :: 1300-1325 vs. 1325-1350 $p = 0.550$

Thus, we can conclude that the variable ACCENTED itself does play a significant role, but only in the sense that, synchronically speaking, unstressed syllables tend to show higher rates of *VOCALIC* spellings at any given time. The variable's interaction with time turns up as mostly non-significant, with one possible exception: Unstressed syllables show a higher rate of change towards *VOCALIC* spellings around 1250 CE (cf. the fourth and fifth bars in Figure 4-70).

4.1.8.4 Analysis: Spellings ~ accentuation + input consonant + result + time

We have so far looked at the factor of accentuation in the entire data; we will now divide up the findings according to the three input consonants (and, once again, in the case of voiced velar fricatives, according to RESULT in order to distinguish between secondary palatals and 'secondary labial-velars').

The following two plots depict the accented and non-accented primary palatals (lOE [j]):

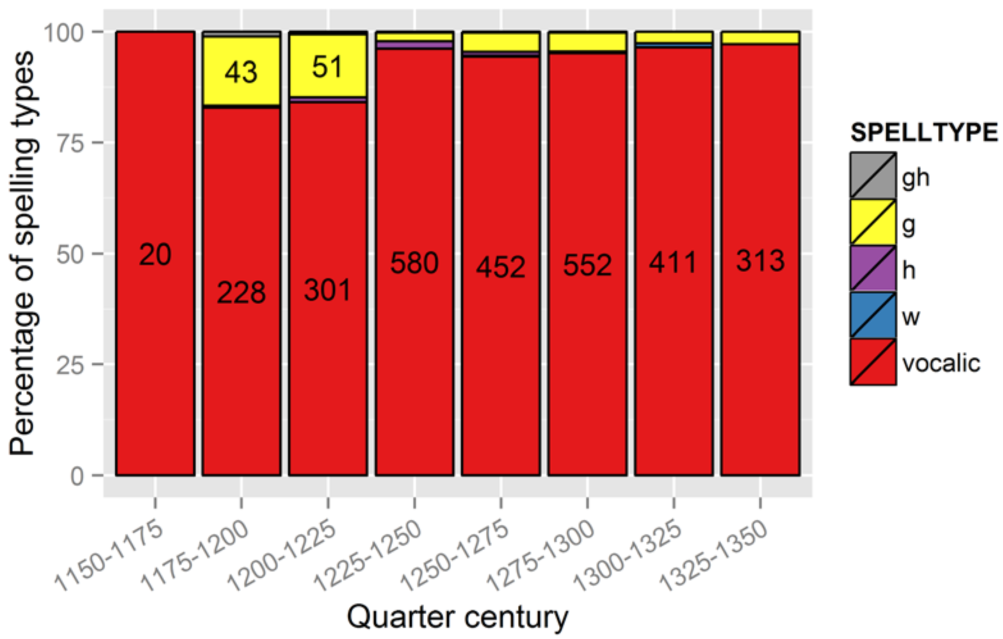

Figure 4-73: Proportion of spelling types by quarter century (INPUTCONSONANT: [j], ACCENTED: *YES*)

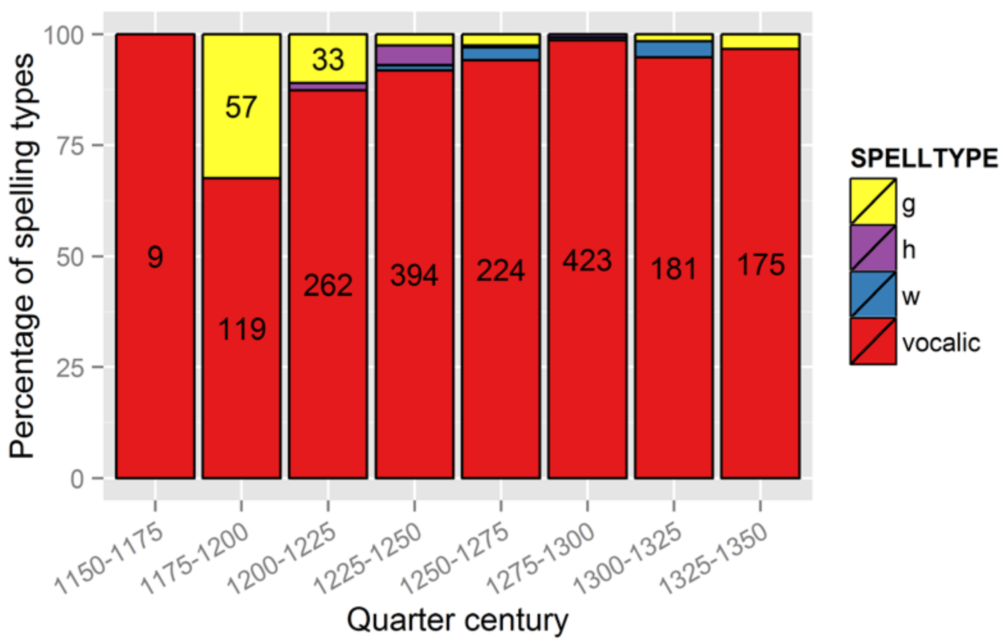

Figure 4-74: Proportion of spelling types by quarter century (INPUTCONSONANT: [j], ACCENTED: *NO*)

The differences between the spelling type proportions in the two Figures are minute, which is due to the large overall proportion of *VOCALIC* spellings for primary palatals in the data. In fact, 1175-1200 seems to be the only quarter century that shows a visible difference in this respect, although this difference is not statistically significant (Fisher's exact test even yields a *p*-value of 1).[332] Interestingly, the (very few) unetymological *WTYPE* spellings (blue) seem more present in the unstressed findings (Figure 4-74) than in the stressed findings.

We will now investigate the influence of accentuation in the secondary palatals (lOE [ɣ] > [i]).

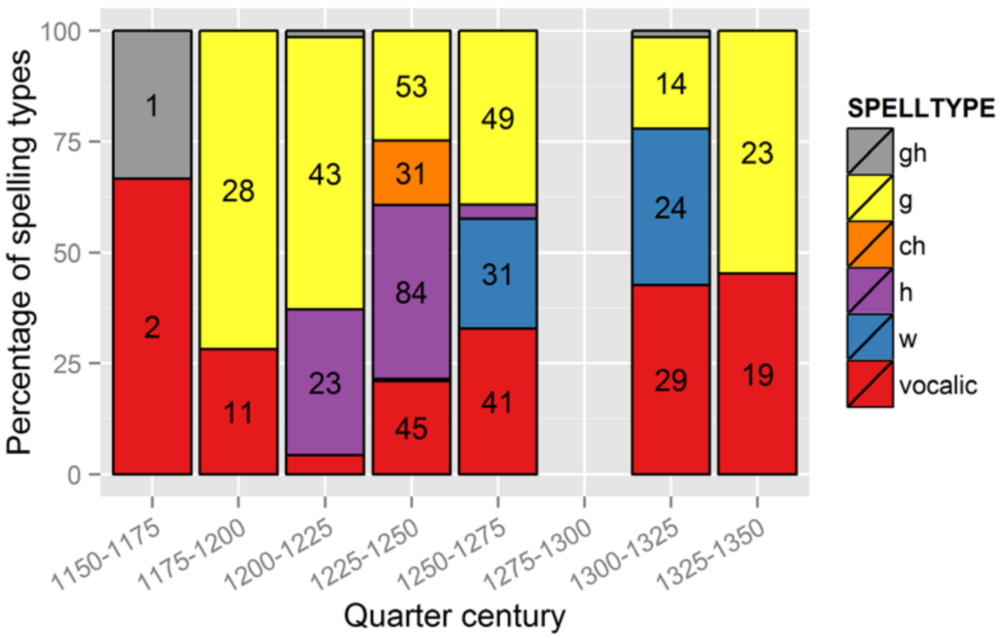

Figure 4-75: Proportion of spelling types by quarter century ([ɣ > i], 'secondary palatals', ACCENTED: *YES*)

[332] Fisher's exact test (cf. Fisher 1922) is used instead of Pearson's χ^2 test because the tables for the quarter century 1175-1200 contain some very small numbers (cf. Field, Miles and Field 2012: 816; Adler 2012: 390-391). Since a total of 451 of the findings in the quarter century 1175-1200 have ACCENTED, INPUTCONSONANT and SPELLTYPE values, the significance tests have a large power (power = 1).

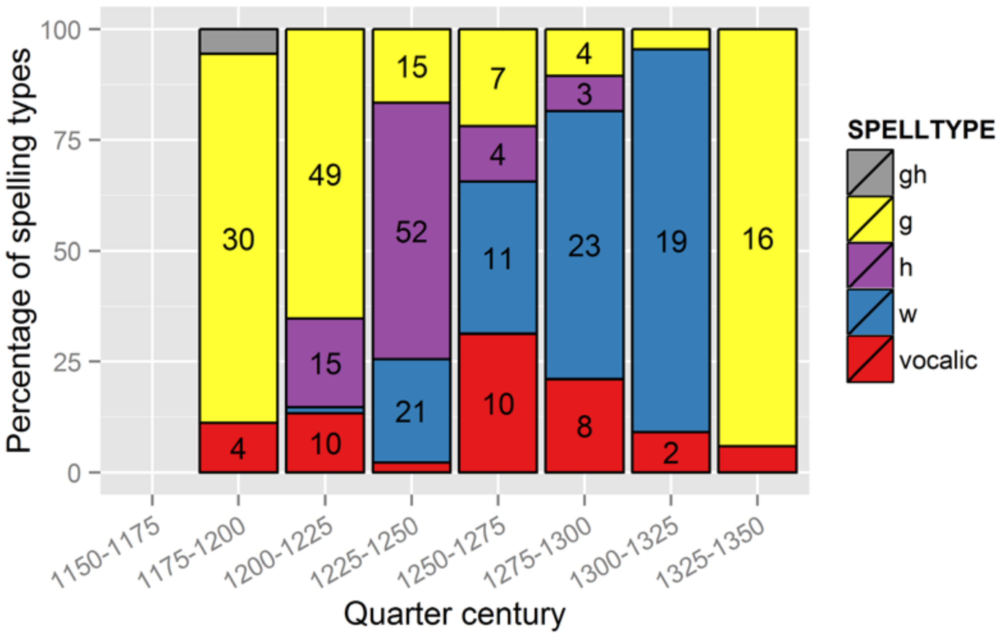

Figure 4-76: Proportion of spelling types by quarter century ([ɣ > i], ‘secondary palatals’, ACCENTED: *NO*)

The first fact to note is that with the secondary palatals we are dealing with far smaller absolute quantities than we were with the primary palatals (cf. Figures 4-73 and 4-74). Nevertheless, we might say that over the second half of the eME period the two plots for the secondary palatals seem to show diverging characteristics: Contrary to our expectations based on the overall data (Figures 4-68 and 4-69), *VOCALIC* spelling proportions seem to be higher in accented findings (even in spite of the upsurge of <ȝ> spellings in the final quarter century); the non-accented findings not only contain more ‘consonantal’ spelling types, but actually more *WTYPE* spellings, and they are therefore remarkably similar to the findings for ‘secondary labial-velars’ (see Figure 4-77 on the following page). Despite these impressions, the differences between spelling types in stressed and unstressed syllables in the final quarter centuries are not significant: Fisher’s exact test run on the findings from the final two quarter centuries yields *p*-values of 0.2 and 0.067, respectively.[333]

[333] Once again, Fisher’s exact test is used because the tables for these quarter century contain some very small numbers (see fn. 332). The absolute numbers are large enough for significance tests to have a large power of c. 0.8.

Next, we will turn to the 'secondary labial-velars' (lOE [ɣ] > [u]).

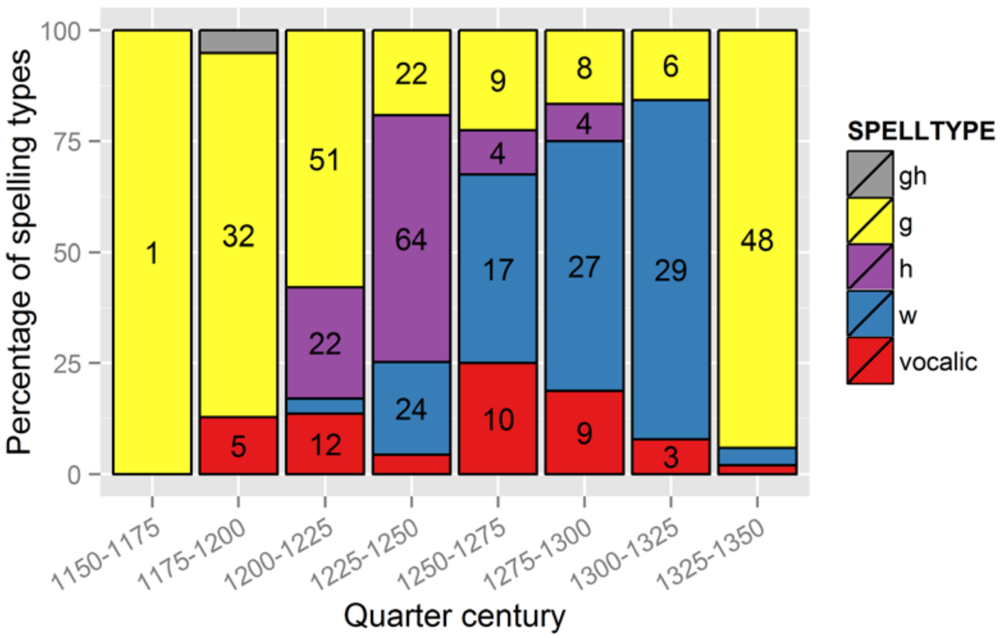

Figure 4-77: Proportion of spelling types by quarter century ([ɣ > u], 'secondary labial-velars', ACCENTED: *YES*)

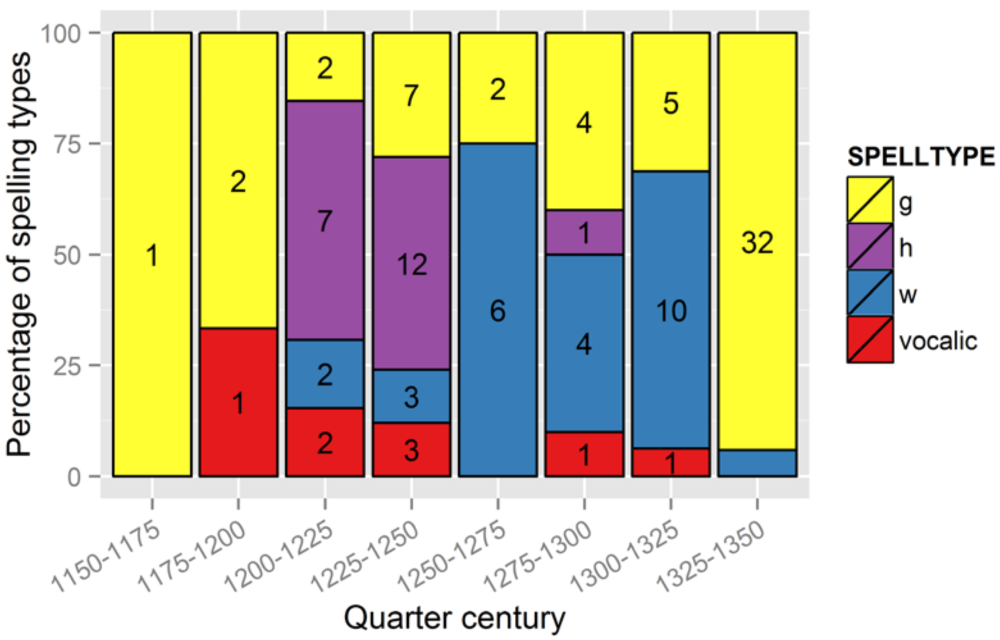

Figure 4-78: Proportion of spelling types by quarter century ([ɣ > u], 'secondary labial-velars', ACCENTED: *NO*)

As with the secondary palatals, we are dealing with rather small absolute numbers in the Figures above. In fact, the absolute numbers are so small that it seems unsafe to draw any firm conclusions. That being said, the proportions here seem very similar to those observed in the unstressed secondary palatals (Figure 4-76). There also do not seem to be any differences between stressed an unstressed 'secondary labial-velars'. In fact, given the small numbers of observances on which especially Figure 4-78 above is based, it actually seems remarkable how closely the two Figures resemble each other.

Reflexes of forms with lOE labial-velar semivowels are more numerous in the data, and the corresponding plots do show some conspicuous differences:

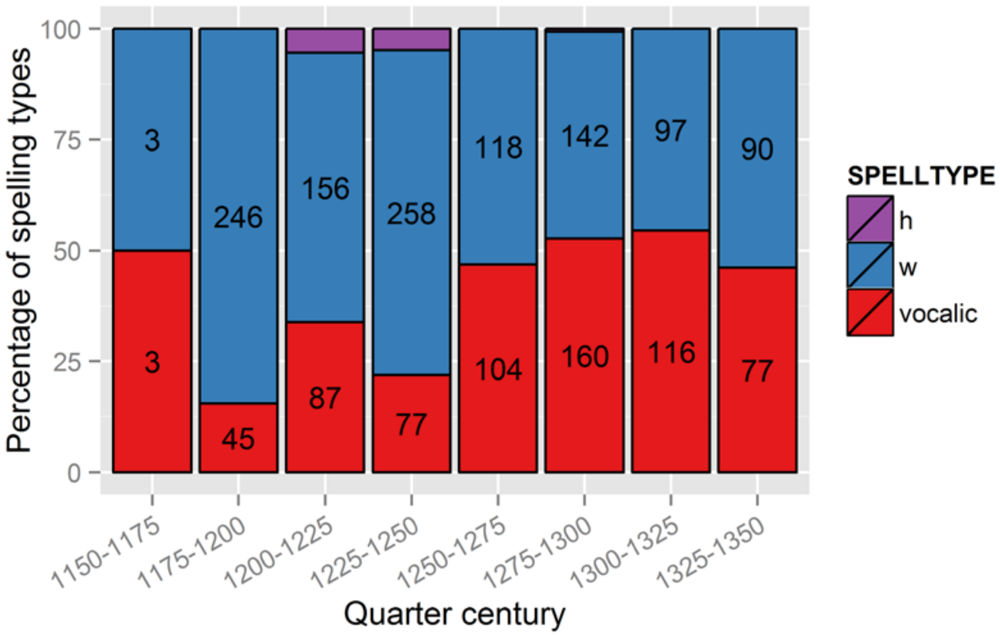

Figure 4-79: Proportion of spelling types by quarter century (INPUTCONSONANT: [w], ACCENTED: *YES*)

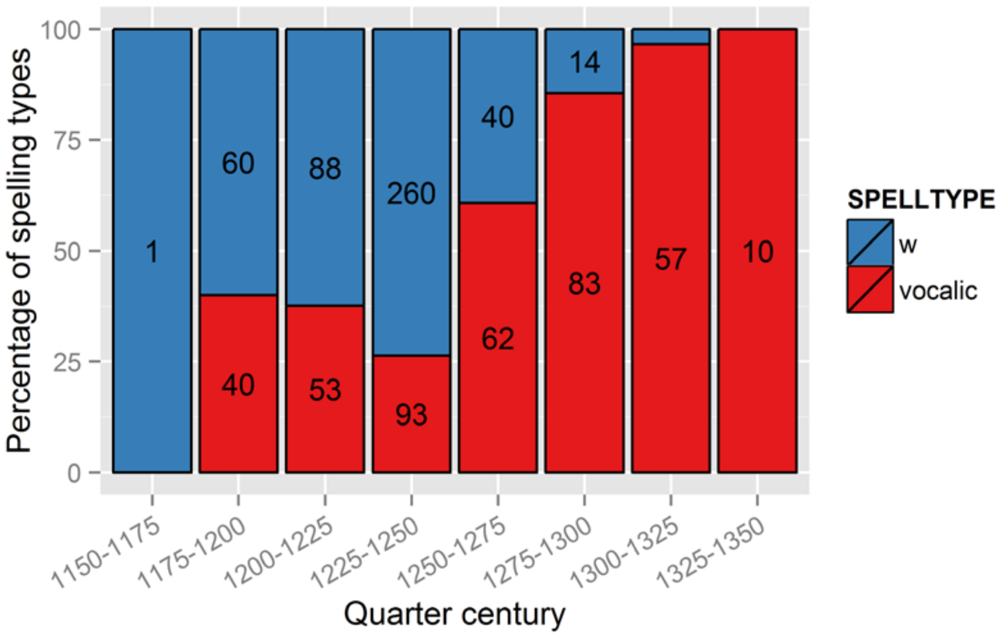

Figure 4-80: Proportion of spelling types by quarter century (INPUTCONSONANT: [w], ACCENTED: *NO*)

The plots for the labial-velars present the most balanced picture: In all well-attested quarter centuries, *VOCALIC* spelling proportions (i.e. percentages of forms from which <w> and <p> are absent) are higher in unstressed syllables than they are in stressed syllables. Moreover, as with the overall findings (cf. Figures 4-68 and 4-69), the differences between the spellings of labial-velars in stressed and unstressed syllables become much more pronounced in the second half of the eME period: The vocalization of [w] becomes visible most quickly in unstressed syllables after 1250: *VOCALIC* spellings in unstressed syllables almost reach 100% by 1300 CE, at which time the proportion of *VOCALIC* spellings in stressed syllables is still at c. 50%. In fact, if a GLM with QUARTERCENT as the only predictor for VOCALIC is run on the findings that have INPUTCONSONANT: *W* and ACCENTED: *NO*, the fourth to the sixth quarter centuries show highly significant ($p < 0.001$) increases of *VOCALIC* spelling proportions, and the increase of *VOCALIC* spellings from the sixth to the seventh quarter century is still significant at the $p < 0.05$ level.

4.1.8.5 Summary

As we have seen, the variable ACCENTED, i.e. the question of whether or not the preceding vowel belonged to a primary-stressed syllable in lOE, is a meaningful factor, at least insofar as the proportions of *VOCALIC* spellings are generally higher in unstressed syllables than in stressed syllables. However, this can be attributed for the most part to the general tendency towards unstressed syllables being reduced (cf. Giegerich 1992: 66ff.; 285). We also saw that labial-velars in unstressed positions adopt *VOCALIC* spellings rather quickly after c. 1250 CE.

Sections 4.1.9 and 4.1.10 will deal with factors which can be said to have something in common not only with each other but also with accentuation, since closed-class lexical items (see section 4.1.10) tend to be unstressed and to occur frequently (see section 4.1.9).

4.1.9 Lexeme frequency

Lexeme frequency is the first in a row of linguistic factors which have rarely (if ever) been mentioned explicitly as influencing the vocalization of postvocalic semivowels in historical-linguistic literature, but which will have played a significant role if we take the theory of the lexical diffusion of sound changes to be true (cf. Bybee 2007c: 946ff.; Campbell 2013: 196; Phillips 2015; also see section 2.1.2 above for a brief description of the theory). With sound changes that fall into the category of lenition, it has been found that high-frequency words were the ones to change first (cf. Phillips 1983, 1984; Bybee 2012: 214). In this section, we will investigate the effect of lexeme frequency on the proportion of ‘vocality’ among the retrieved spellings.

4.1.9.1 Description

As described in section 3.2.1.1.2, the lexically bound variable FREQUENCY gives the absolute number of findings of the lexel in question within the LAEME CTT.[334]

[334] FREQUENCY is therefore one of the few variables whose values are dependent on the corpus from which we are retrieving data.

Figure 4-81 below presents an overview of which of the retrieved lexels occur most frequently in the corpus.[335]

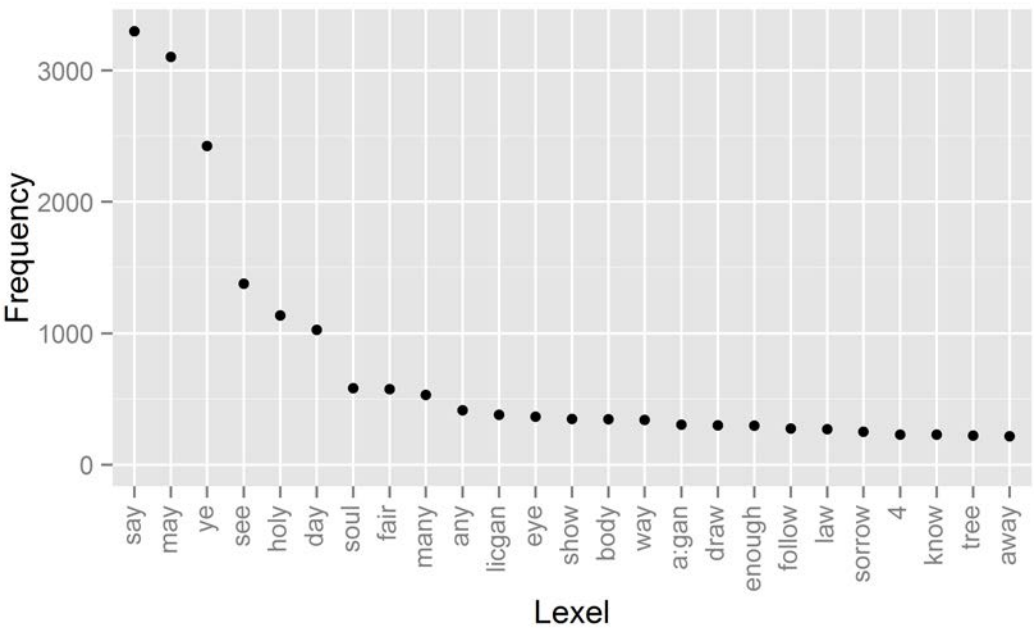

Figure 4-81: Corpus frequencies of the twenty-five lexels which occur most frequently in the findings

It is important to bear in mind that Figure 4-81 does not contain every lexel in the LAEME CTT, but only relevant lexels, i.e. words that contained semivowels or voiced velar fricatives in lOE which were vocalized in ME.[336] The first few lexels (*SAY*, *MAY*, *YE*, *SEE*, *HOLY*, *DAY*) are ones that occur more than 1,000 times in the corpus; we will refer to these as 'exceptionally frequent' in the following. Another few items have FREQUENCY values of around 500, following which the FREQUENCY values decrease more and more slowly, as Figure 4-81 illustrates.

4.1.9.2 Analysis: Spellings ~ lexeme frequency

We will now analyze the influence of the variable FREQUENCY on spelling types. Since FREQUENCY is a continuous variable, we can measure its correlation with other continuous variables directly. If we create a numeric variable that indicates the percentage of *VOCALIC* spellings for each lexeme (we will call this variable

335 The absolute numbers are given in Table A-13 in Appendix F.

336 This explains why the most frequently occurring lexel in the findings, *SAY*, is not a grammatical, but a lexical item; word class will be discussed in more detail in section 4.1.10.

VOCALIC.LEXEL), we detect a small positive overall correlation (Pearson's correlation coefficient r = c. 0.28)[337] between this variable and FREQUENCY.[338] Similarly, a simple linear regression model (LM) that uses FREQUENCY as the only predictor for VOCALIC.LEXEL yields the following results:

	Estimate:	**Standard error:**	***t*-value:**	**Pr(>|t|):**	
Intercept:	56.99	0.3125	182.39	$p < 0.001$	***
FREQUENCY:	0.0078	0.0010	39.35	$p < 0.001$	***
Multiple R^2: 0.0788; adjusted R^2: 0.07874 F-statistic: 1,549 on 1 and 18,105 degrees of freedom Model p-value: < 0.001					

Table 4-19: Summary of the model `lm(VOCALIC.LEXEL ~ FREQUENCY)`

The model summarized in Table 4-19 above specifies that FREQUENCY is a highly significant ($p < 0.001$) predictor for VOCALIC.LEXEL. The multiple R^2 value of c. 0.0788 (which is the square of the correlation coefficient r of c. 0.28 mentioned above, cf. Field, Miles and Field 2012: 258; 922) means that the variable FREQUENCY explains just about 7.9% of the variance in *VOCALIC* spelling proportions and leaves over 92% of the variance unexplained. In addition, the model parameters indicate that the likelihood of the most infrequent words to show *VOCALIC* spellings is about 57% (the "Intercept" value is the VOCALIC.LEXEL value that would be expected at 0 on the FREQUENCY scale),[339] and whenever the frequency of a lexeme increases by 1, its likelihood to show *VOCALIC* spellings increases by c. 0.0078% (which is what the first column in Table 4-19 above, labeled "Estimate", means).[340] These figures become more tangible if we multiply them by 1,000: If we move from the most infrequent words to words that have a FREQUENCY value of 1,000, the likelihood for them to show *VOCALIC* spellings increases by c. 7.8% (i.e. to c. 64.7%).

337 Cf. Field, Miles and Field 2012: 209ff. for more on correlation.

338 However, see below for much smaller results using the Kendall rank-correlation coefficient τ (tau).

339 Of course, in this case the actual intercept (a FREQUENCY of 0) is not meaningful. – For more on the interpretation of model parameters, cf. e.g. Field, Miles and Field 2012: 259 and Teetor 2011: 276-277.

340 The standard error indicates that there is some variance, but the value of the t-statistic and its associated p-value indicate that the rate at which 'vocality' increases with lexeme frequency is significantly different from 0 (cf. Field, Miles and Field 2012: 259).

