

## High vocoids in English: A diachronic analysis\*

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**Hwangbo, Young-Shik. 2015. High vocoids in English: A diachronic analysis.** *Studies in Phonetics, Phonology and Morphology* 21.3. 517-533. This paper analyzes the sequences of high vocoids (/ji, ju, wi, wu/) from a diachronic perspective, focusing on their distribution. /ju/-related phenomena have been dealt with, producing various suggestions or accounts about its underlying status, optional /j/-deletion, the position of /j/ in a syllable, co-occurrence restrictions between /j/ and its neighboring sounds, different behaviors of /ju/ and /wi/, etc. This paper does not tackle these issues directly, but instead investigates the distribution of high vocoid sequences (/ji, ju, wi, wu/) which appear in the CELEX Lexical Database, and examines how they have changed through time. The results reveal that /ju/ is very peculiar in that almost all the words with /ju/ have been added to English by continuous influx of French or Latin words, in most of which /ju/ is represented by the single letter <u>, not by two letters. In contrast, the majority of /wi/ words are native words, and /wi/ is represented by two letters. /wu/ and /ji/ words are very few, but almost all of them are native words. It is concluded, thus, that the peculiarity of the sequence /ju/ might be related to the idiosyncratic behavior of /ju/ frequently observed in the issues mentioned above. (Sungkyul University)

Keywords: high vowels, high glides, high vocoids, distribution, ju, wi, ji, wu

### 1. Introduction

The /ju/ sequence is an area of English phonology which has produced various conflicting analyses. McMahon (2000: 106) summarizes them as follows (with slight change in pronunciation symbols):

- (1) a. What is the status of the /j/ glide which appears before /u/?
- b. How can we capture the fact that /j/ appears predominantly before /u/, but not before every instance of this vowel?
- c. What are the most appropriate underlying vowels for /ju/, /u/, /ʊ/, and /ʌ/?

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For various, often conflicting, answers to these questions, see Chomsky and Halle (1968), Halle (1977), Rubach (1984), Halle and Mohanan (1985), Borowsky (1986), Hogg and McCully (1987), Davis and Hammond (1995), Clark and Yallop (1995), and McMahon (2000), among others.

The asymmetric distribution of /j/ and /w/ has also been an area of investigation. One of them is about what kind of vowel can come after /Cj/ and /Cw/; almost all vowels can occur after /Cw/ while only /u/ can come after /Cj/ (cf. Halle and Mohanan 1985: 89, Borowsky 1986: 279). Another is concerning the status of /j/ and /w/ in a syllable (Davis and Hammond 1995, Kang 2001). For example, Davis and Hammond (1995: 160) argues that /j/ of /CjV/ belongs to a nucleus while /w/ of /CwV/ belongs to an onset. Hwangbo (2014) also investigates the distribution of /j/ and /w/ with respect to its neighboring consonants or vowels, and reports that /w/ puts more restrictions on the preceding consonants while /j/ (especially /Cj/) puts more restrictions on the following vowels, and that foreign words and their spelling seem to have something to do with the asymmetric distribution of /j/ and /w/.

The discussion of /j(u)/ and /w(i)/ naturally leads us to be interested in all the high vowels and glides ('high vocoids' for short) and their combinations: /ju/, /wi/, /ji/, and /wu/. This is a topic of the present paper; it deals with a combination of high vocoids, their distribution, and the influence of loanwords on their distribution, from a diachronic point of view.

This paper is organized as follows. In section 2 the procedure to collect data is presented. In section 3, the distribution of high vocoid sequences is investigated from a diachronic perspective. Section 4 concludes the paper considering the implications of the findings for some related phonological issues.

## 2. Data Collection

This paper is based on the CELEX Lexical Database (Baayen et al. 1993, hereafter CELEX), which contains 52,447 words (or lemmas) from British English with their pronunciations, syllable structures, morphological and syntactic information, word frequencies, and so on.

Firstly, from the CELEX primary pronunciations<sup>1</sup>, I extracted 3,658 words which include as their pronunciation /ju, jʊ, jʊə/ ('/ju/ words' for short), /ji, ji, jiə/ ('/ji/ words' for short), /wi, wi, wiə/ ('/wi/ words' for short), /wu, wʊ, wʊə/ ('/wu/ words' for short). I will call this 'Data A (High vocoid words).'

Secondly, from Data A, I ruled out complex words (words which have at least one modern productive element; e.g., *windmill*, *yearly*), contracted words (e.g., *we've*), zero derived words, and words for which morphological analysis is not appropriate (e.g., *UNESCO*), according to the morphological status which is provided by CELEX. In addition, I crossed out two words (*tube* and *use*) which occur twice, and *twee* (from *sweet*), and three alphabet entries <q>, <u>, and <w>. As a result, I obtained 561 non-derived words. I looked up these words in the *Oxford English Dictionary Online* to find out the etymology or origin of each word (e.g., Old English, French, Latin, Uncertain, Imitative, Echoic, etc.) and the first date of use (the year when it appeared first in the literature)<sup>2</sup>. I will call the result 'Data B (Non-derived words).'

