

# Quantity-to-Quality Contrast Shift and Phonemic Merger in Wisconsin Walloon High Front Vowels

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## 1. Introduction

This paper discusses the shift from a length to a tenseness contrast among high vowels in the Wisconsin variety of Walloon, a Romance language originating in southern Belgium, and its role in the reduction of the Wisconsin Walloon phonemic inventory. We provide evidence from tokens of high front vowels extracted from a corpus of native speaker recordings, and discuss some implications for heritage language phonology and sound change theory.

### *1.1. Walloon in Wisconsin*

Walloon is a threatened language with as few as 300,000 speakers in Belgium (Simons & Fennig 2018). Between 1853 and 1857, many Belgian families seeking farmland immigrated to the United States. The average size of family farms in Belgium had been steadily shrinking, due in part to the growth of industrial farming and its increased reliance on large farming machinery instead of manual labor (Tinkler 2013). Immigrants from the Namur region, shown in Figure 1, settled in Wisconsin's southern Door Peninsula, shown in Figure 2. Due in part to their geographic isolation, the community developed a "close-knit, cohesive, nearly self-sufficient ethnic island, maintaining their religion, language, and customs for many generations" (Tinkler 2013).

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Figure 1: Belgium, with Namur highlighted

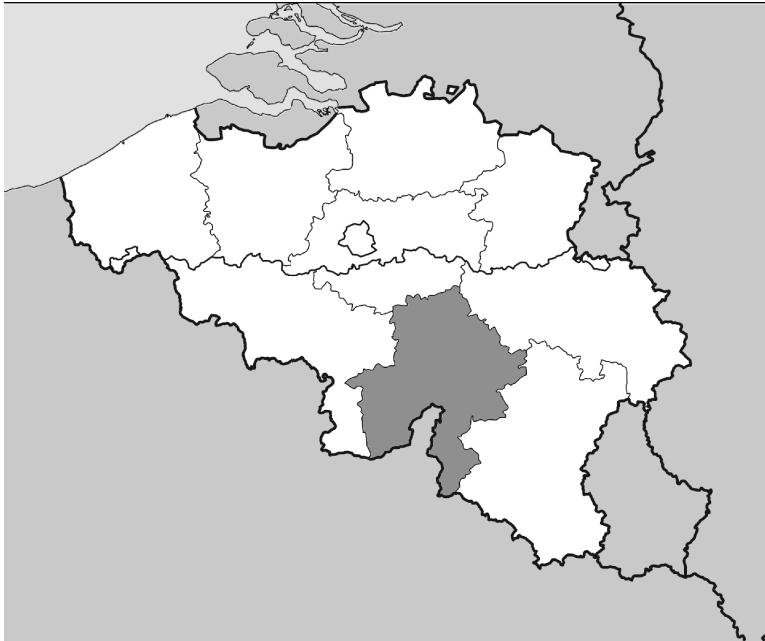
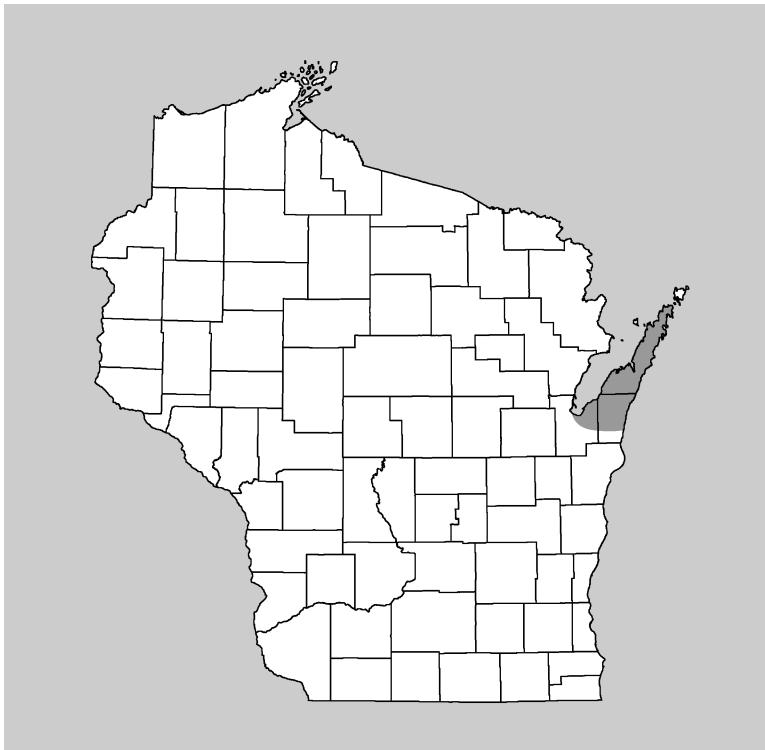