Figure 4-82 visualizes these predictions with the help of a regression line:

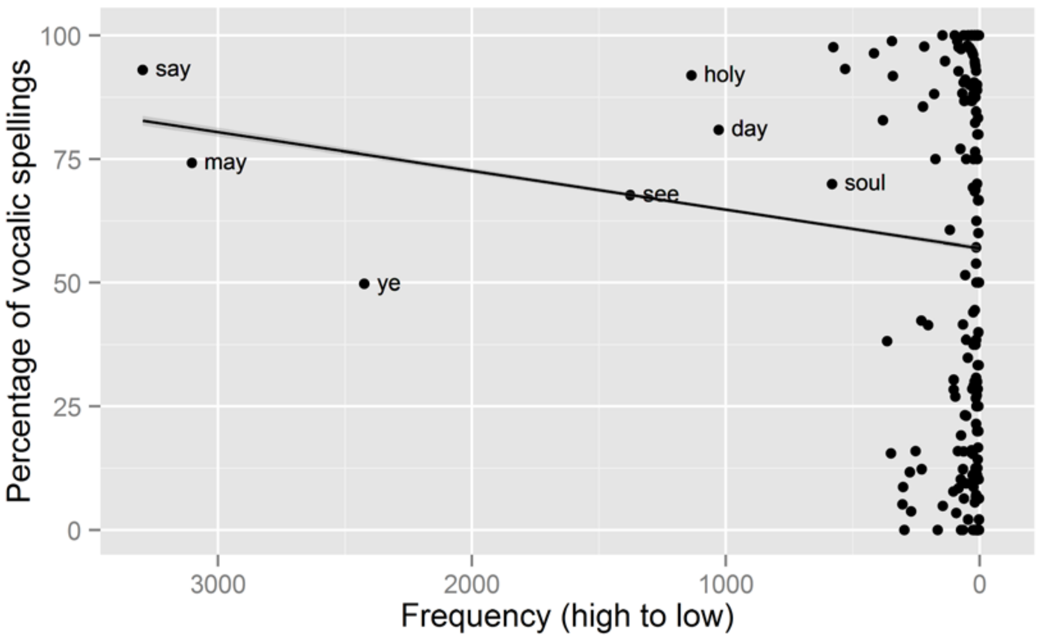

Figure 4-82: *VOCALIC* spelling proportions by lexeme frequency, with a linear regression line[341]

As specified by the model summary above (see Table 4-19), the regression line begins at the right-hand side at about 57% and increases by roughly 8% as the FREQUENCY values increase by 1,000. We can see at once that the regression is only a rough approximation that does not describe the data very well (as mentioned above, the model's R^2 = c. 0.079). Especially the many infrequent words (on the right-hand side of the plot) exhibit a large range of different *VOCALIC* spelling percentages on the y-axis. The low predictive power of FREQUENCY is also demonstrated by the fact that the Kendall rank-correlation coefficient (Kendall's τ) for VOCALIC.LEXEL and FREQUENCY is relatively low compared to Pearson's *r* ($\tau = 0.146$; $r = 0.28$), indicating a very small positive correlation.[342]

[341] The FREQUENCY values on the x-axes of this and the following Figures are sorted *from high to low* in order to make these plots comparable to Figure 4-81 as well as to Figures 4-85 through 4-88, which all list the most frequent items on the left-hand side.

[342] As already mentioned (see section 4.1.2.2.1), Kendall's rank-correlation coefficient τ is based on value rankings, which comes close to making up for the fact that we have many instances of low-frequency lexels, and thus many lexels that share the same FREQUENCY value (cf. Field, Miles and Field 2012: 225).

If we therefore trim away some of the ‘noise’ in the data by excluding the most infrequent lexemes as well as the exceptionally frequent lexemes and allow only FREQUENCY values that lie between 100 and 1,000 to enter into the equation, we arrive at a much better model and a plot with a significantly steeper regression line:

	Estimate:	**Standard error:**	***t*-value:**	**Pr(>|t|):**	
Intercept:	21.9995	1.0383	21.19	$p < 0.001$	***
FREQUENCY:	0.1107	0.0027	40.29	$p < 0.001$	***

Multiple R^2: 0.1924; adjusted R^2: 0.1923
F-statistic: 1,623 on 1 and 6,814 degrees of freedom
Model p-value: < 0.001

Table 4-20: Summary of the model `lm(VOCALIC.LEXEL ~ FREQUENCY)` (only frequencies between 100 and 1,000)

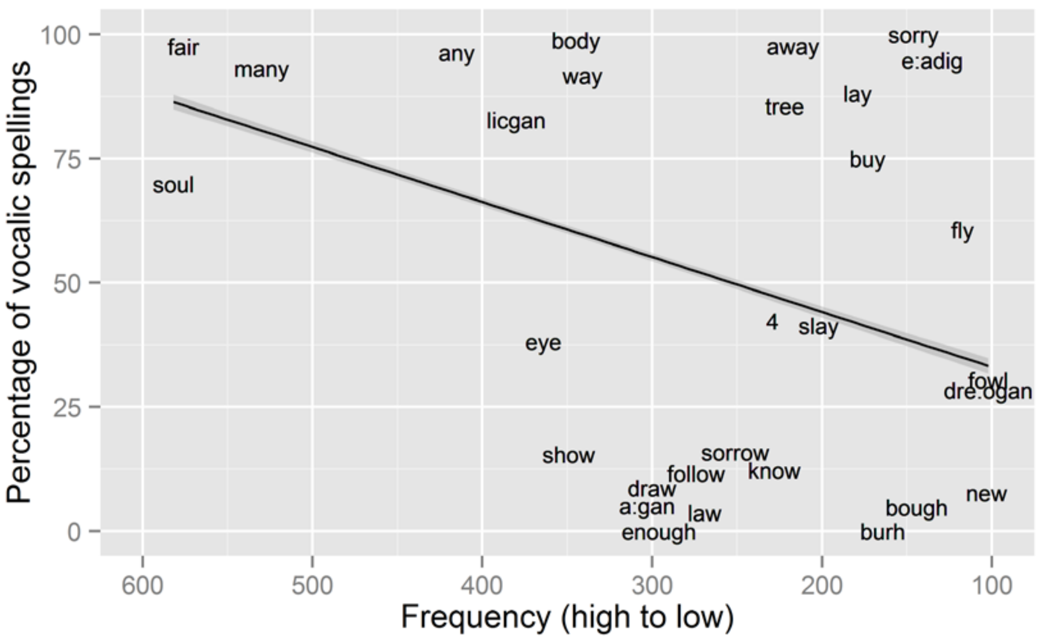

Figure 4-83: *VOCALIC* spelling proportions by lexeme frequency (minimum frequency 100, maximum frequency 1,000), with a linear regression line[343]

By thus excluding exceptionally frequent and infrequent lexemes and concentrating on what henceforth will be referred to as the ‘moderately frequent lexemes’, we arrive at a model that predicts *VOCALIC* spelling percentages of as low as c.

343 The x-axis actually ranges from 100 to 600 because there are no lexemes with frequencies of between 600 and 1,000 in the findings.

22% for the most infrequent lexical items (the intercept is not shown in Figure 4-83 above, whose reversed x-axis begins at 100 on the right-hand side), and predicts that these increase by c. 11% each time we add 100 to the FREQUENCY value (as opposed to the c. 0.78% increase per 100 FREQUENCY points predicted by the model using all data). Of course, this model is also not very accurate: Figure 4-83 still shows a large amount of variance especially in the right (i.e. low-frequency) half of the plot; in addition, this model predicts a *VOCALIC* spelling proportion of 100% for a FREQUENCY value of 704, which means that any lexeme with a corpus frequency exceeding 704 hits would be expected to show a *VOCALIC* spelling proportion of above 100% if the model were accurate for all data points. In other words, lexemes with a moderate FREQUENCY value show a rather extreme trend in regards to their *VOCALIC* spelling proportions. Correlation-measurement values for FREQUENCY and VOCALIC.LEXEL are significantly higher for this reduced set of data (Pearson's $R = 0.439$; KENDALL'S $\tau = 0.229$).

Applying the `ctree()` function to the findings using FREQUENCY as the only predictor leads to highly significant ($p < 0.001$ for each split) findings, which are plotted in Figure 4-84 and summarized below:

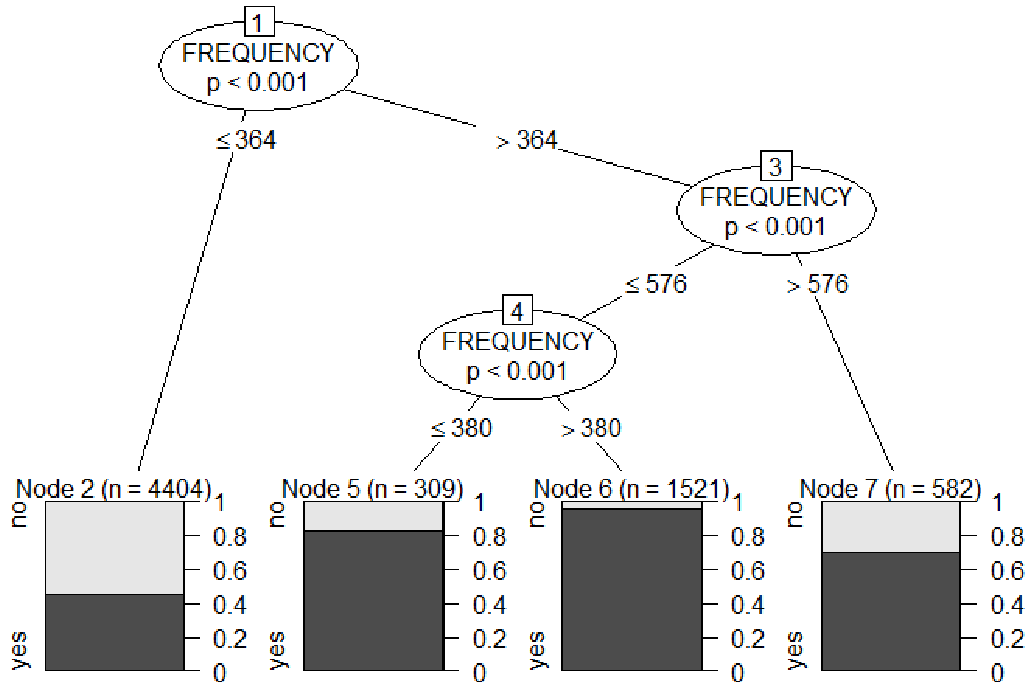

Figure 4-84: Conditional inference tree for VOCALIC ~ FREQUENCY (minimum frequency 100, maximum frequency 1,000)

The first split (node 1) is made between lexels with a corpus frequency of 364 or lower (i.e. the lexel *EYE* and everything to its right in Figure 4-83), for which an overall *VOCALIC* spelling proportion of just above 40% is calculated (node 2), and more frequently occurring lexels (i.e. the lexel *LICGAN* and everything to its left in Figure 4-83). Only five lexels (*LICGAN*, *ANY*, *MANY*, *FAIR*, and *SOUL*) remain within the latter group (cf. Figure 4-83). Among these, *SOUL* is the odd one out, with a *VOCALIC* spelling proportion of below 70% (node 7).[344] Considering the remaining set of lexels, *LICGAN*, whose *VOCALIC* spelling proportion is at about 80% (node 5), branches off from the others, whose combined *VOCALIC* spelling proportion is well above 90% (node 6). With the exception of the split concerning the lexeme *SOUL* (node 3), all of these splits and the resulting combined proportions of *VOCALIC* spellings point into the direction of the positive correlation between FREQUENCY and 'vocality' described above, i.e. they detect a higher *VOCALIC* spelling proportion on the 'more frequent' side of the split.

We will now look beyond the binary VOCALIC: *YES* / *NO* distinction and consider the more informative 'spelling type' outcome variables. Since the lOE consonantal input sounds differ in regards to the 'consonantal' spellings employed to represent them, it will be necessary to treat them in isolation. In order to do this we must once again split up the findings according to the variables INPUTCONSONANT and RESULT.

4.1.9.3 Analysis: Spellings ~ lexeme frequency + input consonant + result

Figure 4-85 on the following page shows the proportions of spelling types for the most frequent lexels whose lOE input consonant was a palatal semivowel. All eleven lexels whose FREQUENCY values are above 100 are included. Both the names of the lexels and their respective frequencies in the corpus (sorted from high to low) are listed on the x-axis.

344 N.b.: This is the only remaining lexel whose input consonant is the labial-velar semivowel.

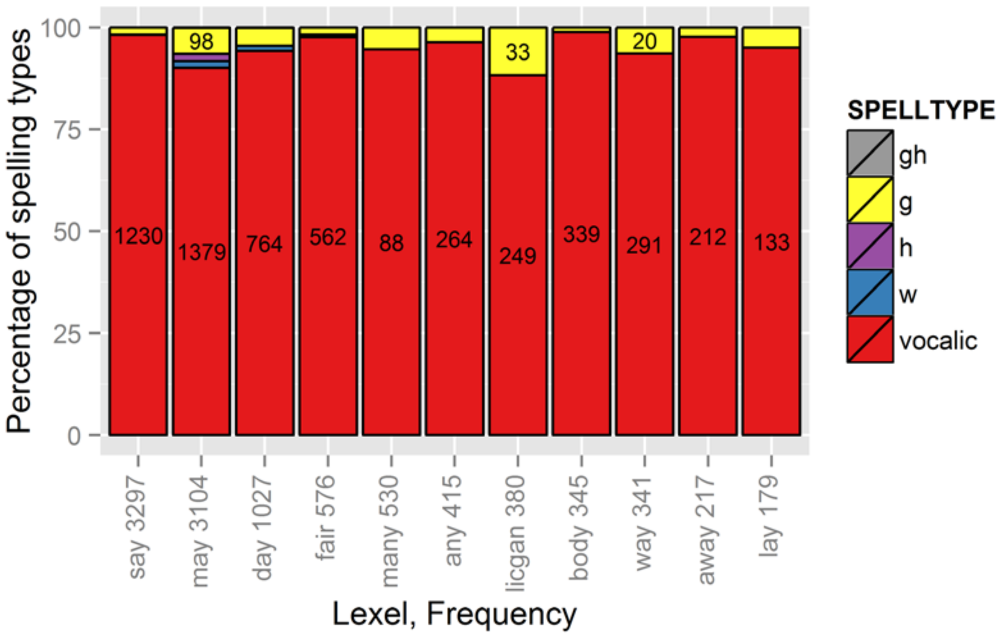

Figure 4-85: Proportions of spelling types for most frequent lexels (INPUT-CONSONANT: [j])[345]

Once again (cf. Figures 4-37, 4-73, 4-74 above), the overall proportions of *VOCALIC* spellings (red) are very high for INPUTCONSONANT: *J* forms. There is no visible trend if we compare the proportions in the eleven bars against each other, but *VOCALIC* spelling proportions range between c. 85% and 100% rather unpredictably. The observable irregularities, including the use of untypical spelling types such as *WTYPE* or <h>, seem to be associated much more with linguistic features of individual lexemes than with their frequencies. E.g. the lexel *MAY* (represented by the second bar from the left) also had forms with secondary palatals (which are depicted in Figure 4-86), and thus <h> will have been used occasionally even in forms of the word *may* that had primary palatals.

Figures 4-86 and 4-87 depict the SPELLTYPE proportions for the most frequent lexels whose lOE input consonant was a voiced velar fricative. The plots contain fewer bars than Figure 4-85 because there are fewer lexels with the voiced velar fricative as their input consonant and a frequency of above 100.

345 In keeping with the other Figures in this section, the lexels on the x-axes of this and the following Figures are sorted in order of descending frequency.

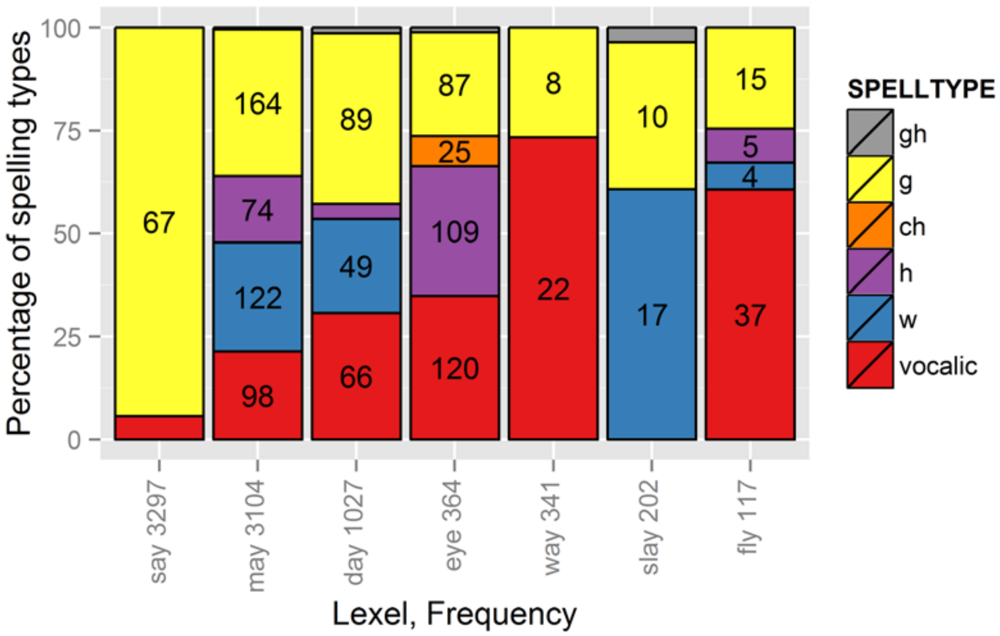

Figure 4-86: Proportions of spelling types for most frequent lexels ([ɣ > i], 'secondary palatals')

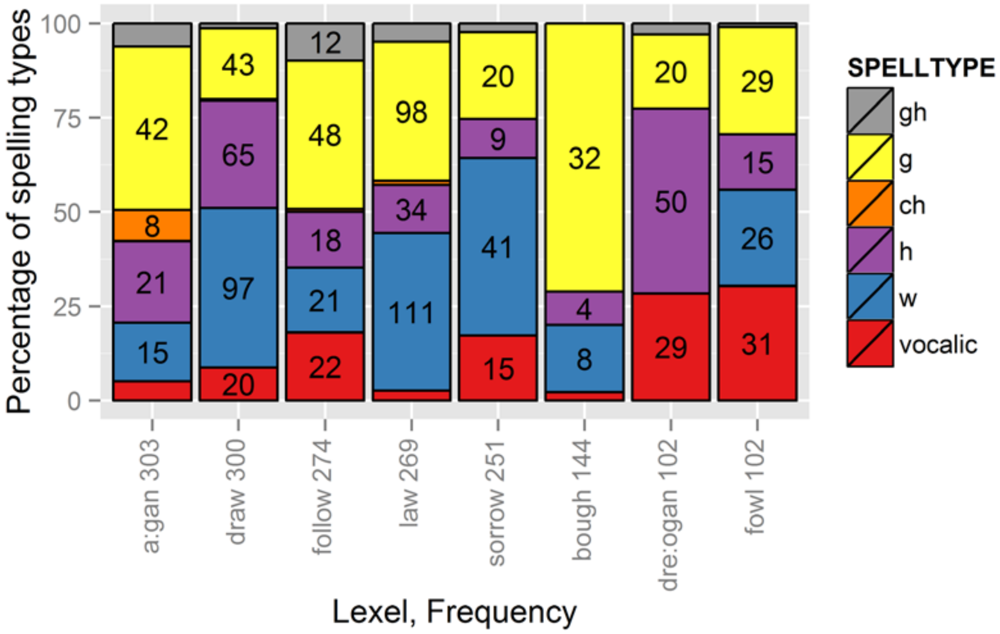

Figure 4-87: Proportions of spelling types for most frequent lexels ([ɣ > u], 'secondary labial-velars')

Although the overall *VOCALIC* spelling proportions are relatively low in both secondary palatals (Figure 4-86) and 'secondary labial-velars' (Figure 4-87), and the different 'consonantal' spelling types therefore come into play to a far greater extent than with the primary palatals, the results are rather surprising. The overall trend of high-frequency items showing a propensity towards *VOCALIC* spellings (as strongly suggested e.g. by the regression line in Figure 4-83 above) would lead us to expect higher proportions of *VOCALIC* spellings (red) towards the left-hand side in Figures 4-86 and 4-87, but this is clearly not the case. In fact, the opposite seems closer to the truth: In general, the bars in the two plots above show conspicuously higher proportions of *VOCALIC* spellings towards the right-hand side, i.e. the more *infrequent* the lexels are. Most strikingly, *SAY*, which is the most frequent lexel in the corpus, shows a proportion of *GTYPE* spellings (yellow) in Figure 4-86 which is almost as high as the proportion of *VOCALIC* spellings in Figure 4-85. Calculations of the correlation between FREQUENCY and VOCALIC.LEXEL with the findings split up according to INPUTCONSONANT and RESULT values (using only moderately frequent lexemes, as in section 4.1.9.2 above) corroborate this difference: The findings with secondary palatals show medium to high negative[346] correlation coefficients (Pearson's R = -0.49; Kendall's τ = -0.859), as do the findings with 'secondary labial-velars' (Pearson's R = -0.83; Kendall's τ = -0.359).

Apart from this unexpected general tendency, fluctuations in the proportions of 'consonantal' spelling types per lexel are perhaps best understood as idiosyncrasies of the respective lexical items. E.g. the association of <ch> spellings (orange) with *EYE* has already been mentioned (see section 4.1.7.4).

346 *Negative* in this context means 'the more frequent the lexel, the fewer *VOCALIC* spellings per lexel'.

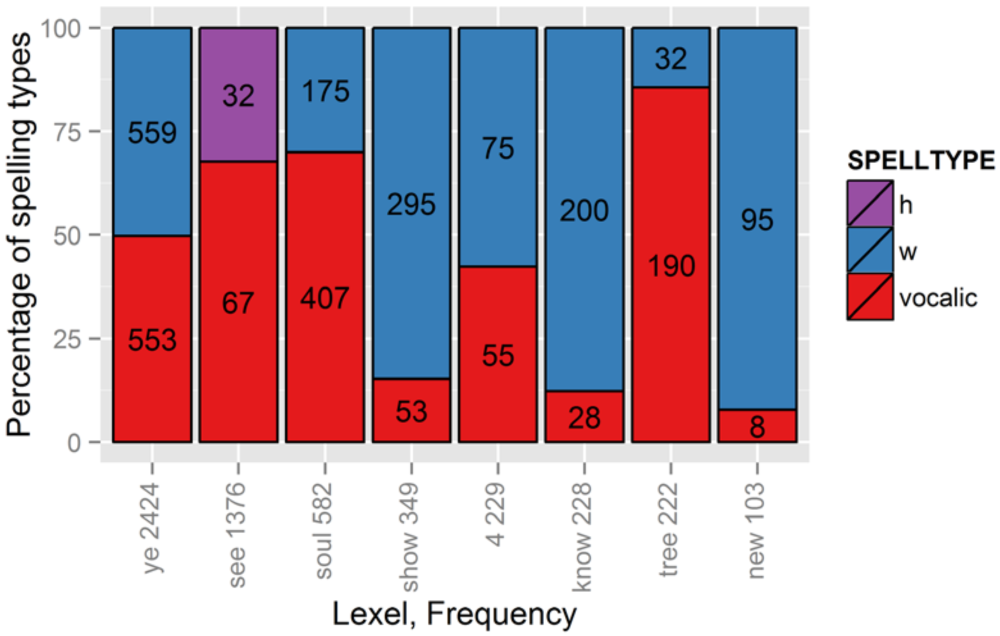

Figure 4-88: Proportions of spelling types for most frequent lexels (INPUT-CONSONANT: [w])

Finally, the moderately frequent lexels relevant to labial-velar semivowel vocalization exhibit much unpredictable fluctuation over the range from most frequent (*YE*, FREQUENCY: *2,424*) to infrequent (*NEW*, FREQUENCY: *103*). There is a moderately high positive correlation between FREQUENCY and VOCALIC.LEXEL (Pearson's *R* = 0.503; Kendall's τ = 0.342). In other words, forms having had [w] at their relevant places in lOE do have a moderately higher average likelihood to be spelled without <w> or <p> (i.e. to show *VOCALIC* spellings) if the respective lexeme was more frequent in eME. However, as Figure 4-88 above demonstrates, individual lexemes show great differences in regards to their spelling type proportions.

4.1.9.4 Summary

Especially the regression models in section 4.1.9.2 have shown that the variable FREQUENCY seems to have a rather weak overall effect on the spellings of the respective sounds: The more frequent lexemes have a slightly stronger propensity to show spellings that are *VOCALIC*. At the same time, there is much variance among the spellings, and dividing up the data by input consonants and considering differences between more and less frequent lexemes (see section 4.1.9.3) has not yielded many useful results. If anything, it is conspicuous that in lexemes which had voiced velar fricatives in lOE, FREQUENCY correlates negatively with

VOCALIC spelling proportions. However, there is much fluctuation in all plots in section 4.1.9.3, which means differences between individual lexemes have a greater overall effect than lexeme frequency as such.

4.1.10 Word class

Word class is a second factor that may have played a significant role if the sound changes under scrutiny were lexically diffused. In previous studies it has been found that closed-class words, i.e. grammatical words, have been the first to be affected by diachronic lenition (cf. Phillips 1983). Naturally, there will be much overlap between the 'word class' variables and other variables such as ACCENTED (since grammatical words generally tend to be unstressed; cf. Weber 2006: 258) and FREQUENCY (since grammatical words are generally the most frequent; cf. Lindquist 2009: 27).

4.1.10.1 Description

As described in section 3.2.1.1.2, two different 'word class' variables have been coded: The levels of CLASS2 denote the word classes (a.k.a. parts of speech) recognized in traditional English grammars (e.g. cf. Leech, Deuchar and Hoogenraad 2006: 49ff.), whereas CLASS1 reflects the equally traditional binary distinction between the two major categories 'closed' (i.e. grammatical words) and 'open' (i.e. lexical words). As suggested by the placement of the dotted line in Figure 4-89, the two 'word class' variables are not completely collinear, since an *a priori* decision was made to distinguish between CLASS1: *OPEN* verbs (called 'full verbs' in Leech, Deuchar and Hoogenraad 2006: 49) and CLASS1: *CLOSED* verbs (called 'operator verbs' in Leech, Deuchar and Hoogenraad 2006: 50). Only one of the LAEME lexels relevant to the sound change in question (viz. *MAY*) fits within this latter category.[347] Thus, all 1,990 retrieved closed-class verb forms are actually instances of the word *may*.

[347] Theoretically, at least for ModE, the group of closed-class verbs contains *be*, *have*, auxiliary *do*, and all modal auxiliaries (Busse 2002: 213-214; also cf. Leech, Deuchar and Hoogenraad 2006: 50).

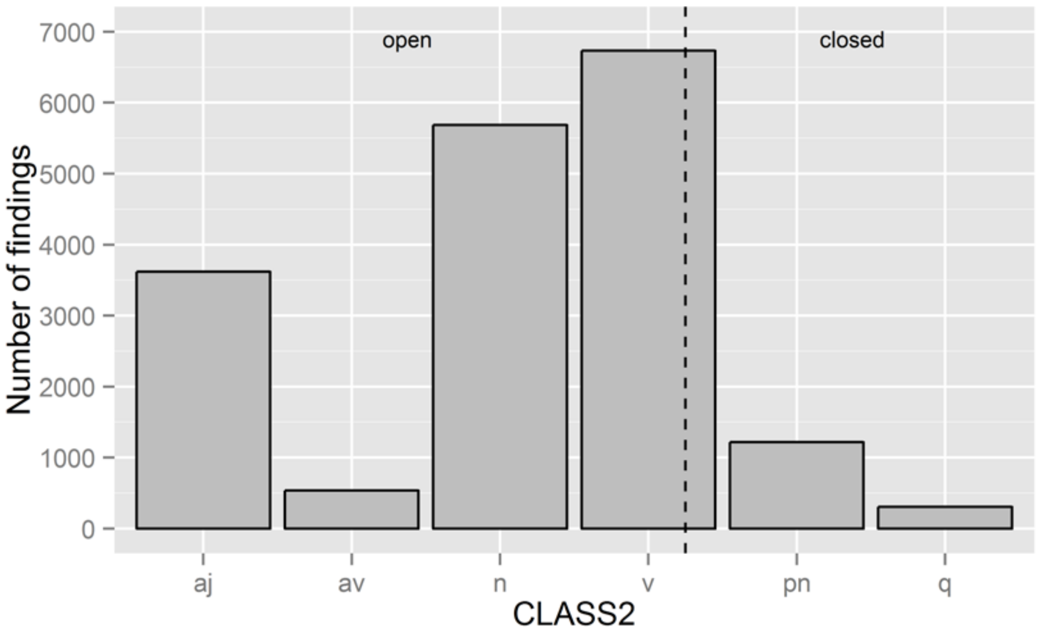

Figure 4-89: Word classes in the data

Figure 4-89 visualizes the amounts of retrieved findings respective to CLASS2 categories, and the dotted line additionally separates the data according to CLASS1 (*OPEN*/*CLOSED*). Closed-class items, which are typically rather frequent in any language, are relatively poorly represented here.[348]

[348] The reasons for this are twofold: For one, the instances of pronouns relevant to semivowel vocalization are restricted to some forms of second-person pronouns (LEXEL: *YE*) as well as some occurrences of the lexels *ANY* and *FEW*. Other pronouns simply did not contain semivowels and are thus not retrieved from the corpus. Secondly, other closed classes, e.g. determiners or conjunctions, are not represented at all in the list of relevant lexemes, and are therefore not featured as CLASS2 variants, even though theoretically they should be.

LEXEL	Number of findings	Percentage
MAY	1,990	56.60%
YE	1,112	31.63%
4	130	3.70%
ANY	76	2.16%
9	46	1.31%
30	39	1.11%
20	33	0.94%
FEW	30	0.85%
50	27	0.77%
60	18	0.51%
70	10	0.28%
14	5	0.14%

Table 4-21: Summary of lexels (CLASS1: *CLOSED*)

Table 4-21 lists all CLASS1: *CLOSED* lexels that are represented in the findings. CLASS1: *CLOSED* findings (i.e. all data to the right of the dotted line in Figure 4-89) are represented by only twelve different lexels, most of which contribute only relatively few data points. About 88% of all CLASS1: *CLOSED* findings are instances of the lexels *MAY* and *YE*. We will now begin to analyze the effects of 'word class' variables on the retrieved spellings.

4.1.10.2 Analysis: Spellings ~ word class

Generally speaking, CLASS2 (i.e. the 'parts of speech' variable) does a far better job of explaining spelling types than CLASS1 (*CLOSED*/*OPEN*) does: A GLM that uses CLASS1 to predict the outcome VOCALIC explains almost none of the variance (Nagelkerke's pseudo-$R^2 = 0$); a GLM with CLASS2, on the other hand, explains over 10% of the variance (Nagelkerke's pseudo-$R^2 = 0.105$). A GLM with both 'word class' predictor variables combined explains more than 12% of the variance (Nagelkerke's pseudo-$R^2 = 0.126$).[349] The `ctree()` algorithm run on the data using both predictors detects a number of significant splits, which are visualized and described in the following.