Finally, I ruled out all the words of foreign origin from Data B irrespective of the first date of use, leaving only native words. The number of words remained is 153, and I will call this 'Data C (Native words).'

 All words of Data C is given in Appendix.

## (2) Data used in this paper

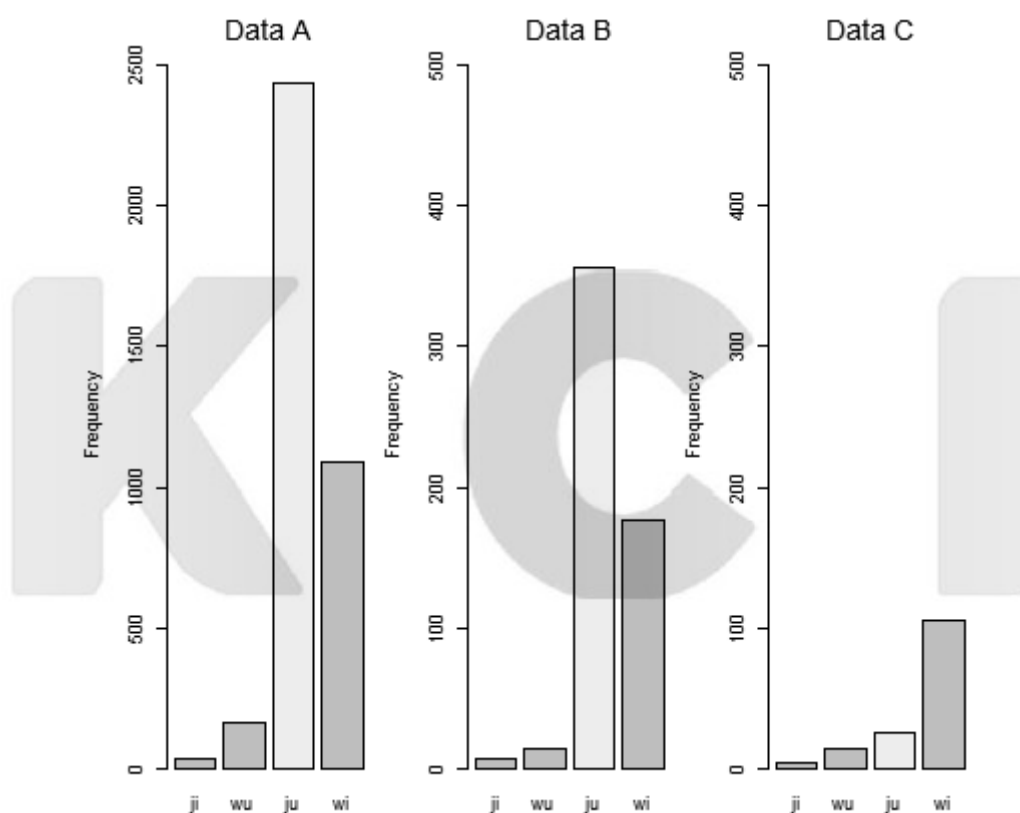
	Data A	Data B	Data C
Description	'High vocoid words' which contain /ji, wu, ju, wi/ in their pronunciation	'Non-derived words' from Data A. Date and origin added	'Native words' from Data B
Examples	<i>new, wind, year, wood, cube, yin, wince, wolfram, misuse, windmill, woody, yearly</i>	<i>new, wind, year, wood, cube, yin, wince, wolfram</i>	<i>new, wind, year, wood</i>
Number of words	3,658	561	153

<sup>1</sup> CELEX also provides secondary pronunciations if any. But this paper uses only primary pronunciations.

<sup>2</sup> There are some words which have 'a1500,' 'c1500,' 'OE,' or '13..' for their first date of use. I removed 'a' (= ante) and 'c' (= circa), and replaced 'OE' with '900' and '13..' with '1300' for the purposes of convenience, since this does not have any serious influence on the result of the present analysis.

### 3. Analysis and Results

In this section, I review and analyze Data A, B, and C in (2) from a diachronic perspective. Before doing so, I will compare the distribution of /ji, wu, ju, wi/ in the above three data with each other.

