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1 Introduction

This paper addresses what Lass (1976:58) called "the inception problem" of the Great Vowel Shift (GVS). Assuming the uniformitarian hypothesis, or a panchronic view of change, this paper takes a combined look at the variation found in historical written records (Helsinki Corpus) and that found in present-day spoken regional varieties in order to shed new light on the GVS.

It has become a linguistic commonplace that high-frequency words and constructions tend to lead phonological change (e.g. Hooper 1976, Bybee 2001, Krug in press). Moreover, while most modern historical linguists accept lexical diffusion as one way for changes to spread, specific diffusionist claims for the GVS are hard to find (Ogura 1987 is an exception). I argue that it is changes which affected the personal pronouns—in particular constructions of the subjective pronouns I and THU—that triggered the GVS (capitalization of linguistic items indicates the inclusion of variants). This paper therefore presents new evidence for the majority view that at least the upper half of the GVS, which is the present focus and which is regarded by even the most critical researchers as a chain shift, was indeed a *drag* chain shift (cf. Labov 1994, Stockwell 2002). Figure 1 gives a summary of the changes that are associated with the GVS and throws into relief the density of personal pronouns in the high vowel space.

More specifically, I suggest that the GVS is phonetically motivated in ways that are consistent not only with Natural Phonology, Optimality Theory (OT), and usage-based theories, but also with structuralist assumptions on sound change. In fact, this paper reconciles some apparent conflicts between Neogrammarian assumptions and social or diffusionist accounts. The specific evidence to be presented is as follows. In the course of Middle English and well into the Modern period, I and THU became increasingly bonded to the vowel-initial items AM and ART, respectively. I argue that the increasing number of strings I AM and THU ART (cf. Krug 1998 on String Frequency) triggered word-boundary liaison, i.e. the avoidance of hiatus by intrusion of /j/ and /w/, which are well-known liaison phenomena in present-

[1] Thanks to Robert Stockwell and Donka Minkova for their comments, and Marianna DiPaolo, Crawford Feagin, William Labov, Richard Matthews, and Robert Murray.

day varieties of English. Significantly, these are precisely the glides that are commonly (e.g. Stockwell 2002) taken to be the second elements of the diphthongs which developed from early ME /i:/ and /u:/.[2]

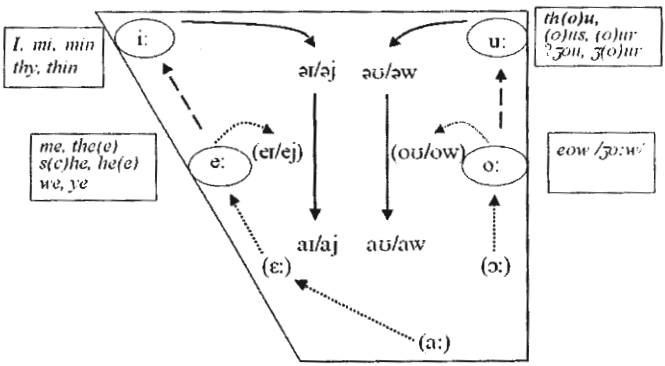

Figure 1. Great Vowel Shift and Pronouns

It is important for the plausibility of this argument that the increase in liaison coincides with the loss of intervocalic glottal stops in Middle English (see Minkova forthcoming). In a first step, however, I will suggest that long-high-vowel diphthongization (LHVD) may be a more universal tendency which is explainable by appealing to the sonority hierarchy.

2 Diphthongization of Long High Vowels

2.1 Present-day Varieties of English and Other Languages

Uniformitarianism is a panchronic perspective assuming that historical changes are in principle no different from ongoing ones (see Christy 1983). One consequence of this view is that present-day variation and change can be exploited to shed light on historical changes, which is why this section collects evidence from modern regional and national dialects of English and other Germanic languages, showing that high vowel diphthongization is a widespread phenomenon. While this is not the first account to state the commonness of high-vowel diphthongization in varieties of English (e.g. Wells 1982, Stockwell and Minkova 1988, 1999), the link to the sonority hierarchy and to the inception of the historical GVS that will be discussed has not, to my knowledge, been established before.