Figure 2: Wisconsin, with Door Peninsula highlighted



Today, Walloon continues to be spoken in limited contexts in a few communities in the southern Door Peninsula, although the exact number of fluent speakers is unknown. There are fewer than 100 first-language speakers, and perhaps fewer than 50. First-language speakers interviewed for this project were born between 1922 and 1941. These speakers generally acquired English when they began attending school, around the age of 5. Many of this generation’s children are heritage speakers, with varying degrees of fluency in Walloon and a preference for English in their daily lives. The Walloon spoken in Wisconsin is still mutually intelligible with Namurois Walloon, although Belgian and American speakers alike recognize lexical and phonetic dialectal differences. The common perception among both groups is that it is the Belgian varieties of Walloon that are undergoing the most change (by way of assimilation to French) and that Wisconsin Walloon is a relatively unchanged, ‘preserved’ variety. In this paper, however, we discuss two changes in the vowel system that appear to be unique to the Wisconsin variety: a shift from a contrast in length among high front vowels to one of tenseness, and the merger of two of these phonemes.

### 1.2. Phonologization and sound change

The relationship between vowel tenseness and length is well documented (c.f. Chomsky & Halle 1968, Labov 1994, Iosad 2017, Lindsey 1990, Maddieson 1984, McMahon 1991). In many languages, vowels that surface as long are predictably tense, and vowels that surface as short are predictably lax, giving rise to a surface-level ambiguity as to whether the contrast is primarily one of length, with tenseness as the redundant/enhancing phonetic correlate, or vice versa. Although the validity of tenseness as a distinctive feature is debated (c.f. Durand 2005, Halle 1977, Lass 1976), it has been argued to be a necessary component of phonemic inventories for at least some languages (c.f. Lindsey 1990, McMahon 1991), and we will argue the same for Wisconsin Walloon. Specifically, we argue that tenseness, originally a phonetic correlate of length, has phonologized and is replacing length as the primary contrastive feature. We will then briefly consider the implications for larger discussions of patterns of sound change.

## 2. Walloon Phonology

Before describing our own observations of Wisconsin Walloon vowels, we will briefly summarize some previous studies of Belgian and Wisconsin Walloon (BW and WW). As a *langue d’oil* variety, the Walloon phonemic inventory is generally quite similar to the French one. Of particular note in the vowel inventory is the presence of the front rounded vowels /y/, /ø/, and /œ/ that contrast with their unrounded counterparts /i/, /e/, and /ɛ/. Belgian Walloon, unlike modern Hexagonal French, also exhibits contrastive length among some vowels, depending on the dialect. In Namurois Walloon, length is contrastive among the high vowels /i/, /y/, and /u/ (Hendschel 2012). For the purposes of this paper, the front high vowels are most relevant.