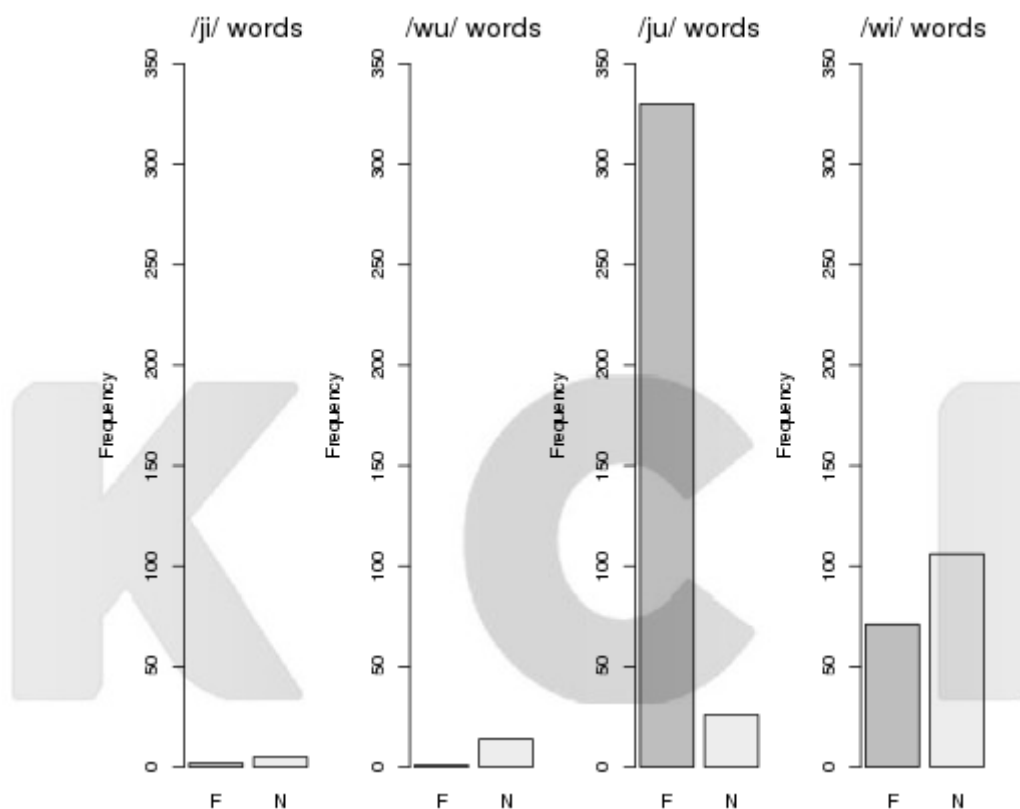


**Figure 1. Frequency (number) of high vocoid words**

The overall distribution of /ji, wu, ju, wi/ in Data A (High vocoid words) and Data B (Non-derived words) seems to be similar; /ju/ occurs far more frequently than the others, and /ji/ occurs least.

In Data C (Native words), however, the distribution of the high vocoid sequences dramatically changed; the number of /ju/ words decreased to the point that it became much smaller than that of /wi/ words. What made such a difference? It must be the

foreign words that made the difference, because Data C is a result of ruling out the foreign words from Data B. Figure 2 makes this point clearer.



**Figure 2. Frequency (number) of foreign and native words in Data B**  
(F = Foreign, N = Native)

In Figure 2, we see that in the case of /ju/ the portion of the foreign words is extremely larger than that of the native words while in the other cases the portion of the native words is larger than that of the foreign words. If we take away the foreign words from Figure 2, the result is the bar graph for Data C in Figure 1.

We also see from Figure 1 and Figure 2 that the overall distribution of /ji/ and /wu/ seems to remain intact even though foreign words are excluded. It follows from this that there are no or only few loanwords including /ji/ or /wu/. This point will also be addressed again later in this section.

Next, I will examine the distribution of high vocoid sequences in Data B (Non-derived words) and Data C (Native words), in this case, however, from a diachronic point of view. I will show the distributional change of high vocoid words according to the first date of use. The starting point is set to the year 1100, since it has been generally considered both the end of the Old English period and the beginning of the Middle English period (Pyles and Algeo 1993), and the end point is set to the year 1950 since the most recent loanword (*quisling*) in Data B was found in the literature in 1940.

We should be very careful, however, not to think that in the past the words under analysis were pronounced in the same way as they are in the present day. Many words probably underwent the Great Vowel Shift and some other sound changes. For example, early Middle English diphthongs / $\epsilon u$ ,  $e u$ ,  $i u$ / converged into / $j u$ / in Modern English as shown briefly in (3):

(3) Development of / $j u$ / (Hwangbo 2014: 759)<sup>3</sup>

5) Development of ju (Hwangbo 2014: 73)					
	Gloss.	Old English	Early Middle English	Late Middle English	Modern English
scēawa	shrew	æaw	ɛu	ɛu	ju
hrēowan	rue	eow	eu	iu	
snīwan	snew	i:w	iu		

Even foreign words with <eu> also followed the same development of / $\epsilon u$ / to / $j u$ / (Jespersen 1965: 340). However, only 12% of foreign / $j u$ / words are conjectured to have undergone such development, as will be discussed in Section 4. For more discussion of the development of / $j u$ / and related matters, see Jespersen (1965: 340), Pyles and Algeo (1993: 147-148, 174-175), Lass (1994: 248), and Hwangbo (2014: 759). It should be remembered again that the following figures show only when the present-day high vocoid words began to be used in English.