[349] The null deviance is 23,492 on 18,106 df; the respective models have residual deviances of 23,490 on 18,105 df (using CLASS1), 22,050 on 18,101 df (CLASS2), and 21,747 on 18,100 df (CLASS1 + CLASS2).

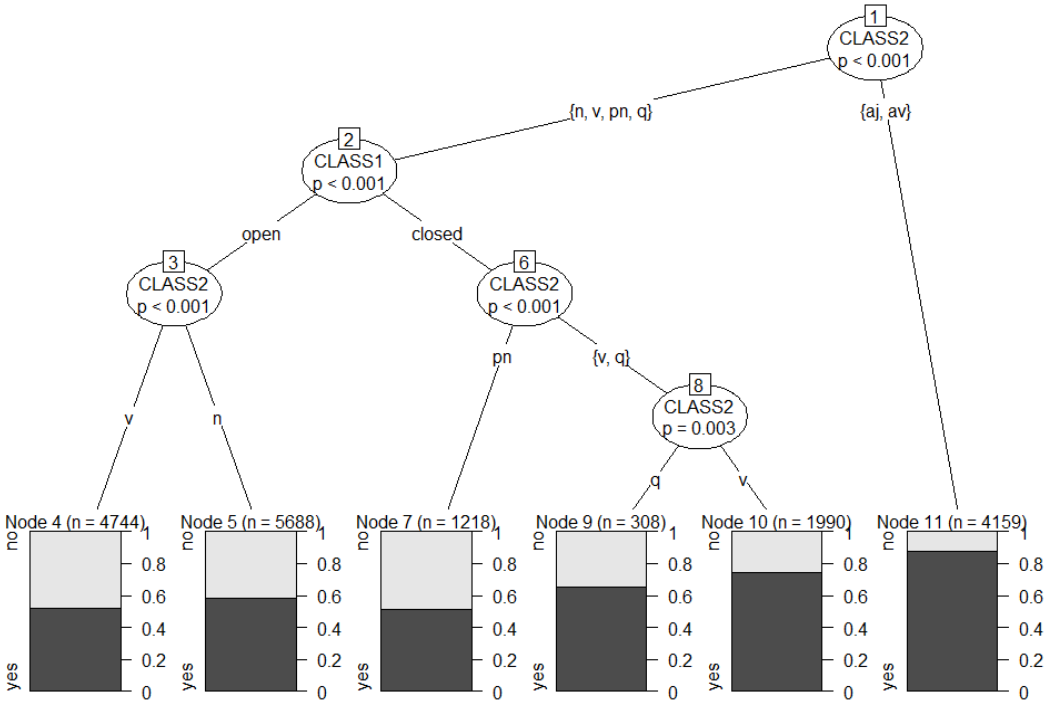

Figure 4-90: Conditional inference tree for VOCALIC ~ CLASS1 + CLASS2

The highest-order split (node 1) is made because adjectives (*AJ*) and adverbs (*AV*) show a highly significantly ($p < 0.001$) greater percentage of *VOCALIC* spellings than all other types of words. The next split (node 2, $p < 0.001$) is detected between other open-class (nouns and lexical verbs) and closed-class items (pronouns, numerals, and the verb *may*). However, the differences between *VOCALIC* spelling percentages among these groups are not easy to see, as they all seem to lie around 55 to 60%. An alternative version of this conditional inference tree using a reduced set of data points will be presented in the following section.

4.1.10.3 Analysis: Spellings ~ word class + lexeme frequency

There is a natural relationship between word class and word frequency.[350] As already mentioned, closed-class items are among the most frequent lexemes in any language. We will therefore briefly highlight the relationship between the 'word class' variables and FREQUENCY (see section 4.1.9 above), and analyze their joint influence on the 'spelling type' variables.

As we saw in section 4.1.9.2, it makes sense to trim away exceptionally frequent and infrequent lexemes and concentrate on what we have called 'moderate-

350 An analysis of collinearity shows that the VIF for CLASS1 and FREQUENCY is higher than usual, though not problematic for the use of both in the same model (2.52). The corresponding squared GVIF$^{1/(2 \times df)}$ values for CLASS2 and FREQUENCY are lower and completely inconspicuous (1.08 and 1.5).

ly frequent lexemes'. Running the `ctree()` algorithm using both 'class variables' (as in section 4.1.10.2), but this time only on instances of moderately frequent lexemes, leads to the detection of three highly significant ($p < 0.001$) splits, all of which are made between CLASS2 levels; the variable CLASS1 is not a decisive factor for the moderately frequent lexemes. The resulting dendrogram is given below:

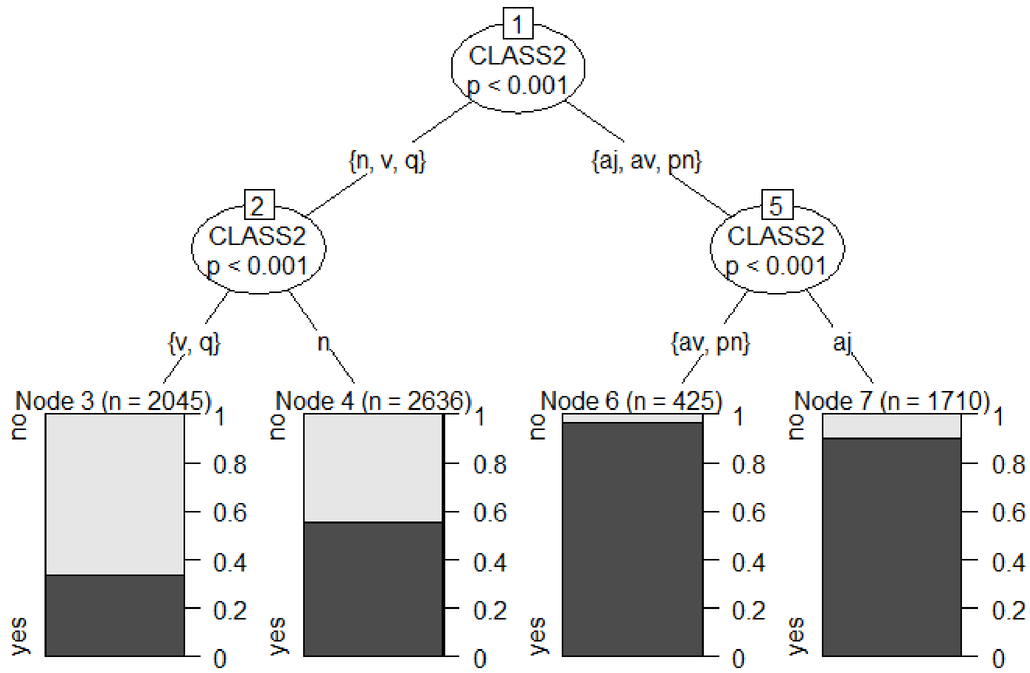

Figure 4-91: Conditional inference tree for VOCALIC ~ CLASS2 (+ CLASS1)

The highest-order split (node 1) is made between rather heterodox groups of word classes: Nouns (CLASS2: *N*) highly significantly cluster with verbs (*V*) and numerals (*Q*) with relatively low *VOCALIC* spelling proportions, whereas adjectives (*AJ*), adverbs (*AV*) and pronouns (*PN*) have relatively high *VOCALIC* spelling proportions. Even in the lower-order splits (nodes 2 and 5), various closed- and open-class items cluster together (numerals with verbs, and pronouns with adverbs, respectively) in terms of their associated proportions of *VOCALIC* spellings.

The fact that the variable CLASS1 loses its importance once we focus on instances of moderately frequent lexemes has to do with the relative scarcity of closed-class items among the moderately frequent lexemes. Table 4-22 shows that CLASS1: *OPEN* findings are distributed across the whole FREQUENCY spectrum (from 2 to 3,297), and that they are mostly represented by moderately frequent as well as rather infrequent items, as the rather low mean and median values show. CLASS1: *CLOSED* findings, on the other hand, are actually mostly to be found on the high-frequency side of the spectrum: The maximum, third quartile, and median values are identical (3,104), which means that more than half of all CLASS1: *CLOSED* findings are actually instances of the most frequent closed-class item, viz. *MAY* (whose overall corpus FREQUENCY value is 3,104). Nevertheless, there are closed-class items with a frequency as low as 8, so that we know that there are low-frequency outliers within the CLASS1: *CLOSED* findings. Table 4-21 above shows that these must be the numerals, which have low overall frequencies in the corpus.

CLASS1	**Min.**	**1st Quartile**	**Median**	**Mean**	**3rd Quartile**	**Max.**
CLOSED	8	2,424	3,104	2,543	3,104	3,104
OPEN	2	74.5	341	659.1	1,027	3,297

Table 4-22: Summary statistics for the distribution of CLASS1 levels over the FREQUENCY spectrum

These findings are visualized as a box plot in Figure 4-92:

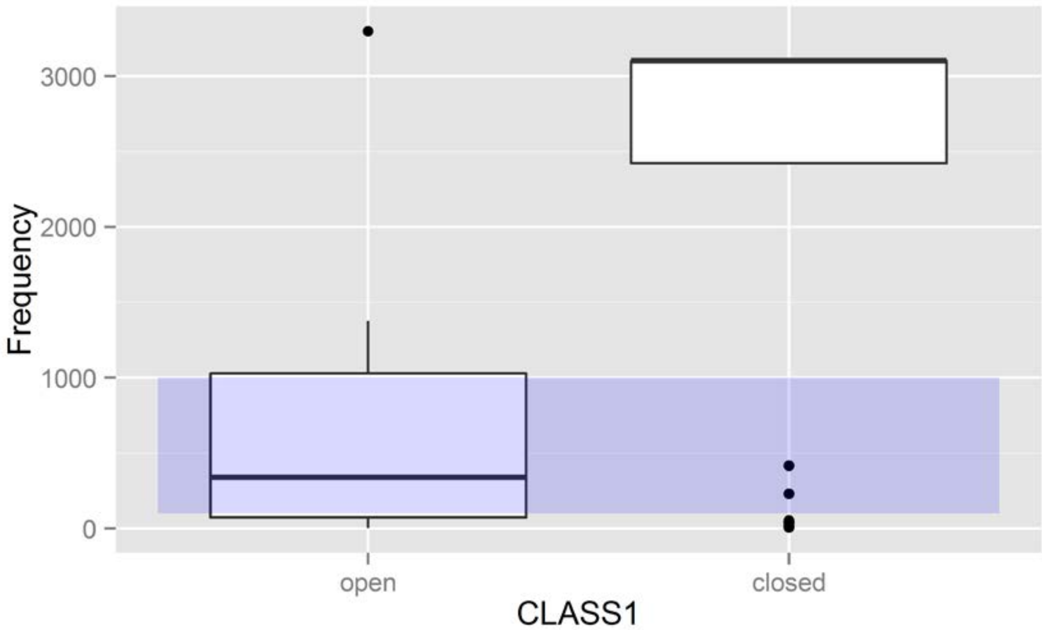

Figure 4-92: Box plot of CLASS1 and FREQUENCY (shaded area highlights moderately frequent lexemes)

The box plot makes it clear that the most frequent open-class lexel in the corpus, viz. *SAY*, is an outlier in terms of its high frequency. Apart from instances of this lexel, the other open-class items are relatively normally distributed, as the shape of the left box shows. On the other hand, high- and low-frequency closed-class items are separated by just as great a gap in the FREQUENCY spectrum. The high-frequency closed-class item findings are mostly instances of the most frequent closed-class lexel *MAY*, as we have already seen, which is why the right box looks very unbalanced with the thick bar (representing the median) at the top.

The shaded area of the box plot, which marks the range of moderately frequent lexemes, drives home the point that it is hard to make a fair comparison of the levels of CLASS1 against each other because they are represented by lexemes with different frequencies. Open-class items are mostly represented by rather infrequent lexemes, while closed-class items are overwhelmingly represented by instances of *MAY* and *YE*, which are exceptionally frequent. Open-class items greatly outnumber closed-class items within the range of moderately frequent lexemes.

Figure 4-93 below shows a box plot in which the CLASS2 levels (i.e. the parts of speech) in the findings are compared in terms of their associated lexeme frequencies:

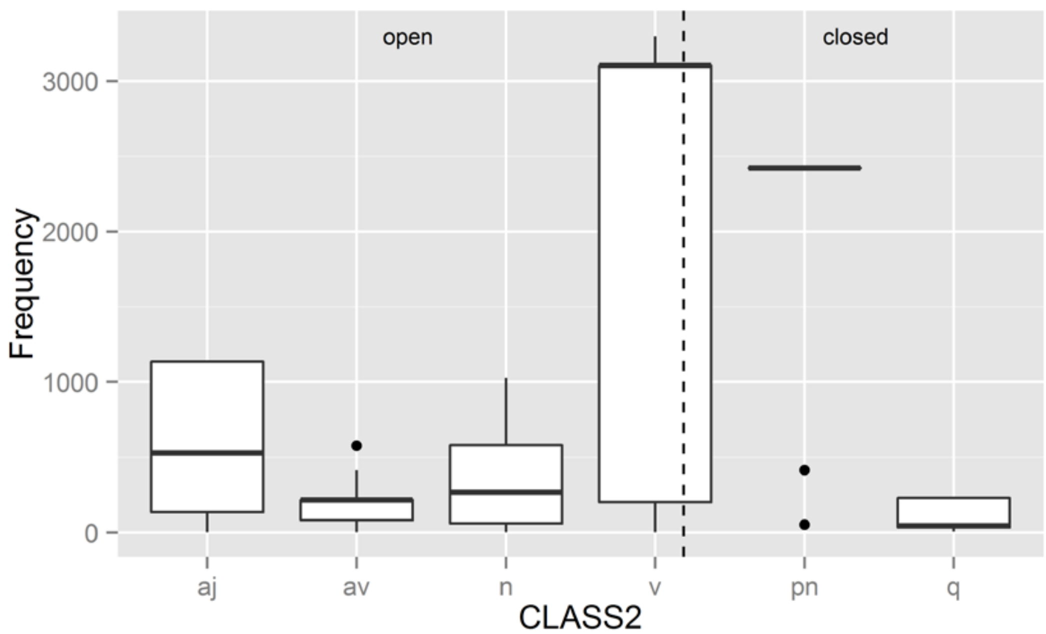

Figure 4-93: Box plot of CLASS2 and FREQUENCY

Findings that belong to the CLASS1: *OPEN* word classes (*AJ*, *AV*, *N*, *V*) are mostly distributed fairly evenly among the lower end of the spectrum of FREQUENCY values. Verbs constitute the only word class whose associated lexels are dispersed over the entire FREQUENCY spectrum, although not evenly. The high overall median is due to the fact that the two most frequent lexels (*SAY* and *MAY*) are verbs. In the pronoun (CLASS2: *PN*) category, the positions of the frequent lexel *YE* and the two outliers *ANY*, and *FEW* are clearly discernible. Finally, the box for numerals (CLASS2: *Q*) lies at the low end of the FREQUENCY spectrum, as would be expected.

The box plots above have shown that the data are not distributed in a way that makes it easy to concentrate on the effect of word class on the spellings used to represent the speech sounds in question. Especially the closed word classes are poorly represented and rather unevenly distributed in terms of their lexeme frequencies. Nevertheless, a quantification of the combined influence of FREQUENCY and the 'word class' variables on the spelling variables will be undertaken in the following.

Figure 4-94 below presents the same data as Figure 4-82 (again, with the percentage of *VOCALIC* spellings per lexel on the y-axis), but with the findings split up into two groups according to CLASS1, with two linear regression lines (black and gray, respectively) for *CLOSED* and *OPEN* lexical items.

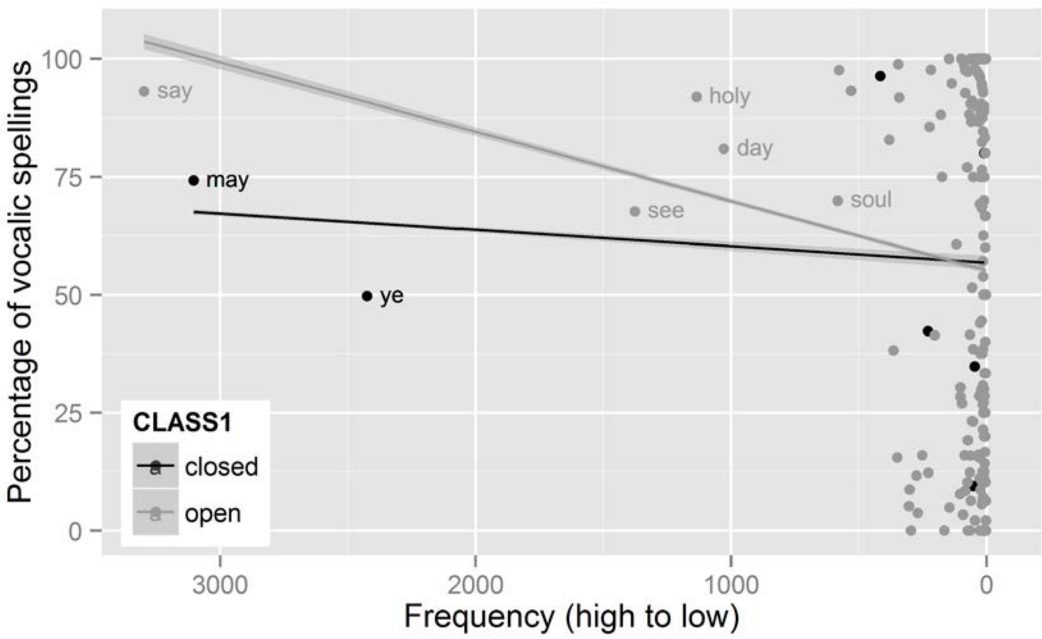

Figure 4-94: *VOCALIC* spellings by frequency, with linear regression lines, grouped according to CLASS1

If we run linear regressions according to CLASS1 on all data points, the first impression that we get is that *CLOSED* items on average do not exhibit higher proportions of *VOCALIC* spellings. In the well-attested low-frequency edge of the plot (i.e. to the far right), the two regression lines begin at almost the same height and then move apart, with CLASS1: *OPEN* items actually showing higher proportions of *VOCALIC* spellings as lexeme frequency increases. However, the two lines are informed by very few data points above a FREQUENCY value of c. 600, which means that the trajectories represented in Figure 4-94 cannot mean much.[351]

There are also not enough closed-class items within our pre-defined x-axis range of moderate frequencies (100 – 1,000) for the resulting regression line to be of much use. By therefore expanding the range to include all closed-class items (the most infrequent of which has a frequency of only 8), we let in some of the 'noise' from infrequent lexemes, but we do get a new regression line which represents all closed-class items which lie within the well-attested range of FREQUENCY values (which has now been re-defined as 8 – 1,000):

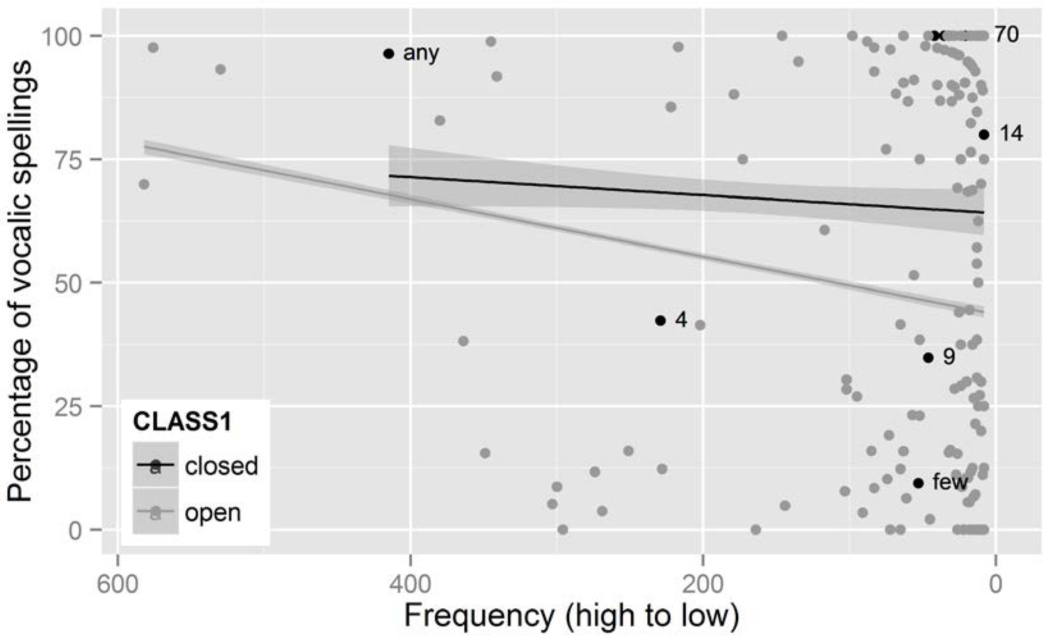

Figure 4-95: *VOCALIC* spellings by frequency (minimum frequency 8, maximum frequency 1,000), with linear regression lines, grouped according to CLASS1

The linear regression lines in Figure 4-95 can be taken to suggest that within the range of moderate FREQUENCY values the closed-class lexical items show slightly higher *VOCALIC* spelling proportions than the open-class items do on average. However, the slight increase of *VOCALIC* spelling proportions with frequency is not statistically significant, as the relatively wide 95%-confidence region shows. In addition, on closer inspection of the CLASS1: *CLOSED* lexels involved (most of which are labeled in Figure 4-95), it turns out that the position of these items on

[351] *MAY* and *YE* are actually the only high-frequency *CLOSED* lexels in the findings, which means that the bulk of the trajectory of the black regression line in Figure 4-94 is basically informed by the *VOCALIC* spelling proportions of these two words alone.

the y-axis, and therefore the overall trajectory of the black regression line, might have more to do with their input consonants than with anything else: All closed-class items whose *VOCALIC* spelling percentages approximate 100% are in fact instances of forms containing primary palatal semivowels (*ANY*/lOE *ænig*; *70*/lOE *seofontig*, and similar numerals), and all closed-class items with lower *VOCALIC* spelling percentages are instances of forms containing other input consonants (*14*/lOE *feopertyne*, *4*/lOE *feoper*, *9*/lOE *nigon*, *FEW*/lOE *feap*). This means that the position and inclination of the regression line are heavily dependent on the fact that e.g. *ANY* (a ‘primary palatal’ lexel) happens to have a frequency of c. 400 whereas e.g. *FEW* (a ‘labial-velar’ lexel) happens to have a frequency of c. 50.[352]

We will now turn to the word classes according to the variable CLASS2 within the range of moderately frequent lexical items (i.e. items with an overall corpus frequency of between 100 and 1,000). As we have just seen, closed-class lexels are relatively rare within this range (cf. Figure 4-92), which is why in the following we will focus on the variants of CLASS2 which are open-class items (nouns, lexical verbs, adjectives, and adverbs).

[352] One would only need to add a hypothetical closed-class word with a frequency similar to that of *ANY*, but with a labial-velar semivowel and therefore with a probably much lower *VOCALIC* spelling proportion (and there is nothing to suggest that such a word could not exist), and the trajectory of the regression line would look very different.

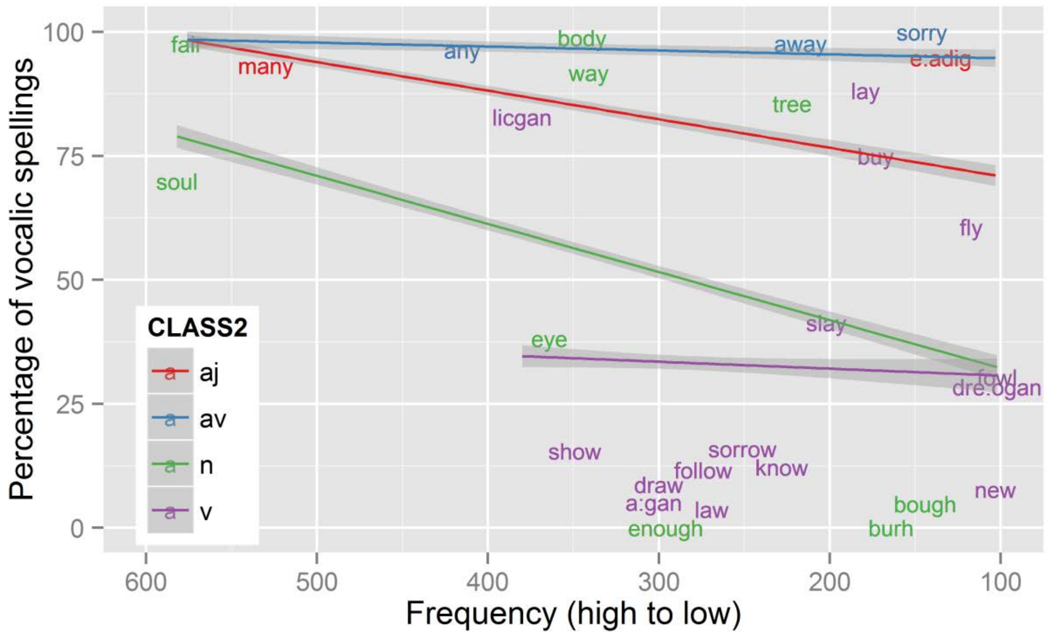

Figure 4-96: *Vocalic* spellings by frequency (minimum frequency 100, maximum frequency 1,000), with linear regression lines, grouped according to Class2[353]

Figure 4-96 presents roughly the same data as Figure 4-83, but with linear regressions run according to Class2 variants. First of all, the overall variance is high (with *vocalic* spellings per lexel ranging from close to 0% to close to 100%) for all word classes[354] except adverbs. The adverbs (blue) all show a fairly strong propensity for *vocalic* spellings, but a look at the exclusively adverbial lexels, i.e. *any*, *away*, and *sorry*, shows them all to be examples of primary-palatal words (i.e. words with InputConsonant: *j*), so that we might just as well take their InputConsonant value to be the reason for their positions on the y-axis (cf. the discussion of the Class1: *closed* items above). Verbs do not seem to show much of an increase of *vocalic* spelling proportions with lexel frequency, but it is hard to say because they are dispersed only over the lower half of the present frequency spectrum (100-380). An increase of the percentage of *vocalic*

353 In Figure 4-96 each lexel is allotted to one color for practical reasons even though some lexels combine with different kinds of grammels, and therefore their associated data points comprise members of different parts of speech (i.e. Class2 variants). Class2-ambiguous lexels include *fair*, which can be Class2: *aj*, *av*, or *n*, and *new*, which can be Class2: *aj*, *av*, or *v*. The linear regressions were run on the basis of the actual Class2 values.

354 This includes the class of adjectives, to which many instances of *new* and *enough* belong although these lexels are allotted to other colors in Figure 4-96 for the reasons given in fn. 353.

spellings with frequency is detectable only for nouns (green) and adjectives (red). Given that CLASS2 attains a relatively high explanatory power as a predictor variable for VOCALIC (see the beginning of section 4.1.10.2 above), we might expect CLASS2 to be included in multivariate models in section 4.2, and the different behavior of the CLASS2 variants in Figure 4-96 reinforces this expectation.

4.1.10.4 Analysis: Spellings ~ word class + time

Having dealt with the relationship between the 'word class' variables and lexeme frequency, we will now have a look at the combined effects of the 'word class' variables and time. Figures 4-97 and 4-98 show the differences between the diachronic development of abstract spelling types (using SPELLTYPE and the time variable QUARTERCENT) in open-class and in closed-class lexical items.

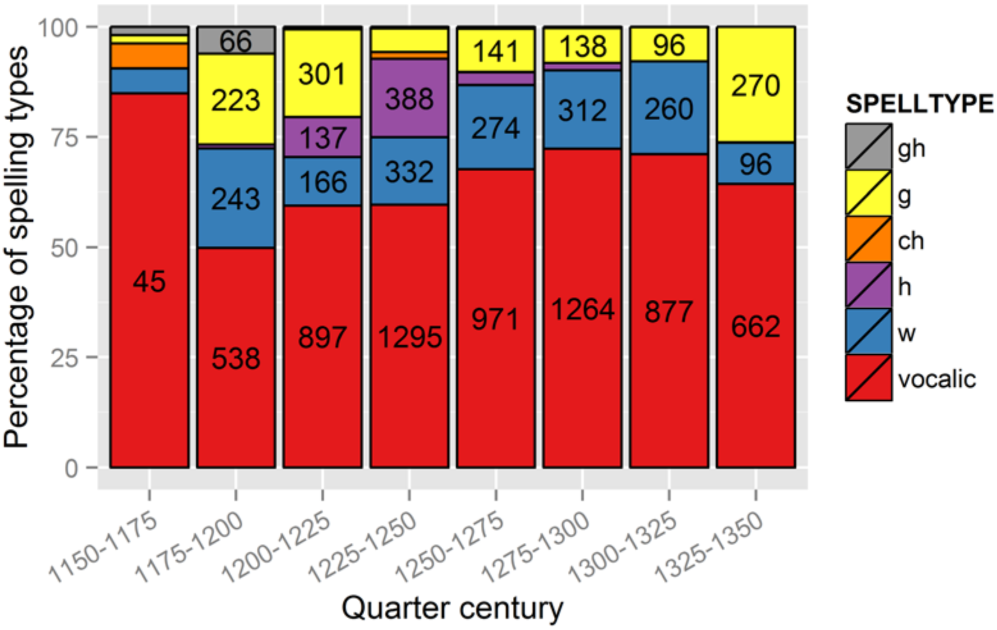

Figure 4-97: Proportion of spelling types by quarter century (CLASS1: *OPEN*)

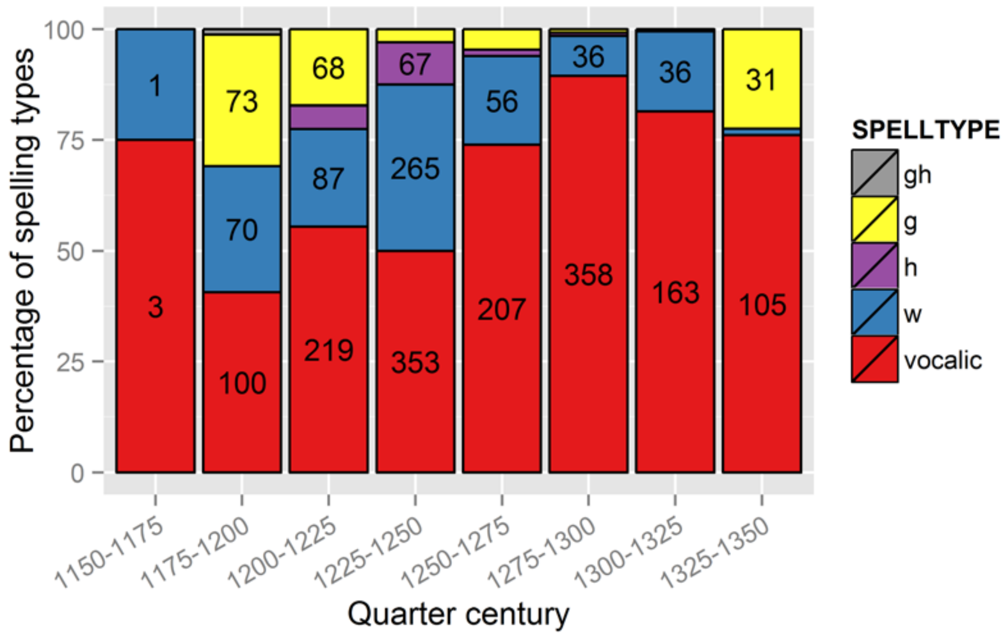

Figure 4-98: Proportion of spelling types by quarter century (CLASS1: *CLOSED*)

According to the theory of lexical diffusion, we should expect closed-class items to have led the change. In other words, we should expect larger proportions of *VOCALIC* spellings (red) throughout the bars of Figure 4-98. However, this is only the case over the second half of the LAEME period (starting from the fifth bar). In the first half of the period (disregarding the poorly attested first quarter century), the opposite seems to be the case: It is the open-class items which show higher rates of *VOCALIC* spellings.

