Dutch a CV - Syllable Structure meets *Head-driven Phonology*: Exploring some alternatives

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1. Introduction

In this article, I present an analysis of certain aspects of syllable structure in Dutch monomorphemic words within the framework of Head-driven Phonology (HDP).[1] HDP is a development of Dependency Phonology (Anderson and Ewen 1987) and Government Phonology (Kaye, Lowenstamm and Vergnaud 1990); cf. van der Hulst and Ritter (1999, in prep.), van der Hulst (in prep. c). See van der Hulst (in prep. b) for an introduction to the overall approach and its prevailing variants.

The Dutch data under consideration are well-known and have been presented in such works as Trommelen (1983), van der Hulst (1984), Kager (1989), Kager and Zonneveld (1986), Zonneveld (1993), Booij (1995) and van Oostendorp (2000). Even though Dutch, like most Germanic languages, appears to have a complex syllabic organization that allows for tri-consonantal onsets, up to five-consonantal codas, and a distinction between long and short vowels, my analysis is based on the following syllabic template: (C(C)) V (C) (which is claimed to be the universal maximum).

A central puzzle, the focus of section 2, involves the alleged distinction between long and short vowels, which, I propose to analyze in terms of a tense/lax distinction: both types of vowels are short, but lax vowels require a following consonant, while tense vowels can only occur in open rhymes. I will propose that the basic mechanism for enforcing the distributional properties of vowels is 'subcategorization'. The fundamental question arises *why* lax vowels require a following consonant, while tense vowels do not. I will show how the tense/lax distinction is represented within variant of Government Phonology (e.g. Ritter 1997) and within 'Radical cv Phonology', RcvP (van der Hulst 1994ab, 1995, 1996, 1999, 2000, to appear, in prep.a), which is my theory of subsegmental structure within HDP.

Next, in section 3, I turn to so-called 'superheavy syllables'[2] consisting of a tense vowels followed by an apparent tautosyllabic consonant ($V_{Tense}C$), which leads us to investigate the fact that the occurrence of such 'syllables' is largely limited to word-final position. Since such $V_{Tense}C$ 'syllables' will be argued to be bisyllabic, the second syllable containing a silent empty nucleus, we

[1] This article is based on a larger work in progress that forms part of van der Hulst and Ritter (in prep.).

[2] I use quotation marks here, and elsewhere, when a term refers to a traditional analysis, while, strictly speaking, being inadequate within the analysis that is proposed here.

will need to establish how empty nuclei are licensed (such that they can be silent). I then discuss the absence of internal $V_{Tense}C$ 'syllables', for which I suggest an analysis. In section 4, I consider an alternative analysis for the absence of internal $V_{Tense}C$ 'syllables' that does not work. Section 5 fits the distribution of $V_{Lax}CC$ 'syllables' into the analysis, while section 6 addresses the representation of the vowel schwa, which, as I will show, cannot in all cases be seen as an unlicensed empty nucleus. Section 7 discusses two aspects to the proposed analysis for which viable alternatives exist within variants of the overall approach that is adopted here. In section 8, I offer my main conclusions and point to further areas of research.

2. Tense and lax vowels

2.1. The analysis of distributional differences

The vowel system of Dutch displays a distinction between two series of vowels which has received a number of different characterizations. Several studies qualify the distinction as one involving a length opposition, the representation of which varies depending on the framework that is adopted. Another property argued to be relevant has been called tenseness (laxness), sometimes said to be predictable from the long - short distinction and sometimes held responsible for it. In more traditional works the opposition is stated in terms of a distributional difference referred to as unchecked - checked. The key observation here is that the vowels called short, lax are distributionally restricted to occurring before consonants only.

The three sets in Modern Dutch are the following:

(1)

Short/Lax			Long/Tense			Diphthongs		
ɪ			i	ü	u	ɛy	œy	ɔw
ɛ	œ	ɔ	e	ø	o			
		ɑ			a			

In addition, [ɛ:, œ:, ɔ:] as well as [i:, ü:, u:] occur in a limited number of 'loan' words:

(2)

<serre>	s[ɛ:]rre	'porch'
<freule>	fr[œ:]le	(nobility title)
<rose>	r[ɔ:]se	'pink'
<analyse>	anal[i:]se	'analysis'
<centrifuge>	centrif[ü]ge	'centrifuge'
<rouge>	r[u:]ge	(kind of make-up)

Whereas all vowels can be stressed (if in the right metrical position), Dutch has one unstressable vowel, called schwa, usually transcirbed as [ə].

