On the representation of quasi-long vowels in Dutch and Limburgian

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0. Introduction

Standard Dutch has three vowels which are phonologically long but phonetically short. These are the high vowels [i], [y], and [u]. The fact that these vowels are phonetically short has hardly received any attention in the literature. In this paper I would like to show that shortness should be an essential ingredient of the phonological characterization of these vowels. On the other hand, however, the arguments that they are long are rather strong. Hence, length must be an essential part of their phonological characterization, too. This raises the question how to reconcile these conflicting pieces of evidence. Only one solution seems to be adequate. Adopting a proposal first made in Smith et al. (1989) I claim that the vowels [i], [y], [u] are located in a nucleus containing two positions on the X-line, the second of which is empty. Such a representation explains their ability to behave like a long vowel with respect to stress and syllable structure; the fact that the second slot is empty correctly characterizes these vowels as phonetically short. Furthermore, this representation also explains why with respect to certain phonological phenomena these vowels act as short.

1. Why [i], [y], [u] must be long

Two arguments show conclusively that [i], [y], [u] must somehow be represented as long. The first argument is based on syllable structure. It has been shown by various students of Standard Dutch phonology that the truly long vowels of Dutch, vz. [a], [e], [o], [ö] can only be followed by at most one consonant within the syllable (cf. Trommelen 1983, van der Hulst 1984, Kager and Zonneveld 1986, Trommelen and Zonneveld 1989). Contrary to this, the truly short vowels, which are [A], [E], [O], [Y], [I] can be followed by at most two consonants.[1] Some examples illustrating these regularities follow.[2]

[1] The non-low short vowels [E], [O], [I] are slightly lower than the corresponding long vowels e, o, I. To account for this we need a rule which inserts either [tense] or [ATR].

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(1)	long		short		
	raam	'window'	ramp	'disaster'	*raamp
	geen	'none'	help	'help	*heelp
	room	'cream'	romp	'trunk'	*roomp
	beul	'hangman'	tulp	'tulip'	*deunk
			wilg	'willow'	

In the examples on the left the long vowels are followed by one tautosyllabic consonant. In the second column the rime contains two consonants; since the vowel is short, these examples are in accordance with the requirements of Dutch syllable structure. In the rightmost column it is shown that long vowels cannot be followed by two tautosyllabic consonants.[3] Informally, this generalization can be described as follows: maximally three positions are allowed in the domain of the rime. The formal status of this statement is interesting in itself. In this paper, however, I will say nothing about this issue, since it does not bear directly on the topic we are discussing.

The vowels [i], [y] and [u] behave like the forms in the left-hand column in (1), i.e. they allow only one additional position in the rime. This is illustrated by the following examples:[4]

(2)	tien	'ten'	*tienk,	*tiemp,	etc.
	kluun	'stumble	*kluunk,	*kluump,	etc.
		'on ice'	*toenk,	*toemp,	etc.
	toen	'then'			

The fact that [i], [y] and [u] pattern with the long vowels with respect to syllable structure constitutes the first argument in favour of the hypothesis that they are phonologically long.

The second argument comes from the stress system. It has been observed that, normally, a final syllable with a VVC or VCC rime has word stress (cf. Kager 1989 for extensive discussion and an overview of the literature; see also Trommelen and Zonneveld 1989). These 'superheavy' syllables differ from final syllables with a VC rime, which normally do not have word stress. The

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2 The examples are writen in standard orthography. Long vowels are represented as a sequence of two short vowels. Orthographic *a, o, u, i, e* represent the short vowels [A], [O], [U], [I], [E].

3 t and s are allowed after the last consonant, even if all positions of the rime are occupied. One way of explaining the 'exceptional' behaviour of these segments is to allow for an appendix where t and s can be syllabified. This solution is proposed in van der Hulst (1984) and also Kager & Zonneveld (1986). For a similar analysis of the equivalent English facts see Borowsky (1987).

4 The orthographic symbols *ie, uu, oe* represent the quasi long-vowels [i], [y], [u].

contrast between VVC and VC is illustrated in (3); data are drawn from van der Hulst (1984). Stressed vowels are written in boldface.