Thus, while closed-class lexical items cannot be said to have led the change from the beginning, they seem to have adopted the new spellings at a faster rate, so that their *VOCALIC* spelling percentages overtook those of the open-class items around 1250 CE. In a GLM that uses CLASS1, QUARTERCENT, and the interaction between the two variables as predictors for VOCALIC, the interaction turns out to be highly significant ($p < 0.001$) at around 1250 CE (i.e. between bars four and five) and around 1275 CE (i.e. between bars five and six).[355] In other words, the second half of the thirteenth century is the period over which open-class items and closed-class items show highly significant differences in regards to changes in *VOCALIC* spelling proportions. Figures 4-97 and 4-98 above inform us that the increase rate is much higher in closed-class items.

355 In addition, around 1300 (i.e. between bars six and seven) the interaction between CLASS1 and QUARTERCENT is significant ($p < 0.05$). The R code executed for this model is `glm(VOCALIC ~ CLASS1 * QUARTERCENT)`.

While Figures 4-97 and 4-98 serve to highlight the basic differences between closed-class and open-class items, we must remember that they each contain findings with different values according to the other linguistic variables, most importantly INPUTCONSONANT. In section 4.1.10.5, we will therefore additionally split up the data by consonantal input.

We will first continue the general overview using the more fine-grained 'word class' variable CLASS2. Figure 4-99 shows the diachronic development in adjective forms:

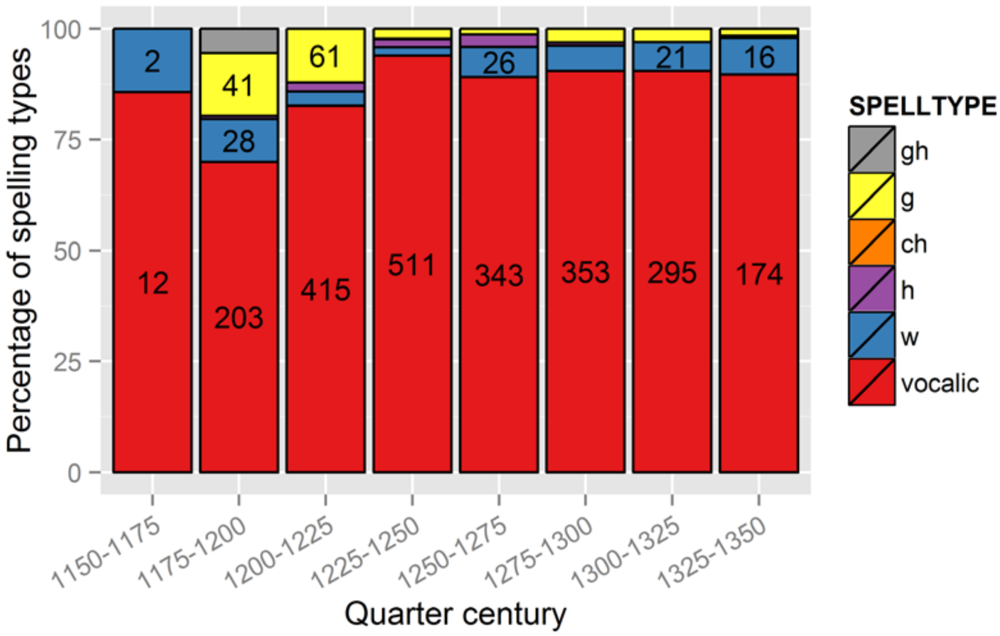

Figure 4-99: Proportion of spelling types by quarter century (adjectives)

Adjectives and adverbs were identified above as the parts of speech that showed the most significant differences from all others.[356] On closer inspection, it turns out that the exceptional behavior of adjectives might in fact be due to a disproportionately large amount of cases with INPUTCONSONANT: *J* (primary palatal semivowels, see section 4.1.4.2 above) among the findings: A large part of the 3,622 retrieved adjective forms end in lOE *-iȝ* (> ModE *-y*) (cf. OED, s.v. "-y, *suffix*[1]"), as the most frequent adjective lexels show: *HOLY* (1,135 tokens, i.e. nearly a third of all retrieved adjective forms), *MANY* (530 tokens), *FAIR* (447 tokens), *ANY* (338 tokens), *SORRY* (145 tokens), *E:ADIG* (135 tokens), etc. Indeed,

356 This was the first group to be split from the others (node 1) in the dendrogram in Figure 4-90 due to rather large overall *VOCALIC* spelling proportions.

76% of all INPUTCONSONANT values (792 of 1,040) assigned to adjective forms are instances of the palatal semivowel.[357]

Very similar conditions hold true for adverbs (the list of adverb lexels is headed by the palatal-semivowel-associated lexels *AWAY*, *FAIR*, and *TODAY*), and a corresponding bar plot for adverbs looks fairly similar to Figure 4-99, but contains much smaller absolute numbers of findings, so that it is not of much use.

A bar plot showing the development of spelling types in retrieved instances of nouns is given below:

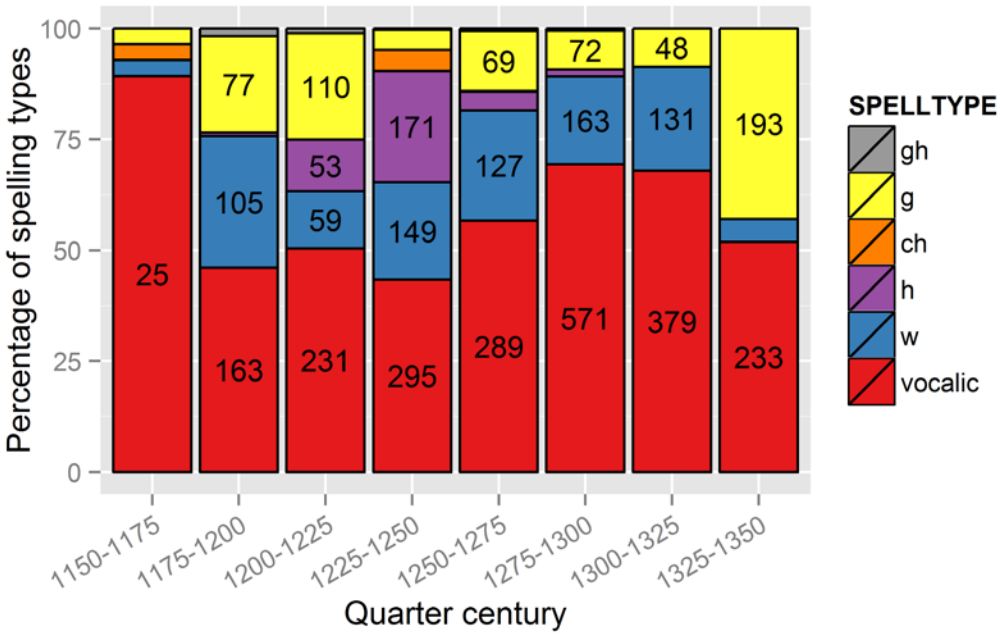

Figure 4-100: Proportion of spelling types by quarter century (nouns)

The three INPUTCONSONANT levels (*J*, *G*, *W*) are represented in a much more balanced manner in the noun findings than was the case with adjectives. In particular, the presence of <h> spellings (purple) in the first half of the thirteenth century as well as the sudden rise of *GTYPE* spellings (yellow) in the final quarter century indicate the presence of sounds derived from lOE voiced velar fricatives, as we have seen.

The relatively dramatic upsurge of *GTYPE* spellings in the final quarter century that is visible in Figure 4-100 might lead us to wonder what makes this phenomenon, which has been remarked upon earlier, so evident in the 'noun' findings. It

[357] Retrieved adjective forms with other input consonants ([w], [ɣ]) are relatively few, so that analyzing their diachronic development (with the help of QUARTERCENT) yields rather small absolute numbers and is therefore not feasible.

turns out that it is the exceptionally frequent use of the noun lexel *BOUGH* as a key word in the *Ayenbite of Inwyt* which accounts for more than a hundred instances of the *littera* <ȝ> in noun forms in this quarter century, as highlighted by the following short passage from the text file:

(21) *AC ECH OF yISE ZEUE **BOzES** {,} HEy UELE SMALE TUYEGGES {.} {>.1.>} *yE {\} UERSTE **BOz** OF PREDE {,} yET IS {,} ONTREUyE {.} HE HIM TODELy {,} IN yRI LITTLE **BOzES** {.}
'But each of these seven branches has many small twigs. The first branch of pride, which is untruth, (it) is subdivided into three little branches.'
(LAEME CTT, file ayenbitet: *Ayenbite of Inwyt*, London, British Library, MS Arundel 57, tags removed, my emphasis)

This shows that findings such as those presented in Figure 4-100 above may be influenced by something as mundane as the relatively frequent use of a single word in one text due to the text's subject matter (in this case the categorization of vices and virtues, in which *boȝ* 'bough, branch' is employed as a technical term).

The overview of the development in lexical verb forms (i.e. CLASS1: *OPEN* and CLASS2: *V*) has much in common with the other open-class items:

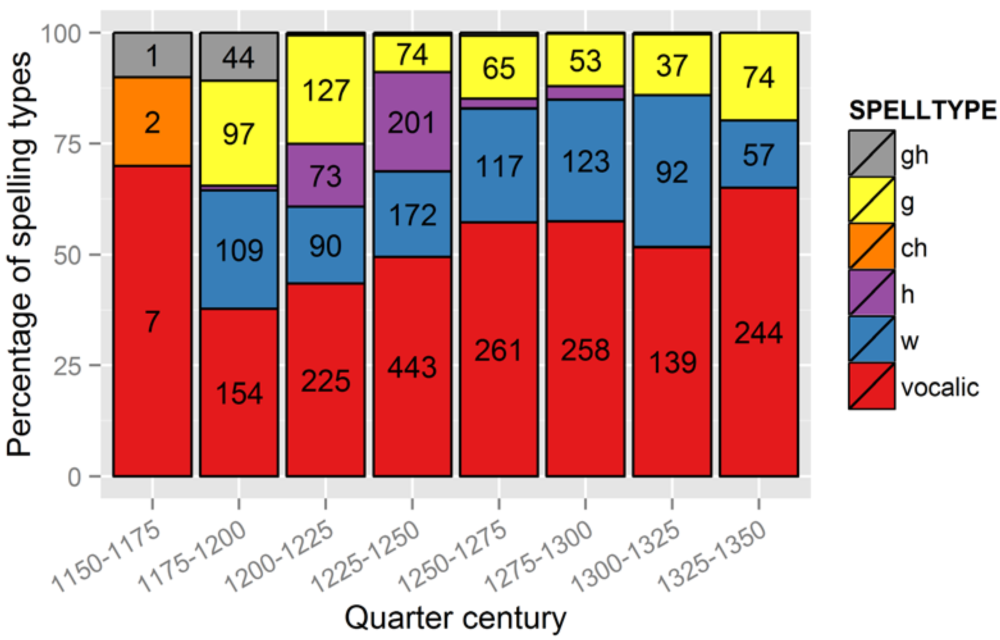

Figure 4-101: Proportion of spelling types by quarter century (lexical verbs)

The general development of *VOCALIC* spelling proportions in both Figure 4-100 (nouns) and Figure 4-101 (lexical verbs) can be characterized as a slow and steady increase over the eME period. Nouns and lexical verbs were conflated into one group in the `ctree()` dendrogram in Figure 4-90, and it is thus no surprise that they show very similar characteristics in the above Figures.

By contrast, the verb *MAY*, which is the only example of a closed-class verb among the relevant lexels, shows a significantly higher percentage of *VOCALIC* spellings, and is to be found at a very different position in the dendrogram in Figure 4-90. Figure 4-102 below shows that changes concerning spelling type proportions took place at a much faster rate with this verb:

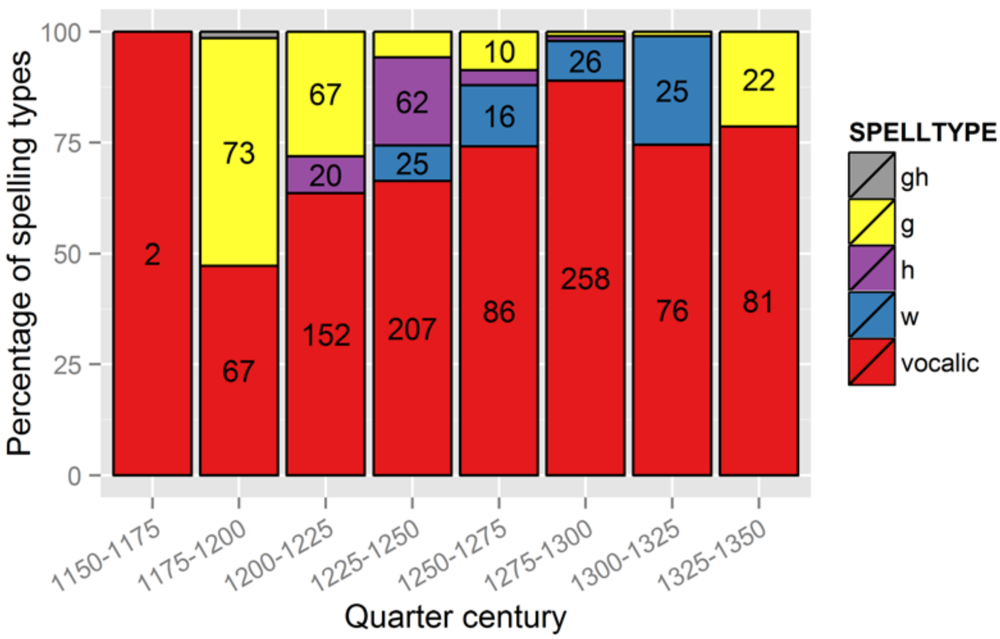

Figure 4-102: Proportion of spelling types by quarter century (the verb *MAY*)

Disregarding the poorly-attested first quarter century, the percentage of *VOCALIC* spellings of forms of *MAY* rises from c. 50% (1175-1200) to almost 90% (1275-1300) within a hundred years, after which it slightly drops again. The significant presence of <h> and *WTYPE* spellings and the late upsurge of *GTYPE* spellings (yellow) are explicable by the fact that almost a quarter of the *MAY* findings (460 of 1,990) are forms that contained a [ɣ] in lOE.

Figure 4-103 shows the development of spelling types in pronoun findings, a great majority of which (1,112 of 1,218) are instances of the lexel *YE* (although actually not the nominative ‘ye’, but rather oblique ‘you’ or possessive ‘your’), the remaining findings being forms of *ANY* and *FEW*. Since the overwhelming majority of retrieved pronouns are INPUTCONSONANT: *W* forms (viz. forms of *YE* and *FEW*), it is not surprising that almost all pronouns in the corpus show either a *WTYPE* or a *VOCALIC* spelling (cf. Figure 4-39). The plot also displays the steep rise of *VOCALIC* spellings (especially around and after 1250 CE) that is characteristic of closed-class items.

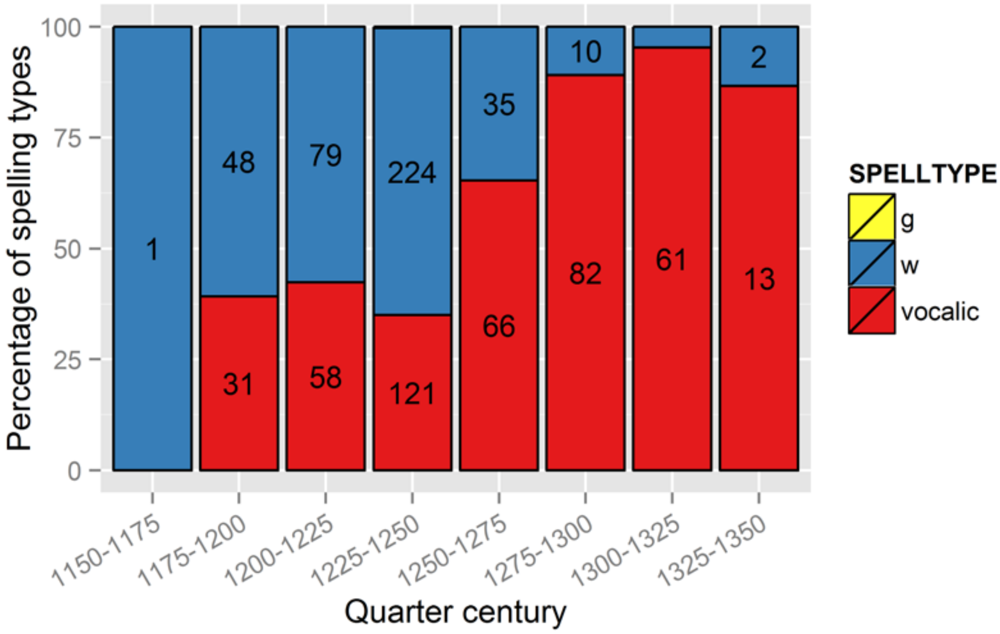

Figure 4-103: Proportion of spelling types by quarter century (pronouns)

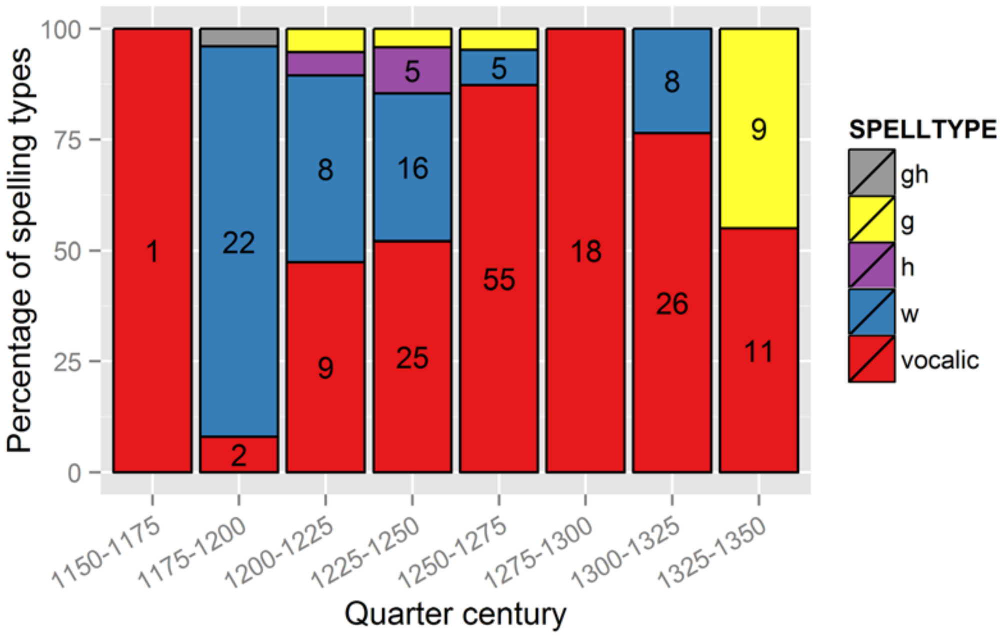

Figure 4-104: Proportion of spelling types by quarter century (numerals)

Finally, Figure 4-104 shows the development of spelling types in numerals. This plot too exhibits the rather steep increase of *VOCALIC* spellings around 1250 CE that is characteristic of closed-class items, although the class of numerals is relatively poorly attested (cf. the numbers of findings for the respective numerals in Table 4-21 above). As the presence of various other colors in the plot suggests, at least the input consonants [j] and [w] are well-represented in the class of numerals. The resurgence of *GTYPE* spellings (in proportional terms) in the final quarter century is due to the spelling of the numeral 'nine' (< OE *niᵹon* [niɣon]) as <neȝen> in the *Ayenbite of Inwyt*.

4.1.10.5 Analysis: Spellings ~ word class + input consonant + time

In this section, the findings presented in Figures 4-97 (CLASS1: *OPEN*) and 4-98 (CLASS1: *CLOSED*) will be further analyzed according to the variable INPUTCONSONANT. The reason for this is that Figures 4-97 and 4-98 highlighted general differences between the spelling of open-class and closed-class items over time, but in doing so conflated all different consonantal inputs.

The following two plots represent open-class and closed-class items, respectively, which have *J* as their INPUTCONSONANT value.

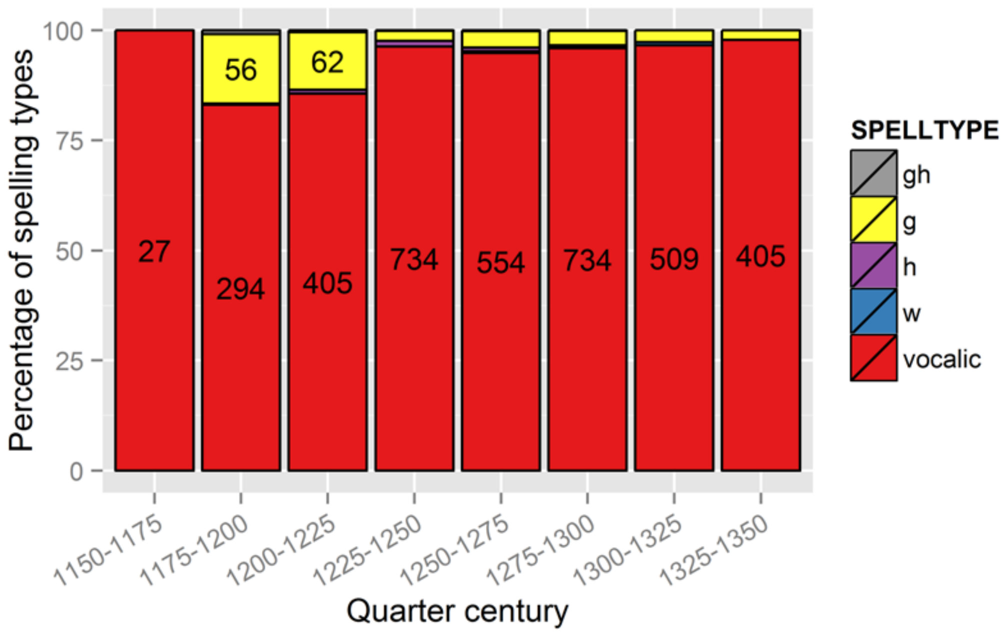

Figure 4-105: Proportion of spelling types by quarter century (INPUTCONSONANT: [j], CLASS1: *OPEN*)

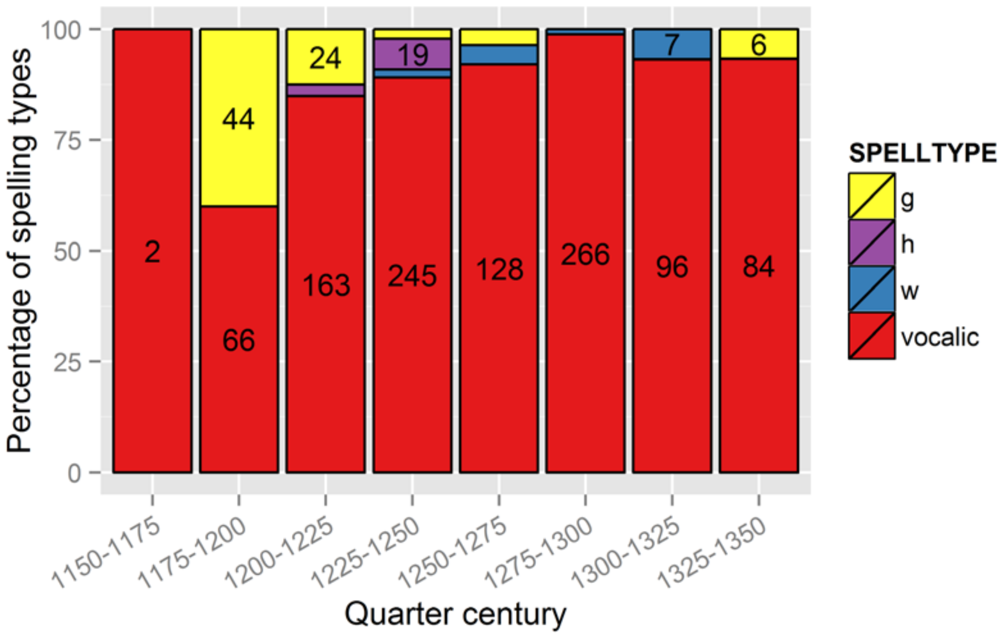

Figure 4-106: Proportion of spelling types by quarter century (INPUTCONSONANT: [j], CLASS1: *CLOSED*)

Although the difference in proportions between the two plots is not great, it is conspicuous that

– open-class items have a higher overall proportion of *VOCALIC* spellings (red), and
– in closed-class items the increase of *VOCALIC* spelling proportions over time begins at a lower point on the percentage scale and occurs more rapidly.

Forms with 'secondary palatals', i.e. forms that had had a voiced velar fricative in lOE which ultimately became vocalized to [i], exhibit more extreme differences in regards to the two CLASS1 levels, as will be seen in the following.

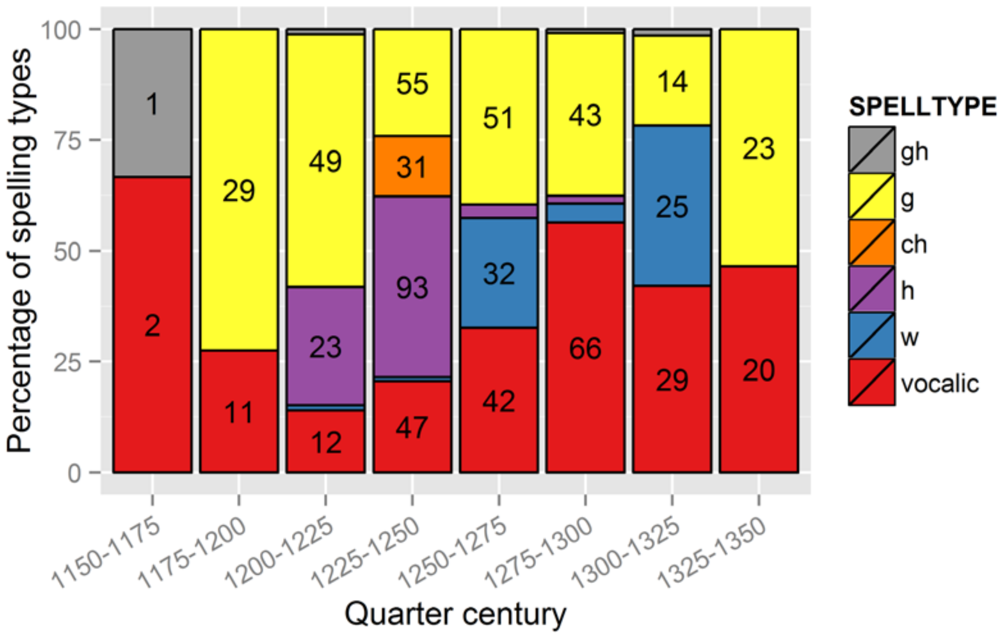

Figure 4-107: Proportion of spelling types by quarter century ([ɣ > i], 'secondary palatals', CLASS1: *OPEN*)

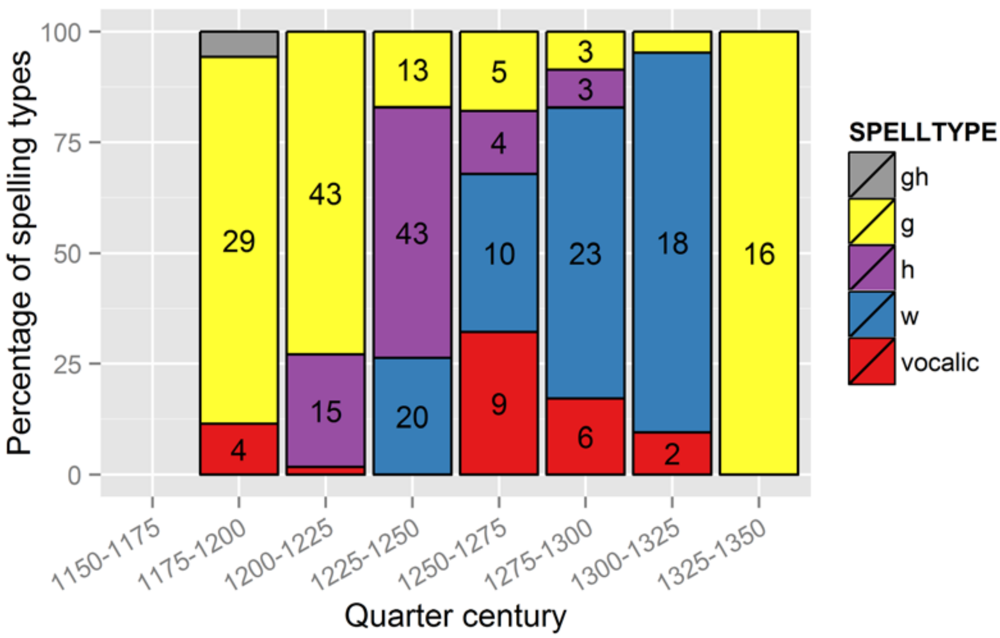

Figure 4-108: Proportion of spelling types by quarter century ([ɣ > i], 'secondary palatals', CLASS1: *CLOSED*)

The open-class secondary palatals (Figure 4-107) can be said to show a more-or-less gradual shift away from 'consonantal' spelling types and towards *VOCALIC* spellings, which is far from complete, however, but only reaches about 50% by the end of the period. On the other hand, in the closed-class findings, *VOCALIC* spellings are practically absent from the first half of the period, and are featured only marginally in the second half, even if we ignore the disproportionate amount of INPUTCONSONANT: *G* forms in the final quarter century. The absolute numbers of findings are rather small, unfortunately, so it does not seem safe to make any more definite statements.