An appropriate representation of the opposition between tense and lax vowels must explain the following three facts:

(3) a. Lax vowels must be followed by a consonant; tense vowels may not be followed by a consonant, except word-finally
b. There are fewer lax vowels than tense vowels
c. Syllables with lax vowels count as heavy for stress

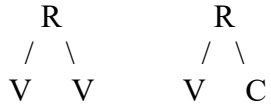
With respect to (3a) it has sometimes been argued that lax vowels are barred in word-final position only. That this is *not* so, can be shown by looking at *hiatus*. To the left of hiatus we do not find lax vowels, as was pointed out in van der Hulst (1984, 1985):

(4)	<chaos>	'chaos'	[χaɔs]
	<hiaat>	'hiatus'	[hiat]
	<video>	'video'	[video]

The vowels to the left of hiatus *must* be tense. Comparable strings in which the vowels to the left of hiatus would be [ɑ], [ɪ] or [ɛ] are not well-formed. Thus the constraint on lax vowels is not restricted to word-final position. It also follows that the occurrence of consonants after lax vowels is not a 'minimal word effect'. Not only does this idea rest on the mistaken claim that tense vowels are long, it is, in addition, simply wrong, given that lax vowels require a following consonant whenever they occur, and not just in monosyllabic words.[3]

To explain that lax vowels *must* be followed by a consonant, while tense vowels cannot it has been proposed that the rhyme in Dutch is minimally and maximally bipositional (Trommelen 1984, Kager & Zonneveld 1985):

(5)



In this 'bipositional rhyme' account tense vowels are represented as long. Phonemically, then, Dutch is said to have long and short vowels, the later being required to occur in a branching rhyme due to the bipositional rhyme constraint.

An account of this type fails to explain (3b) and (3c). The fact that the vowel contrast is neutralized toward the value tense suggests that laxness is marked. But the rhyme approach does not account for this, since no markedness distinction is made between long and short vowels. As for stress, I will not show here why tense vowels count as light (see van der Hulst 1984, Kager 1989, Zonneveld 1986, Zonneveld and Trommelen 1999). However, let us note the basic issue. It has long been assumed that *if* stress is sensitive to syllabic weight *and* the language has long vowels, long vowels will always be heavy (cf. Lahiri and Koreman 1987). In other words, weight of closed syllables implies weight of long vowels if both are present in the language. In Dutch, however, 'long' vowels count as light, whereas 'short' vowels are heavy, which suggests that syllable closure

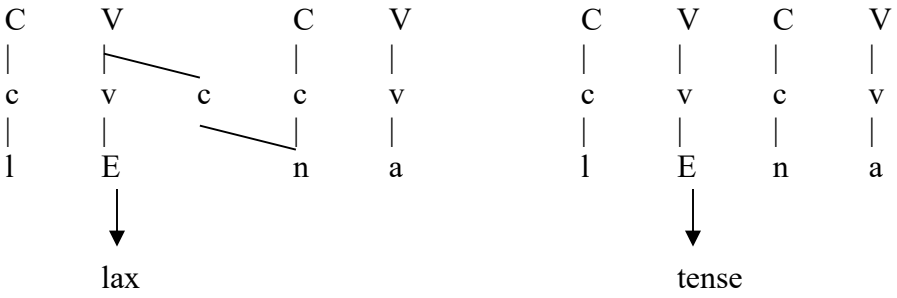
[3] There are a few interjections (*he, joh*) and loans (*schwa, chalet*) that have a lax vowel in word final position

is the relevant factor. Maintaining that tense vowels are long requires extra stipulations such as saying that they are long but monomoraic (cf. Lahiri and Koreman 1987) or that long vowels (forming branching nuclei) cannot be seen because the stress rule looks at the rhyme node. Both approaches simply deny the validity of the implicational weight relationship between long vowels and closed syllables, a price that I consider too high.

An additional argument against the tense=long hypothesis is that, as indicated in (2), Dutch has 'real' long vowels, both in the lax and in the tense system. One might argue that these vowels are 'marginal'. However, van Oostendorp (2000) makes this point more forcefully on the basis of an analysis of the Tilburg dialect of Dutch which (due to monophthongization of certain diphthongs) makes more rigorous use of long lax vowels.