In Figure 3, I present the distributional change of high vocoid sequences in Data C (Native words). The number of / $j i$ / words is 5 and remained unchanged, that of / $w u$ /

<sup>3</sup> Present-day pronunciations of *shrew* and *rue* are / $\text{ʃru:}$ / and / $\text{ru:}$ / because / $j$ / does not occur after / $r$ / in Present-day English, as will be considered in Section 4. *Snew* is a past form of *snow*, but it is obsolete.

words increased from 9 to 14, that of /ju/ words from 15 to 26, and that of /wi/ words from 53 to 106. Figure 3 shows that native /wi/ words have been prevailing all the time, and /ju/ words have been below /wi/ words in number.

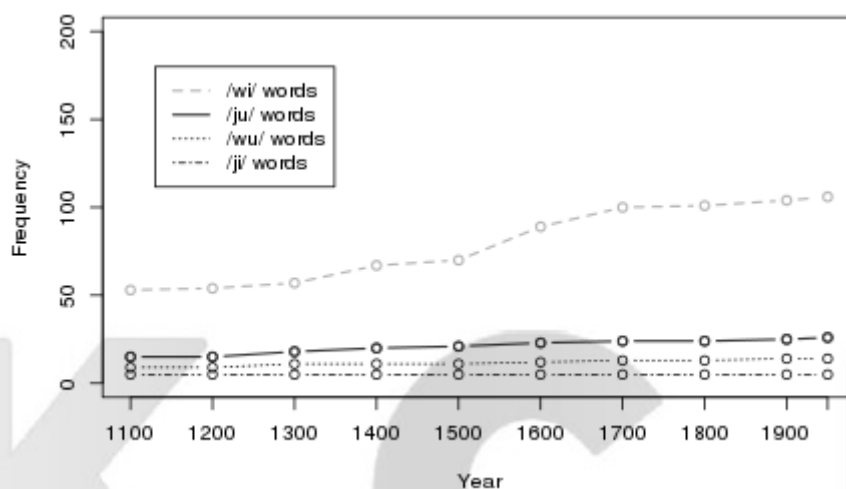
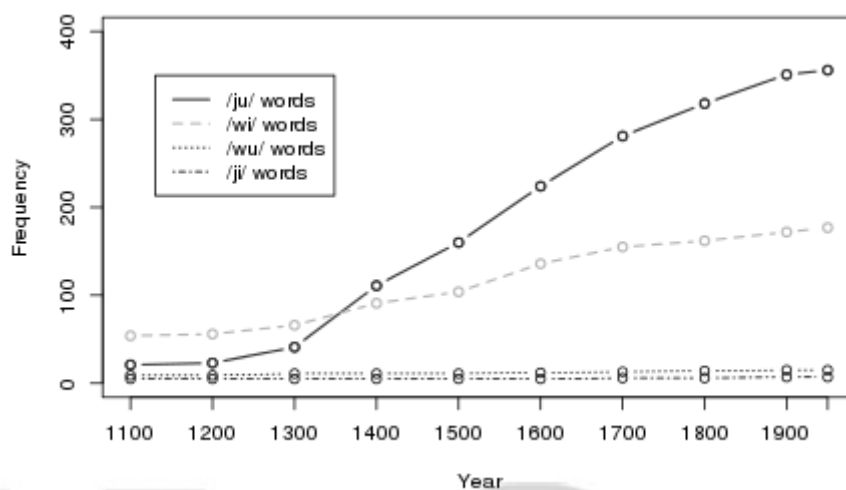