[2] Notational convention: Whether the second elements of the diphthongs were phonetically glides [j, w] or vowels, i.e. [i/ɪ] and [u/ʊ] will be discussed below.

It is well known that Australian and New Zealand English have diphthongized versions of the phonemes /i:/ and /u:/ (e.g. Wells 1982, Trudgill and Hannah 2002). It is equally well known that southern English varieties share this characteristic. In fact, given the history of Australian and New Zealand settlement, it is often assumed that these are among the characteristics that have been exported from England. Today's RP itself is known to have slightly diphthongized long high vowels (Trudgill and Hannah 2002). What is perhaps less well-known is that LHVD is common today not only in southern England but also in East Anglia, the Midlands, and in distinctly northern English regions, such as Hull and Newcastle. Table 1 summarizes how often a given RP long-vowel phoneme is reported as phonetically diphthongal in the 18 urban varieties described in Foulkes and Docherty (1999). Dialects that diphthongize a certain long vowel (often or consistently) receive a score of 1; non-diphthongizing ones receive 0. Varieties that diphthongize only occasionally receive a score of 0.5.

Table 1 confirms that, at scores of 10 (/i:/) and 11 (/u:/), the high-vowels have by far the highest diphthongization ratios. Notice further the symmetry for the back and front high vowels. Except once, they either both diphthongize, or neither of them does. And since the one dialect for which the two reportedly do *not* diphthongize in tandem is the London-based South East Regional Standard (whose /i:/ is not given as diphthongal, certainly a debatable position; cf. Wells 1982), the symmetry is in fact probably perfect.[3] That *symmetry* is a structural notion needs no further comment.

Another point worth noting is that of the six urban dialects that according to Foulkes and Docherty (1999) do not even occasionally diphthongize /i:/ or /u:/, four are subject to the Scottish Vowel Length Rule (SVLR) (e.g. McMahon 2000a). As is well known, these dialects lack phonemic length, even though phonetic lengthening of (tense) vowels does occur in certain environments. Importantly, however, regardless of the environment, /i/ and /u/ are consistently the shortest vowels in these varieties even when the SVLR applies (McKenna 1988). It seems reasonable to assume, then, that contrastive length is an important internal factor for triggering LHVD.[4] Such facts will be linked to the sonority hierarchy in the next section.

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[3] RP is expected to diphthongize less, not more, than the London Standard.

[4] It is conceivable that this accounts for the fact that high-vowel diphthongization does not occur in the Romance languages. Compare similarly that one of the few (implicational) phonological universals is that high vowels are crosslinguistically shorter than low vowels. I reject the position that the opening of the jaw is exclusively responsible for the longer duration of low vowels because it is from a *neutral* (ə) position that we have to start measuring (the duration and muscular effort involved in) jaw aperture or closure.

	RP phoneme:	i:	u:	ɜ:[1]	ɔ:[1,2]	ɑ:
1	Newcastle	1	1	0	0	0
2	Derby	1	1	0	0	0
3	Sheffield	1	1	0	(1)	0
4	W. Wirral (near Liverpool)	0	0	0	0	0
5	Sandwell (W. Midlands)	1	1	0	0	0
6	Norwich	1	1	0	0	0
7	Milton Keynes	1	1	0	(1)	0
8	Reading	1	1	0	(1)	0
9	Hull	1	1	0	0	0
10	S.E. Regional Standard (London)	(?) 0	1	0	0	0
11	S.E. London English	1	1	0	(1)	0
12	Cardiff	0.5	0.5	0	0	0
13	Glasgow (SVLR)	0	0	0	0	0
14	Edinburgh (SVLR)	0	0	0	0	0
15	Scots (SVLR)	0	0	0	0	0
16	(London) Derry (SVLR)	0	0	0	0	0
17	Dublin local	0.5	0.5	0	0	0
18	Dublin mainstream/fashionable	0	0	0	0	0
	Diphthongization score	10	11	0	(4)	0