(3)	VVC		VC	
	sig**aa**r	'cigar'	h**a**rnas	'armour'
	matr**oo**s	'sailor'	h**e**rtog	'duke'
	juw**ee**l	'jewel'	m**o**slim	'Muslim'
	terr**eu**r	'terror'	c**u**rsus	'course'

Now consider the following data:

(4)	pan**ie**k	'panic'	lim**ie**t	'limit'
	deb**uu**t	'debut'	kost**uu**m	'costume'
	kalk**oe**n	'turkey'	citr**oe**n	'lemon'

These facts demonstrate that [i], [y] and [u] pattern with long vowels. Again this is strong evidence that these vowels should be treated as phonogically long.

Long vowels are represented as feature complexes linked to two X-slots dominated by the nucleus. This representation, however, turns out to be not without problems. Certain facts of the tonal phonology of Limburgian dialects suggest that the vowels [i], [y] and [u] should be treated as short. A sketch of the main facts is given in the next section.

2. *Basic facts of Limburgian tonology*

Many dialects spoken in the province of Limburg have a contrast between a falling tone and a concave (falling-rising) tone. Examples illustrating the contrastive function of these tones are given below.[5] Data are drawn from the dialect of Maasbracht, a village in the centre of the Dutch part of Limburg. This dialect is my mother tongue.

(5)	falling tone		concave tone	
	reet	'reed'	reet	'crevice'
	böök	'books'	böök	'beech'
	kaak	'jaw'	maak[6]	'make'

[5] In this paper I will only discuss monosyllabic forms. Although the distribution of tones is unpredictable in longer forms, they are not essential to the discussion.

[6] There are no minimal pairs in which long *a* figures. This has nothing to do with some special properties of this vowel. It is due to mere chance.

If the first part of a vowel is underlined, it is realized with a falling tone; an exhaustively underlined long vowel is pronounced with the concave tone.[7]

Following common practice in autosegmental phonology I assume that contour tones are represented as a sequence of level tones (cf. Goldsmith 1976 and Yip 1989). If this proposal is correct, then the following structures seem adequate representations (H = high pitch; L = low pitch):

(6)	falling tone	concave tone
	HL	HLH

These representations contain a lot of redundancy. The HL part participates in the representation of both tones. Being redundant it can be left out of underlying representations. At this level tonal structures are as follows:

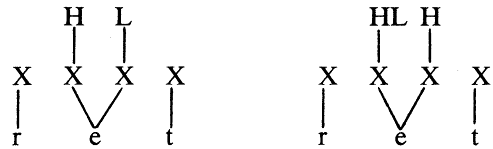
(7)	falling tone	concave tone
	--	H

I assume that the obligatory high tone which starts both tonal sequences is a so-called 'pitch accent'. This is a high tone which necessarily accompanies a foot. It is the tonal equivalent of a marker on the grid in tree-cum-grid or bracketed grid theories. According to this view a high tone is generated every time a foot is constructed. This tone is located in the head position of a syllable, just like a grid marker in the theory proposed in Kager (1991). The second tone (L) is also predictable. In the case of the falling tone it is inserted by a default rule filling in an empty tonal position if no other tone is available. Together, the construction of a foot (which I neglect in this paper) and the insertion of the default tone yield HL, the correct representation of the falling tone. In the case of the concave tone, the contrastive tone associates to the tonal position that remains free after the construction of the foot. In this way a sequence of two consecutive H tones is derived; the first H is generated at the instigation of foot construction; the second H is the associated contrastive H. This is a violation of the OCP, according to which two adjacent identical elements are forbidden (cf. McCarthy 1986). In order to save the intermediate ill-formed representation a low tone is automatically

7 Concerning the transcription of the Limburgian forms I have tried to stay as close to standard Dutch orthography as possible. The long front rounded vowel, however, which in the orthographical system is spelled as *eu*, I have represented as *öö*.

inserted to separate the two high tones.[8] Examples of the resulting representations are given in (8).

(8)



The floating low tone generated by the OCP must be saved on the grounds of 'Prosodic Licensing' proposed by Ito (1986). In Limburgian, at least in the Maasbracht variant, it is impossible to link two tones to one tone bearing unit. Therefore, a new X-slot must be inserted, which is filled by the surrounding vowel. In this way a concave tone surfaces. Notice that this analysis predicts that the concave tone is realized on an overlong vowel. This is indeed correct, at least in the dialect of Maasbracht. There is some evidence that in the dialect of Maastricht there is no overlength. It has been noted, however, in de Bot, Cox and Weltens (1990) that in this dialect the tone which contrasts with the falling tone is not concave. It is realized as a simple high tone. This suggests that in the Maastricht dialect the OCP triggers fusion, rather than insertion of a low tone.