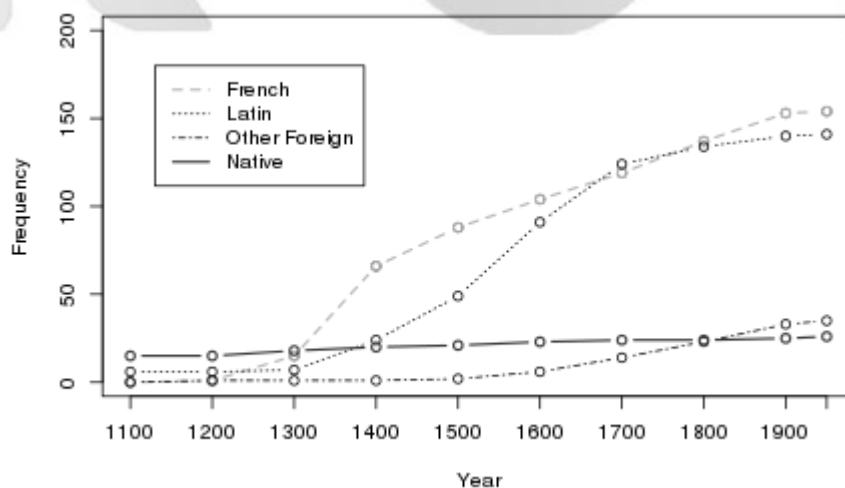
Figure 3. Native words in Data C

In the next figure (Figure 4), I will show the distributional change of high vocoid sequences in Data B which includes not only non-derived native words but also non-derived foreign words. The most remarkable feature we can find out in Figure 4 is the fact that the /ju/ words came to outnumber /wi/ words around 1400 and have increased steeply. The number of /wi/ words increased from 54 to 177, but the number of /ju/ words increased from 21 to 356, drastically reversing the relative position in frequency. By contrast, /ji/ and /wu/ words have been very scarce all the time and seldom increased. The number of /ji/ words was 5 in 1100 and 7 in 1950. The number of /wu/ words was 9 in 1100 and 15 in 1950.



**Figure 4. Non-derived words in Data B**

The next figure (Figure 5) reveals what caused such a steep increase of /ju/ words in detail by showing them according to their origin. It is evident that it was caused by the huge influx of French loanwords begun after the year 1200 and Latin loanwords begun after the year 1300.



**Figure 5. /ju/ words in Data B**



We can find out in Figure 5 that until 1300 the native /ju/ words were the largest in number, but at the end they are the least. The number of them increased only from 15 to 26, but French from 0 to 154, Latin from 6 to 141, and the other foreign /ju/ words from 0 to 35. These findings support the observation that in the Middle English period many French words were borrowed while in the Modern English period many Latin words were imported (Pyles and Algeo 1993). In addition, Figure 5 reassures that almost all /ju/ words originated from foreign words, especially French and Latin loanwords. It should also be pointed out here that this fact itself has already been observed by scholars (Jespersen 1965 among others). However, the figures presented here enable us to grasp the specifics of the borrowing by presenting the origin, the first date of use, and the amount of loanwords in detail.

In contrast, the /wi/ words are made up differently from /ju/ words, as illustrated in Figure 6. The native /wi/ words have been predominant over time, unlike the native /ju/ words. They increased from 55 to 108. It should be pointed out that the foreign /wi/ words have been so scarce that the number of native /wi/ words has been larger than the sum of all foreign /wi/ words. The number of French /wi/ words increased from 0 to 31, Latin /wi/ words from 1 to 14, and the other foreign /wi/ words from 0 to 26.

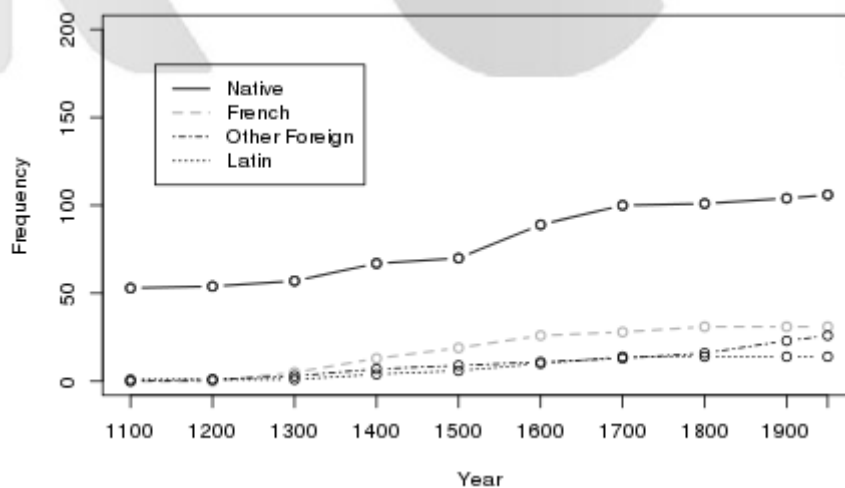


Figure 6. /wi/ words in Data B

Next, I consider the words with a high vocoid sequence with the same frontness: /wu/ and /ji/. As seen in Figure 7, there are only 14 /wu/ words in Data B, and all but one are native words<sup>4</sup>. They started from 9 and ended up at 14. There are neither French nor Latin /wu/ words.