1 = existence of phoneme in English largely due to loss of postvocalic /r/
2 = no proper diphthongization and/or diphthong is residual rather than innovative
3 = not typically
4 = breaking (with disyllabification): /i:/ > [ijə]; /u:/ > [uwə]

Table 1. Diphthongization in *Urban Voices* (see Foulkes and Docherty 1999)

The varieties in Table 1 are modern urban dialects, but LHVD is not a recent phenomenon. It is also widespread across England in traditional, rural dialects, as a cursory analysis of the Freiburg English Dialect Corpus (which consists mainly of NORMS' speech) shows. In addition, even though LHVD is often assumed to have been exported from southern England to Australia and New Zealand, LHVD outside the British Isles did not necessarily originate in southern England. For one thing, the phenomenon is common in most varieties of US English (e.g. Wells 1982, Ladefoged 1999, Labov 2001, Kretzschmar and Tamasi forthcoming). More importantly, LHVD is also common in other Germanic languages which are certainly not influenced by London English: In German, Yiddish, Dutch, and various Scandinavian dialects, Germanic /i:/ and /u:/ underwent changes that resemble the English developments. Quite possibly, therefore, LHVD is a natural, universal tendency. Why this is will be discussed in the next section.

2.2 Motivating High-Vowel Diphthongization Theoretically

If we combine recent advances in Natural Phonology, OT, lexical diffusion theories, and other usage-based approaches, then the evidence seems fairly compelling that long high-vowel diphthongization can be motivated phonetically and should thus be regarded a natural change. I begin with sonority, a notion which was introduced at the beginning of the 20th century (see Jespersen 1904, Jones 1964). Sonority has been exploited and refined in linguistic studies throughout the last century (e.g. Chomsky and Halle 1968, Hooper 1976, Suzuki 1994). However, it is only now being properly recognized that sonority is not only a feature for the description of sounds but that the sonority hierarchy holds enormous explanatory potential for sound change (e.g. Ritt 1994, McMahon 2000a, Murray 2002). Sonority is now generally defined as a combination of voicing and constriction of the vocal tract (cf. Lass 1984, Taylor 1995). As the latter of these two involves muscular effort, sonority effects can be restated as a function of the EFFORT constraint in OT and, if measured or classified appropriately, it could be tested in stochastic OT models. At the same time, it should be clear that EFFORT is an appealing notion to Natural Phonologists (cf. Dziubalska-Kolaczyk 2001), as reducing EFFORT is essentially tantamount to lenition. Some details of the sonority hierarchy are debated, but there is a broad consensus that the global order is as follows:

	least sonorous							*most sonorous*
(1)	obstruents	<	nasals	<	liquids	<	glides	< vowels

Crucially, a sonority hierarchy holds also within the domain of vowels—a fact that was already noted by Jespersen (1904). Here, the order is as follows (with consensus being unanimous):

	least sonorous				*most sonorous*
(2)	high vowels	<	mid vowels	<	low vowels

As sonority is a function of muscular effort, it follows from this hierarchy that as a sound moves down the hierarchy (and becomes more sonorous), it undergoes lenition. For simplicity, *lenition* is here used as a cover term that embraces all types of economy-driven changes that in Natural Phonology (e.g. Dressler 1989: 187) have been labeled "backgrounding processes of an assimilatory nature". These include shortening, lenition in a narrow sense (e.g. stop > fricative; fricative > approximant; voiceless > voiced), centralization, assimilation, deletion, or fusion. Perhaps counterintuitively, I will argue in what follows that the development of gliding vowels from long high vowels, too, can be seen as a leniting development. Since the degree of mus-

cular effort is greatest in producing high vowels, it is doubly high for producing *long* high vowels, as the mora representations in (3) and (4) illustrate. It should therefore not be unexpected if speakers resort to a minimally leniting realization which is not disruptive to communication:

(3) ii > ɪi
(4) uu > ʊu

The output of (3) is generally believed to be a common realization of the phoneme /i:/ in both British and American English, just as the output of (4) is a common realization of /u:/ in both standard accents (e.g. Wells 1982). According to the argument in terms of sonority detailed above, this reflects a natural change. For one thing, it reduces the degree of muscular effort by substituting one high vowel mora with a laxer (more central and lower) one. If the uniformitarian hypothesis applies in this case, there is little reason to assume that the initial lenition of early English /i:/ and /u:/ should have been fundamentally different (see for instance Labov 1994: 238, who takes [ɪi] to be the first change from [i:] in the GVS). Stating this amounts to the identification of an internal, phonetic motivation for the GVS, despite the fact that, according to McMahon (2000b:92), "considerations of articulatory or perceptual preference are difficult to invoke" for chain shifts of this type.

After [ɪi] and [ʊu] have developed, nucleus-glide dissimilation sets in. It is an old insight that diphthongs with similar first and second elements are prone to change. In optimality theoretic terms, nucleus and glide in such non-optimal diphthongs as /ij/, /ɪi/, /ɪj/ or /ʊu/, /uw/, /ʊw/ undergo optimization by dissimilation. Minkova and Stockwell (forthcoming) have formulated this process as an OT HEAR CLEAR constraint. If the above account is correct, we need to posit a two-step analysis for the change that affected the long-high vowels, both of which appeal to universal constraints: It was EFFORT (i.e. a speaker-optimal force) that triggered the emergence of the gliding vowel; nucleus-glide dissimilation, on the other hand, was accelerated by the fact that (speaker) EFFORT and HEAR CLEAR (i.e. a hearer-optimal force) pushed in the same direction. The diphthongization of pure long high vowels has to be characterized as lenition because sonority increases along the path in (5), which is phonetically the most realistic development from early English /i:/:

(5) ii > ɪi > əi > aɪ

Two further observations for older and present-day Dutch fit squarely with the claims made above. Firstly, van Reenen and Wijnands find that the diphthongization of West Germanic /u:/ in Middle Dutch "started *independently*

in four areas" (1993:405, emphasis added). Independent origin (as opposed to contact) clearly supports the naturalness of high-vowel diphthongization. Secondly, a project on present-day Dutch vowels (Van de Velde and van Hout 2002) finds /ɑ:/ to be very stable across the different dialects, whereas /e:/ and /o:/ are diphthongal. Such mid-high vowel diphthongization is similar to the one observed during the GVS (Figure 1), where it is noteworthy that erstwhile /a:/ and /ɔ:/ raised until the mid-high position before they diphthongized. Consistent with the assumptions on length as an important motivating factor in diphthongization, Dutch /i/ and /u/, which are short, do not show such signs of diphthongization. (Notice that their erstwhile *long* predecessors were diphthongized, as noted above.)

As was seen, not all varieties of English exhibit LHVD. It may, however, be due to the production effort involved—and thus ultimately also to their low degree of sonority—that many Germanic dialects that do *not* diphthongize /u:/ tend to centralize and unround it. This type of lenition occurs in some dialects of American English, South African English, Scottish English and Southern Irish English (Trudgill and Hannah 2002). Norwegian, Swedish, and Faroese are Scandinavian examples.[5]

To summarize so far, gliding vowels are particularly likely to develop from long high vowels, and proper diphthongs develop from them by nucleus-glide dissimilation. Since crosslinguistically /i/ and /u/ are the most frequent vowels, second only to /a/, one question immediately arises: If high vowels tend to diphthongize, why do most languages have them in the first place? Again, it is a combination of functional and structural reasons that can provide the most satisfactory answer. As Crothers (1978) and Maddiesen (e.g. 1999) have shown, it is typical for a language to keep its vowels as distinct from each other as possible. In occupying the three extreme positions of the vowel quadrilateral (/i/, /u/, /a/), languages create hearer-optimal systems, in that they can accommodate other vowels at maximal distances from each other. As far as disentangling the functional and structural principles is concerned, it seems most reasonable to assume that the perceptual constraint (HEAR CLEAR) is the underlying, more basic factor, and that structural factors (like symmetry or use of available space) are a function of the former.