In an attempt to deal with (3a) van der Hulst (1985) and van der Hulst & van Lit (1988) suggest that the paradox can be solved if we assume that Dutch has short vowels only, unspecified for tense or lax. To derive the contrast between lax and tense vowels it is suggested that vowels in open syllable become tense, while vowels in closed syllables become lax, due to a 'phonetic rule'. This analysis necessitates postulating underlying geminates for those cases in which the lax vowel is followed by a single consonant:[4]

(6) lax <Lenna> (proper name) [lɛna] tense <Lena> (proper name) [lena]



The geminate consonants are often referred to as being 'ambisyllabic'. Van der Hulst and Smith (1982) proposed that ambisyllabic consonants *are* geminates, predicting that no language has a contrast between them.[5] Indeed, Dutch does not have geminates independently from the tense/lax distinction. A necessary subtlety of this analysis is that, since certain tense vowels do not correspond to a lax counterpart (cf. 3b), the phonetic rule must neutralized the underlying contrast between high and mid non-front vowels.

The alternative I propose here is to locate the distinction directly in the vowels, not in terms of length, but in terms of a phonological characterization of the tense/lax distinction. Vennemann (1991) likewise proposes that this distinction must be recognized as a phonological primitive in its own right in German. The question is: what is the phonological characterization of this distinction? I propose to recognize the notion of 'subcategorization' (as suggested in van der Hulst 1981,

[4] My use of proper names here and elsewhere does not imply that these patterns are restricted to this type of word. The patterns discussed here are common throughout the entire lexicon.

[5] A similar proposal can be found in Borowski, Itô and Mester (1984). The claim that geminates and ambisyllabic consonants are not contrastive is made in Vogel (1977).

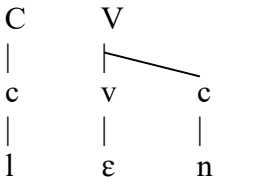
Anderson 2002). One might say that lax vowels are like intransitive verbs in that, like intransive verbs, they select a complement. Of course, tense vowels, given that they cannot occur in closed syllables, must also be provided with a subcategorization frame:

(7) lax vowels: [- C]$_{rhyme}$ tense vowels: [-]$_{rhyme}$

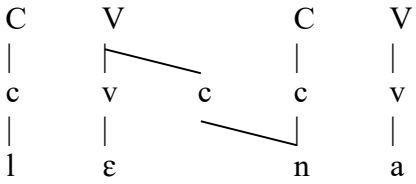
Perhaps it is reasonable to say that lax vowels are marked because they require a complement, thus providing a basis for (3a).

Appeal to the notion subcategorization suggests that lax vowels form a syllabic constituent (a rhyme) with the immediately following vowel. At first sight, this seems to entail that the subcategorization requirement of lax vowels overrules the idea of onset maximization (as is assumed in Trommelen 1984, who 'encodes' the subcategorization in adopting the proposal in 3). In terms of the theory of Government Phonology (Kaye, Lowenstamm & Vergnaud 1990, Kaye 1990), this analysis seems to entail that the subcategorization property overrules 'coda licensing' (the constraint that every coda consonant must be followed by a following onset that can 'govern' it.) Thus, the representation in (8a) results. An alternative, however, is that we maintain the idea that single consonants following lax vowels are geminates phonologically, as in (4), repeated here as (8b):

(8) a.

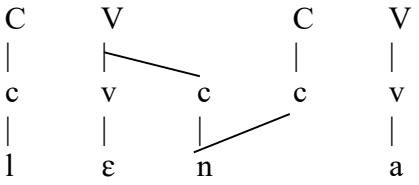


b.



An apparent problem with (8a) is that Dutch is one of those languages that has final devoicing. The position of the /n/ could be taken by a voiced stop: *rabbi, Bobbie*, etc. Geminate structures can be said to escape the final devoicing constraint due to the fact that the consonant is essentially initial, with the coda position just 'borrowing' the onset content.[6] However, Brockhaus (1995) shows that, within Government Phonology, 'final' devoicing applies to obstruents that precede an empty nucleus. This presupposes that these 'final' consonants are onsets rather than codas. It will turn out that this idea is compatible with the analysis proposed here. Hence, 'final devoicing' does not provide an argument against (8a). Another potential problem for (8a) is that, within RcvP, codas are restricted to sonorant consonants, while 'ambisyllabic consonants' can be (almost[7]) any consonant. The representation in (8b) does not have that drawback because in this case the coda position is essentially empty. Two conceivable alternatives to (8a) and (8b) are given in (9):

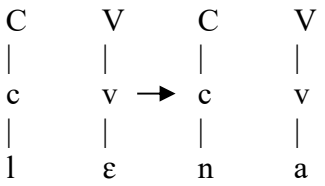
(9) a.