Figure 3: Contrastive vowel length in Walloon

Walloon Short Vowels	English	Walloon Long Vowels	English
[jyt] ‘yute’	‘over’	[jy:t] ‘yût’	‘eight’
[li] ‘li’	‘the,’ ‘read’ (PP)	[li:] ‘lî’	‘to read’

All short high vowels have a lax variant, such that [jyt] is often pronounced [jvt] and [li] is often pronounced [li]. Long vowels, however, are always tense. Long vowels are indicated in the orthography by a circumflex accent. The short /i/, in Namurois and most dialects of Walloon, is subject to elision when the syllabification allows it, akin to the schwa in French, such that it would be pronounced in a sequence such as *ène pitite* ([ɛn.pi.tit], ‘a little one’) but not *li pitit* ([lip.tit], ‘the little one’). Hendschel (2012) provides an overview of the complexities of the elision process, but we limit our discussion of it here to highlighting the fact that /i/ is unique among the high vowels in its ability to be reduced.

High vowels are also consistently long before voiced consonants, which Hendschel attributes to a lengthening effect (2012).

Figure 4: Vowel lengthening

Walloon	IPA	English
eglijhe	[egli:ʒ]	‘church’
Lidje	[li:dʒ]	‘Liège’
uzance	[y:zâs]	‘usage’

Hendschel (2012) does not discuss whether this lengthening is phonetic or phonological in nature, though we will argue for a phonological interpretation since length is phonemic in Belgian Walloon and since the lengthening process here will be shown to be mirrored in Wisconsin Walloon through a different phonological process. We also point out here that, like in Hexagonal French, tonic stress in BW is phrase-final, so the lengthening we see in words like *uzance* would not be related to stress-induced lengthening. This lengthening effect leads to an opaque interaction with word-final consonant devoicing. Devoicing can be observed independent of lengthening, for example, in the lexeme ‘red’:

Figure 5: Word-final consonant devoicing

Walloon	IPA	English
rodje	[rɔtʃ]	‘red’
rodji	[rɔdʒi]	‘to redder’

Devoicing often applies variably, and when applied to consonants following a high vowel, creates a counter-bleeding interaction. So, the word ‘church’ may surface as either [egli:ʒ], with the high vowel predictably lengthened before the voiced consonant, or as [egli:j]. The latter form is unexpected since the underlying high vowel is short and would not be expected to lengthen before a voiceless consonant. Evidence for a similar interaction will be shown to be present in our Wisconsin Walloon data.

Although the majority of the Wisconsin Walloon population is descended from speakers of the Namur region of Wallonia, it is fairly certain that this is not the case for the entire population. It is therefore important to highlight the amount of variation between dialects of Walloon as well as within the Namurois dialect concerning the aforementioned features of the Walloon vowel system. Vowel length, for example, is not contrastive in the same way across dialects. For instance it is only in central Walloon dialects that the length contrast among high vowels can be found. By contrast, some southern Walloon varieties exhibit a contrast between /a/ and /a:/ (such as in /pas/ ‘pass’ vs. /pa:s/ ‘pasta’), whereas central Walloon varieties make a quality contrast between /a/ and /ɔ/ (i.e. /pas/ vs. /pɔs/). Vowels that do not contrast in length may appear variably long or short, so a word such as ‘strong’ may be pronounced in Namurois Walloon as either [fwar] or [fwa:r].

Finally, it is important to note that although short /i/ and /y/ may sometimes surface as [ɪ] and [ʏ] respectively in Namurois Walloon, the lax variants are neutralized in some neighboring varieties to the north. We can do no more than speculate whether these sorts of variation were present in the language spoken by Belgian immigrants to Wisconsin in the 1850s, but the data we present in this paper suggest that it is a strong possibility.

## 2.1. Wisconsin Walloon Phonology

The only documented linguistic study of Wisconsin Walloon previous to our work is a 1982 Master’s thesis by Eric Colet which details various aspects of the language’s phonology, morphology, lexicon, and syntax. The focus is largely on a comparison with modern Namurois Walloon, and the general finding is that the two varieties differ only slightly. The most detailed discussions are of those features that do differ, and in the case of the language’s phonology, one of those features is the high

vowel system. Based on an impressionistic analysis of his data, Colet reports an ongoing reduction of the Wisconsin Walloon phonemic inventory, in which short /y/ is usually, but not categorically, replaced by short /i/.