One of the main characteristics of Limburgian tonology is the fact that the two tones can only contrast if certain conditions concerning the structure of syllables are satisfied. First of all, a tonal contrast is only possible in a syllable with minimally two sonorant segments. The following sequences, therefore, allow the contrast:

(9) VV = long vowel, or diphtong
VS = short vowel + any sonorant consonant

Below I illustrate the fact that the second sequence in (9) allows for a tonal contrast (for an illustration of the first sequence cf. (5)). In (10) it is also demonstrated that one sonorant is not sufficient to allow for a tonal contrast.

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[8] Normally it is assumed that the OCP results in fusion (cf. for instance Borowsky 1987, Avery & Rice 1989). There is some independent evidence that fusion is not operative in Maasbracht Limburgian. Under certain conditions a cluster of dental consonants change into a dental followed by a palatal. For instance, lt and nt change into lt', nt'. On the precondition that Maasbracht Limburgian does not have fusion, this palatalization process can be seen as an attempt to adapt a representation which is ill-formed with respect to the OCP. Two segments which are identical on the place node are changed into two non-identical segments.

(10) tonal contrast is possible

kal	'to talk'	kal	'nonsense'
ter	'tar'	mer	'but'
kan	'jug'	kan	'can' (verb)
dam	'dike'	damp	'vapour'

tonal contrast is not possible

bak	'tray'	---
stek	'stick'	
hok	'cage'	
buk	'to stoop'	
stik	'to stitch'	

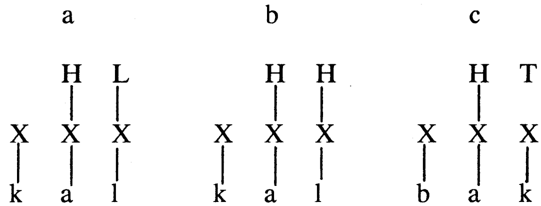
The second important regularity is that the two sonorants must be arranged in the following way: the first sonorant must be located in the head of the nucleus and the second sonorant consonant must immediately follow that position. A sonorant in the 'onset', the prevocalic position, is irrelevant for tone, as shown in (11).

(11) tonal contrast is not possible

mik	'to aim'
nak	'neck'
lek	'to lick'
rok	'skirt'

To explain the first regularity we have to claim that only [+sonorant] segments are capable of carrying tone. In this respect Limburgian is identical to a language like Thai. We then can rely on an aspect of Limburgian tonology that we have already seen before; it is impossible to link two tones to one tone bearing unit. Recall that this property explains why the concave tone is realized with an overlong vowel. The analysis now runs as follows: the first sonorant must receive a high tone because this tone is required by the accompanying foot. This high tone precludes the presence of any other tone, because one and only one tone can be linked to one tone bearing unit. Consequently, a contrastive tone can only find room for its realization if there is a second sonorant segment to which it can be associated. I illustrate this line of reasoning with the examples *kal* and *bak*.

(12)

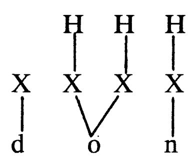


The second sonorant in example (12a) is filled by the rule inserting the default tone. In example (12b) the second tonal position is filled by association. Then the two high tones are separated by a low tone, which yields an overlong vowel with a concave tone, as shown before. In example (12c) the first tonal position is occupied by the pitch accent which must accompany the metrical foot. As a result of this the second tone (abbreviated as T in (12c)) cannot link to that position. Therefore it must be removed by Ito's principle of Prosodic Licensing. This explains why syllables with only one sonorant do not allow a tonal contrast.

The second regularity can be explained if we assume that only segments in the nucleus are capable of carrying tone. In this respect Limburgian also patterns with Thai. Neither in this language can onset consonants carry tone. The fact that sonorants in non-head position cannot carry tone explains why a word like mik in (11) does not allow tonal contrast. It follows from the fact that there is one and only one sonorant segment in the nucleus.