[6] Alternatively, one might invoke the Inalterability Constraint, proposed in Hayes (1986) to explain why geminates are immune to processes that apply to single consonants in otherwise identical environments.

[7] The segments /y/ and /w/ cannot be 'ambisyllabic', nor can /h/. I give no account for that here.

b.

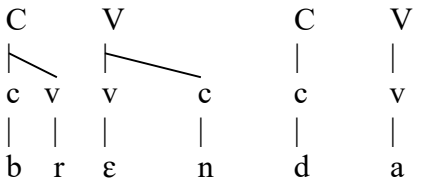


(9a), a variant of (8a) in a way, represents the geminate structures as left-headed, rather than right-headed. A drawback of this option is, however, that, like (8a), it also requires allowing any type of consonant in the coda position.[8] In (9b), we allow the consonant that fulfills the lax vowel requirement to be a following onset. It is not so clear, however, what the little arrow means except that the lax vowels wants a following consonant, irrespective of whether this consonant belong to the next syllable or forms a coda. More serious is that the structure in (9b) does not account for the fact that lax vowels are heavy for stress, at least less well then when lax vowels occur in closed syllables. Finally, (9b) does not seem to sit well with the notion of subcategorization since the lax vowel and the following consonant do not form a constituent in (9b).

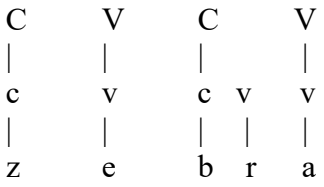
All things considered, it seems best to stick to the representation in (8b) for the moment, but I will return to this issue later and reconsider the usefulness of (8a), or (9a).

When a lax vowel is followed by a consonant cluster that is not a complex onset, the most straightforward representation is the one in (10a). (10b) provides an example with a complex onset:

(10) a. <Brenda> (proper name) [brɛnda]

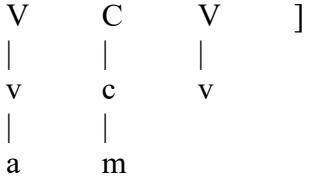


b. <zebra> 'zebra' [zebra



So far then, we have seen that lax vowels always occur in a closed syllable. From (7), we expect to find no tense vowels in closed syllables. This is true word-medially. Word-finally, however, in words that end in a consonant, we *do* find a contrast between lax and tense vowels. Since we have stipulated that tense vowels cannot occur in closed syllables, final consonants that follow a tense vowel must form onsets:

(11)

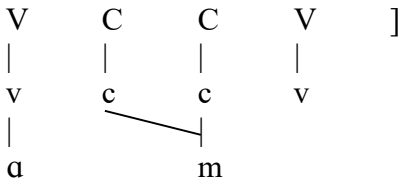


[8] At the end of this article I will reconsider the usefulness of the structure in (9a).

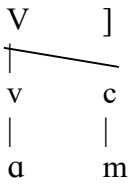
In the next section, I will turn to the idea that such 'stranded' onsets are followed by an empty, silent nucleus.

A word-final consonant following a lax vowel can be represent as a geminate (parallel to 8b) or we might represent it as a closing consonant (parallel to 8a):

(12) a.



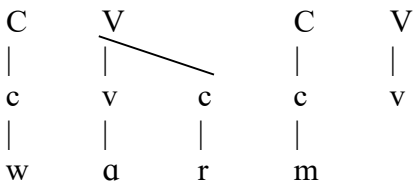
b.



(12b) must allow any type of consonant in the coda position and for this reason it may not be adequate (cf. above). Also, if we accept the idea of 'Coda Licensing' (Kaye 1990), which has it that every coda must be followed by an onset, (12b) cannot be correct.

We also have to reckon with the fact that word-finally, a lax vowel can be followed by two consonants that form a *falling sonority* cluster:

(13)



In certain styles of speech an epenthetic schwa vowel can appear between the /r/ and the /m/. I do not discuss this phenomenon here.[9]

In this article, I do also not include a discussion of final clusters of even greater complexity, which, as has been observed widely, follow from the apparent possibility to add a coronal (cluster) at the right edge of the word:

(14) herfst 'autumn' [hɛrf-st]
oogst 'harvest' [oχ-st]

This cluster has been referred to as 'the appendix' (cf. Fudge 1969, 1987, van der Hulst 1984). I refer to van der Hulst and Ritter (in prep.) for a detailed analysis of the appendix as a 'phonological clitic'.