The 'secondary labial-velars' (lOE [ɣ] > [u]) are represented only by open-class items. An overview of this group is given below for reference:

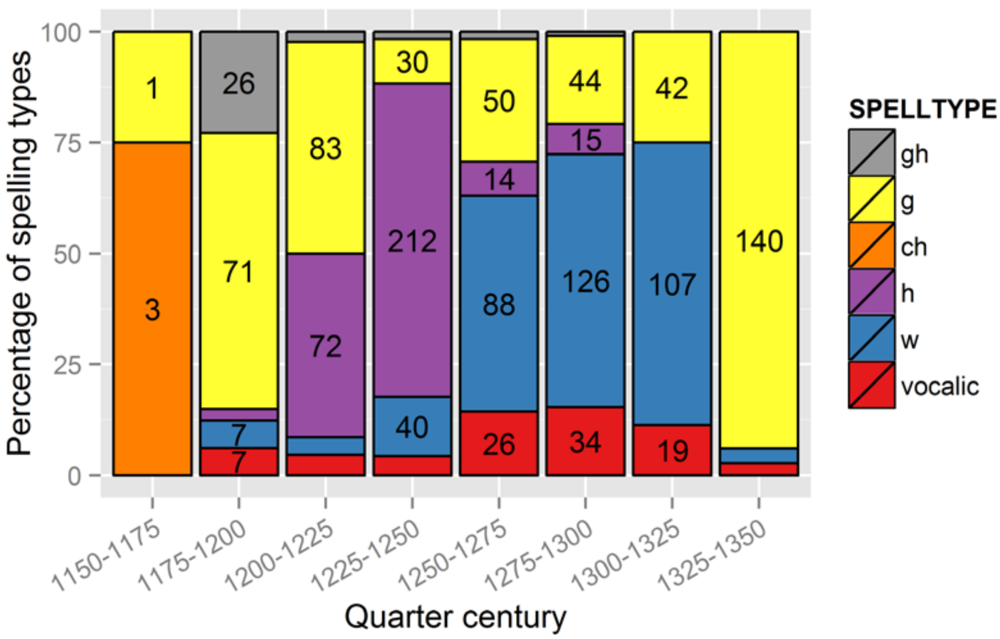

Figure 4-109: Proportion of spelling types by quarter century ([ɣ > u], 'secondary labial-velars', CLASS1: *OPEN*)

Since there are no closed-class forms with 'secondary labial-velars' in the retrieved data, Figure 4-109 is essentially a simplified version of Figure 4-41 (which shows all spelling types of all 'secondary labial-velars') in section 4.1.4.4 above. In this plot *VOCALIC* spelling proportions are the lowest of all in the present section, even disregarding the upsurge of <ȝ>-spellings (yellow) in the final quarter century. More importantly, the *VOCALIC* spelling proportions are conspicuously lower than in the following corresponding plot based on labial-velar semivowel forms.

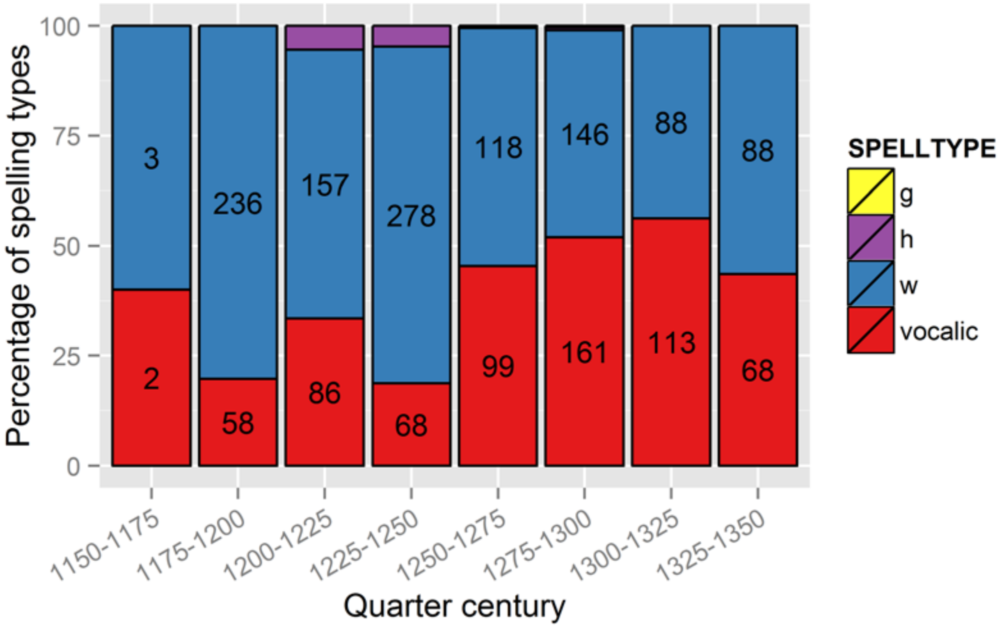

Figure 4-110: Proportion of spelling types by quarter century (INPUTCONSONANT: [w], CLASS1: *OPEN*)

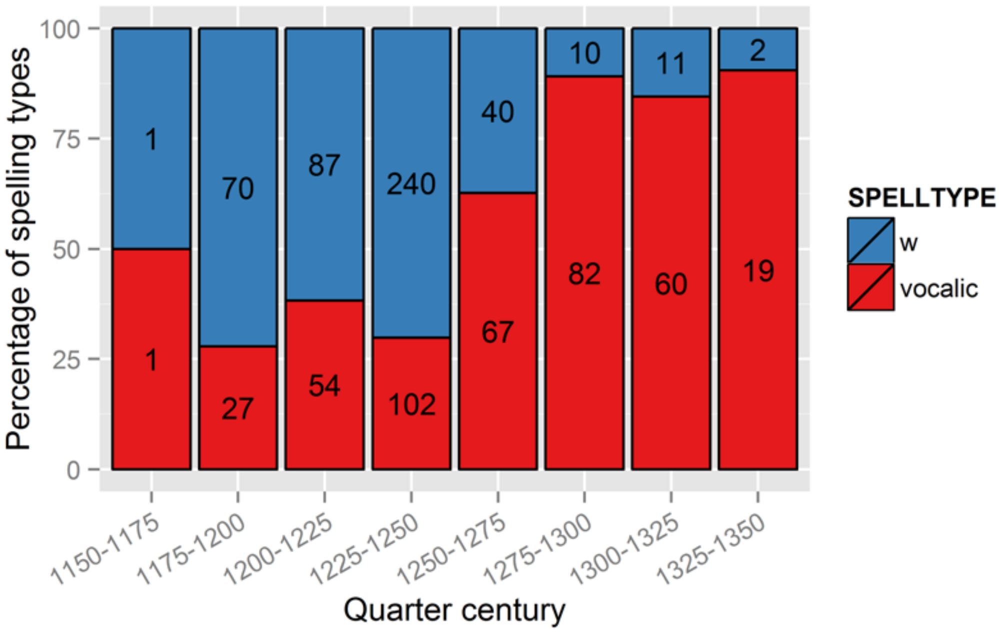

Figure 4-111: Proportion of spelling types by quarter century (INPUTCONSONANT: [w], CLASS1: *CLOSED*)

Figures 4-110 and 4-111 show the developments in forms that had contained a labial-velar semivowel in lOE. Once again, the spelling type proportions over the first half of the period seem almost identical, but after 1250 CE *VOCALIC* spellings increase at a significantly higher rate in the closed-class findings than they do in the open-class findings. By the end of the period, the *VOCALIC* spelling proportion has risen to about 90%, which is very exceptional for the labial-velar semivowels (cf. the general overview in Figure 4-39 in section 4.1.4.3 above).

4.1.10.6 Summary

It has become clear that CLASS2 is a predictor variable to be reckoned with, while the binary variable CLASS1 (*OPEN*/*CLOSED*) probably is not; especially the plots in section 4.1.10.4 have shown that an interaction of CLASS2 with the time variables is to be expected, since closed-class items such as pronouns and numerals begin with relatively low *VOCALIC* spelling percentages, which then increase at a faster rate than is the case with, say, nouns or adjectives.

The uselessness of CLASS1 (*OPEN*/*CLOSED*) as a predictor (Nagelkerke's pseudo-R^2 = 0, see section 4.1.10.2) might come as a surprise in this context, but section 4.1.10.3 has provided a good explanation of this: The variants of CLASS1 are too unevenly represented in the findings (i.e. CLASS1: *CLOSED* items are underrepresented), which has to do with the fact that we are dealing only with such word forms as are relevant to semivowel vocalization and not with the entire LAEME CTT.

4.1.11 Summary: Overview of variables

So far we have seen that most of the nine classes of predictor variables can indeed be said to correlate with the behavior of the outcome variables. In particular, INPUTCONSONANT seems to make the greatest difference (Figures 4-37 through 4-39) in terms of the changes in spelling types over time: The vocalization of the lOE labial-velar semivowel lags behind that of the palatal semivowel by roughly two hundred years, and the vocalization of lOE [ɣ] begins even later, following [w] at a temporal distance of roughly 150 years. Other variables, such as INPUTVOWELQUALITY (section 4.1.6) or TAUTOSYLLABICITY (section 4.1.5), also make conspicuous differences in terms of spelling types. Some variables, such as CLASS1, do not show a large overall effect at all, but this might be due to the fact that some of their variants are underrepresented in the findings (see the discussion in section 4.1.10.6 above).

The correlation between the individual predictor variables and the binary outcome variable VOCALIC was tested time and again with the help of generalized linear regression models (GLMs). Table 4-23 below (and continued on the next pages) gives an overview of all models run with single predictor variables.[358] The first row summarizes the 'null model', i.e. a model of all values of the outcome variable VOCALIC without any added predictor variables.[359] The null model is based on nothing but the overall proportion of VOCALIC: *YES* spellings in the data, and it has no explanatory power because it has no predictors (cf. Crawley 2013: 391). All other rows summarize GLMs run on the data with VOCALIC as the outcome variable and one of the variables discussed in the present chapter functioning as a single predictor, in the order of their analysis in sections 4.1.2 through 4.1.10.

Predictor	**Null deviance**	**Residual deviance**	**Model χ^2**	**Significance**	**Missing observations**	**AIC**	**Nagelkerke's pseudo-R^2**
(none)	23,492 (18,106 df)	23,492 (18,106 df)	0	$p = 1$	0	23,494	0
MSDATE	23,492 (18,106 df)	23,052 (18,105 df)	439.64 (1 df)	$p < 0.001$ ***	0	23,056	0.033
MSDATE25	17,883 (13,613 df)	17,651 (13,612 df)	232.56 (1 df)	$p < 0.001$ ***	4,493	17,655	0.023
QUARTERCENT	16,598 (12,660 df)	16,170 (12,653 df)	428.46 (7 df)	$p < 0.001$ ***	5,446	16,186	0.046
HALFCENT	3,117.4 (2,450 df)	2,901.0 (2,448 df)	216.39 (2 df)	$p < 0.001$ ***	15,656	2,907	0.117
DIALECT1A	21,609 (16,639 df)	21,605 (16,637 df)	4.43 (2 df)	$p = 0.109$	1,467	21,611	0

358 For the sake of simplicity, models with multiple predictor variables (and sometimes their interactions) that have been run exploratively earlier in the present chapter will not be added to the discussion here. Section 4.2 is entirely devoted to multivariate models; in that section the most salient variables listed in Table 4-23 as well as interactions between variables will be brought together in a principled manner via a step-by-step model selection process.

359 Backhaus, Erichson and Weiber (2013: 164) use the term "independence model".

Predictor	Null deviance	Residual deviance	Model χ^2	Significance	Missing observations	AIC	Nagelkerke's pseudo-R^2
DIALECT1B	21,609 (16,639 df)	21,360 (16,636 df)	249.78 (3 df)	$p <$ 0.001 ***	1,467	21,368	0.020
DIALECT1C	21,609 (16,639 df)	21,286 (16,631 df)	323.23 (8 df)	$p <$ 0.001 ***	1,467	21,304	0.026
DIALECT1D	20,771 (15,923 df)	19,925 (15,890 df)	845.74 (33 df)	$p <$ 0.001 ***	2,183	19,993	0.071
INPUTCONSONANT	19,524 (14,655 df)	12,344 (14,653 df)	7,180.83 (2 df)	$p <$ 0.001 ***	3,451	12,350	0.526
RESULT	23,356 (18,034 df)	18,031 (18,033 df)	5,325.06 (1 df)	$p <$ 0.001 ***	72	18,035	0.352
TAUTO-SYLLABICITY	16,627 (12,060 df)	12,647 (12,059 df)	3,980.44 (1 df)	$p <$ 0.001 ***	6,046	12,651	0.376
SYLLABICITY	16,627 (12,060 df)	12,577 (12,058 df)	4,050.76 (2 df)	$p <$ 0.001 ***	6,046	12,583	0.381
INPUTVOWEL-QUALITY	22,840 (17,715 df)	14,809 (17,705 df)	8,030.81 (10 df)	$p <$ 0.001 ***	391	14,831	0.503
INPUTVOWEL-QUANTITY	21,679 (17,183 df)	18,694 (17,182 df)	2,985.03 (1 df)	$p <$ 0.001 ***	923	18,698	0.222
ACCENTED	21,615 (17,099 df)	20,865 (17,098 df)	749.35 (1 df)	$p <$ 0.001 ***	1,007	20,869	0.060
FREQUENCY	23,492 (18,106 df)	22,734 (18,105 df)	757.98 (1 df)	$p <$ 0.001 ***	0	22,738	0.056
CLASS1	23,492 (18,106 df)	23,490 (18,105 df)	1.19 (1 df)	$p =$ 0.275	0	23,494	0

Predictor	Null deviance	Residual deviance	Model χ^2	Significance	Missing observations	AIC	Nagelkerke's pseudo-R^2
CLASS2	23,492 (18,106 df)	22,050 (18,101 df)	1,441.11 (5 df)	$p <$ 0.001 ***	0	22,062	0.105

Table 4-23: Summary of various monovariate generalized linear models (outcome variable: VOCALIC)[360]

The third column ("Residual deviance") specifies how well the model with the respective predictor variable fits the data, giving the distance between the linear regression line that the respective model predicts and the actually observed data points. It is the aim to keep this distance relatively small for any model to be a 'good fit'. The success of an individual variable in achieving its goal of decreasing the deviance can be equated to the difference between the "null deviance" (second column) of the model before the predictor is added, and the "residual deviance" (third column) of the model after the predictor has been added.[361] This difference is also known as the 'model chi-square' value, which is given in the fourth column ("Model χ^2"). In other words, this is a quantification of the improvement of the model compared to the null model (i.e. the model which is hardly a model because it consists of nothing but the overall mean of *VOCALIC* spelling proportions) by the addition of the respective predictor variable (cf. Field, Miles and Field 2012: 331ff.); the new model's degrees of freedom (df) resulting from the number of given variable levels are added in brackets.[362] The associated *p*-value in each line of the fifth column is an estimate of how much better than chance the model including the respective predictor is likely to be at predicting the retrieved *VOCALIC* values (cf. Field, Miles and Field 2012: 332). Most of the variables actually do contribute significantly; the only variables that do not serve to explain enough of the variance in the outcome variable VOCALIC

[360] Values given in gray in the last two columns are not directly comparable to any others in the same columns because they relate to models based on a unique data set, as explained in the following.

[361] Cf. Field, Miles and Field (2012: 248ff.) and Larson-Hall (n.d.: 104ff.) for more on 'residuals' and goodness-of-fit measurements.

[362] E.g. QUARTERCENT, having eight levels, offers seven degrees of freedom. – Cf. Field, Miles and Field (2012: 38) for more on degrees of freedom.

for them to be considered significant are DIALECT1A, i.e. the broadest space variable, and CLASS1, i.e. the distinction between closed- and open-class lexical items. The variable DIALECT1A was left out from the beginning (see section 4.1.3.1 above), while the characteristics of CLASS1 and the reasons for its general lack of explanatory power were assessed in 4.1.10 above.

The sixth column ("Missing observations") points to an important problem for any direct comparison of the respective models in Table 4-23. As we have seen in the descriptions above (see sections 4.1.2.1, 4.2.3.1, etc.), most of the predictor variables do not provide values for every single data point (MSDATE, FREQUENCY, and the 'word class' variables being the only exceptions). The numbers of missing values range in the hundreds for some variables, and in the thousands for others.[363] As a consequence, most of the models summed up in Table 4-23 are actually based on data sets which are smaller subsets of the 18,107 retrieved findings. This is a problem because measures of fit which can be used to compare different models, such as the Akaike information criterion (AIC, seventh column; cf. Findley 2006; Field, Miles and Field 2012: 263; Larson-Hall n.d.: 106) generally assume that two models are based on the exact same data set.[364] In other words, most of the AIC values in Table 4-23 cannot be meaningfully compared to each other. Likewise, the Nagelkerke pseudo-R^2 values (final column) give an approximation of the fraction (between 0 and 1) of variance explained by the respective model, so that e.g. the QUARTERCENT-based model explains c. 4.6% of the variance in the *VOCALIC* spelling occurrences of *its* (reduced) data set, whereas the HALFCENT-based model explains c. 11.7% of the variance in *its* (much more reduced) data set. Of course, the amount of variance to be explained in the first place will be smaller in the smaller data set, and thus it will be easier for a variable with missing data points to score a higher pseudo-R^2. However, not only are we speaking of two *differently sized* data sets, but in many cases we are even speaking of two entirely *different* data sets (in this extreme case, there is actually *no* overlapping data at all because of the way in which the 'time' variables QUARTERCENT and HALFCENT were coded). In other words, the AIC and pseudo-R^2 values are only truly comparable among models that are based on the exact same data (e.g. among models based on DIALECT1A, DIALECT1B, and DIA-

[363] HALFCENT is the most extreme in this respect, with over fifteen thousand data points missing (cf. Figure 4-5 in section 4.1.2.1).

[364] In addition, the value of the AIC "doesn't mean anything on its own […]. The only thing you do with the AIC is compare it to other models with the same outcome variable" (Field, Miles and Field 2012: 263).

LECT1C, or those based on MSDATE, FREQUENCY, and the ‘word class’ variables). This problem will be solved by concentrating on a smaller data set in section 4.2.

4.2 Multiple variables

The effects of the predictor variables on the outcome variables (i.e. the spellings of the relevant sounds) were predominantly treated *separately* throughout section 4.1 (cf. the overview of various monovariate models in Table 4-23). The present section will examine the *combined* effects of the different predictor variables on the main outcome variable (i.e. on the question of whether or not a spelling is *VOCALIC*) through fitting multivariate statistical models.

We will first need to select the variables whose influence is to be tested (section 4.2.1); next we need to make them directly comparable (4.2.2) before we can begin the actual process of multivariate model selection (4.2.3).

4.2.1 Selection of variables

A number of predictor variables have been coded in multiple versions, whose characteristics were then analyzed in section 4.1 above: The dimension of time (meaning ‘date of manuscript production’) was captured in four different variables, two of them continuous (MSDATE, MSDATE25) and two discrete (QUARTERCENT, HALFCENT); the ‘space’ variables were coded so as to reflect differently-sized dialect areas (DIALECT1A, DIALECT1B, DIALECT1C, DIALECT1D), two different ‘syllabicity’ variables were created for conceptual reasons (TAUTOSYLLABICITY, SYLLABICITY), and there are two variables that can both be called ‘word class’ variables (CLASS1, CLASS2). As we start dealing with the combined effects of different variables, it is important that we use only one version of each of the respective variable groups. This is true for conceptual reasons (because the different versions of variables often quantify the same phenomenon) as well as for statistical reasons (either because there is a large amount of overlap in the respective variables’ levels and they are therefore collinear, or because the different versions of the variable actually apply to different subsets of the data, as is the case with QUARTERCENT and HALFCENT, see section 4.1.11 above).

Table 4-23 in section 4.1.11 has shown the different variables to have varying amounts of missing values. This fact will also play a role in the selection of variables to include into multivariate models: Since every variable with missing values reduces the set of observations on which the model can be run, it will be important to try not to reduce the data set too much by selecting variables with relatively low numbers of missing data points.

With the time variables, we saw in section 4.1.2 that the continuous versions appear to have more precise values, but because of the way they have been coded (the ‘precise’ year numbers really being mean values of spans usually extending over decades), their values are clouded in great uncertainty. The discrete variables (QUARTERCENT and HALFCENT) generally achieve better results: QUARTERCENT describes almost the same data as MSDATE25 (containing only slightly fewer data points), but it explains twice as much of the variance of *VOCALIC* spellings in its data as MSDATE25 explains in its data (Nagelkerke’s pseudo-R^2 = 0.046 and 0.023, respectively; cf. Table 4-23). HALFCENT, on the other hand, has an even larger explanatory power (pseudo-R^2 = 0.117), but this number relates to a highly reduced set of observations (cf. Figure 4-5 and Table 4-23). We will therefore opt for the use of QUARTERCENT as the time variable to be used in multivariate models.

With the four space variables, the overview in Table 4-23 shows that their predictive power increases with their granularity: DIALECT1D proportionately explains the most variance and thus reaches the lowest AIC and the highest pseudo-R^2 values. However, DIALECT1D also has considerably more missing values that the other space variables (i.e. many texts are not located at the most fine-grained level). Moreover, DIALECT1D has thirty-tree variants, about half of which are represented by only very little data, as shown in Figure 4-17 in section 4.1.3.1. Much of the spelling-type predicting power of this variable is therefore gained by its having a significant number of variants which hold true for only one or two texts, and thus the variable runs a high risk of reflecting the idiosyncrasies of individual scribes rather than actual spatial information. We will therefore opt for DIALECT1C, which also reflects the traditionally recognized ME dialects to a great extent.

There is not much difference between the two ‘syllabicity’ variables, as was seen in section 4.1.5. Judging the two variables and their explanatory power in numerical terms, the three-level variable SYLLABICITY slightly outperforms the two-level variable TAUTOSYLLABICITY; SYLLABICITY’s AIC value is also lower although it includes a penalty for SYLLABICITY’s additional degree of freedom (cf. Field, Miles and Field 2012: 263). We will therefore opt for SYLLABICITY.[365]

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365 This choice is made on purely quantitative grounds (i.e. based on the fact that SYLLABICITY has a slightly higher explanatory power than TAUTOSYLLABICITY) in spite of the fact that in section 4.1.5.4 the traditional binary distinction between tau-

The choice between CLASS1 and CLASS2 is relatively easy: As CLASS1 explains practically none of the variance in *VOCALIC* spellings (cf. Table 4-23), we will use CLASS2 in the multivariate models.

4.2.2 Making the selected variables comparable

In order for variables to be eligible for inclusion into the same model, they must have values for the same data points (Crawley 2013: 389). Thus, in order to make our selected variables directly comparable, we will reduce the data set so that it includes no missing data points for the selected predictor variables (i.e. the ten variables listed in Table 4-24 in the following). This shrinks the data set down to about a third of its original size, leaving 6,214 of the 18,701 retrieved observations.

The next question is where to begin the model selection process, i.e. which predictor variable to include first. Table 4-24 (continued on next page) summarizes the results of running monovariate GLMs on the reduced data set with each predictor in turn.

Predictor	**Null deviance**	**Residual deviance**	**Model χ^2**	**Significance**	**AIC**	**Nagelkerke's pseudo-R^2**
(none)	8,531.3 (6,213 df)	8,531.3 (6,213 df)	0	$p = 1$	8,533.3	0
QUARTERCENT	8,531.3 (6,213 df)	8,210.9 (6,206 df)	320.35 (7 df)	$p < 0.001$ ***	8,226.9	0.067
DIALECT1C	8,531.3 (6,213 df)	8,468.2 (6,206 df)	63.07 (7 df)	$p < 0.001$ ***	8,484.2	0.014
INPUTCONSONANT	8,531.3 (6,213 df)	5,483.5 (6,211 df)	3,047.82 (2 df)	$p < 0.001$ ***	5,489.5	0.519

tosyllabic and non-tautosyllabic cases was concluded to be sufficient as such (a judgment which was informed by the qualitative evaluation of the differences between the three SYLLABICITY levels).

Predictor	Null deviance	Residual deviance	Model χ^2	Significance	AIC	Nagelkerke's pseudo-R^2
RESULT	8,531.3 (6,213 df)	7,268.1 (6,212 df)	1,263.19 (1 df)	$p <$ 0.001 ***	7,272.1	0.246
SYLLABICITY	8,531.3 (6,213 df)	6,008.9 (6,211 df)	2,522.39 (2 df)	$p <$ 0.001 ***	6,014.9	0.447
INPUTVOWELQUALITY	8,531.3 (6,213 df)	5,991.6 (6,204 df)	2,539.7 (9 df)	$p <$ 0.001 ***	6,011.6	0.449
INPUTVOWELQUANTITY	8,531.3 (6,213 df)	7,827.2 (6,212 df)	704.08 (1 df)	$p <$ 0.001 ***	7,831.2	0.143
ACCENTED	8,531.3 (6,213 df)	8,231.0 (6,212 df)	300.24 (1 df)	$p <$ 0.001 ***	8,235.0	0.063
FREQUENCY	8,531.3 (6,213 df)	8,307.7 (6,212 df)	223.57 (1 df)	$p <$ 0.001 ***	8,311.7	0.047
CLASS2	8,531.3 (6,213 df)	8,388.6 (6,208 df)	142.66 (5 df)	$p <$ 0.001 ***	8,400.6	0.030

Table 4-24: Summary of salient monovariate generalized linear models (outcome variable: VOCALIC; data set reduced to exclude missing values)

The advantage of the reduced data set is that the variables now become directly comparable to one another via measures of fit: The “AIC” and “Nagelkerke’s pseudo-R^2” columns now contain meaningful figures for the comparison of all variables shown. The values in Table 4-24 make some variables out to be relatively potent predictors (with INPUTCONSONANT, INPUTVOWELQUALITY, and SYLLABICITY explaining as much as c. 40-50% of the variation), while other variables do not seem to contribute much (e.g. ‘word class’ or ‘space’ variables are responsible for only very low percentages of the variation in spellings).

The relative explanatory power of the individual variables is bound to change as they are combined with one another and as their interactions are included in multivariate models. In the following section, we will try to find a model that adequately summarizes the influence of the most relevant predictors on the spelling types – generally and for all three input consonants.

4.2.3 Multivariate model selection

4.2.3.1 All input consonants

Since the potentially relevant predictor variables are relatively numerous, the usual course of beginning with a maximal model (i.e. first fitting a model containing all variables and possible interactions) which is then successively simplified (cf. Crawley 2013: 393ff.; Gries 2013: 260; Hatzinger et al. 2014: 368-369) does not seem practicable. The method we will opt for instead is one known as forward stepwise model selection (cf. Hastie, Tibshirani and Friedman 2009: 58ff.; Bates 2010: 114ff.; Gries 2013: 260), in which we begin with a minimal model, to which variables and interactions that make a significant difference are added one by one. This is done in R using the function `add1()`, which automatically fits a number of possible models by adding a range of different predictors to an already existing model and returns a table of the resulting changes in fit.

Before we can actually begin running models with more than one predictor, we must first check for multicollinearity among the selected predictor variables within the reduced data set. If we elicit variance-inflation-based measures from a model containing all ten selected predictor variables (cf. Table 4-24) using the R function `vif()` as before, we find that the variable INPUTVOWELQUANTITY has a problematically high squared GVIF$^{1/(2 \times df)}$ value.[366] Since the variable INPUTVOWELQUANTITY is highly collinear with the other variables, and there are no pressing theoretical reasons for keeping it in,[367] we will discard it as a predictor within the model selection process. If we now run the `vif()` function on the remaining variables, we find that the variable RESULT highly correlates with the other remaining variables.[368] Again, there is no pressing reason for keeping this variable, which has a diagnostic value only for voiced velar fricatives, as we already know, and which therefore cannot contribute much in terms of explanatory power in a model of the data for all input consonants. Testing the remaining vari-

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366 The squared GVIF$^{1/(2 \times df)}$ value for INPUTVOWELQUANTITY is 12.57; the conventional tolerance threshold value is 5 (cf. Larson-Hall n.d.: 121-122; Heiberger and Holland 2004: 243; also see fn. 300).

367 It would be more problematic if we were speaking about, say, a time variable, which for conceptual reasons is absolutely necessary for adequately modeling a sound change (cf. Backhaus et al. 2011: 95).

368 RESULT has a squared GVIF$^{1/(2 \times df)}$ value of c. 6.94.

ables for multicollinearity yields no more problematic variance-inflation-based values, and thus we can continue with the eight remaining variables.

We will begin with the null model, i.e. the model in which the values of the outcome variable VOCALIC are those predicted when all continuous predictor variables are 0 and all discrete predictor variables are at their respective base levels.[369] The null model for the reduced data set has an AIC value of 8,533.3 (cf. the first row in Table 4-24). As mentioned above (see fn. 287), this number cannot be taken as an absolute value, but only as a relative measurement for other models as long as they are based on the same data set (which is the case now that the data set has been reduced so as to exclude the missing values of all selected variables). In general, AIC values drop as explanatory power rises, so that the general rule is, 'The lower the AIC, the better the model'.[370] Accordingly, the null model has the highest AIC value in Table 4-24, and the AIC values of the other models decrease as e.g. Nagelkerke pseudo-R^2 values increase.