Figure 6: Phonemic merger of /y/ and /i/ (adapted from Colet 1982)

Word	BE Walloon	WI Walloon	English
<i>âdjourdu</i>	/odʒurdy/	[odʒurdi]	‘today’
<i>suk</i>	/syk/	[sik]	‘sugar’

This merger leaves a three-way phonemic distinction among /y:/, /i:/, and /i/. Vowel length is discussed no further in the thesis, though it is frequently indicated in transcriptions. We do not know to what extent, if any, vowel length is variable, but Colet does mention in multiple instances the general presence of variation between speakers. Firstly, there are speakers who more closely resemble the more central Namurois Walloon, and others who more closely resemble the more northern variety, aligning with their immigration histories (26).

Colet makes no mention of vowel laxing, and consistently transcribes all short /i/ vowels as /i/. In our own data, verifying vowel frequencies in PRAAT, these vowels are nearly consistently laxed. Similarly, we examined a 1983 recording that accompanies a pronunciation manual written by Josephine Wautlet (1983), and used PRAAT to verify that this vowel is consistently laxed here as well. Given this, and the description of frequent vowel laxing in Namurois Walloon by Hendschel (2012), we surmise that vowel laxing was probably already frequent in both Namurois and Wisconsin Walloon.

### 3. Methods and Data

The corpus of available Wisconsin Walloon speech data is comprised of 12.5 hours of informal conversations, and 14 hours of individual elicitation sessions with native speakers. Seven women and seven men were recorded. Audio recordings were collected in 2017, with speakers wearing condenser headset microphones (either Shure SM35 or Nady HM-10) and recorded using a Zoom H4N portable digital recorder.

For the current analysis, data were pulled from elicitation sessions with participants Theresa and Arlene, as well as from informal conversations with participants Margaret and Ervin. Vowel length, F1, and F2 for high vowel tokens were measured using Praat. Current analysis is based on 149 manually extracted tokens of high vowels, which were coded for their corresponding Belgian Walloon equivalents: /i/, /i:/, /y/, and /y:/. A token that surfaces as [ɪ], for example, would be coded as /i/ when it corresponds to the BW short high front unrounded phoneme. Without exception, vowels that correspond to the BW phonemes /i:/ and /y:/ surface as [i] and [y], respectively, but with varying lengths. Vowels that correspond to the BW phonemes /i/ and /y/ consistently surface as [ɪ] or in a few cases a more centralized variant, and again with varying lengths. Established length contrasts in Belgian Walloon were used to organize statistical comparisons because the role of length in WI Walloon is central to the current analysis. The distribution and lengths of tokens are shown in Figure 7.

Figure 7: Distribution and lengths of WW vowels by corresponding BW phoneme

BW phonemes	WW equivalents	Avg. Length (ms)	Min. Length	Max. Length
i:	54	117	61	224
i	46	83	26	177
y:	25	126	54	235
y	23	90	25	203

One-way ANOVA tests showed statistically significant differences between length measurements in tokens coded as /i/ and /i:/ ( $p < .001$ ), and /y/ and /y:/ ( $p = .009$ ).

To determine the role of phonological context in length variation, instances of high front vowels in prosodic phrase-final position were also analyzed against high front vowels that appeared elsewhere.

Figure 8: Comparison of high vowels in Belgian and Wisconsin Walloon

Prosodic context	Count	Avg. Length (ms)
Prosodic Phrase-final	54	129
Prosodic Phrase Non-final	46	83

A one-way ANOVA confirmed that long vowels in prosodic phrase-final position were overall significantly longer ( $p < .001$ ). Importantly, this appears to be a reliable contextually-dependent account of length variation that does not require length to be interpreted at the phonemic level, the implications of which will be discussed in subsequent sections.