At this point, let me make explicit some crucial assumptions about syllable structure. The idea is that syllabic constituents are maximally binary, following Government Phonology (GP). Head-driven Phonology (HDP) differs from GP, in not recognizing a distinction between a nucleus and

[9] In this article I analyze the lexical structure of Dutch words. I consider the epenthetic schwa in *war[ə]m* to be a post-lexical phenomenon. Post-lexically, we find more instances of 'optional' vowel-zero alternations. The vocabulary of HDP can be applied to this level too, but it is important to keep both levels separate; cf. van der Hulst (2003).

rhyme node (which is why I use these two terms interchangeably). Hence, the following structures are the only ones that are universally available, and, as it would seem, used in Dutch:

(15) a. C | c b. C / \ c v c. V | v d. V / \ v c

The notation is that of RcvP: capital C and V stand for onset and nucleus. We can also think of the symbols, as well as the lower case instances[10] as representing major class properties, as follows:

(16) a. $C_{[+cons]}$ | $c_{[-son]}$ b. $C_{[+cons]}$ / \ $c_{[-son]}$ $v_{[+son]}$ c. $V_{[+son]}$ | $v_{[-cons]}$ d. $V_{[+son]}$ / \ $v_{[-cons]}$ $c_{[+cons]}$

This approach thus incorporates the idea that major class distinctions are encoded in the syllabic constituent structure (cf. Golston and van der Hulst 1999). In each of the four syllabic positions, we can find an array of manner (as well as place and laryngeal) distinctions, which, in RcvP, are again defined in terms of the elements c and v. For details, I refer to van der Hulst (1994ab, 1995, 1996, 1999, 2000, to appear, in prep a).

I further assume that syllable structure is part of the lexical representation of words, rather than being derived. This is in part because syllable structure encodes major class information and in part because, as we will see, not all syllable structure corresponds to segmental material (and vice versa[11]). The presence or absence of a coda consonant is determined by the subcategorization properties of the vowels. Tense vowels select open rhymes, while lax vowels select closed rhymes. Diphthongs (cf. 1) also select the structure of a branching rhyme. Like closed syllable, they are heavy for stress:

(17) V: / \ v c; | | ɛ y V: / \ v c; | | œ y V: / \ v c; | | ɔ w

Diphthongs are analyzed as consisting of a low lax vowel followed by a glide that is homorganic with the head value of the lax vowel (cf. van der Hulst 1984: 95). In the case [œy], the first part is considered to be a rounded, front vowel, with frontness being the head element (cf. below for an analysis of the vowels). Zonneveld and Trommelen (1980) provide a discussion of diphthongs in Dutch.

2.2. Why lax vowels must be followed by a consonant

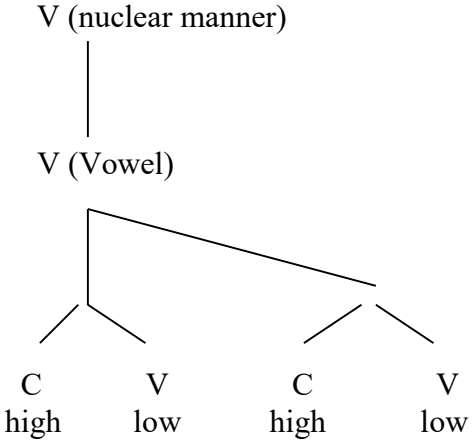
[10] The case distinction has no theoretical significance.

[11].Segmental material that does not correspond to syllabic positions accounts, among other things, for consonant - zero alternations, such as in French liaison.

We would like to *derive* the subcategorization requirement from the internal segmental structure of lax vowels. In early version of Government Phonology (as in Kaye, Lowenstamm and Vergnaud 1985, 1990), all lax vowels lack 'positive charm'. In latter versions (e.g. Harris 1994, Harris and Lindsey 1995, Ritter 1997) the distinction between tense and lax vowels is made in terms of segment-internal headedness. The idea is that tense vowels are *headed*, whereas lax vowels are *headless*. In this theory it could be said that there is a general requirement in Dutch that (stressable) rhymes must be headed. Tense vowels fulfill this requirement internally, while lax vowels must fulfill it externally, by requiring a dependent within the rhyme.