Recent work on phonological change has provided strong evidence for a claim that goes back to Schuchardt 1885, *viz.* that phonological changes affect high-frequency items first (e.g. Hooper 1976, Krug 1998, Bybee 2001, Jurafsky et al. 2001). In Krug (in press), it is argued that it is in particular leniting changes where high-frequency items take the lead. These are precisely the (speaker-)economy-driven changes noted above. Since the previous section has argued that the changes which affected ME /i:/—and by implication /u:/, for which the same argument can be made—are EFFORT-

[5] The latter two additionally exhibit diphthongization.

plication /u:/, for which the same argument can be made—are EFFORT-induced ones, this is a viable starting point for looking at a group of highly frequent items in English: personal pronouns.

Figure 1 shows the high incidence of Middle English personal and possessive pronouns in the high vowel space. Before we turn to the historical evidence, let us briefly establish just how frequent such pronouns actually are based on present-day, spoken (British) English. Such a method certainly has drawbacks, but the advantages prevail. Feasibility is one aspect: A period that has 500 spelling variants for the single word *through* does not lend itself readily to a quantitative corpus survey of two dozen pronouns when only global frequencies and rough proportions among the different pronouns are of interest. The main argument against using authentic Middle English data, however, is that the genres available for that period are a far cry from natural face-to-face conversation.

The frequency of the pronouns in Table 2 is quite impressive: 1.35 million pronouns in approximately 10 million words, or about 1 of every 7 words in the corpus is a personal pronoun. I stated earlier that high-frequency items tend to be in the vanguard of change. An important concomitant of the fact that many high-frequency pronouns are concentrated in the high and mid-high vowel space is that a large proportion of high and mid-high vowel phonemes are to be found in exactly these pronouns. If the vowels in these salient items begin to change, then the likelihood for less salient items to follow suit increases considerably.[6] This is clearly a diffusionist claim (see Phillips 1984, 2001). Admittedly, the evidence for lexical diffusion in the GVS is rather weak (despite Ogura 1987; cf. Labov 1994's reinterpretation). However, Ogura's (1987) study is a truly 'lexical perspective' as it does not investigate the behavior of personal pronouns. Thus, Schuchardt (1885) was perhaps right in suspecting that only significant differences in discourse frequency lead to diverging rates of sound change.

That first and second person singular pronouns are significantly more frequent than all other items involved in the GVS is conspicuous from the fact that *you* and *I* among themselves account for 42% of all pronouns men-

[6] This implication remains valid even if, as in today's English, pronouns like *he, she, we, you* often have reduced variants. It is unimportant whether the proportion of long high vowels in pronouns was, say, 50% or 20%, as it would always have been high enough to be salient. What is more, shortened variants are would have been less common in early Middle English, as the erosive force of high frequency has doubtless reduced these items' phonological bulk over the past 500 years. Indeed, the very fact that they *did* undergo the GVS strongly supports the hypothesis that they were overwhelmingly long. Had they been prototypically short, they would not have taken part in the shift, like, for instance, *could* (from erstwhile *cūþe*).

tioned above. To be sure, this proportion must have been slightly lower in Middle English due to fact that the pronouns of the second person singular and plural had not yet merged; still the long-vowel variants are sure to have been prominent enough to be salient in the propagation of sound change.[7]

Frequency per 1,000 words	250 – 350	75 – 150	20 – 50	10 – 15	1 – 9	< 1
Pronouns	**I*** **you**, it	**we**, they, **he**	**she**, them, **your**, **me**, **my**	him, his[D], their, **our**, **us**	her[O], her[D], its[D], **mine**, **yours**	**ours**, his[P], hers, theirs

* bolded items had long (mid-)high vowels prior to GVS

Table 2. Hierarchy of Pronouns in English (spoken BNC, c.10m words)[8]

3 Intrusion as a Trigger for Long-High Vowel Diphthongization in the Great Vowel Shift

3.1 Pronoun-Copula Sequences

Recent studies (e.g. Bybee 1999, Krug 2000, Heine 2002, Traugott forthcoming) have shown that it is not enough to look at individual words but that it is often illuminating to look at constructions, especially when a given word occurs commonly in certain combinations. This insight has not yet become conventional wisdom in work on phonological change, despite the fact that grammaticalization has important phonological concomitants (e.g. Lehmann's (1995) processes of attrition and coalescence). In phonology, phonemes of individual words are usually still the locus of discussion, but Bybee (2001) may yet spark a new research tradition that focuses on the effects of constructions in sound change. Perhaps the present paper can be a modest contribution.