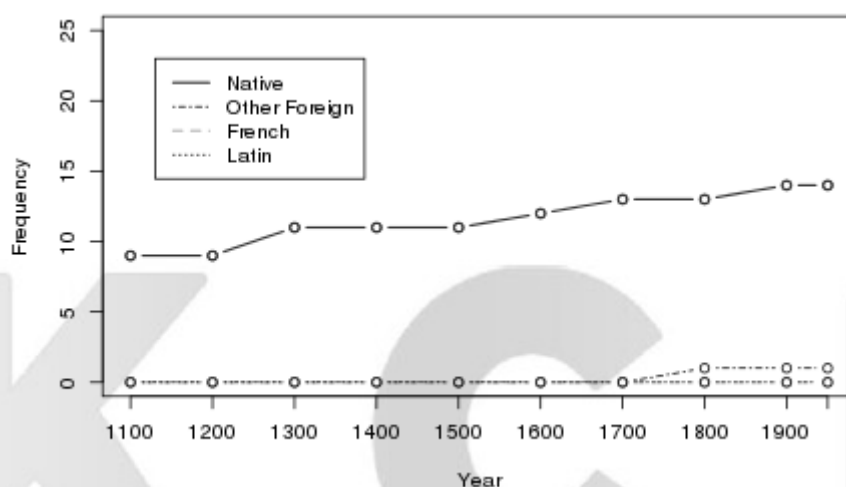
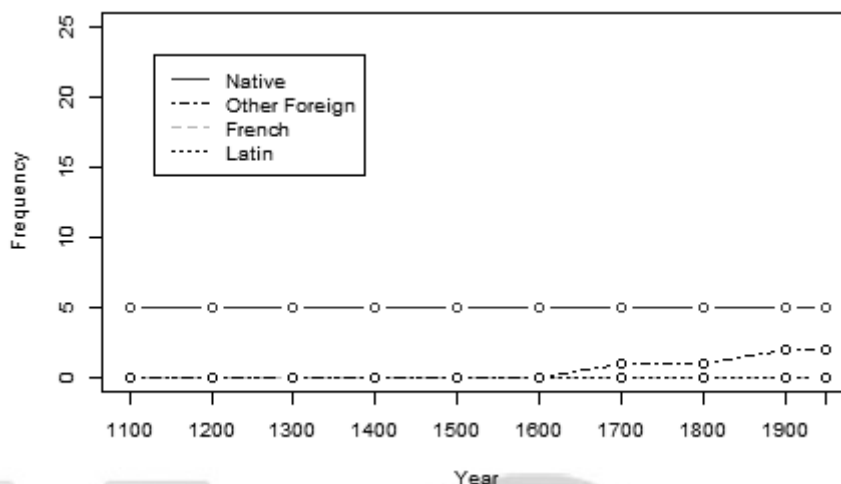


Figure 7. /wu/ words in Data B

In Figure 8, I review /ji/ words in Data B. It only has 7 /ji/ words: 5 of them are native, one is Chinese (*vin*), the other is German (*Yiddish*). The number of native /ji/ words has not been changed. There are neither French /ji/ words nor Latin /ju/ words found in Data B.

<sup>4</sup> Here, the only non-derived word is *wolfram*, which came into English from German in 1757.



**Figure 8. /ji/ words in Data B**

In summary, most of /ji/ and /wu/ words in Data B are native words while most of /ju/ words are foreign words. /wi/ words are in between, but native /wi/ words are more numerous than foreign /wi/ words. Until 1300 /ju/ words had been less numerous than /wi/ words, but since 1400 /ju/ words have been far more numerous than /wi/ words due to the huge influx of French and Latin /ju/ words. This caused a drastic distributional change of high vocoid sequences as is clear when we compare Figure 3 with Figure 4.

#### 4. Discussion and concluding remarks

It has been revealed, in the previous section, that the frequency of /ju/ words is extraordinarily high, compared to the other high vocoid sequences, and it is due to the fact that a huge number of French and Latin /ju/ words have been borrowed into English over time. In this section I will consider its implications for English phonology.

Before doing so, I will roughly address a relation between phonemes and letters. Each glide belonging to /wi, ji, wu/ has its own corresponding letter; /w/ is represented usually by the letter <w> (e.g., *wind* and *wood*) and sometimes by the letter <u> (e.g., *quick*), and /j/ usually by the letter <y> (e.g., *you*). In most

occurrences of /ju/, however, the glide /j/ does not have any corresponding letter of its own. Instead, the whole /ju/ is represented by the letter <u> (e.g., *music*). For example, there are 330 foreign /ju/ words in Data B, 292 words (88%) of which have a single letter <u> for their /ju/. The other 38 words (12%) have <ew>, <eu>, <ieu>, or <ui> for their /ju/.

The pronunciation of the letter <u>, of course, is not restricted to /ju/, as can be seen in *succubus* /'sʌkjʊbəs/ and *rude* /ru:d/. The popular pronunciation of the letter <u> is /ʌ/ (42%), and the other pronunciations are /ju/ (17%), /u/ (13%), /ɜ/ (10%), and /ə/ (12%), according to Hwangbo (2012), in which only monomorphemic words were considered.