Here I will present the approach that is taken in Radical cv Phonology (van der Hulst 1994ab, 1995, 1996, 1999, 2000, to appear, in prep.a). In RcvP all phonological oppositions are encoded in terms of the elements |C| and |V| (adopted from Dependency Phonology, Anderson and Ewen 1987). In the manner gesture for rhymal head positions that works out as follows:

(18)



In the rhyme head position, we find vowel 'manners', which I take to relate to degree of stricture (or degree of aperture). The secondary choice is labeled high/low again:

(19)

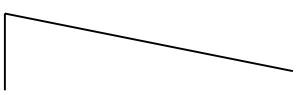
	Vv	low low vowel (tense)
	Vc	low high vowel
	Cv	high low vowel
	Cc	high high vowel (tense)

Adding a dependent element that is identical to the head element can be regarded as a formal expression of 'enhancement', which in the case of vowels translates into 'tense' or 'peripheral', as opposed to non-enhanced (central, lax).

We can take enhancement to be the unmarked form of dependency and in practice enhanced structures could be simplified by leaving the dependent unspecified: V, Vc, CV, C.

Place distinctions are also encoded in terms of c/v oppositions:

(20)



(21) Cc front fronted
Cv front rounded
Vc back fronted (central)
Vv back rounded

With these distinctions, we can represent the vowel system as follows:[13]

(22)

Place	C	Cv	Vc	V
Manner				
C	i	ü	-	u
Cv	ɪ	-	-	-
Vc	ɛ	œ	ɑ	ɔ
V	e	ø	a	o
	ɛy	œy	-	ɔw

With reference to the structures in (15/16), we can now say that tense vowels select the simple structure in (15/16c) because they are themselves simple, while lax vowels, being complex, select the complex structure in (15/16d).

Admittedly, this explanation for why lax vowels must co-occur with consonants is perhaps less attractive than the one that follows from saying that lax vowels are headless since it does not allow for stating an appealing generalization such that all stressable rhymes must be headed.

3. Why so-called 'superheavy' syllables cannot be internal

In section 2.1. I mentioned that tense vowels can only occur in an apparent 'closed syllable', when this syllable is word-final; the spelling reflects tenseness in that position by a geminate spelling:

(23) <banaan> 'banana' [banan] *naamba [nanba]

[12] Acoustically, round and back involve lowering of F2.
[13] A drawback is that low back vowels come out as less marked that low central vowels. In the low, non-front area round is marked. In van der Hulst (to appear) I discuss the notion of markedness within RcvP.

In traditional analyses, syllables like <naan> are called superheavy because tense vowels are taken to be long (bipositional, or 'bimoraic'). Hence adding a 'closing' consonant, makes the rhymes of those syllables 'trimoraic'. Assuming that 'bimoraic' rhymes are heavy (as opposed to light 'monomoraic' rhymes), 'trimoraic' rhymes are called 'superheavy'. Other types of superheavy syllables consist of a short, or lax vowels followed by two consonants:

(24) <patent> 'patent' [patɛnt]

In Dutch such VCC superheavies are also limited to word-final position. There are exceptions to the generalizations that $V_{Tense}C$ 'syllables' and $V_{Lax}CC$ 'syllables' do not occur internally. They are not numerous, however, and I do not address them here (cf. van der Hulst and Ritter, in prep).

In the present analysis both cases of superheaviness are **not** parallel because tense vowels are analyzed as short (because, indeed, they are not heavy). Thus the term 'superheavy' is not really adequate for the final syllable of words like *banaan*. Technically speaking, the syllabic structure of the two words in (23) and (24) is different:

(25)

banaan:	CVC**V**C
patent:	CVC**VC**

Despite this lack of parallelism I will here propose a unified account hat straightforwardly both excludes tense vowels before apparent closing consonants and lax vowels followed by two apparent closing consonants.

In the previous section, we concluded that the final consonant in *banaan* forms onset. We would have to say the same for the final consonant of *patent*. To treat the final consonant in both types of cases as an onset is, in fact, an old and quite widespread idea going back to McCarthy (1979) and Giegerich (1985, 1986). For Dutch the proposal has been made by Langeweg (1988) and more recently in Zonneveld (1993). In proposals of this type it is usually not only assumed that the consonant forms an onset, but also (as, indeed, I did in the previous section) that this onset is followed by an empty nucleus:

(26) a.

C	V	C	V	C	V
|	|	|	|	|	|
c	v	c	v	c	v
|	|	|	|	|	
b	a	n	a	n	

b.

C	V	C	V		C	V
|	|	|	|		|	|
c	v	c	v	c	c	v
|	|	|	|		|	
p	a	t	ɛ		n	

The presence a final empty nucleus cannot, however, be taken for granted. In certain cases (such as in the analysis provided in Kaye 1990 of Yawelmani and Turkish) final empty nuclei can be

motivated, but this is not always the case. In Government Phonology it is simply stipulated that every onset is a dependent of a nucleus (this stipulation is called *The Onset licensing Principle* in Harris 1994). Here I will go along with the idea.[14] Government Phonology also adopts the idea that *every* final consonant is an onset, not just those that end alleged superheavy rhymes. This idea is encoded in the Coda Licensing Principle which says that every coda must be followed by an onset (cf. Kaye 1990). This principle enforces that intervocalic sononants will always be onsets, but it also disallows word ending in a coda.