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[7] Supporting evidence comes from an investigation of southern AmE /aɪ/, where monophthongization is most advanced in the personal pronouns (Feagin 1994).

[8] The figures are those produced by the part-of-speech option of the SARA software. Manual cross-checks have shown that these are very reliable overall. For ambiguous forms: *D* stands for *determinative*, *P* for *possessive pronoun*; *O* for *objective case*. *You* is not disambiguated for either SG or PL or for subjective vs. objective case. Nor is *it* disambiguated for the latter distinction. The figure for *me* includes some 2,000 instances of possessive determiner (e.g. *me dad*). The figures for *thou, thee, thy* and *thine*, which are marginal in present-day English, are omitted here.

What follows is a discussion of the two most frequent sequences in many languages: subjective personal pronouns of first and second person singular (i.e. the two necessary participants in face-to-face interaction) followed by the copula—in modern English: *I am* and *you are*. Table 3 shows how frequent these sequences are in modern English. They clearly outnumber the two most frequent lexical items *time* and *thing*, both of which belong to Halliday and Hasan's (1976: 274) class of 'general nouns' and are therefore not clear-cut lexical items. Obviously, such constructions dwarf common lexical words that figure prominently in discussions on the GVS like *house* or *mouse*.

In the next section, I argue that liaison in pronoun-copula sequences provides an additional trigger for the GVS. That is, the role of I and THU was not restricted to the two factors mentioned above, namely (a) that both of these pronouns had long high vowels prior to the GVS and (b) that they were, as high-frequency items, likely to be in the vanguard of change.

I'm	*I am*	*time*	*fine*	*thing*	*you're*	*you are*	*house*	*mouth*	*mouse*
14.925	916	8.447	822	5.921	9.185	1.551	2.635	365	59
15.841					**10.736**				

Table 3. Pronoun-copula sequences, grammatico-lexical items and lexical items in spontaneous spoken language (BNC, c.5m words)

3.2 ONSET: Loss of Hiatus and Replacement by Liaison during Middle English

In Old English, much like in present-day German, glottal stops preceded a morpheme beginning in a vowel (e.g. ʔon or ʒe-ʔ-earnian, see Minkova forthcoming). Part of the argument is based on the frequent use of vowel alliteration in Old English verse (vowels would alliterate with any other vowel), which is generally taken as evidence that it was in fact the epenthetic glottal stops preceding the vowels that alliterated. Minkova cites studies which show that vowel alliteration in poetry became rare during the 14th century, decreasing from 15% in *Beowulf* to 3% overall in 14th century verse. According to Minkova, this change is due to French influence. The ultimate answer to whether Old English actually had morpheme-initial glottals, if it exists, is immaterial for the main argument presented here (though not for a wider claim concerning onset replacement, advanced below). What is important here is the consensus that hiatus is obsolescent or nonexistent in late Middle English. In what follows, I argue that after the loss of epenthetic glottals it becomes more likely for erstwhile hiatus contexts (i.e. the clashing of two vowels) to undergo liaison. Thus, in Middle English, ONSET by glottal stop was gradually superseded by ONSET through liaison. Liaison in spo-

ken Middle English occurred commonly by resyllabification (e.g. *an.other* > *a.nother;* cf. Minkova forthcoming). In hiatus contexts, however, liaison can only be established by intruding elements.