This analysis makes an interesting prediction. A sonorant in coda position will not be able to carry tone either, because it is not dominated by the nucleus. We thus predict that a sonorant segment following a long vowel cannot carry a contrastive tone. This prediction is indeed correct. Words with three sonorants in the rime do not have a richer tonal inventory than the words with two sonorants in rime position. To illustrate why the third sonorant cannot add to the tonal capacity of a syllable, I give the representation of the verb *doon* ('to do', which is realized with a concave tone). Suppose we would add an extra tone to the underlying representation of this word. After association we arrive at the following representation:

(13)



The third tone cannot associate to the third sonorant, because this segment is located in non-head position. Therefore, it can only link to the second sonorant. However, this sonorant is already occupied by the first contrastive tone. Since the third tone cannot associate, it must be removed. The resulting representation is identical to the structure we get on the basis of a monotonal underlying representation. This shows that our prediction is correct; the third sonorant segment does not add to the tonal capacity of a syllable.

After this sketch of the basic facts of Limburgian tonology, we can turn to the central question of this paper. What is the proper representation of the vowels [i], [y] and [u]? Let us see how they relate to the facts of Limburgian tone.

3. The tonal behaviour of [i], [y], [u]

The most striking aspect of the vowels we are discussing is the fact that they do not allow a tonal contrast. Consider the following words:

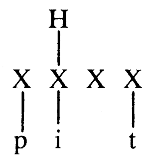
(14)	piek	'peak'	truus	'proper name'
	piet	'proper name'	stoep	'footway'

Tonally, these forms behave like the second set of examples in (10), which indicates that there is only one sonorant in the domain of the syllable head.

To account for this fact one might think of representing these vowels as being linked to only one X-slot, the formal representation of short vowels. Although this would explain the tonal facts we have seen so far, this analysis cannot be maintained when we look at the facts of stress and syllabification. In Limburgian both syllable structure and the distribution of stress are exactly identical to standard Dutch. With respect to the vowels [i], [y], [u] we see that they can be followed by at most one consonant in the rime. The forms in (2) can illustrate this, because these items are also words of the Maasbracht dialect. As far as stress is concerned we witness the same thing as in Dutch; the vowels [i], [y], [u] are normally stressed when followed by a consonant. This can be illustrated by the forms in (3) and (4), which are also words of the Maasbracht dialect. We thus conclude that the vowels [i], [y], [u] cannot be represented as short.

Only one representation can explain why these vowels behave as long for stress and syllable structure, although they seem to be short for tone. First of all we have to assume that [i], [y], [u] are located in a nucleus with two X-slots. The branching structure of the nucleus entails that the syllable behaves as heavy with respect to stress. It also explains why one and only one consonant is allowed after these vowels. Secondly, we have to assume that the second X-slot in the domain of the nucleus is empty. Being empty it is not a sonorant segment. Hence, it cannot qualify as a tone bearing unit. Therefore, one and only one tonal position is available. Since this position must be occupied by the pitch accent, a tonal contrast is ruled out in the domain of these vowels. Below I give the structure of *piet* after the application of foot construction and the subsequent insertion of the pitch accent.

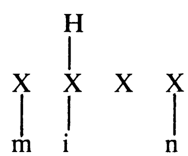
(15)



Notice that this representation immediately accounts for the phonetic shortness of these vowels. Since the feature matrix is linked to only one X-slot, it is realized as short. This follows from the fact that the X-slots are the major factor determining phonetic length, one of the premisses of X-slot theory.

Recall that a sonorant in non-head position cannot bear tone. This is true for 'onset sonorants' as well as 'coda sonorants'. It explains why only the sonorants in the nucleus can add to the tonal capacity of a syllable. We now are committed to the following prediction. If it is true that sonorants in coda position cannot bear tone, and if it furthermore is true that the vowels [i], [y], [u] are structurally long with a second empty slot in nucleus position, then we predict that a sonorant consonant after these vowels cannot add to the tonal capacity of the syllable. Stated differently, even if the vowels [i], [y], [u] are followed by a sonorant consonant, they cannot carry a distinctive tone. To see this consider the structure of a word like *mien* 'proper name'.

(16)



The first X-slot is located in onset position. Hence, no tone may be linked to it. The second slot is the first segment of the nucleus. This segment, however, must be occupied by the pitch accent high tone, which must be there to realize the metrical foot in a pitch accent language. The third X-slot of the nucleus is empty, so it is impossible to link a tone to it; it is not a sonorant segment. Finally, the fourth sonorant segment is located outside the nucleus, so again, no tone can be associated to it. In sum, [i], [y], [u] are incapable of carrying a tonal contrast, even if they are followed by a sonorant segment. Is this prediction correct? In the following examples I have underlined the segments which are realized as high. Recall that the symbols *ie, uu, oe* represent [i], [y], [u] respectively.[9]

[9] While studying the examples one might wonder why the *r* is missing in postvocalic position. This is a consequence of the fact that, before *r*, vowels are heavily lengthened, in much the same way as in standard Dutch. As a result of this, a vowel can always carry contrastive tone before r, even the vowels *i, y* and *u*.