At this point, the addition of any single predictor would reduce the residual variance highly significantly. The AIC values in Table 4-24 tell us which predictor variable to add to the null model first, viz. INPUTCONSONANT.[371] The resulting monovariate model `glm(VOCALIC ~ INPUTCONSONANT)` will be referred to as "model 1". This model, which hypothesizes that the question of whether or not a *VOCALIC* spelling is likely to occur depends only on which of the three lOE input consonants we are dealing with, already explains more than half (51.9%) of the variance in the variable VOCALIC, as is to be gathered from the last column ("Nagelkerke's pseudo-R^2") in Table 4-24. This model basically says the same thing as the conditional inference tree for VOCALIC ~ INPUTCONSONANT in Figure 4-30; its large explanatory power reflects the fact that e.g. Figures 4-37, 4-38, and

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369 The R code used to run the null model for the outcome VOCALIC is `glm(VOCALIC ~ 1)`. The VOCALIC values predicted by the null model are rather arbitrary, since many of the discrete variables involved do not have naturally meaningful 'base levels'. The important fact about the null model is that no observed values of variables have been added to it, so that the deviance in the outcome variable has not been reduced (Model $\chi^2 = 0$), and it has no explanatory power (Nagelkerke's pseudo-R^2 = 0).

370 The AIC is a parsimony-adjusted measurement, which means that increasing numbers of predictor variables involved are penalized through an increase of the AIC value (Field, Miles and Field 2012: 263).

371 Applying the R function `add1()` to the null model and including the eight remaining predictor variables in the function's `scope` argument essentially leads to the same results as those given in Table 4-24.

4-39, which split up the data into the three different lOE input consonants, greatly differ in regards to their proportions of *VOCALIC* spellings.

After INPUTCONSONANT, the next variable to be included in the stepwise model selection process is SYLLABICITY, as the output of the function `add1()` shows:

Added predictor	**Df**	**Residual deviance**	**AIC**	**LRT** [372]	**Significance**
. + (none)		5,483.5	5,489.5		$p < 0.001$ ***
. + QUARTERCENT	7	5,183.7	5,203.7	299.76	$p < 0.001$ ***
. + DIALECT1C	7	5,415.8	5,435.8	67.69	$p < 0.001$ ***
. + SYLLABICITY	**2**	**4,947.0**	**4,957.0**	**536.48**	**$p < 0.001$ *** **
. + INPUTVOWELQUALITY	9	5,247.9	5,271.9	235.55	$p < 0.001$ ***
. + ACCENTED	1	5,455.9	5,463.9	27.54	$p < 0.001$ ***
. + FREQUENCY	1	5,444.7	5,452.7	38.79	$p < 0.001$ ***
. + CLASS2	5	5,258.9	5,274.9	224.52	$p < 0.001$ ***

Table 4-25: Output of `add1(model1)`

Table 4-25 is to be interpreted as follows: In the first column ("Added predictor"), the period (.) is shorthand for 'everything already included', so that all rows but the first describe possible models with two predictors, viz. INPUTCONSONANT and the one specified. The first row describes the currently existing model (i.e. model 1 with only one predictor and no more). In other words, rows 2 through 8 specify what would happen if each of the seven other predictors were added to the model; e.g. if we were to add the time variable QUARTERCENT (second row) next, the residual deviance (i.e. the unexplained variance) in the model with both predictors would be 5,183.7; the AIC, which currently is 5,489.5, would drop to 5,203.7. Finally, the model with both predictors would be a highly significantly better model than the model with one predictor, though this would be the case no matter which variable were added.

SYLLABICITY (fourth row) turns out to be the best variable to be added to an expanded version of model 1: Its addition makes the residual deviance drop by the greatest amount (LRT = 536.48), and the new model has the lowest possible AIC value (4,957). Thus, the model 2 formula is `glm(VOCALIC ~`

372 The abbreviation "LRT" in the `add1()` output stands for 'likelihood ratio test', which is a measurement synonymous with what is referred to as the "model χ^2" value in Tables 4-26 and 4-27, viz. a quantification of the difference between residual deviance and null deviance.

`INPUTCONSONANT + SYLLABICITY)`.[373] Model 2 explains c. 58.7% of the variance in *VOCALIC* spellings. In section 4.1.5.2 above, we already saw that the variable SYLLABICITY is indeed responsible for the rather pronounced differences between the spelling type proportions (see Figures 4-43 and 4-44).

Next, the `add1()` function is applied to the expanded model 2. Since we now have a model with two predictor variables, from this point on we can consider interactions between variables that are already in the model for inclusion into the next version of the model.[374] Eligible are all single variables not yet included as well as the interaction of the variables already included, viz. INPUTCONSONANT :: SYLLABICITY. Because interactions of predictor variables can be relatively hard to understand, and the meaning of higher-order interactions quickly becomes even harder to grasp, only interactions between two variables (as opposed to three or more) will be allowed into the models (cf. Gries 2013: 259). The time variable QUARTERCENT improves model 2 the most, and so model 3 includes three single variables: `glm(VOCALIC ~ INPUTCONSONANT + SYLLABICITY + QUARTERCENT)`. Thus, in model 3, the two variables already mentioned combine with the 'time' dimension and together explain c. 62.4% of the variance in *VOCALIC* spellings. The fact that the dimension of time plays a significant role (the spellings gradually changing from 'consonantal' to 'vocalic') was shown throughout section 4.1.2.2. If we could extend the time period covered in our data by a few centuries, the time dimension could easily become the most important predictor: The proportion of *VOCALIC* spellings would probably range from nearly 0% in OE texts to 100 in later ME texts. As it is, in the two centuries covered by the LAEME CTT, the general proportion of *VOCALIC* spellings increases from c. 50% to c. 75 or 80% (cf. Figures 4-9 and 4-11), and this difference is not enough to let the time variables compete with INPUTCONSONANT or SYLLABICITY. In other words, the questions of which original sound we are dealing with, and whether it belonged to the same syllable as the preceding vowel, make more of a difference

373 Consecutive models within the model selection process were actually created with the R function `update()`, e.g. `model2 <- update(model1, ~ . + SYLLABICITY)`. The period (`.`) within this line of code means 'everything already in model 1'.

374 This is achieved by including the interactions to be considered for inclusion into the `scope` argument of the function `add1()`. The line of code therefore looks as follows: `add1(model2, scope = c("QUARTERCENT", "DIALECT1C", "INPUTVOWELQUALITY", "ACCENTED", "FREQUENCY", "CLASS2", "INPUTCONSONANT:SYLLABICITY"), test = "LRT")`.

in terms of the 'vocality' of spellings in eME than the question at which point in the two-hundred-year time frame a text was written.

The stepwise model selection process described above is continued as long as a new model with more predictors can be found which improves the previous model significantly. If more than one possible model would be significantly better (as was the case with the selection of model 2; cf. Table 4-25), the model with the lowest AIC value is selected (cf. Gries 2013: 260-261). The process is continued along these lines, and the outcomes are summarized in Table 4-26 below. Once again, in the second column ("Added predictor"), the period (.) is shorthand for 'everything already included', but this table must be read from top to bottom, so that model 2 has two predictors, model 3 has three predictors, and so on.

Model #	**Added predictor**	**Model χ^2**	**AIC**	**Nagelkerke's pseudo-R^2**	**Significance**
1	**InputConsonant**	3,047.82 (2 df)	5,489.5	0.519	$p < 0.001$ ***
2	. + **Syllabicity**	3,584.30 (4 df)	4,957.0	0.587	$p < 0.001$ ***
3	. + **QuarterCent**	3,896.10 (11 df)	4,659.2	0.624	$p < 0.001$ ***
4	. + **InputVowelQuality**	4,070.40 (20 df)	4,502.9	0.644	$p < 0.001$ ***
5	. + InputConsonant :: InputVowelQuality	4,305.40 (29 df)	4,285.9	0.669	$p < 0.001$ ***
6	. + QuarterCent :: InputVowelQuality	4,530.92 (86 df)	4,174.4	0.693	$p < 0.001$ ***
7	. + **Dialect1C**	4,638.25 (93 df)	4,081.0	0.704	$p < 0.001$ ***
8	. + InputVowelQuality:: Dialect1C	4,931.45 (141 df)	3,883.8	0.734	$p < 0.001$ ***
9	. + QuarterCent :: Dialect1C	5,062.84 (158 df)	3,786.4	0.746	$p < 0.001$ ***
10	. + Syllabicity:: InputVowelQuality	5,176.48 (171 df)	3,698.8	0.757	$p < 0.001$ ***
11	. + Syllabicity:: QuarterCent	5,283.46 (185 df)	3,619.8	0.767	$p < 0.001$ ***
12	. + InputConsonant:: Dialect1C	5,353.27 (197 df)	3,574.0	0.773	$p < 0.001$ ***

Model #	Added predictor	Model χ^2	AIC	Nagelkerke's pseudo-R^2	Significance
13	. + **CLASS2**	5,392.95 (202 df)	3,544.3	0.777	$p < 0.001$ ***
14	. + QUARTERCENT :: CLASS2	5,515.79 (234 df)	3,485.5	0.788	$p < 0.001$ ***
15	. + SYLLABICITY :: CLASS2	5,580.53 (242 df)	3,436.8	0.794	$p < 0.001$ ***
16	. + INPUTVOWELQUALITY :: CLASS2	5,663.03 (259 df)	3,388.3	0.801	$p < 0.001$ ***
17	. + INPUTCONSONANT :: SYLLABICITY	5,683.56 (263 df)	3,375.7	0.803	$p < 0.001$ ***
18	. + INPUTCONSONANT :: QUARTERCENT	5,714.35 (276 df)	3,370.9	0.805	$p < 0.01$ **
19	. + SYLLABICITY :: DIALECT1C	5,736.8 (288 df)	3,372.5	0.808	$p < 0.05$ *

Table 4-26: Summary of the stepwise multivariate model selection process (outcome variable: VOCALIC; data set reduced to exclude missing values)

The *p*-value in the final column specifies how significantly the amount of variance explained by the respective model differs from the amount of variance explained by the previous model (in the case of model 1, the previous model is the null model). Every model up to model 17 differs highly significantly ($p < 0.001$) from its predecessor. The point at which the inclusion of any further predictors, including interactions between variables, would no longer significantly improve the new model's explanatory power is reached at model 19, which is therefore the final model, and which contains nineteen predictors (viz. six of the eight variables tested and many of their respective two-way interactions); ACCENTED and FREQUENCY are the only factors that have turned out to be insignificant in the model selection process. A somewhat simplified notation of the final model is given in (22) below:

(22) model 19: glm(VOCALIC ~ (INPUTCONSONANT + SYLLABICITY + QUARTERCENT + INPUTVOWELQUALITY + DIALECT1C)² + CLASS2 + SYLLABICITY::CLASS2 + QUARTERCENT::CLASS2 + INPUTVOWELQUALITY::CLASS2)

The exponentiation of the inner bracket with "²" means that all variables given in the inner bracket and all of their mutual two-way interactions are included. The interactions involving CLASS2, on the other hand, are listed individually because CLASS2 does not significantly interact with all other variables. This is a rather complex model, which states that *VOCALIC* spelling proportions are best predicted by a combination of the five most significant predictors INPUTCONSONANT, SYLLABICITY, QUARTERCENT, INPUTVOWELQUALITY, and DIALECT1C[375] and all of their interactions, and the variable CLASS2 and some of its interactions with the other variables. This model manages to explain nearly 81% of the variance in *VOCALIC* spellings. As is to be seen in the fifth column ("Nagelkerke's pseudo-R^2") of Table 4-26, the differences in explanatory power of consecutive models become continuously smaller the more complex the models become, so that e.g. leaving out CLASS2 completely and stopping at model 12 would still leave us with a model that explains about 77% of the variance in *VOCALIC* spellings. Such a model might seem to be intuitively preferable because it dispenses with a variable and many interactions while still achieving a relatively high explanatory power. However, strictly speaking, every model up to model 19 does make a significant difference in terms of the amount of variance it explains, and so model 19 really is the preferable model.

4.2.3.2 Findings with input consonant [j]

All statistical models in the previous section have aimed to explain the phenomenon of semivowel vocalization (as manifested in the eME written records) on the basis of all forms retrieved from the LAEME CTT. However, the fact that we are dealing with the vocalization of three different lOE input sounds ([j], [w], and [ɣ]) implies that different factors might turn up as relevant if we divide the findings up accordingly and fit different models to the three data sets separately.

We will therefore further reduce our data set to include only instances that go back to the lOE palatal semivowel (INPUTCONSONANT: *J*), which leaves us with 2,543 findings. A test for collinearity among the potential predictor variables singles out FREQUENCY as problematic (squared $GVIF^{1/(2 \times df)}$ = c. 6.17). We can safely discard this variable, since it cannot be expected to contribute much to the

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375 A GLM with these five variables as the only predictors for VOCALIC (`glm(VOCALIC ~ INPUTCONSONANT + SYLLABICITY + QUARTERCENT + INPUTVOWELQUALITY + DIALECT1C)`) achieves a pseudo-R^2 value of 0.656, showing that these five variables alone explain about two thirds of the variance in *VOCALIC* spelling proportions.

model considering its fairly low pseudo-R^2 value in Table 4-24, and considering that it has also not made it into the general model (see section 4.2.3.1). After the exclusion of FREQUENCY, all variance-inflation-based measurement values are below 5, and thus unproblematic. In contrast to the situation with the model for all three input sounds (see section 4.2.3.1), the variable INPUTVOWELQUANTITY is not highly collinear with the other predictors and can therefore be included onto this model selection process. We will therefore proceed with seven variables potentially relevant to [j]-vocalization: QUARTERCENT, DIALECT1C, SYLLABICITY, INPUTVOWELQUALITY, INPUTVOWELQUANTITY, ACCENTED, and CLASS2.

The null model for VOCALIC in the palatal semivowel data (which shall be called "j0") shows a deviance of 1,232.3 on 2,542 df and an AIC value of 1,234.3. Table 4-27 below (and continued on the next page) sums up the subsequent models arrived at through the forward stepwise selection procedure that was described in section 4.2.3.1 above.

Name of model	**Added predictor**	**Model χ^2**	**AIC**	**Nagelkerke's pseudo-R^2**	**Significance**
j1	**QUARTERCENT**	158.01 (7 df)	1,090.3	0.157	$p < 0.001$ ***
j2	. + **DIALECT1C**	262.9 (14 df)	999.41	0.256	$p < 0.001$ ***
j3	. + **SYLLABICITY**	343.13 (16 df)	923.17	0.329	$p < 0.001$ ***
j4	. + QUARTERCENT:: SYLLABICITY	415.92 (29 df)	876.39	0.393	$p < 0.001$ ***
j5	. + **CLASS2**	440.61 (34 df)	861.69	0.414	$p < 0.001$ ***
j6	. + **INPUTVOWELQUALITY**	458.87 (38 df)	851.43	0.430	$p < 0.01$ **
j7	. + SYLLABICITY:: INPUTVOWELQUALITY	474.61 (43 df)	845.69	0.443	$p < 0.01$ **
j8	. + QUARTERCENT:: INPUTVOWELQUALITY	519.45 (64 df)	842.85	0.481	$p < 0.01$ **
j9	. + DIALECT1C:: SYLLABICITY	548.25 (76 df)	838.06	0.505	$p < 0.01$ **

Table 4-27: Summary of the stepwise multivariate model selection process (outcome variable: VOCALIC; data set reduced to exclude missing values; INPUTCONSONANT: [j])

The predictor variable with the largest explanatory power for the 'palatal semivowel' findings is QUARTERCENT: The model with QUARTERCENT as its only predictor explains almost 16% of the variance in *VOCALIC* spelling proportions. The next important predictor is DIALECT1C, which brings up the amount of explained variance to nearly 26%. In other words, the retrieved spellings relevant to palatal semivowel vocalization vary most over time and space; these two variables alone account for a quarter of the variance in *VOCALIC* spellings. SYLLABICITY is another important factor: As was seen in section 4.1.5.2 (cf. especially Figures 4-43 and 4-44), if the original palatal semivowel was tautosyllabic with the preceding vowel, *VOCALIC* spellings are more likely to occur. The next significant variables are CLASS2 (i.e. the 'part of speech' variable) and INPUTVOWELQUALITY (which seems to come rather late for its being one of the more frequently mentioned factors in secondary literature, see Table 2-10 in section 2.4.1.3 – however, it does significantly interact with time, meaning that it has a bearing on the vocalization of [j]). The combination of these five predictor variables and some of their interactions manages to explain about half of the variance in the 2,543 observances (Nagelkerke's pseudo-$R^2 = 0.505$) at the point at which no further predictors would improve the model significantly (i.e. "j9"). A simplified notation of the final model for instances of [j]-vocalization is given below:

(23) model j9: glm(VOCALIC ~ (QUARTERCENT + SYLLABICITY + INPUTVOWELQUALITY)² + DIALECT1C + CLASS2 + SYLLABICITY::DIALECT1C)

As with model 19 discussed above (see section 4.2.3.1), this model also excludes INPUTVOWELQUANTITY and ACCENTED although both were explicitly tested. In general, the two models are rather similar; the main difference is that the model for [j]-vocalization contains fewer predictors and only manages to account for half of the variance in its data (as opposed to model 19, which accounts for over 80% of the variance in its data). This is basically because in the previous section all three input sounds were conflated and INPUTCONSONANT was allowed to act as a very powerful predictor, and thus it comes as no surprise. A conspicuous finding is that if we focus on instances of the palatal semivowel the time and space variables increase in importance and overtake SYLLABICITY and INPUTVOWELQUALITY. This means that time is the best predictor for the *VOCALIC* spelling proportions in primary palatal semivowel forms. At the same time, QUARTERCENT only interacts significantly with SYLLABICITY and INPUTVOWEL-QUALITY, which means that these are the two factors that influence the change, whereas differences among the DIALECT1C and CLASS2 levels remain relatively stable over time.

4.2.3.3 Findings with input consonant [w]

We will now subject the findings whose relevant sound derives from the lOE labial-velar semivowel to the same treatment. Trimming down the data set for [w] in order to exclude missing values in the potentially relevant variables (i.e. the variables listed in the first column of Table 4-24, but excluding INPUT-CONSONANT and RESULT, which are not meaningful when dealing with [w]-relevant findings) leaves us with 2,045 findings. A test for collinearity among these variables using the `vif()` function shows that perfect collinearity exists among the predictors.[376] The two variables that are perfectly collinear are SYLLABICITY and INPUTVOWELQUANTITY: All forms that have been coded as SYLLABICITY: *AMBI* have short input vowels (these are reflexes of lOE forms such as *clape* 'claw' and *ȝesepen* 'seen'). Using the binary variable TAUTOSYLLABICITY instead of SYLLABICITY solves the problem. The `vif()` function indicates that we further must eliminate FREQUENCY and ACCENTED on account of problematic variance inflation factors (squared $GVIF^{1/(2 \times df)}$ = c. 71.66 and c. 9.31, respectively), which means that the variables that remain to be tested are QUARTERCENT, DIALECT1C, TAUTOSYLLABICITY, INPUTVOWELQUALITY (the factor that Pinsker (1974: 33-34) claims to be decisive for [w] vocalization; see section 2.4.2.3 [vii]), INPUTVOWELQUANTITY, and CLASS2.

The null model for the input consonant [w] data (model "w0") has a residual deviance of 2,741 on 2,044 df and an AIC of 2,743.7. The steps of the additive model selection process are listed in Table 4-28 on the following page.

376 Field, Miles and Field (2012: 275) explain that "[p]erfect collinearity exists when at least one predictor is a perfect linear combination of the others".

Name of model	Added predictor	Model χ^2	AIC	Nagelkerke's pseudo-R^2	Significance
w1	**Tautosyllabicity**	488.75 (1 df)	2,257.0	0.288	$p < 0.001$ ***
w2	. + **QuarterCent**	654.61 (8 df)	2,105.1	0.371	$p < 0.001$ ***
w3	. + **Dialect1C**	779.69 (14 df)	1,992.0	0.429	$p < 0.001$ ***
w4	. + QuarterCent :: Dialect1C	966.24 (31 df)	1,839.5	0.510	$p < 0.001$ ***
w5	. + **InputVowelQuality**	1,137.77 (37 df)	1,680.0	0.578	$p < 0.001$ ***
w6	. + **Class2**	1,201.68 (42 df)	1,626.1	0.602	$p < 0.001$ ***
w7	. + Tautosyllabicity :: Class2	1,267.57 (45 df)	1,566.2	0.626	$p < 0.001$ ***
w8	. + QuarterCent :: Class2	1,368.46 (73 df)	1,521.3	0.661	$p < 0.001$ ***
w9	. + Tautosyllabicity :: QuarterCent	1,426.80 (79 df)	1,474.9	0.680	$p < 0.001$ ***
w10	. + QuarterCent :: InputVowelQuality	1,534.71 (115 df)	1,439.0	0.715	$p < 0.001$ ***
w11	. + InputVowelQuality :: Class2	1,568.73 (122 df)	1,419.0	0.725	$p < 0.001$ ***
w12	. + Tautosyllabicity :: InputVowelQuality	1,587.06 (128 df)	1,412.7	0.731	$p < 0.01$ **
w13	. + Dialect1C :: Class2	1635.37 (151 df)	1,410.4	0.746	$p < 0.01$ **
w14	. + Tautosyllabicity :: Dialect1C	1660.57 (157 df)	1,397.2	0.753	$p < 0.001$ ***

Table 4-28: Summary of the stepwise multivariate model selection process (outcome variable: Vocalic; data set reduced to exclude missing values; InputConsonant: [w])

Interestingly, in the findings relevant to [w]-vocalization the question of which syllable the sound belonged to is the most significant single predictor once more (cf. the first row, "w1"). This neatly ties in with Figures 4-45 and 4-46 (see section 4.1.5.2), which demonstrated that the differences in *vocalic* spelling proportions are indeed extreme between the tautosyllabic and non-tautosyllabic [w]-relevant findings. This variable explains nearly 30% of the variance in *VOCALIC* spelling proportions (Nagelkerke's pseudo-R^2 = 0.288). The next significant predictors are time and space as well as their interaction, which together with TAUTOSYLLABICITY account for more than half of the variance (Nagelkerke's pseudo-R^2 = 0.51). The other added predictors make the resulting final model (w14) look fairly similar to those already discussed:

(24) model w14: glm(VOCALIC ~ (TAUTOSYLLABICITY + QUARTERCENT + DIALECT1C + CLASS2)² + INPUTVOWELQUALITY + TAUTOSYLLABICITY::INPUTVOWELQUALITY + QUARTERCENT::INPUTVOWELQUALITY + CLASS2::INPUTVOWELQUALITY)

The final model accounts for three quarters of the variance in *VOCALIC* spellings within the labial-velar semivowel data. Once again, INPUTVOWELQUANTITY drops out of the equation, and almost all two-way interactions between the remaining predictors are significant. INPUTVOWELQUALITY significantly interacts with time, which corroborates Pinsker's (1974: 33-34) findings; however, these two variables interact in all other final models as well, which means that this cannot be seen as a [w]-specific feature. This time TAUTOSYLLABICITY is the most potent predictor. All of the predictors included in the model interact with QUARTERCENT, which means that they all influence the change.

4.2.3.4 Findings with input consonant [ɣ]

Finally, a model that adequately predicts the variance of *VOCALIC* spellings for the sounds that derive from the lOE voiced velar fricative will be selected. Reducing the set of findings to INPUTCONSONANT: *G* forms that contain no missing values in the relevant variables leaves us with 1,626 observations. A search for collinearity among the relevant variables using the `vif()` function returns INPUTVOWELQUANTITY as problematic (squared $GVIF^{1/(2 \times df)}$ = c. 24.15). After the removal of INPUTVOWELQUANTITY, the remaining variables show fairly low values of variance-inflation-based measures and may therefore be combined.

The null model for [ɣ] (model g0) has a deviance of 1,509.4 on 1,625 df, and an AIC value of 1,511.4. The variables to be tested for inclusion into subsequent versions of the model are QUARTERCENT, DIALECT1C, RESULT, SYLLABICITY, INPUTVOWELQUALITY, ACCENTED, CLASS2, and FREQUENCY. Once again, the steps of the additive model selection process are summarized on the next page.

Name of model	Added predictor	Model χ^2	AIC	Nagelkerke's pseudo-R^2	Significance
g1	**INPUTVOWELQUALITY**	174.33 (8 df)	1,353.1	0.168	$p < 0.001$ ***
g2	. + **QUARTERCENT**	287.86 (15 df)	1,253.6	0.268	$p < 0.001$ ***
g3	. + **DIALECT1C**	351.88 (22 df)	1,203.6	0.322	$p < 0.001$ ***
g4	. + INPUTVOWELQUALITY :: QUARTERCENT	452.54 (56 df)	1,170.9	0.402	$p < 0.001$ ***
g5	. + INPUTVOWELQUALITY :: DIALECT1C	569.50 (87 df)	1,115.9	0.489	$p < 0.001$ ***
g6	. + **RESULT**	586.78 (88 df)	1,100.7	0.501	$p < 0.001$ ***
g7	. + QUARTERCENT :: RESULT	616.40 (94 df)	1,083.0	0.522	$p < 0.001$ ***
g8	. + **SYLLABICITY**	635.44 (96 df)	1,068.0	0.535	$p < 0.001$ ***
g9	. + QUARTERCENT :: SYLLABICITY	658.07 (103 df)	1,059.4	0.550	$p < 0.01$ **
g10	. + QUARTERCENT :: DIA-LECT1C	688.16 (117 df)	1,057.3	0.571	$p < 0.01$ **
g11	. + INPUTVOWELQUALITY :: SYLLABICITY	698.36 (120 df)	1,053.1	0.577	$p < 0.05$ *

Table 4-29: Summary of the stepwise multivariate model selection process (outcome variable: VOCALIC; data set reduced to exclude missing values; INPUT-CONSONANT: [ɣ])

Intuition might have led us to expect that the most potent single predictor variable would be RESULT, given that this variable codifies the opposition between secondary palatals, as in forms such as *niȝon* ‘nine’, and what we have called ‘secondary labial-velars’, as in forms such as *boȝa* ‘bow’, and it therefore indicates whether the respective voiced velar fricatives joined the development of [j] or of [w]. However, not RESULT but INPUTVOWELQUALITY turns out to be the single predictor that explains the largest amount (viz. c. 17%) of the variance in *VOCALIC* spellings. The two variables are closely related, as their cross-tabulation in Table

4-16 (see section 4.1.6.2) has shown;[377] it should be kept in mind that RESULT becomes an important factor only from c. 1250, as Figures 4-40 and 4-41 have shown, meaning that the split between [ɣ > i] and [ɣ > u] left its mark on spellings from the second half of the eME period. This fact might contribute to INPUTVOWELQUALITY being a more potent predictor than RESULT.

Time and space enter into the picture next, as well as the interaction of INPUTVOWELQUALITY with both time and space variables (which indicates that different vowels influenced the ongoing vocalization, as reflected in the spellings, at different rates, and in different places). Together with these interactions, these variables so far explain about half of the variance (see model g5 in Table 4-29). RESULT and SYLLABICITY are significant enough to be included, but of minor importance. The final model (model g11) including all significant predictors manages to explain c. 57.7% of the *VOCALIC* spelling variance in [ɣ]-derived forms. Once again, a somewhat simplified notation of the final model is given below.

(25) model g11: glm(VOCALIC ~ (INPUTVOWELQUALITY + QUARTERCENT + DIALECT1C)² + RESULT + SYLLABICITY + INPUTVOWELQUALITY::SYLLABICITY + QUARTERCENT::RESULT + QUARTERCENT::SYLLABICITY)

The factor of vowel quality has the greatest explanatory power for the degree of vocalization of voiced velar fricatives. Figures 4-57 through 4-62 in section 4.1.7.4 point into this direction. Time, space, the vocalic result ([i] vs. [u]), and the question of tautosyllabicity also play important roles as predictors. It is interesting to note that QUARTERCENT interacts with all other predictors, which means that they actually influence the vocalization of [ɣ].

CLASS2 has turned out to be an insignificant predictor along with ACCENTED and FREQUENCY. The other final models all include CLASS2 (and usually also interactions of other variables with CLASS2). With the effects of both word class and lexeme frequency being insignificant for the vocalization of voiced velar fricatives, we might conclude that there is no significant evidence of lexical diffusion at least for this part of the data. However, the small absolute numbers in

[377] The two variables are not collinear to a high degree, otherwise one of them would have had to be excluded before the model selection process began. Their respective squared GVIF$^{1/(2 \times df)}$ values are c. 1.6 (RESULT) and 1.06 (INPUTVOWELQUALITY). – INPUTVOWELQUALITY explains more of the variance because it has more variants (viz. nine in our reduced data set) than RESULT (which only ever had two: *I* and *U*). However, INPUTVOWELQUALITY achieves a much lower AIC (which is a good thing) in spite of the penalty for having more variants. This implies that the different variants (i.e. the different input vowels) are actually 'doing' significant things to make INPUTVOWELQUALITY a better predictor for VOCALIC in the [ɣ] data.

Figures 4-107 through 4-109 in section 4.1.10.5 suggest that the apparent insignificance of word class might also be due to the general scarcity of [ɣ]-relevant forms.

4.2.4 Summary

The forward stepwise model selection process has revealed that, when it comes to explaining the overall occurrence of *VOCALIC* spellings (cf. model 19 summarized in (23) above,

- INPUTCONSONANT is the most potent explanatory variable; in other words, it makes most sense to treat the three consonantal inputs [j, w, ɣ] separately, as is usually done in secondary literature;
- in addition, time, space (i.e. dialect regions), SYLLABICITY, and INPUTVOWELQUALITY as well as all two-way interactions between all five factors so far mentioned are significant predictors for the vocalization;
- and finally, part of speech (CLASS2) is also a significant predictor which interacts with at least some of the other variables.