It is true that the intrusion argument for Middle English is essentially theoretical, but there is no reason to assume that when resyllabification occurred due to elision and liaison,[9] a different type of liaison, namely intrusion, should have been ruled out. Indirect evidence from present-day varieties of English is not hard to find, after all. Interestingly, for instance, the local Dublin variety is described as exhibiting breaking of the long high RP phonemes (Table 1), which is concomitant with disyllabification, so that /i:/ is realized as [ijə] and /u:/ as [uwə]. The similarity of the first two elements in either case to the first stages of the GVS will be obvious even to the linguist not familiar with the relevant literature. Needless to say, linking and intrusive /r/, /w/ and /j/ (as in *father and, India and, show it, do it, see it, Sophia*) can be regarded as instantiations of the same type of syllable optimization: ONSET before morpheme-initial vowels.

During Middle English, two prominent potential sites for liaison were first and second person singular pronouns followed by the copula: I-/j/-AM and THU-/w/-ART. OE *ic eam* or *ic beo* were no liaison sites, though. For the development of liaison sites, OE *ic* /ɪç ~ ɪtʃ/ had to erode to *I*, which happened during Middle English, as an analysis of all first person singular pronouns in the historical Helsinki Corpus (c.1.5m words) showed. For ease of exposition, I have subsumed the following variants under 'ICH-forms': *hic, hich, hyc, ic, icc, ich, iche, ig, ih, ihc, ik, ike, yc, ych, yche* and *yk* (capitalization was disregarded in the analysis). *I, Y, J, e* and *hi,* on the other hand, were categorized as 'I-forms'. Only pronominal first person singular uses were taken into the count. A total of about 18,000 instances of 1SG Pronoun out of about 22,500 spellings was thus manually disambiguated.

The erosion from Old English *ic* to (early) Modern English *I* as found in this corpus is as follows: Old English is homogeneous in having exclusively ICH-forms. During early Middle English (1150-1250), I-forms are making inroads, accounting for about 10% of all subjective 1SG pronouns. This proportion increases dramatically over the next century, when I-forms account for about 40%. From 1350-1710, the distribution is again almost categorical and virtually restricted to I-forms, with less than 1% ICH-forms surviving (Krug forthcoming). Subsequently, all pronominal forms were scanned for finite AM-forms (e.g. *eam, eom, am, amm,* with *am* being the dominant form since 1150) and BE-forms (like *beo, biom, be*). Patently, it is the AM-forms that constitute potential liaison sites following I-forms.

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[9] Another telling example is the alliterative verse: Þe tweyne yZen and þe nase, / þe naked lyppez (*Sir Gawein and the Green Knight* 962; Minkova forthcoming).

Figure 2 shows that from about 1300 there is a considerable number of liaison sites (at about 4 per 100,000 words, I-AM sequences compare in frequency to the word *house* in present-day spoken English, cf. Table 3). More impressively, while the incidence of liaison sites continues to rise steadily until it has increased more than 20-fold in early Modern English, the proportion of liaison sites (as percentages of all sequences of 1SG pronoun when followed by finite forms of the copula) follows an almost perfect S-curve pattern. After a slow start in early Middle English there is a steep rise around 1350. At around 90%, liaison sites (I-AM) have been almost categorical ever since, which mirrors the typical leveling-off phase in an S-curve. The beginnings of the GVS are usually dated at around 1400.[10] To be sure, there is no direct evidence for liaison in I-AM sequences; nevertheless, there is positive evidence for (a) a steep increase in potential liaison sites right before (or coinciding with) the beginning of the GVS, (b) the contemporaneous loss of hiatus and (c) the existence of similar intrusion phenomena in modern English dialects. Taken together, this seems to present at least compelling circumstantial evidence suggesting that intrusion in I-AM and THU-ART indeed played a motivating role in the inception of the GVS.

The question as to how this affected the phonemes is easy to answer. Early Middle English /i:/ and /u:/ became /aɪ/ and /aʊ, as well as /aj/ and /aw/. The phonetically most realistic assumption is that both pairs were essentially in complementary distribution, with the former occurring before pauses and consonants, and the latter occurring typically before vowels, just as in the sequences *I am* and *thu art*. This, supported by progressive tautosyllabification of these two sequences, must have created a stereotypical diphthongal pronunciation for these constructions (even when the vowels in the pronouns were short), which also contributed to the diphthongal impression associated with *I* and *thu* due to the natural diphthongization tendencies outlined in section 2. Diphthongization is likely to have spread from these salient items.