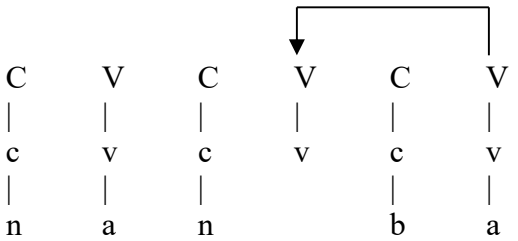
A theory that appeals to empty syllabic constituents must control their distribution. Addressing this issue, Government Phonology develops the idea that empty nuclei must be **licensed**, which may be due to several factors of which I mention here the following two:

(27) a. Final licensing [assumed to be parametric]
b. Licensing via Proper Government [assumed to be universal]

(27a) says that some languages simply allow a final empty nucleus. Given the principle of Coda Licensing, languages that have a negative setting for this parameter cannot have words that end in consonants.[15] (27b) says that internal empty nuclei are 'allowed' if they are **Properly Governed**. Proper Government holds if an empty nucleus is followed (or preceded[16]) by a syllable which itself is 'audible' (or more technically, which is unlicensed[17]). When we say that empty nuclei are 'allowed' if licensed, we mean (in the context of the theory assumed here) that they are 'allowed *to be silent*'. An unlicensed empty nucleus will (by convention) be **audible**.[18]

Let us now look at how GP can explain the finality of superheavies in Dutch. If (27b) is universal, we would expect to find superheavy syllables word internally, since the string in (28) looks well-formed:

(28)



* [nanba]

But if we wish to ban medial tense vowels followed by an apparent closing consonant, (28) cannot be a well-formed representation. So what is wrong with it?

---

[14] For a different view see Polgárdi (1998).
[15] Kaye (1990) argues that allowing a final consonant is independent from allowing closed syllables.
[16] Proper government is usually taken to be right-headed ('iambic'). In section 7.1. I discuss the option of left-headed (trochaic) government.
[17] Proper governors must be either full vowels, or empty nuclei that are audible because they are not properly governed. Both categories occupy nuclei that are unlicensed.
[18] Audibility is seen as resulting from phonetic interpretation rather than from inserting an element.

We might propose that a tense vowel 'must turn into' a lax vowel when followed by an empty, licensed nucleus. This analysis resembles the analysis for 'closed syllable vowel shortening effects' in Turkish and Yawelmani proposed in Kaye (1990). In these languages, *long* vowels cannot be followed by an empty nucleus. This was later shown to be a case of **government-licensing** (attributed to Shohei Yoshida): the head of long vowels needs to be government-licensed by a following non-silent nucleus so that it can govern its complement (Charette 1990).

If we extend this idea to Dutch, we would have to say that only *non-final* empty nuclei have this effect on preceding tense vowels. This, in itself, need not be a problem since it has been observed in other cases that internal and final empty nuclei have different licensing effects (cf. Charette 1990, Cyran 2002).

One might object that an analysis that involves a process turning tense vowels into lax vowels would face the problem of there being more tense vowels than lax vowels; the process would have to neutralize the distinction between high and mid round vowels. If this is indeed undesirable, we could simply have a constraint that bars tense vowels before a **non-final** empty nucleus, without assuming a 'repair' that makes them lax.

Alternatively, one might now say that this structure can be 'rescued' by realizing the empty position as a schwa. Indeed *nanəba* would count as a well-formed word:

(29)	camera	'camera'	[kaməra]
	molecuul	'molecule'	[moləkül]

Whatever, the merit of this analysis, it seems obvious that the absence of tense vowels before empty nucleus is not really *explained*. An analysis of the tense/lax distribution cannot appeal to government-licensing since there is no reason for why tense vowels should be government-licensed. In fact, since tense vowels (in the RcvP analysis) are simpler than lax vowels, one would expect the latter to be in more need of government-licensing than the former.[19]

Let us explore another route to exclude the structure in (28). Let us say that internal empty nuclei in Dutch are unable to license an onset:[20]