If we divide the data up according to the different input consonants [j, w, ɣ] and select the best-fitting model for each data subset, we find that

- the two extra-linguistic factors (time and space) and two of the linguistic factors (viz. tautosyllabicity and the quality of the preceding vowel) play important roles for all three sounds: They are the universally important factors. Additionally,
- in the model for [j], the two universally important linguistic factors interact with time, i.e. they significantly influence the development of palatal semivowels ('space' does not); in addition, part of speech (CLASS2) is also a significant predictor, which, however, operates on the synchronic level only;
- in the model for [w], all variables interact with time, i.e. they significantly influence the development of labial-velar semivowels; this includes the factor of part of speech (CLASS2); the question of which syllable the relevant sound belonged to is the strongest single predictor;
- in the model for [ɣ], all variables interact with time, i.e. they significantly influence the development of voiced velar fricatives; this includes the distinction between 'secondary palatals' ([ɣ > i]) and 'secondary labial-velars' ([ɣ > u]). Neither FREQUENCY nor word class are included in the model,

which can be taken as evidence against lexical diffusion in this case. The quality of the preceding vowel is the most potent single predictor; the fact that RESULT contributes relatively little to the model has to do with the fact that the secondary palatals and the 'secondary labial-velars' began to grow apart only from around 1250.

In general, many of the factors mentioned as potentially relevant in previous secondary literature have turned out to be significant predictors within the present multivariate models. This fact will be illustrated in Table 5-1 in the following chapter.

5. Conclusion

5.1 Summary of results

The present study has described the vocalization of postvocalic semivowels in early Middle English (as manifested in the spellings) and investigated the factors influencing the sound change with the help of statistical methods. More specifically, we have compiled a list of factors mentioned in historical-linguistic literature (section 2.4), which were then used to code our predictor variables (section 3.2.1). After identifying and extracting lexemes relevant to the sound change (section 3.2.2) we have assessed the predictor variables and their influence on the spellings individually (section 4.1) and then used them for comparing and selecting regression models that aim to explain [378] the changing proportions of 'vocality' in the spellings of the different sounds involved (section 4.2). [379]

As mentioned in Chapter 1, the vocalization of semivowels in medieval English has been dealt with time and again in language histories and historical grammars, but the present study has been the first comprehensive quantitative study of the phenomenon. The present analysis has shown that previous qualitative surveys and studies of the vocalization of semivowels have been right about which were the most important factors influencing the sound change, at least in regards to the points upon which the accounts generally agree. Different scholars have placed very different emphasis upon the factors that they considered to have been involved, but if we arrange these factors according to how often they are mentioned in secodary literature (as was done in section 2.4.4.1), the resulting order closely reflects the order of significance of the predictor variables in the final overall regression model (model 19 in section 4.2.3.1). Especially the four factors that have turned out to be universally important (i.e. important for all input sounds involved) in the statistical analysis, viz. time, space, tautosyllabicity, and input vowel quality, are in fact also the most frequently mentioned factors in secondary literature.

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[378] See section 5.2 on the limited implications of the term 'explaining' in this context.

[379] Reasons for assuming that eME spellings generally reflect pronunciations very closely have been elaborated in section 2.2.

Factors mentioned as influential in secondary literature, roughly ordered by frequency of mention (cf. section 2.4.4.1):	Significant predictor variables for VOCALIC, ordered by overall significance (cf. section 4.2.3.1):
(time)[380]	
(input consonant)[381]	INPUTCONSONANT
tautosyllabicity	SYLLABICITY
	QUARTERCENT
input vowel quality	INPUTVOWELQUALITY
input vowel quantity	(n.s.)
dialect	DIALECT1C
accentuation	(n.s.)
	CLASS2
(only for	**[ɣ] :)**
result	RESULT

Table 5-1: Comparison of factors mentioned in literature vs. significant predictor variables

The most potent predictor for the sound change is INPUTCONSONANT, i.e. the distinction between the input sounds [j, w, ɣ]. As observed in section 4.1.4, there is a temporal difference of about two hundred years between the vocalization of the palatal and the labial-velar semivowels. We are therefore quite clearly dealing with a case in which a sound change has "generalize[d] from one segment to another of similar type" over a range of centuries (Murray 2015: 29; this was already hypothesized about and called 'phonetic analogy' by Hugo Schuchardt [1885: 8],[382] cf. Fertig 2015). The time lag between primary and secondary semivowels (the latter going back to the lOE voiced velar fricative [ɣ]) is even greater, so that the lOE voiced velar fricatives can be said to have undergone vocalization to [i, u] about 250 years later than lOE [j, w] were vocalized, respectively.[383] The split between secondary palatals ([ɣ > i]) and 'secondary labial-velars' ([ɣ > u]) becomes visible in the spellings around 1250, except in Kent, where the split had only just begun at the end of the period covered by the LAEME CTT (in the *Ayenbite of Inwyt*, c. 1340).

380 The factor of time is implicit in the fact that we are dealing with sound changes.

381 This factor is implicit in the separate treatment of [j, w, ɣ].

382 My translation. Original: "lautliche[…] Analogie".

383 It is hard to date the vocalization of 'secondary labial-velars' using the LAEME CTT due to the low overall percentage of *VOCALIC* spellings in the findings (see Figure 4-41).

Similarly, the frequently mentioned factor of tautosyllabicity actually makes an overall temporal difference of at least two hundred years. Cases in which the relevant sound was part of the next syllable are the ones in which vocalization lags behind. Section 4.1.5.4 has shown that it is not necessary to include the notion of ambisyllabicity, as currently discussed (cf. Minkova 2015a: 139-140), at least as far as the vocalization of semivowels is concerned.

The factor of time itself is hard to capture due to the general problem of the limited datability of medieval texts (see section 3.1.2.4). The description and analysis of the time variables in section 4.1.2 has shown that the discrete variable QUARTERCENT, which categorically assigns texts to quarter centuries, leads to the most useful results. By contrast, our continuous time variables are noisy due to the fact that the estimated 'year of composition' numbers for the LAEME texts are mostly imprecise. Different scholars have implicitly or explicitly dated the sound changes in question to OE, the transitional period, or to ME (cf. the accounts in section 2.4). As mentioned above, our approach of comparing general percentages of different spelling types over time has allowed us to pinpoint the vocalization time lines of the three input sounds with considerably more precision that can be achieved through the qualitative analysis of spellings.

In general, diatopic variation plays a lesser role than diachronic change does in the LAEME CTT. This has to do with the fact that the coverage of dialect areas is relatively patchy. The well-attested dialect areas (*SWML*, *SC*, *EML*, *ESS&LON*) are remarkably similar to each other in regards to the diachronic development of spelling type proportions. The Kentish dialect as represented by Michael of Northgate's *Ayenbite of Inwyt* indeed seems to have been conservative in certain respects (see below).

The quantity (short vs. long) of the preceding vowel is not included as a predictor in any of the final models run in section 4.2: In two of the models, the variable had to be excluded because it was highly collinear with others; in models in which it could be included, it turned out to be non-significant. The same is true for the rarely mentioned factor of the accentuation of the relevant syllable. Among the factors unmentioned in previous studies, only part of speech (i.e. the variable CLASS2) has turned out to be a significant predictor in some models, whereas lexeme frequency has not and the difference between open- and closed-class words (i.e. CLASS1) has no predictive power to begin with.[384]

The analysis of individual variables in section 4.1, and especially the more qualitative evaluations of the many QUARTERCENT-based figures (Figures 4-11,

384 Cf. the discussion in section 5.2.

4-12, 4-20, etc.) have led to a number of unexpected findings. Most conspicuous are the temporally and locally limited spelling types used for the reflexes of forms that contained voiced velar fricatives in lOE (i.e. the forms with 'secondary' semivowels), viz. <h> in the first half of the thirteenth century, and <ʒ> in the second quarter of the fourteenth century (purple and yellow in Figure 4-38, respectively). The latter phenomenon is a feature particular to the *Ayenbite of Inwyt*, which is the only long Kentish text in the corpus. In this text <ʒ> is regularly used to render [x, ç] as well as what must here be [ɣ] (Dolle 1912: 113-114); in Michael of Northgate's Kentish the production of [ɣ] thus seems to have been rather conservative (cf. Luick 1921: 416, 421; see section 2.4.3.2 (iii) above).[385]

Our investigation of the *WTYPE* spellings (<ƿ, w>) in section 4.1.1.2 has shown that these letters were almost never used 'vocalically' (i.e. for [u]), but rather 'semivocalically' (i.e. for [w]), in eME. The fact that from c. 1250 they are frequently used for such instances of the lOE voiced velar fricative as were vocalized to [u] (cf. Figure 4-41 in section 4.1.4.4) therefore suggests that we might safely refer to these instances as 'secondary labial-velars' although this term has so far not been used.

5.2 Discussion and outlook

While it might be true that lexical frequency effects generally play an important role in phonological change (Hamann 2015: 254),[386] the present study has largely not been able to verify this. The general claim of lexical diffusion theory is that sound changes happen in a way that is lexically gradual, but the fact that sound changes by their very nature only affect parts of the lexical inventory, simply because not every word contains every sound, can make it hard to verify this claim, especially if only a small number of sounds are focused on, as has been the case here: The present analysis has focused on a sound change that concerned only the lOE sounds [j, w, ɣ] following certain other sounds (mostly vowels). These conditions were found to hold true within certain forms of 319 of the LAEME lexels,

385 Of all relevant <ʒ> spellings in the *Ayenbite of Inwyt*, 179 are used in cases that have INPUTCONSONANT: *G*, and only 13 are used in cases with INPUTCONSONANT: *J*. As already pointed out (see fn. 286), it is baffling that Dolle (1912: 26) notes in his section on palatals that <ʒ> is used in only one particular form of *day*, but fails to note that this particular form had the lOE input consonant [ɣ] (viz. < OE *daȝas*).

386 Cf. Bybee's (2012: 230) verdict that the "diagnostic value [of lexical diffusion patterns] has been seriously under-appreciated in the examination of the causes of sound change".

and these are very unequally distributed across the lexical frequency spectrum as well as across word classes.

As can be seen in various Figures throughout section 4.1.9.3, some lexical items can be said to show very different results which are not necessarily connected with either their input sounds or their frequency; in other words, there seem to be lexically bound and otherwise unpredictable 'exceptions' in the data. In future studies with similar research questions, it would therefore be interesting to use a 'lexical' variable such as LEXEL as a random effect within a mixed-effects modeling approach (cf. Baayen 2008: 241ff.; Johnson 2008: 230; Field, Miles and Field 2012: 862ff.; Gries 2013: 333ff.; Levshina 2015: 192ff.; West, Welch and Gałecki 2015; Gries 2015; for an application of this method to a diachronic-linguistic question cf. Wedel, Kaplan and Jackson 2013).[387] In general, quantitative historical linguistics should profit from the use of mixed-effects modeling because it is a principled approach that offers a solution to one of the main problems in historical linguistics, namely the problem of the messiness and the contingency of the available data (cf. Laing and Lass n.d.a, §1.1; see sections 2.2.2 and 3.1.2.3 above). Adding LEXEL as a random effect would allow each variant, i.e. each lexel, to have an intercept and/or a slope of its own within the overall model. However, the capacity of current computers is not such as would easily allow the augmentation of such regression models as presented in Chapter 4 by the addition of LEXEL (which after all has 319 variants) as a random effect without first having to greatly reduce the data set.

In the following, the general scope and limitations of the present study will briefly be pointed out. Our analysis has shown which factors can be said to have played a (statistically) significant role in medieval semivowel vocalization, but not necessarily what were the causes of the sound changes. The quantitative analysis undertaken in the present study by its very nature hinges on correlations between variables, and it is almost a commonplace for statisticians to emphasize the fact that correlation does not equal causality (cf. Barnard 2006; Gelman and Hill

[387] Mixed-effects modeling is a statistical approach that takes into account the 'noisiness' within data sets by ensuring that (a) a distinction is made between generalizable and non-generalizable features of the data set, and (b) the non-generalizable, or "random", features are treated in such a way that they do not influence the measurements of the "fixed" features that we are interested in. The distinction between what is usually known as "fixed effects" and "random effects" ultimately derives from Eisenhart (1947) (cf. Crawley 2013: 681). Over the past decade mixed-effects modeling has been introduced and become somewhat of a standard procedure in statistical data analysis in fields such as sociology (e.g. Gelman and Hill 2006) and ecology (e.g. Zuur et al. 2009; Zuur, Saveliev and Ieno 2012).

2006: 31; Field, Miles and Field 2012: 212; Backhaus, Erichson and Weiber 2013: 69ff.).[388] This is also true for the goodness-of-fit measures that we have applied to regression models, e.g. (pseudo-)R^2, which is, or corresponds to, nothing other than the squared multiple correlation coefficients of the various terms in the model. Especially since measures like (pseudo-)R^2 are said to 'explain' the variance in the outcome variable, it is important to point out that 'explaining' in this context should not be understood as offering causes and reasons for the observed behavior of the outcome variable (cf. Field, Miles and Field 2012: 222-223; Crawley 2013: 467).

From what is known about phonetics and sound change (cf. Bybee 2012; Millar and Trask 2015: 48ff.; Garrett 2015: 241-242), we can be sure that most of the actual causes for the sound change investigated in this study have to do with such features of the spoken language as are not usually represented in the written language at all: In contrast to speech, alphabetic writing is completely linear (Galliker 2013: 205) and largely phonemographic and hence abstract (Smith 2007: 32). From a relational perspective (see section 2.1.5) we might say that written characters do represent speech sounds, but they do so in a linear and discrete fashion, just as traditional phonology treats the arrangement of speech sounds as linear and discrete.[389] However, phonologians need to be aware that the idea of the linear arrangement and the discreteness of phonemes is itself an abstraction from the messiness of actual speech. As Millar and Trask (2015: 49) explain,

> physically, the various speech organs are all moving about at their own pace, and they do not all simultaneously and instantly jump from one configuration to another, as you move from one speech sound to the next. Instead, organs spend a good deal of time moving away from one configuration and towards the next one, leaving and arriving at different times.

Millar and Trask's (2015: 49) image is that of speech articulators constantly "leaving and arriving", like trains at a large train station. The idealized configurations that a speaker's articulators move from and towards are what is aimed at in the production, and interpreted in the perception, of speech. This is the domain of

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388 However, see Judea Pearl's (2009: 401-428) critical evaluation of the absence of 'causality' from statistical modeling and his attempts to re-introduce notions of causation on the basis of the results of artificial-intelligence research.

389 This traditional view of speech sounds as distributed along a syntagmatic axis in time is implicit in Millar and Trask's (2015: 48) description of speech as follows: "When we speak, we produce a stream of speech sounds, or segments, one after the other". One could also argue that the very use of the expression 'segments' already implies the idea of linearity.

phonology, while phonetic reality shows a much more complicated picture due to what Joan Bybee (2007c: 947) has referred to as the "fluid and continuous nature of the speech stream". This fluidity of actual speech is something that linguists are generally very much aware of; it is this fluidity (*in spite of which* such abstractions as phonemes exist, cf. Jones 1967: 1ff.) that especially "must be borne in mind" in studies of sound change (Bybee 2007c: 947) and that is at the root of many sound changes.[390]

In the present study the idea of a linear arrangement of speech sounds has been implicit in the use of expressions such as '*preceding* vowel'; however, if we take into consideration the fact that linear segments are abstractions, and that actual speech is always "a series of partially overlapping articulatory gestures" (Bybee 2007b: 205),[391] it almost becomes a truism to state that the elements of a V + semivowel sequence 'influence' each other: Their production never happens separately, but really always takes place in the context of intricately orchestrated muscular movements performed in order to produce sound combinations that are associated with particular meanings within the minds of speakers and listeners. Written language generally does not represent the fluidity and the 'overlapping' nature of speech sounds.

To the disappointment of many students, any questions as to 'why' sound changes happen at all, or why they happen over certain periods of time or in certain varieties, cannot be answered to any satisfying degree. Sound changes are emergent, or 'invisible hand' phenomena (cf. Keller 1989; Ladstätter 2004; Pop and Frey 2013; the term 'invisible hand' actually goes back to Adam Smith [1759]), and the many day-to-day interactions of the large communities of speakers that slowly cause them to emerge over time are too complex to monitor and model, no matter how much data is collected and analyzed. The aim of the statistical models in the present study has been to show which of the many linguistic and non-linguistic factors suggested in secondary literature can actually be shown to act as significant predictor variables for the sound change as reflected in the

390 E.g. phenomena involving "distant assimilation" (e.g. *umlaut* phenomena that took place in early Germanic varieties, cf. Millar and Trask 2015: 49-50) become less mystifying and more explicable the further one moves away from the idea of a linear arrangement of speech sounds.

391 Cf. Luschützky (1997: 150ff.), Hall (2010), and Bybee (2015: 470f.) for more on the approach that is referred to as gestural phonology, or articulatory phonology, and which ultimately derives from the work of Browman and Goldstein (e.g. 1992, 1995).

spellings in some 160 eME source texts spread out over two hundred years. The reality was certainly much more complex than we will ever know.

The present study has dealt with the vocalization of semivowels in the eME period, which can be seen as a prototypical, exemplary sound change in the history of English. Indeed, "consonant deletion" is listed by Elly van Gelderen (2006: 117) as one of the "main trends" in Middle English phonology.[392] In this respect the present study has hopefully provided examples of what can be gained through the application of quantitative evaluation and statistical modeling techniques to historical language data. Especially such well-transcribed and annotated historical corpora as the LAEME CTT (Laing 2013-; see section 2.1.1) can be said to have opened up a "privileged window into the past" (López-Couso 2016: 128): Using such corpora, historical-phonological findings from the nineteenth and twentieth centuries can now be placed on a much firmer empirical footing, and sound changes can thus be described more precisely than ever before.

[392] Also cf. Lutz (1991: 154ff.), and the discussion of semivowel vocalization as an example of lenition in section 2.3.3.1.

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Appendix

Appendix A: LAEME file names, text titles and manuscripts

No.	FILENAME	TITLE	MANUSCRIPT
1	aberdeent	couplet and three quatrains in English	Aberdeen, University Library, 154.
2	add25031t	Ten Commandments	London, British Library, Additional 25031.
3	add27909t	Leuedi sainte marie moder and meide	London, British Library, Additional 27909.
4	adde6at	Sayings of St Bernard	Oxford, Bodleian Library, Additional E.6.
5	adde6bt	XV signs before Doomsday; exposition of the Pater Noster	Oxford, Bodleian Library, Additional E.6.
6	adde6ct	Exposition of the Pater Noster	Oxford, Bodleian Library, Additional E.6.
7	arundel248t	Gabriel fram evene-king, etc.	London, British Library, Arundel 248.
8	arundel292vvt	misc. verse: Creed, Pater Noster, Ave Maria, etc.	London, British Library, Arundel 292.
9	ashmole1280t	Richard of St Victor, Allegoriae in Novum Testamentum; prayer to ease childbirth	Oxford, Bodleian Library, Ashmole 1280.
10	ashmole360t	My Leman on the Rood	Oxford, Bodleian Library, Ashmole 360.
11	ayenbitet	Ayenbyte of Inwyt	London, British Library, Arundel 57.
12	bardneyt	Stella Maris fragment	Oxford, Bodleian Library, Rawlinson C 510.
13	benetholmet	Cartulary of the Abbey of St Benet of Holme	London, British Library, Cotton Galba E ii.
14	bestiaryt	Bestiary	London, British Library, Arundel 292.
15	beverleyt	King Athelstan's grant of privileges to St John's, Beverley	London, British Library, Cotton Charter iv 18.
16	blicklingt	Creed	Private: Blickling Hall, Norfolk 6864.

No.	Filename	Title	Manuscript
17	bod34t	Hali Meiðhad; Sawles Warde	Oxford, Bodleian Library, Bodley 34.
18	bodley26t	sermons; carol	Oxford, Bodleian Library, Bodley 26.
19	bodley57t	My Leman on the Rood	Oxford, Bodleian Library, Bodley 57.
20	buryFft	copies of pre-Conquest documents relating to the Abbey of Bury St Edmunds	Cambridge, University Library, Ff.II.33.
21	caiusart	Ancrene Riwle	Cambridge, Gonville and Caius College, 234/120.
22	candet1t	Candet Nudatum Pectus	Durham, Dean & Chapter Library, A.III.12.
23	candet2t	Candet Nudatum Pectus	Oxford, Bodleian Library, Digby 45.
24	candet3t	Candet Nudatum Pectus, etc.	Oxford, Bodleian Library, Digby 55.
25	candet4t	Candet Nudatum Pectus	Oxford, Bodleian Library, Rawlinson C 317.
26	candet5t	My Leman on the Rood, etc.	Cambridge, St. John's College, 15 (A.15).
27	candet6t	Candet Nudatum Pectus, etc.	Oxford, Bodleian Library, Bodley 42.
28	candet7t	Candet Nudatum Pectus, etc.	London, British Library, Additional 11579.
29	candet8t	Candet Nudatum Pectus	Cambridge, Sidney Sussex College, 97 (D.5.12).
30	candet9linzat	Candet Nudatum Pectus	Linz, Stiftsbibliothek Sankt Florian, XI.57.
31	cccc8t	Worldes blisce haue god day	Cambridge, Corpus Christi College, 8.
32	ccco59t	Edi beo þu heuene quene, etc.	Oxford, Corpus Christi College, 59.
33	chertseyt	Chertsey Cartulary	London, British Library, Cotton Vitellius A xiii.
34	cleoarat	Ancrene Riwle	London, British Library, Cotton Cleopatra C vi.
35	cleoarbt	corrections to Ancrene Riwle	London, British Library, Cotton Cleopatra C vi.
36	clericot	Interludium de Clerico et Puella	London, British Library, Additional 23986 (roll).

No.	FILENAME	TITLE	MANUSCRIPT
37	corp145selt	South English Legendary	Cambridge, Corpus Christi College, 145.
38	corpart	Ancrene Wisse	Cambridge, Corpus Christi College, 402.
39	cotabusest	Ten Abuses	London, British Library, Cotton Caligula A ix, part II.
40	cotcleoBvit	Pater Noster, Ave Maria, etc.	London, British Library, Cotton Cleopatra B vi.
41	cotdoomsdayt	Doomsday	London, British Library, Cotton Caligula A ix, part II.
42	cotdwct	Death's Wither-Clench	London, British Library, Cotton Caligula A ix, part II.
43	cotfaustat	sermon fragments	London, British Library, Cotton Faustina A v.
44	cotfaustbt	couplets on the raising of Lazarus	London, British Library, Cotton Faustina A v.
45	cotlastdayt	Latemest Day	London, British Library, Cotton Caligula A ix, part II.
46	cotorisont	An Orison to Our Lady	London, British Library, Cotton Caligula A ix, part II.
47	cotowlat	Owl and the Nightingale	London, British Library, Cotton Caligula A ix, part II.
48	cotowlbt	Owl and the Nightingale	London, British Library, Cotton Caligula A ix, part II.
49	cotsermont	A Lutel Soth Sermun	London, British Library, Cotton Caligula A ix, part II.
50	cotvespcmat	Cursor Mundi	London, British Library, Cotton Vespasian A iii.
51	cotwillt	Will and Wit	London, British Library, Cotton Caligula A ix, part II.
52	coventryt	copy of a writ of King Edward	Stratford-upon-Avon, Shakespeare Birthplace Library, DR 10/1408.
53	creditonat	documents relating to Crediton, Devon	London, British Library, Cotton Roll ii.11.
54	creditonbt	copy of an OE mortgage of land	London, British Library, Cotton Roll ii.11.
55	cuckoot	Svmer is icumen in	London, British Library, Harley 978.
56	culhht	Pater Noster, Ave Maria	Cambridge, University Library, Hh.6.11.
57	digby2a1t	Hi sike al wan hi singe	Oxford, Bodleian Library, Digby 2.

No.	Filename	Title	Manuscript
58	digby2a2t	Hayl mari hic am sori	Oxford, Bodleian Library, Digby 2.
59	digby2bt	No more ne willi wiked be	Oxford, Bodleian Library, Digby 2.
60	digby2ct	incantation against the flowing of blood	Oxford, Bodleian Library, Digby 2.
61	digby86bodysoult	Debate between the Body and the Soul	Oxford, Bodleian Library, Digby 86.
62	digby86hendingt	Proverbs of Hending	Oxford, Bodleian Library, Digby 86.
63	digby86mapt	misc. verse texts	Oxford, Bodleian Library, Digby 86.
64	digby86painst	Pains of Hell; Iesu dulcis memoria	Oxford, Bodleian Library, Digby 86.
65	digby86siritht	Dame Siriz	Oxford, Bodleian Library, Digby 86.
66	digpmt	Poema Morale	Oxford, Bodleian Library, Digby 4.
67	dulwicht	La Estorie del Euangelie	London, Dulwich College, MS XXII.
68	edincmat	Cursor Mundi	Edinburgh, Royal College of Physicians, MS of Cursor Mundi.
69	edincmbt	Northern Homily Collection	Edinburgh, Royal College of Physicians, MS of Cursor Mundi.
70	edincmct	Cursor Mundi	Edinburgh, Royal College of Physicians, MS of Cursor Mundi.
71	egblessedt	Orison to the Blessed Virgin	London, British Library, Egerton 613.
72	eglitelt	Love Song of Our Lady	London, British Library, Egerton 613.
73	egpm1t	Poema Morale	London, British Library, Egerton 613.
74	egpm2t	Poema Morale	London, British Library, Egerton 613.
75	egsomert	Somer is comen & winter gon	London, British Library, Egerton 613.
76	egstellat	Of on þat is so fayr and briȝt	London, British Library, Egerton 613.
77	emmanuel27t	miscellanea	Cambridge, Emmanuel College, 27 (I.2.6).

No.	FILENAME	TITLE	MANUSCRIPT
78	eul107t	O homo securum	Edinburgh, University Library, MS 107.
79	fmcpmt	Poema Morale, etc.	Cambridge, Fitzwilliam Museum, McClean 123.
80	gandccreedt	Creed, Pater Noster, Ave Maria, In Manus Tuas	Cambridge, Gonville and Caius College, 52/29.
81	genexodt	Genesis and Exodus	Cambridge, Corpus Christi College, 444.
82	gospatrict	copy of the Writ of Gospatric	Carlisle, Cumbria RO, D/Lons/L Medieval Deeds C1.
83	hale135t	Nou sprinkes þe sprai	London, Lincoln's Inn Hale, 135.
84	hat26tct	Ten Commandments; Seven Gifts	Oxford, Bodleian Library, Hatton 26.
85	havelokt	Havelok	Oxford, Bodleian Library, Laud Misc 108.
86	herefordverset	Þi sente moder was ful wo	Hereford, Cathedral Library, O.III.11.
87	huntproct	proclamation of Henry III	Kew, The National Archives, C66/73 (Patent Roll 43 Henry III), membr. 15 item 40.
88	iacobt	Iacob and Iosep	Oxford, Bodleian Library, Bodley 652.
89	jes29t	Owl and the Nightingale, Poema Morale, etc.	Oxford, Jesus College 29, part II.
90	johnstandt	Stand wel moder vnder rode	Cambridge, St. John's College, 111 (E.8).
91	lam499t	lyrics, phrases	London, Lambeth Palace Library, Lambeth 499.
92	lamhomA1t	Lambeth Homilies	London, Lambeth Palace Library, Lambeth 487.
93	lamhomA2t	Lambeth Homilies	London, Lambeth Palace Library, Lambeth 487.
94	lampmt	Poema Morale	London, Lambeth Palace Library, Lambeth 487.
95	lamursnt	On Ureisun of Ure Loverde	London, Lambeth Palace Library, Lambeth 487.
96	laud108at	Life of Christ, Infancy of Christ, etc.	Oxford, Bodleian Library, Laud Misc 108.

No.	Filename	Title	Manuscript
97	laud108bt	Debate between the Body and the Soul	Oxford, Bodleian Library, Laud Misc 108.
98	laud471dwct	Death’s Wither-Clench	Oxford, Bodleian Library, Laud Misc 471.
99	laud471kst	Kentish Sermons	Oxford, Bodleian Library, Laud Misc 471.
100	layamonAat	Laȝamon A	London, British Library, Cotton Caligula A ix, part I.
101	layamonAbt	Laȝamon A	London, British Library, Cotton Caligula A ix, part I.
102	layamonBOt	Laȝamon, Brut	London, British Library, Cotton Otho C xiii.
103	linzbt	short verse	Linz, Stiftsbibliothek Sankt Florian, XI.57.
104	linzct	Who-so him biþouete	Linz, Stiftsbibliothek Sankt Florian, XI.57.
105	maidsdwct	Death’s Wither-Clench	Maidstone, Maidstone Museum, A.13.
106	maidspat	Proverbs of Alfred	Maidstone, Maidstone Museum, A.13.
107	maidststt	Three Sorrowful Tidings	Maidstone, Maidstone Museum, A.13.
108	merton248t	misc. fragments	Oxford, Merton College, 248.
109	neroart	Ancrene Riwle	London, British Library, Cotton Nero A xiv.
110	nerowgt	Wooing Group	London, British Library, Cotton Nero A xiv.
111	newcoll88t	Three Sorrowful Things, etc.	Oxford, New College, 88.
112	ormt	Ormulum	Oxford, Bodleian Library, Junius 1.
113	oxproct	proclamation of Henry III	Cowley, Oxfordshire Record Office, OCA/H.29.1.
114	petchront	Peterborough Chronicle, final continuation	Oxford, Bodleian Library, Laud Misc 636.
115	pofh145t	fragments (Proverbs of Hending, etc.)	Cambridge, St. John’s College, 145 (F.8).
116	prisprayt	A Prisoner’s Prayer	London, Corporation of London Records Office, Guildhall, Liber de antiquis Legibus.