(17)	mien	'pr. name'	buun	'stage'
	tien	" "	buul	'sack'
	wiel	" "	z'uul	'pr. name'
	giel	" "	fuum	'to smoke'
	zoen	'kiss'		
	poen	'money'		
	roel	'pr. name'		
	boem	'bang'		

The examples show that the prediction is indeed borne out. None of the forms above carries the concave tone. They are representative instantiations of a perfectly regular generalization; in Limburgian the vowels [i], [y] and [u] cannot carry contrastive tone, not even if they are followed by a sonorant consonant. Phonetically these forms are realized with a falling tone. This is caused by the phonetic low tone of the sonorant in coda position.

One might suppose that the functional yield of the tonal contrast on sonorant consonants is marginal. One might interpret this fact as the basis for some alternative explanation. This, however, is not a possible solution. The number of words with a concave tone on a sonorant consonant is too great to be considered marginal. Some additional examples are given below:

(18)	man	'man'	vol	'full'
	den	'then'	kom	'come' (imp.)
	vel	'skin'	mer	'but'

We have to assume, then, that the reason why [i], [y], [u] do not allow contrastive tone, not even if they are followed by a tautosyllabic consonant, must be of an entirely different nature. The explanation I have proposed is in terms of syllable structure. It is claimed that these vowels occupy two positions in the nucleus, and that the second slot has no feature matrix.

There is some additional evidence for this hypothesis. Frequently, it is assumed that maximally two X-slots may occur in the nucleus, at least in the lexical component. A restriction of this nature is needed in autosegmental theory in order to describe the fact that languages do not seem to have three-way length contrasts. In light of this hypothesis Limburgian turns out to be highly problematic. Apart from the vowels [i], [y], [u], which are phonetically short but structurally long, Limburgian, but not Dutch, has also phonetically long [i] [y], [u]. These vowels behave as truly long vowels. Apart from the fact that they are very long phonetically they also are structurally long, which means that they allow contrastive tone. In the examples below I have represented these vowels as [i:], [y:], [u:].

(19)	bi:	'bee'	bi:	'at'
	ri:	'ride'	hi:	'here'
	ky:	'cows'	ky:t	'calf'
	mu:	'sleeve'	nu:	'now'
	ru:	'rough' (fem.)	ru:	'rough' (masc.)

Taking the presence of truely long [i], [y], [u] into consideration, we have to admit that in Limburgian three vowel lengths contrast. We have already seen that [I] is the short counterpart of [i]. The fact that three degrees of length contrast in the high front unrounded vowel is strong evidence for the hypothesis we have developed in this paper: quasi-long vowels are to be represented as bi-positional at the level of the X-line, but as mono-positional at the segmental line, which means that the second slot in the domain of the nucleus must be empty. According to this analysis the three-way length contrast is represented in the following way:

(20)	short	quasi-long	truly long
	X	X X	X X
	i	i	i

In an analysis as summarized in (20) the universal restriction imposed on the number of segments in the domain of a nucleus can still be upheld. Even in Limburgian it is the case that a nucleus dominates no more than two X-slots at the level of lexical representation.

4. Conclusion

In this article I have argued that the quasi-long vowels of Dutch and Limburgian are to be represented in the following way: the nucleus in which they are located dominates two X-slots, the second of which is empty. This explains why they are able to act as long vowels, even though they are phonetically short. Additional support for this hypothesis comes from the area of Limburgian tonology. I have shown that the quasi-long vowels do not allow contrastive tones, not even if they are followed by a sonorant consonant in the same syllable. The representation I have proposed can readily explain this curious fact. Since the quasi-long vowels are strucurally long, i.e. contain two slots in the nucleus, the following sonorant consonant must be located outside the nucleus. In this position, however, a segment cannot be a tone bearing unit, which must be assumed independently. In the domain of the nucleus no contrast is possible either, because the second slot does not contain a sonorant. It therefore does not qualify as a tone bearing unit. A further argument is provided by the fact that there is at least one vowel which contrastively occurs in three degrees of length. The representation I have proposed can be embedded in a theory which claims that at the lexical level no nucleus shall ever dominate more than two X-slots.

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