#### 4. Phonological Changes in Walloon

Colet (1982) claimed that, at the time of his study, the four-way phonemic contrast among high front short and long vowels was undergoing a reduction such that the short vowels were merging into one phoneme (/i/). Our findings generally support this, but we find evidence in our data that the reduction also coincides with a shift from a quantity to a quality contrast. That is, we find evidence that the high vowels contrast not by length but by tenseness. Long and short high front vowels in BE Walloon systematically correspond to tense and lax vowels in WI Walloon. The vowel merger reported by Colet holds, except that the merged vowel is usually /i/ (or a more centralized variant), not /i/. A comparison of the two systems is given in Figure 9.

Figure 9: Comparison of high vowels in Belgian and Wisconsin Walloon

Word	BE Walloon	WI Walloon	English
padrî	/padri:/	/padri/	‘behind’
pitit	/p(i)ti/	/p(i)ti/	‘small’
bûre	/by:r/	/byr/	‘butter’
uch	/yʃ/	/ɪʃ/	‘door’

While BW long and short vowels consistently correspond to tense and lax vowels respectively in WW, the contrastive role of vowel duration is much less clear. Although we find that tense vowels in WW are longer than the lax ones on the whole, we also find a great deal of overlap in the ranges of duration for each vowel (see Figure 7). Since in BW phonological length was already associated with both duration and tenseness (Hendschel 2012), it is not surprising that duration and tenseness still correlate. Simply, we argue that a process of transphonologization has occurred, whereby the primary phonemic contrast lies in tenseness, with vowel duration acting as an enhancing feature.

Indeed, vowel duration can be influenced by other factors, such as stress. Since stress is placed prosodic phrase-finally in Walloon, we expect prosodic phrase-final vowels to be longer. As shown in Figure 8, this is indeed the case for all high vowels, which allows for the wide range of variation in duration reported earlier. Furthermore, given the status of /i/ as the elidable vowel, it is not surprising that it is more likely to surface as a short vowel than /i/ since it is generally more prone to reduction. This doesn’t change the fact, however, that /i/ also surfaces just as long as some of the longest tense vowels.

##### 4.1. Phonological Processes in Wisconsin Walloon

Earlier we described a vowel lengthening effect in Belgian Walloon, where short vowels are lengthened before voiced consonants. We find evidence for a similar effect in Wisconsin Walloon,

except that in this case, vowels that would be expected to be lax are tense when preceding voiced consonants, as in the examples in Figure 10.

Figure 10: Vowel tensing

Walloon	IPA	English
Dimegne	[dimeɲ]	‘Sunday’
dire	[dir]	‘to say’
ayir	[ajir]	‘yesterday’
å gurnî	[ogyrni]	‘in the attic’

We take this to mean that the lengthening process in Belgian Walloon described in Hendschel (2012) is indeed a phonological one. If Wisconsin Walloon speakers reinterpreted the [long] feature as [tense] in their phonological representation of the high vowels, and instead of a vowel lengthening rule they apply a vowel tensing rule, then we assume that the WW speakers interpreted vowel lengthening as a phonological and not a phonetic process. We also see a parallel counter-bleeding interaction with word-final devoicing.

Figure 11: Counter-bleeding interaction between vowel tensing and word-final consonant devoicing

Walloon	IPA	English
eglijhe	[eglijʃ]	‘church’
shijh	[ʃij]	‘six’
live	[lif]	‘book’

In each of the examples in Figure 11, the final underlying voiced consonant is devoiced, but the preceding vowel remains tense. If the final consonant were voiceless in the underlying form, we would expect the preceding high vowel to be lax. The vowel tensing effect does not, however, appear to apply categorically, as we have found counter-examples in our data.

Figure 12: Counter-examples to vowel tensing rule

Walloon	IPA	English
famile	[famil]	‘family’
ivjer	[ivjar]	‘winter’

In these cases, we would expect to see tense vowels if the rule applied categorically. It is not currently clear whether these are simply lexicalized exceptions to a rule, or whether the rule simply applies variably, or perhaps in redefined contexts.