No.	FILENAME	TITLE	MANUSCRIPT
117	ramseyat	Composite register of Ramsey Abbey	Kew, The National Archives, E 164/28.
118	ramseybt	Composite register of Ramsey Abbey	Kew, The National Archives, E 164/28.
119	ramseycott	fragments of registers of Ramsey Abbey	London, British Library, Cotton Otho B xiv.
120	rawlg18t	Worldes blis ne last no þrowe	Oxford, Bodleian Library, Rawlinson G 18.
121	rawlg22t	Mirie it is while sumer ilast	Oxford, Bodleian Library, G 22.
122	royal12e1at	Stand wel moder vnder rode	London, British Library, Royal 12 E i.
123	royal12e1bt	My Leman on the Rood; Þenc man of min harde stundes	London, British Library, Royal 12 E i.
124	royal2f8t	Orison to the Blessed Virgin; Spring Song on the Passion	London, British Library, Royal 2 F viii.
125	royalkgat	Sawles Warde; St Katherine	London, British Library, Royal 17 A xxvii.
126	royalkgbt	Sawles Warde; St Juliana; Oreisun of Seinte Marie	London, British Library, Royal 17 A xxvii.
127	royalkgct	St Margaret; St Juliana	London, British Library, Royal 17 A xxvii.
128	salisbury82t	Lord’s Prayer	Salisbury, Cathedral Library, 82.
129	scotwart	Ballad on the Scottish Wars	London, British Library, Cotton Julius A v.
130	sherbornet	translation of the Old English bounds to the estate at Horton, Dorset	London, British Library, Additional 46487.
131	swinfieldt	writ of King Edward	Herefordshire, Record Office AL 19/2, Registrum Ricardi de Swinfield.
132	tanner169t	Stabat iuxta Christi crucem	Oxford, Bodleian Library, Tanner 169.
133	tcd432t	My Leman on the Rood	Dublin, Trinity College, 432 (D.4.18).
134	tencmFft	Ten Commandments	Cambridge, University Library, Ff.VI.15.
135	thorneykt	bounds of Kingsdelf	Cambridge, University Library, Additonal 3021.

No.	Filename	Title	Manuscript
136	thorneymt	Will of Mantat	Cambridge, University Library, Additonal 3020.
137	titusart	Ancrene Riwle	London, British Library, Cotton Titus D xviii.
138	titushmt	Hali Meiðhad	London, British Library, Cotton Titus D xviii.
139	tituslang2t	Ancrene Riwle, etc.	London, British Library, Cotton Titus D xviii.
140	titusskt	St Katherine	London, British Library, Cotton Titus D xviii.
141	titusswt	Sawles Warde	London, British Library, Cotton Titus D xviii.
142	tituswoht	Þe Wohunge of Ure Lauerd	London, British Library, Cotton Titus D xviii.
143	tr323at	misc. fragments	Cambridge, Trinity College B.14.39 (323).
144	tr323bt	misc. fragments	Cambridge, Trinity College B.14.39 (323).
145	tr323ct	Debate of the Body and the Soul; Song in praise of the Blessed Virgin	Cambridge, Trinity College B.14.39 (323).
146	tr323dt	Orison to Our Lady; Proverbs of Alfred	Cambridge, Trinity College B.14.39 (323).
147	trhom34ct	sermon on Isaiah	Cambridge, Trinity College B.14.52 (335).
148	trhomAt	Trinity Homilies	Cambridge, Trinity College B.14.52 (335).
149	trhomBt	Trinity Homilies	Cambridge, Trinity College B.14.52 (335).
150	trin43Bt	Wanne mine eyhnen misten	Cambridge, Trinity College, 43 (B.1.45).
151	trincleoDt	misc. verses; sermon	London, British Library, Cotton Cleopatra C vi.
152	trinpmt	Poema Morale	Cambridge, Trinity College B.14.52 (335).
153	vitelld3t	Floriz and Blauncheflur	London, British Library, Cotton Vitellius D iii.
154	vvat	Vices and Virtues	London, British Library, Stowe 34.
155	vvbt	Vices and Virtues	London, British Library, Stowe 34.
156	vvcorrt	corrections to Vices and Virtues	London, British Library, Stowe 34.

No.	Filename	Title	Manuscript
157	vvtit	titles to Vices and Virtues	London, British Library, Stowe 34.
158	wellsat	General Cartulary	Wells, Cathedral Library, Liber Albus I.
159	wellsbt	General Cartulary	Wells, Cathedral Library, Liber Albus I.
160	westminstert	Priscian, Commentarii	London, Westminster Abbey Library, MS 34/3.
161	winchestert	Vision of the monk Eadwine; charter	London, British Library, Additional 15340.
162	wintneyt	Benedictine Rule	London, British Library, Cotton Claudius D iii.
163	worcsermont	sermon on the Nativity	Worcester, Cathedral, Chapter Library Q 29.
164	worcthcreedt	Nicene Creed	Oxford, Bodleian Library, Junius 121.
165	worcthfragst	fragments	Worcester, Cathedral, Chapter Library F 174.
166	worcthgrglt	Ælfric, Grammar and Glossary	Worcester, Cathedral, Chapter Library F 174.

Table A-1: LAEME file names, text titles and manuscripts, sorted alphabetically by file names

Appendix B: De-tagging the LAEME CTT (documentation of regular expressions)[393]

```
# delete html-tags:
<.*?>
# rwn
=> PMa

# delete notes:
\{=.*?=\}
# rwn

# delete linguistic notes:
\{\*.*?\*\}
# rwn

# delete folio references:
\{~.*?~\}
# rwn
=> PMb

# delete "header" (= everything before first $ sign):
(Python script)
=> PMb2

# delete inserted words (text not in the original MSs):
\{\[.*?\[\}
# rwn
=> PMb3

# delete some more notes:
\{&quot.*?\}
# rwn

# delete some more notes:
\{.*?=\}
# rwn

# Due to faulty tagging of linguistic notes, some things had to
be removed manually from files "layamonAat", "layamonAbt",
"layamonBOt", "royalkgat", "royalkgbt". RegEx used to retrieve
remaining linguistic notes:
```

[393] This is a documentation of the regular expression commands that were used to de-tag files from the LAEME CTT with the help of the program Notepad++ (Ho 2014). Lines with explanatory comments are preceded by a hash tag `#`. `rwn` is shorthand for 'replace with nothing', i.e. 'delete via replacement with an empty regex'. `rw1s` is shorthand for 'replace with one whitespace'. `=> x` is shorthand for 'save the resulting files in the folder x'.

```
\{.{3,}\}
=> PMb4

# delete text in languages other than English:
\{\S*?\(.*?\(\S*?\}
# rwn
=> PMc

# delete repeated parts of words:
(\$(\S)+)( \$(\S)+)+
# replace with
$1
=> PMd

# delete + and - (morpheme boundary markers) within words:
(_([A-Za-z]|\*)+)(-|\+)(([A-Za-z]|\*)+)
# replace with
$1$4
# did this 4 times in a row!
=>PMe

# delete non-verbal and illegible elements:
!.*?\n
# replace with
\n

# more cleaning up: delete paragraph marks, etc.
\{para\}
# rwn

\{[A-Za-z ]{4,}\}
# rwn

\{sic\}
# rwn
=> PMf

# delete rhyme annotation:
\{rh\}
# rwn
=> PMf2

# restore XML symbols (<,>,&,”):
&lt;
# replace with
<

&gt;
# replace with
>
```

```
&amp;
# replace with
&

&quot;
# replace with
“
=> PMf3

# add lexel “ye”:
(\$)(/P22\S*_\S*)
# replace with
$1ye$2
=> PMf4

# delete lexels and grammels:
(?<=\n).*?_
# rwn

# delete remaining parts of words:
 \$.*
# rwn

# delete lexels and grammels at beginnings of files:
.*?_
# replace with
\n
=> PMg

# replace line breaks with empty spaces:
\n
# rw1s
=> PMh
```

Appendix C: The "Baker mini corpus"[394]

- The Fall of Adam and Eve (Genesis 3)
- Ælfric: Life of St Æthelthryth
- Cynewulf and Cyneheard
- The Martyrdom of Ælfheah
- Wulfstan: Sermo Lupi ad Anglos
- Alfred the Great's Preface to Gregory's *Pastoral Care*
- Ohthere and Wulfstan
- The Story of Caedmon
- Boethius on Fame
- A Selection of Riddles
- The Battle of Maldon
- The Dream of the Rood
- The Battle of Finnesburh
- Waldere
- The Wife's Lament
- The Husband's Message
- Judith
- Psalm 1
- A Miracle of St Benedict
- On Danish Fashion
- Weeks of the Year
- A Vision of Hell
- From Solomon and Saturn
- Riddle 80
- Extract from *Maxims I*
- *Beowulf*: "Grendel's *mere*"
- *Beowulf* Prologue (lines 1-52)
- *Beowulf* Fitt 1 (lines 53-114)

Grapheme	**Singletons**	**Geminates**	**Total**
e	8701	NA	8701
n	7561	393	7954
a	3951	NA	3951

[394] This is a list of the titles of the twenty-eight OE text excerpts from Baker (n.d.) included in the "Baker mini corpus"; the order of texts and the titles are Baker's (n.d.). For the manuscript versions and editions of the texts used, cf. Baker (2012).

Grapheme	Singletons	Geminates	Total
r	4731	38	4769
d	4504	60	4564
s	3964	129	4093
o	3906	NA	3906
l	2926	321	3247
t	3210	90	3300
h	3221	6	3227
m	3099	26	3125
i	2940	NA	2940
w	2859	NA	2859
þ	2484	0	2484
f	2187	11	2198
ð	2004	61	2065
ġ	1932	NA	1932
ā	1741	NA	1741
u	1714	NA	1714
æ	1585	NA	1585
c	1402	11	1413
b	1171	62	1233
g	1293	0	1293
ǣ	1254	NA	1254
y	1020	NA	1020
ō	976	NA	976
ē	966	NA	966
ī	954	NA	954
ea	877	NA	877
ċ	705	28	733
ēo	632	NA	632
ū	604	NA	604
eo	502	NA	502
ēa	499	NA	499
p	318	8	326
ȳ	325	NA	325
sc	316	NA	316
īe	117	NA	117
io	55	NA	55
īo	53	NA	53
ie	34	NA	34
x	59	NA	59
k	10	0	10

Table A-2: Occurrences of ‘graphemes’ in “Baker mini corpus”

Grapheme	**Number of in-stances**	**Number of instances divided by number of total occurrences in corpus (cf. Table A-2)**
i	274	0.093
æ	146	0.092
ǣ	63	0.050
ī	33	0.035
ē	25	0.026
e	115	0.013
n	93	0.012
ēa	5	0.010
r	34	0.007
*sc**	2*	0.006*
ġ	11	0.006
y	5	0.005
ð	8	0.004
d	17	0.004
l	10	0.003
*p**	1*	0.003*
f	3	0.001
a	5	0.001
ā	2	0.001
*h**	3*	0.001*
*o**	3*	0.001*
*c**	1*	0.001*
*t**	1*	0*
*s**	1*	0*

Table A-3: ‘Graphemes’ preceding dotted *ġ* in “Baker mini corpus” [395]

395 The asterisk * in this and the following Tables marks cases in which all instances occur before a morpheme boundary.

Grapheme	**Number of instanc-es**	**Number of instances divided by number of total occurrences in corpus (cf. Table A-2)**
ie	7	0.206
io	10	0.182
e	1100	0.126
eo	61	0.101
ēa	41	0.082
ē	70	0.072
ea	55	0.058
ȳ	15	0.046
īo	2	0.038
y	45	0.036
i	77	0.026
īe	2	0.017
ī	12	0.012
ū	7	0.012
ð	22	0.011
l	34	0.010
*p**	3*	0.009*
*h**	20*	0.006*
ġ	11	0.006
n	41	0.005
a	16	0.004
þ	10	0.004
r	18	0.004
*f**	8*	0.004*
ēo	2	0.003
d	11	0.002
*m**	5*	0.002*
s	4	0.001
*b**	1*	0.001*
u	1	0.001
*w**	1*	0*
o	1	0

Table A-4: ‘Graphemes’ following dotted *ġ* in “Baker mini corpus”

Grapheme	**Number of instances**	**Number of instances divided by number of total occurrences in corpus (cf. Table A-2)**
c	81	0.057
n	394	0.050
io	2	0.036
ēa	18	0.036
ū	18	0.030
a	94	0.024
ā	41	0.024
ō	19	0.019
u	28	0.016
ēo	10	0.016
i	40	0.014
r	49	0.010
l	31	0.010
īe	1	0.009
ī	7	0.007
e	60	0.007
o	21	0.005
ǣ	6	0.005
ē	3	0.003
ȳ	1	0.003
*þ**	1*	0.003*
eo	1	0.002
æ	3	0.002
*t**	6*	0.002*
*ð**	3*	0.001*
ea	1	0.001
y	1	0.001
*d**	4*	0.001*
*f**	1*	0*
*m**	1*	0*
*h**	1*	0*
s	1	0

Table A-5: ‘Graphemes’ preceding undotted *g* in “Baker mini corpus”

Grapheme	Number of instances	Number of instances divided by number of total occurrences in corpus (cf. Table A-2)
a	300	0.076
u	122	0.071
o	250	0.064
ū	25	0.041
ō	37	0.038
e	226	0.026
ā	41	0.024
l	38	0.012
r	46	0.010
ǣ	9	0.007
i	19	0.006
y	6	0.006
æ	6	0.004
ea	3	0.003
þ	1	0.003
b	2	0.002
c	2	0.001
f	3	0.001
n	9	0.001
ē	1	0.001
*w**	2*	0.001*
d	3	0.001
h	2	0.001
t	2	0.001
s	1	0

Table A-6: ‘Graphemes’ following undotted *g* in “Baker mini corpus”

Appendix D: De-tagging the DOEC, retrieving and processing DOEC search results (documentation of regular expressions)[396]

```
### De-tagging the DOEC:

# delete headers:
<teiheader.*?/teiheader>
# rwn

# to produce a text-only corpus excluding Latin:
# delete everything between and including <foreign> and
</foreign>:
<foreign.*?/foreign>
# rwn

# delete all remaining tags:
<.*?>
# rwn

# delete double spaces:
(two spaces)
# rw1s # did this twice in a row

# delete spaces before punctuation marks:
\s([\..;\?!:])
# replace with
$1

# correct what seems to be a mistake made by the corpus compil-
ers:
:"\s
# replace with
:\s"

### Retrieving DOEC results:

# Node for “words containing post-frontvocalic <g>”:
\S*(i|e|&ae;|y)g\S*
# Node for “words containing post-vocalic (from a selection of
vowels!) <w>”:
\S*(a|&ae;|o|i)w\S*
# Node for “words containing post-backvocalic <g>”:
\S*(a|o|u)g\S*
# Node for “words containing pre-backvocalic <g>”:
```

[396] This is a documentation of the regular expression commands that were used to de-tag files from the DOEC with the help of the program Notepad++ (Ho 2014), as well as regular expression nodes that were used to retrieve data from the DOEC with the help of the program AntConc (Anthony 2014). Formal conventions and abbreviations used are the same as in Appendix B.

```
\S*(i|e|&ae;|y)g(a|o|u)\S*
# Node for “words containing post-liquid <g>”:
\S*(l|r)g\S*

### Processing DOEC results:

# Shortening DOEC results to words containing post-frontvocalic
<g> only:
\d{1.6}\t.*\t([A-Za-z&;]*).*\t\S+\t\S+\t\S+
# replace with
$1
```

Appendix E: Lexels

- *4*
- *9*
- *14*
- *20*
- *30*
- *50*
- *60*
- *70*
- *A:GAN*
- *A:GNIAN*
- *A:NLE:PIG*
- *ABELGAN*
- *ABLOW*
- *ABREGDAN*
- *ABU:GAN*
- *ADAY*
- *ADRY*
- *AKNEE*
- *ALMIGHTY*
- *AMORROW*
- *ANE:AWESTE*
- *ANY*
- *APPLETREE*
- *ASLAY*
- *ASTI:GAN*
- *ATLICGAN*
- *AWAY*
- *AWL*
- *BE:AG*
- *BEFORESAY*
- *BEGROW*
- *BEHRE:OWSIAN*
- *BELE:OGAN*
- *BELGAN*
- *BELICGAN*
- *BEORG*
- *BEORGAN*
- *BESEE*
- *BETE:ON*
- *BLO:WAN*
- *BLOODY*
- *BLOW*
- *BODY*
- *BORROW*
- *BOUGH*
- *BOW*
- *BRAIN*
- *BREGDAN*
- *BREW*
- *BREWER*
- *BU:GAN*
- *BURH*
- *BURHMAN*
- *BUY*
- *CHEW*
- *CLAW*
- *CLAY*
- *CLAYCLOT*
- *COWL*
- *CROW*
- *CWEALMSTO:W*
- *DAWN*
- *DAY*
- *DAYLIGHT*
- *DAYRED*
- *DEW*
- *DI:EGEL*
- *DI:EGELLI:C*
- *DI:EGELLI:CE*
- *DI:EGELNESS*
- *DOOMSDAY*
- *DRAGAN*
- *DRE:OGAN*
- *DRY*
- *DUGAN*
- *DUGUY*
- *DYE*
- *DYRSTIG*
- *DYSIG*
- *E:ADIG*
- *E:ADIGNESS*
- *EARDINGSTO:W*
- *EASTERDAY*
- *EGE*
- *EGEFUL*
- *EGESLI:C*
- *ENDDAY*
- *ENDERDAY*
- *ENOUGH*
- *EREDAY*
- *EWE*
- *EYE*
- *EYEPIT*
- *EYESIGHT*
- *EYEWEARP*
- *EYEYYRL*
- *FAE:GE*
- *FAE:GESI:Y*
- *FAIR*
- *FAIRHOOD*
- *FAIRNESS*
- *FELLOW*
- *FELLOWRAE:DEN*
- *FELLOWSHIP*
- *FEW*
- *FIGTREE*
- *FLOW*
- *FLY*
- *FOLLOW*
- *FOLLOWER*
- *FORBREGDAN*
- *FORBU:GAN*
- *FORDRY*
- *FORESAY*
- *FORHOGIAN*
- *FORLICGAN*
- *FORSEE*
- *FORSWALLOW*
- *FORWRE:GAN*
- *FOWL*
- *FOWLER*
- *FOWLKIN*
- *FREE*
- *FRIDAY*
- *GALLOWS*
- *GANGDAY*
- *GEBE:GEDNESS*
- *GEFE:GEDNESS*
- *GEMYNDIG*

– *GLE:AW*
– *GLE:OWIAN*
– *GLOW*
– *GNAW*
– *GODALMIGHTY*
– *GOODDAY*
– *GREY*
– *GREYHOUND*
– *GROW*
– *HA:LGA*
– *HA:LGIAN*
– *HAGA*
– *HAGOL*
– *HAW*
– *HAY*
– *HAYWEARD*
– *HEADYE:AW*
– *HEAVINESS*
– *HEAVY*
– *HERETOGA*
– *HEW*
– *HI:WIAN*
– *HLA:W*
– *HLO:WAN*
– *HOGIAN*
– *HOLINESS*
– *HOLY*
– *HONEY*
– *HONEYTEAR*
– *HRE:OW*
– *HRE:OWSIAN*
– *HUE*
– *HWAETHWEGA*
– *HYGE*
– *KEY*
– *KNEE*
– *KNEEL*
– *KNOW*
– *LA:RE:OW*
– *LA:TTE:OW*
– *LAW*
– *LAWLESS*
– *LAWLY*
– *LAY*
– *LE:OGAN*
– *LEWD*
– *LICGAN*
– *LIFEDAY*
– *LIFEHOLY*
– *LONGFRIDAY*
– *LOREYE:OW*
– *LYFTFOWL*
– *MA:GE*
– *MAE:GY*
– *MAGA*
– *MAIN*
– *MAINFUL*
– *MANY*
– *MANYMAN*
– *MANYONE*
– *MASSDAY*
– *MAY*
– *MAY{MV}*
– *MIDDAY*
– *MIGHTY*
– *MISSAY*
– *MISTRE:OWIAN*
– *MO:DIG*
– *MO:DIGNESS*
– *MORROW*
– *MORROWGIFT*
– *MOW*
– *NAIL*
– *NEW*
– *NEWLY*
– *NI:WAN*
– *NIGHTFOWL*
– *OFSLAY*
– *OILSE:AW*
– *ONKNOW*
– *OUTLAW*
– *OVERSTI:GAN*
– *PALMSUNDAY*
– *PENNY*
– *PLAY*
– *PLOUGH*
– *RACENTE:AH*
– *RAE:W*
– *RAIN*
– *REGOL*
– *RO:W*
– *ROODTREE*
– *ROW*
– *SAE:LIG*
– *SAIL*
– *SAW*
– *SAY*
– *SCYLDIG*
– *SCYTHE*
– *SEE*
– *SHOW*
– *SHOWER{M}*
– *SHREW*
– *SHREWHOOD*
– *SIGE*
– *SKE:RTHURSDAY*
– *SLAY*
– *SLOTH*
– *SLOW*
– *SME:AGAN*
– *SNAIL*
– *SNOW*
– *SNOWWHITE*
– *SOOTHGECNAE:WE*
– *SOOTHSAGOL*
– *SOOTHSAW*
– *SORRINESS*
– *SORROW*
– *SORROWFUL*
– *SORROWFULLY*
– *SORRY*
– *SOUL*
– *SOW*
– *SPEW*
– *STEWARD*
– *STI:GAN*
– *STO:W*
– *SUNDAY*
– *SUNDRY*
– *SWALLOW*
– *SWE:G*
– *SWE:GAN*
– *SWO:GAN*
– *TAIL*
– *TE:ON*

– *THANE*
– *THROW*
– *THURSDAY*
– *TIE*
– *TILE*
– *TINTREGA*
– *TOBELGAN*
– *TOBLOW*
– *TOCHEW*
– *TODAY*
– *TOHEW*
– *TOMORROW*
– *TRE:OW*
– *TRE:OWIAN*
– *TREE*
– *TREGA*
– *UNLAW*
– *UNLAWLY*
– *UNMIGHTY*
– *UNSAE:LIG*
– *UNTE:ON*
– *UNTIE*
– *UNYE:AW*
– *UNYE:AWED*
– *WA:G*
– *WA:RIG*
– *WAE:G*
– *WAIN*
– *WAY*
– *WEARINESS*
– *WEARY*
– *WEDNESDAY*
– *WEIGH*
– *WELIG*
– *WHITSUNDAY*
– *WITEGA*
– *WITHBU:GAN*
– *WITHSAY*
– *WITIG*
– *WLITIG*
– *WOO*
– *WORKDAY*
– *WORLDWITIG*
– *WRE:GAN*
– *YE*
– *YE:AW*
– *YE:OSTRIG*
– *YE:OW*
– *YE:OWDOM*
– *YE:OWIAN*
– *YESTERDAY*
– *YOUTH*
– *YRA:G*
– *YRO:WIAN*
– *YRO:WIENDLI:C*

Appendix F: Additional figures and tables describing LAEME CTT data

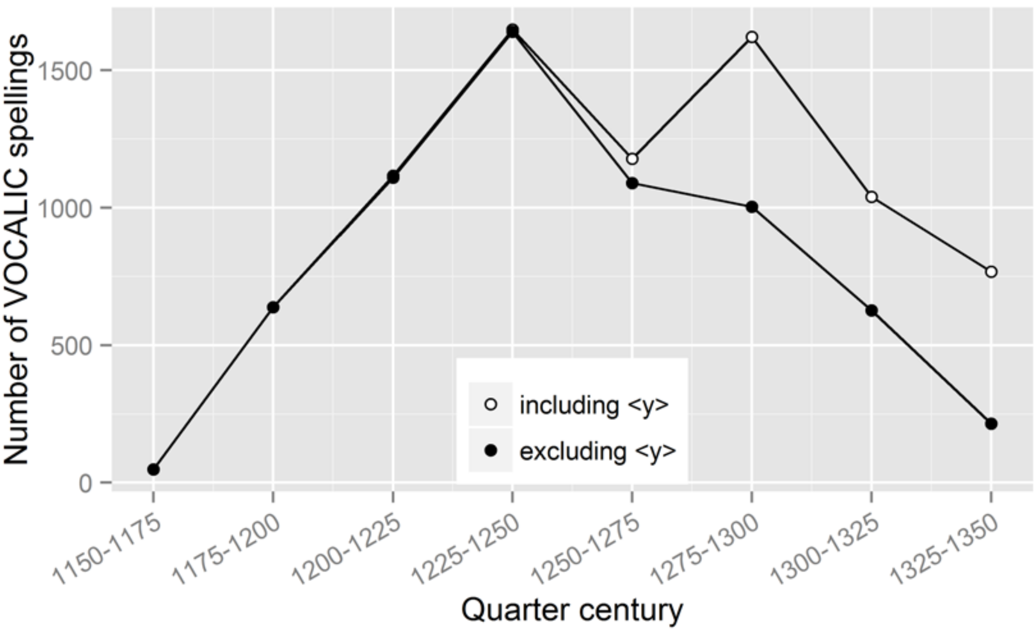

Figure A-1: The emergence of <y> as a 'vocalic' spelling

	1150-1175	*1175-1200*	*1200-1225*	*1225-1250*	*1250-1275*	*1275-1300*	*1300-1325*	*1325-1350*	**Overall sum**
1154	1	0	0	0	0	0	0	0	
1162	1	0	0	0	0	0	0	0	
1188	0	6	0	0	0	0	0	0	
1212	0	0	12	0	0	0	0	0	
1238	0	0	0	8	0	0	0	0	
1240	0	0	0	2	0	0	0	0	
1245	0	0	0	6	0	0	0	0	
1258	0	0	0	0	1	0	0	0	
1262	0	0	0	0	13	0	0	0	
1288	0	0	0	0	0	38	0	0	
1312	0	0	0	0	0	0	7	0	
1338	0	0	0	0	0	0	0	2	
Sum	**2**	**6**	**12**	**16**	**14**	**38**	**7**	**2**	**97**

Table A-7: MSDATE (rows) cross-tabulated with QUARTERCENT (columns): Number of texts

	1150-1175	*1175-1200*	*1200-1225*	*1225-1250*	*1250-1275*	*1275-1300*	*1300-1325*	*1325-1350*	**Overall sum**
1154	43	0	0	0	0	0	0	0	
1162	14	0	0	0	0	0	0	0	
1188	0	1,325	0	0	0	0	0	0	
1212	0	0	1,909	0	0	0	0	0	
1238	0	0	0	1,490	0	0	0	0	
1240	0	0	0	56	0	0	0	0	
1245	0	0	0	1,352	0	0	0	0	
1258	0	0	0	0	12	0	0	0	
1262	0	0	0	0	1,705	0	0	0	
1288	0	0	0	0	0	2,153	0	0	
1312	0	0	0	0	0	0	1,434	0	
1338	0	0	0	0	0	0	0	1168	
Sum	**57**	**1,325**	**1,909**	**2,898**	**1,717**	**2153**	**1,434**	**1,168**	**12,661**

Table A-8: MSDATE (rows) cross-tabulated with QUARTERCENT (columns): Number of findings

	1200-1250	*1250-1300*	*1300-1350*	**Overall sum**
1225	6	0	0	
1275	0	5	0	
1325	0	0	12	
Sum	**6**	**5**	**12**	**23**

Table A-9: MSDATE (rows) cross-tabulated with HALFCENT (columns): Number of texts

	1200-1250	*1250-1300*	*1300-1350*	**Overall sum**
1225	376	0	0	
1275	0	489	0	
1325	0	0	1,586	
Sum	**376**	**489**	**1,586**	**2,451**

Table A-10: MSDATE (rows) cross-tabulated with HALFCENT (columns): Number of findings

DIALECT1D	**Number of findings**
DEVON	37
SOMERSET	59
DORSET	5
WILTSHIRE	393
SHROPSHIRE	1,479

DIALECT1D	Number of findings
HEREFORDSHIRE	1,456
WORCESTERSHIRE	3,231
CHESHIRE	480
STAFFORDSHIRE	5
CUMBERLAND	5
LANCASHIRE	11
DURHAM	47
YORKS, EAST RIDING	408
YORKS, NORTH RIDING	631
CITY OF YORK	434
YORKS, WEST RIDING	299
WARWICKSHIRE	2
LEICESTERSHIRE	3
NORTHAMPTONSHIRE	53
OXFORDSHIRE	894
BERKSHIRE	762
HAMPSHIRE	89
LINCOLNSHIRE	560
SOKE OF PETERBOROUGH	43
HUNTINGDONSHIRE	62
CAMBRIDGESHIRE	41
ISLE OF ELY	95
NORFOLK	983
SUFFOLK	559
ESSEX	1,489
LONDON	6
SURREY	25
SUSSEX	11
KENT	1,267

Table A-11: Summary of the variable DIALECT1D

Input type	Number of findings
BODIG	1,267
TIGAN	28
BYGTH	18
DRYGE	24
LIEGTH	39
WEG	1,894
SWEG	17
DAEG	3,724
CLAEG	66
WITEGA	215

Input type	Number of findings
FLEOGAN	87
EAGE	410
DAGAS	698
DREOGAN	102
FUGOL	153
BUGAN	97
BOGA	67
BOG	106
LAGU	730
AGAN	148
FOLGIAN	478
NIWE	194
GESEWEN	92
EWE	19
LAEWEDE	111
TREOW	1,855
SCEAWIAN	653
FLOWAN	119
AWEL	23
SAWOL	872
NA	3,801
Sum	**18,107**

Table A-12: Summary of phonological input types

LEXEL	FREQUENCY
SAY	*3,297*
MAY	*3,104*
YE	*2,424*
SEE	*1,376*
HOLY	*1,135*
DAY	*1,027*
SOUL	*582*
FAIR	*576*
MANY	*530*
ANY	*415*
LICGAN	*380*
EYE	*364*
SHOW	*349*
BODY	*345*
WAY	*341*
A:GAN	*303*
DRAW	*300*

LEXEL	FREQUENCY
ENOUGH	*296*
FOLLOW	*274*
LAW	*269*
SORROW	*251*
4	*229*
KNOW	*228*
TREE	*222*
AWAY	*217*

Table A-13: Corpus frequencies of the twenty-five lexels which occur most frequently in the findings

Index of subjects

In a number of positions the Old English semivowels [j] and [w] (as in *dæg, flōwan*) began losing articulatory strength and were eventually vocalized to [i] and [u], respectively, joining the preceding vowels (cf. the diphthongs in Modern English *day, flow*). The present study empirically analyzes and quantifies the influence of various factors on this sound change by looking at spellings of relevant word forms in the lexicogrammatically annotated text corpus published along with the *Linguistic Atlas of Early Middle English* (LAEME) in 2013. Factors that are taken into account include spatial and temporal variables as well as a number of linguistic factors, such as the quantity and quality of the preceding vowels, or the question of which part of a syllable the respective semivowels originally belonged to.

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