In sum, /ju/ is closely related to the letter <u> which occurs in the words of Latin or French origin<sup>5</sup>. Such an idiosyncrasy of /ju/ might shed light on some of the phonological issues.

First, since /ju/ is mostly a pronunciation of a single letter <u> which is included in a foreign word, it could be expected to behave like a single sound, i.e., a diphthong. This could be supported by the fact that /ju/ behaves as an inseparable unit in Pig Latin, as illustrated in *twin* /twɪn/ → /ɪntwe/ vs. *cute* /kjut/ → /jutke/, where the components of a sequence /wi/ are separated while those of /ju/ are not (Davis and Hammond 1995, Kang 2001). Inversely, this could be an extra-linguistic evidence for the claim that /j/ of /ju/ exists in the underlying representation, not inserted later by the rule of /j/-insertion (Kang 2001).

Second, if in its most occurrences, /ju/ is a sound related to a single letter <u> included in a foreign word, and thus behaves like a single sound, i.e., a 'rising' diphthong, then it could not fit into the English phonemic system because the other diphthongs are all 'falling'. Then /ju/ is expected to be unstable and have a tendency to be adjusted to the English phonological system.

The above argument might be supported by the fact that /j/ of /ju/ tends to be deleted. In British English, /ju/ seldom occurs after /r/, instead /u/ occurs (e.g., *rude* /'ru:d/). /ju/ fluctuates with /u/ after /l/ (e.g., *lucent* /'lju:snt/ ~ /'lu:snt/)<sup>6</sup>, but /u/ occurs more often than /ju/ in this position. (For the /j/-deletion after a sonorant

<sup>5</sup> Some argue French and Latin <u> was pronounced as a high front rounded vowel /y/, but became /ju/ later. But Jespersen (1965: 103-105) denies this argument and claims that both French and Latin <u> was pronounced as a diphthong /iu/ from scratch. Chomsky and Halle (1968: 252, note 5) also follow Jespersen's argument.

<sup>6</sup> In CELEX, /'lu:snt/ is a primary pronunciation and /'lju:snt/ is a secondary pronunciation.

consonant in British English, see Borowsky 1986 and Hwangbo 2011.) In some dialects of American English, /ju/ does not occur after any coronal consonant in a stressed or word-initial syllable (e.g., *tunic* /'tu:nɪk/, *duke* /'du:k/, *news* /'nu:z/, *lucent* /'lu:snt/). All this shows that the /j/-deletion tends to spread.

Pig Latin may also be a supporting evidence for the trend toward /j/-deletion, since in some dialects /j/ is deleted as seen in *cute* /kjut/ → /ʊtke/ (Davis and Hammond 1995, Kang 2001). Unlike /ju/, there is no report or evidence that /w/ of /wi/ tends to be deleted, as far as I know.

Finally, it is to be noted that the frequency of /ji/ and /wu/ words is very low. As shown in Section 3, /ji/ and /wu/ words have always been scarce in native words. Furthermore, no or few foreign words with /ju/ and /wu/ have been borrowed into English. This can be explained by the OCP (Obligatory Contour Principle)<sup>7</sup>. For example, the high vocoids /j/ and /i/ are almost identical to each other in articulation (i.e., frontness, height, and sonority), and thus the combination of these two high vocoids is likely to be avoided both in English and foreign languages. The same goes for the /wu/ words.

There is a question which remains to be answered, however. The high frequency of /ju/ words has been proved to be a result of the continuous influx of foreign /ju/ words over time. But why did only /ju/ words flood into English, but not /wi/ words? This will be left for future research.

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<sup>7</sup> I thank an anonymous reviewer for reminding me of this point.

### Appendix. Native words in Data C

P. of S. = Part of speech, N = Noun, V = Verb, PRON = Pronoun, ART = Article, ADV = Adverb, OE = Old English, Prep = Preposition, c = circa, a = ante

Word	IPA	P. of S.	Date
bequeath	bɪkwɪ : ð	V	OE
between	bɪtwɪ : n	PREP	c890
betwixt	bɪtwɪkst	PREP	931
bewilder	bɪwɪldə	V	a1680
clerihew	klɛrɪhju :	N	1928
cue	kju :	N	1533
dew	dju :	N	a800
dude	dju : d	N	1883
dwindle	dwɪndl	V	c1000
ewe	ju :	N	a700
feud	fju : d	N	c1300
few	fju :	PRON	c825
fuse	fju : z	V	1611
gewgaw	ɡju : ɡɔ :	N	c1225
hew	hju :	V	OE
hue	hju :	N	971
lewd	lju : d	A	c890
mew	mju :	V	a1325
new	nju :	A	OE
newt	nju : t	N	a1425
nitwit	nɪtwɪt	N	1914
pewit	pɪ : wɪt	N	a1529
puke	pju : k	V	1586
pule	pju : l	V	a1398
quean	kwi : n	N	OE
queen	kwi : n	N	OE
queer	kwɪə	A	1513
quick	kwɪk	A	OE
quiff	kwɪf	N	1617
quill	kwɪl	N	a1425
quin	kwɪn	N	1840
quip	kwɪp	V	1542
quiver	kwɪvə	V	1490
quiz	kwɪz	V	1787
sinew	sɪnju :	N	OE
spew	spju :	V	c897