## 5. Implications and Future Research

This analysis has provided evidence that the Wisconsin dialect Walloon is undergoing a shift in which contrast among high front rounded vowels is marked primarily by tenseness rather than length, as in Belgian Walloon. We argue that while vocalic duration still correlates with tenseness, it simply acts to enhance the contrast between tense and lax vowels.

The cause of this shift is a question that requires further exploration, but we suggest some preliminary explanation. First, as Iosad (2017) notes in his analysis of Welsh, many languages contain cases of “mutually predictable distribution” (2017: 123) such that there is a phonemic contrast between two sets of vowels, one set being both tense and long and the other being both short and lax, as we see in contemporary Belgian Walloon. This redundancy can very well stem from one phonological feature

that is enhanced by a phonetic one (say, phonological length enhanced by phonetic tenseness), but the surface-level redundancy requires the language learner to interpret (or re-interpret) of one of these features as the primary phonological feature. That interpretation may be influenced by various categorical observations of distribution as well as functional pressures to create and maintain contrasts. As an extension, we might therefore suppose that bilingual speakers have an additional incentive to make such interpretations in alignment with their phonological knowledge in their second language. Wisconsin Walloon speakers, observing a correlation between length and tenseness, might then have prioritized the interpretation of a tense/lax distinction among high vowels in Walloon since such a distinction already exists among high vowels in English.

Second, we can possibly draw parallels to other shifts from contrastive length to contrastive tenseness that have been argued elsewhere, such as in Standard Scottish English (McMahon 1991). In this case, the reinterpretation of contrastive length as tenseness involves the interaction of two different lengthening rules, applying to different but overlapping contexts at different historical times, and shifting the predictability of tenseness based on phonological length to a predictability of length based on tenseness, allowing for the latter to take over phonemic status. In a somewhat similar vein, while vowel length is phonemic in Belgian Walloon, it is also conditioned by both phonotactic and prosodic context. Importantly, stress-induced lengthening affects all vowels, including those that don't contrast in length (or tenseness), so the Wisconsin Walloon speakers may very well have come to view length as a purely predictable phenomenon, leaving tenseness to be the contrastive feature among high vowels. Furthermore, the variable and overlapping lengths would seem to present a difficulty for the task of categorizing phonemes, whereas the more discrete and consistent distribution of tenseness would lend itself more easily to interpreting phonemes. Though the boundary between what is phonetic and phonological is by no means clear-cut, especially as redundant features are concerned, the emergence of one such feature as more categorical and grammaticalized than the other would be a good indicator of a process of phonologization in progress, if not completed (cf. Hyman 2013).

Another remaining question is why the contrast has been preserved at all. Tenseness is a contrastive feature elsewhere, as in the mid front unrounded vowels. Furthermore, /y/, /i/ and /ɪ/ are highly frequent, and so the maintenance of contrast seems more likely. Bullock & Gerfen (2004a) argue that an allophonic shift that preserves rather than reduces the underlying phonemes may be accounted for in terms of convergence rather than attrition. Wisconsin Walloon's preservation of /ɪ/ in a word-final open syllable, a position in which [ɪ] never surfaces in English, may also be related to sociolinguistic identity, as in /r/ in Frenchville French (Bullock & Gerfen 2004b), although this needs to be tested in future studies of the vowel's distribution as well as its perception.

The role of language contact with English needs to be addressed in more detail in future analysis. Although, as previously mentioned, the analogy with English phonology is quite possible, it is also clear that the Wisconsin Walloon phonology has resisted assimilation in important ways, such as in the retention of laxness in /ɪ/ in word-final open syllables. Speakers instead appear to be exploiting variation that already existed in the L1. Future analysis will help determine whether Colet's 1982 assessment of phonemic length in WW as comparable to BW could instead be interpreted as early evidence of this emerging shift from quantity to quality.

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