According to the written data, then, loss of vowel-initial glottals coincides with the sharp rise in liaison sites *I-am*—both in absolute terms (incidence) and in relative terms (as proportions of all pronoun-copula sequences). Of course, caution has to be applied when using written data as evidence for phonological developments. Usually orthography lags considerably behind the spoken facts, so that one can assume that the erosion of ICH and the concomitant rise in liaison sites will have occurred even before the 13th century. This must remain speculation, but the discrepancy between written and spoken facts was probably less blatant during the Middle Ages than in a highly standardized language like present-day English, which still

[10] Stenbrenden (forthcoming) has found evidence for an earlier start, though.

retains written reflexes of sounds that have long been lost or changed, as the orthography of a word like *knight* reveals.

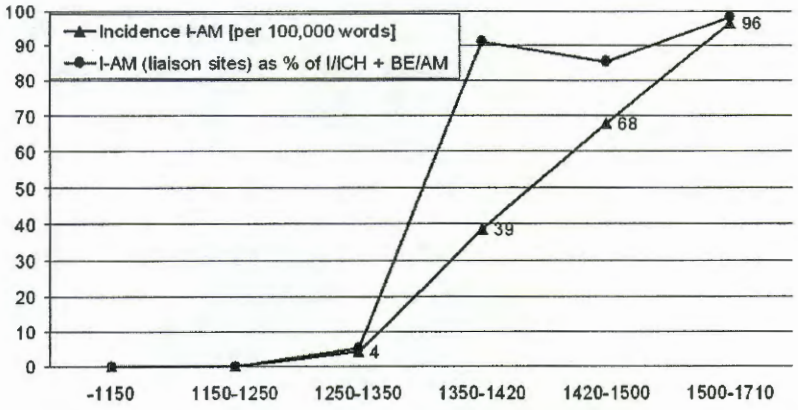

Figure 2. The rise of liaison sites I-AM

4 Concluding Remarks

It seems implausible that three Middle English changes, which appear related, occurred at roughly the same time by mere chance: (i) loss of the glottal marker triggering an increase in liaison, (ii) increasing bonding of I-AM and THU-ART and (iii) inception of the GVS. Therefore, this paper has proposed that two independent factors played a motivational role in the inception of the GVS. Both factors are phonetically grounded (and thus fall under Labov's (1994) definition of Neogrammarian sound change); and both are connected to personal pronouns. The first, a result of the sonority hierarchy, is that long-high vowel diphthongization should be regarded as an articulatorily motivated lenition process, in which the personal pronouns (especially subjective first and second person singulars), as high-frequency items, are doubly likely to participate. If one accepts uniformitarian and diffusionist assumptions, then it follows that the pronouns initiated the changes affecting early Middle English /i:/ and /u:/ and, by implication in a drag chain scenario, the entire Vowel Shift. The second factor concerns the two pronoun-copula sequences I-AM and THU-ART, which became increasingly bonded during Middle English (evidence was presented only for I-AM, but due to the fixing of word order during that period, the same is certain to apply to the second person singular). As a result, these sequences were particularly prone to exhibit liaison. More specifically, it was argued that ONSET by glottal stop before the copula was replaced by the intrusive glides which are commonly

described as the second elements of the diphthongs that developed from ME /i:/ and /u:/.

It was seen, moreover, that certain structural and usage-based assumptions on sound change are not mutually exclusive, just as Diffusion Theory is not necessarily incompatible with Natural Phonology and OT. Indeed, these approaches overlapped and complemented each other in accounting for the claims made above. To conclude, perhaps this paper can most succinctly be epitomized as an answer to the question "Who triggered the Great Vowel Shift?" My answer would be: *You* and *me*—basically.[11]

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[11] A more complete answer would include: Maybe also *he* and *she*, or *us* and *we*. Anybody eventually.

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