squeak	skwi : k	V	1387
squeal	skwi : l	V	a1380
squeegee	skwi : dʒi :	N	1844
squeeze	skwi : z	V	1601
squib	skwɪb	N	c1525
squid	skwɪd	N	1613
squiggle	skwɪɡl	N	1898
squint	skwɪnt	V	1611
stew	stju :	V	a1225
steward	stjʊəd	N	c900
sweep	swi : p	V	a1300
sweet	swi : t	A	c825
swift	swɪft	A	c888
swig	swɪɡ	N	1548
swill	swɪl	V	c725
swim	swɪm	V	OE
swing	swɪŋ	V	c725
swinge	swɪndʒ	V	a1556
swivel	swɪvl	N	1307
swoon	swu : n	V	c1290
swoop	swu : p	V	1566
thew	θju :	N	c888
tweak	twi : k	V	1601
tweet	twi : t	N	c1550
tweezer	twi : zə	N	1654
twiddle	twɪdl	V	a1547
twig	twɪɡ	N	c950
twin	twɪn	N	c1000
twinge	twɪndʒ	N	1548
twinkle	twɪŋkl	V	c888
twist	twɪst	V	1340
twit	twɪt	V	1530
twitch	twɪʃ	V	c1175
twitter	twɪtə	V	c1374
we	wɪ :	PRON	OE
weal	wɪ : l	N	c888
Weald	wɪ : ld	N	OE

wean	wi : n	V	c960
weasel	wi : zl	N	c725
weave	wi : v	V	1593
weave	wi : v	V	c900
wee	wi :	V	1934
wee	wi :	A	a1400
weed	wi : d	N	c888
week	wi : k	N	OE
weep	wi : p	V	c900
weevil	wi : vl	N	c725
weir	wæ	N	839
weird	wæd	A	c1400
wheat	wi : t	N	c825
wheel	wi : dl	V	1661
wheel	wi : l	N	c785
which	wɪʃ	PRON	c888
whiff	wɪf	N	1600
Whig	wɪg	N	c1645
whim	wɪm	N	1647
whimper	wɪmpə	V	1513
whip	wɪp	N	c1325
whisper	wɪspə	V	c950
whist	wɪst	N	1579
whistle	wɪsl	N	c950
whit	wɪt	N	a1450
whither	wɪðə	ADV	9..
whitlow	wɪtləʊ	N	a1400
whittle	wɪtl	V	1530
whiz	wɪz	V	a1547
whoop	wu : p	N	1602
whoosh	wʊʃ	N	1856
wick	wɪk	N	c1000
widgeon	wɪdʒən	N	1508
widow	wɪdəʊ	N	c825
wield	wi : ld	V	c888
wiggle	wɪgl	V	c1225
will	wɪl	V	c825
willow	wɪləʊ	N	a750
wilt	wɪlt	V	1691
wimple	wɪmpl	N	a1100

win	wɪn	V	c888
winch	wɪntʃ	N	c1050
wind	wɪnd	N	c725
windlass	wɪndləs	N	c1400
wink	wɪŋk	V	c897
winkle	wɪŋkl	N	1585
winnow	wɪnəʊ	V	a900
winter	wɪntə	N	835
wish	wɪʃ	V	c897
wisp	wɪsp	N	13..
wit	wɪt	V	c888
witch	wɪtʃ	N	c890
with	wɪð	PREP	c888
with	wɪθ	N	c1000
wither	wɪðə	V	c1000
withers	wɪðəz	N	1541
withy	wɪðɪ	N	956
witness	wɪtnɪs	N	c950
wizen	wɪzn	V	c890
wolf	wʊlf	N	c725
woman	wʊmən	N	OE
womb	wu : m	N	OE
woo	wu :	V	a1050
wood	wʊd	N	OE
woof	wu : f	N	c725
wool	wʊl	N	c725
worsted	wɒstɪd	N	1293
would	wʊd	V	c825
wound	wu : nd	N	c900
ye	ji :	PRON	OE
ye	ji :	ART	OE
year	jɪə	N	OE
yeast	ji : st	N	c1000
yew	ju :	N	c725
yield	ji : ld	V	c893
you	ju :	PRON	OE
youth	ju : θ	N	c897
yule	ju : l	N	726

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