(30) A licensed non-final empty nucleus cannot license any onset content

In Government Phonology it is in general assumed that onsets must be licensed by a following nuclei. In particular, apart from The Onset Licensing Principle (which requires a nucleus for every onset), it has been argued that the specific shape of the onset (in terms of its complexity and/or its content) may require the presence of nuclei of a specific sort. Thus, it has been demonstrated that nuclei can differ in terms of their licensing potential such that full vowels can license the full array

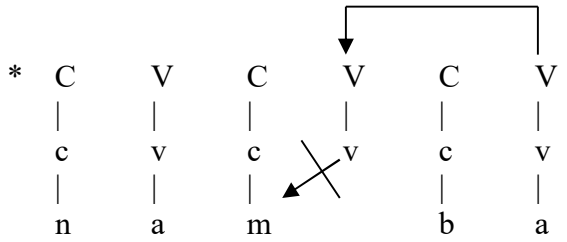
[19] Kaye rejects the parallelism between languages like Yawelmani and Turkish, and English primarily on the basis of the fact that vowel shortening occurs both before final and internal empty nuclei, while, in English, final superheavy syllables are allowed. English is more like Yawelmani/Turkish than Dutch because tense vowels in English are long. We know this because these vowels are heavy for stress, unlike the tense vowels in Dutch.

[20] I am grateful to Klaus Abels for suggesting that the ill-formedness of the structure in (28) might have something to do with the consonant preceding the empty nucleus.

of structures (in terms complexity and content), whereas empty nuclei are more limited in their licensing potential. Reduced vowels like schwa may be in-between (cf. Charette 1990, Cyran 2002). From this perspective it is reasonable to say that licensed empty nuclei in Dutch have no potential to license any content in their onset.

This immediately takes care of the structure in (28), repeated here as (31):

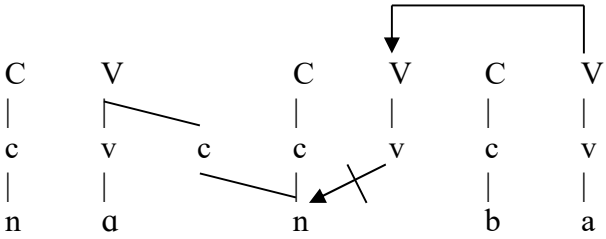
(31)



Again, we might assume that this structure is ill-formed and thus rejected, or that it is rescued by realizing the empty nucleus as schwa (cf. 29).

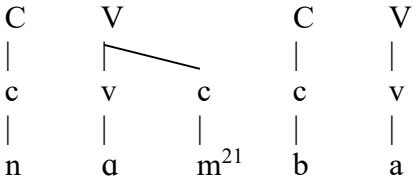
But now we have to address the question how a lax vowel would be able to occur in a similar structure:

(32)



At first sight, one might say that in that case, the need for an empty nucleus does not arise because lax vowels can occur in closed syllables:

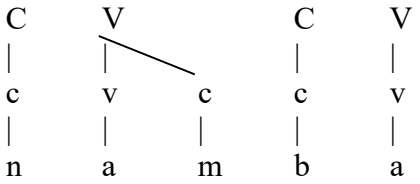
(33)



But even though the structure in (33) is of course well-formed, and, in fact, more plausible, given an intervocalic sequence of falling sonority, the theory still needs to explain why the structure in (32) is ill-formed. One might say (as suggested to me by Nancy Ritter, p.c.) that clusters with falling sonority *must* be analyzed as a coda - onset sequence *if* the language in question allows codas. This is an interesting idea since it does not only rule out (32), it would also renders appeal to

[21] The nasal would in that case be homorganic with the following stop.

(30) unnecessary. After all, if the sequence /n + b/ must be analyzed as a coda - onset sequence, *simply because it can*, tense vowels are automatically ruled out because it has already been stipulated that they cannot occur in closed syllables:

(34) * 

Thus, what makes the structure in (34) ill-formed is the occurrence of a tense vowel in a closed syllable, and what blocks the analysis in (31) is that an empty nucleus cannot occur between a cluster of falling sonority in a language that allows coda - onset sequences.

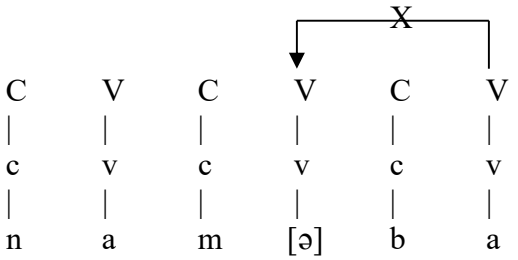
I will show below that this approach, while sensible given the data considered so far, is doomed to crash upon consideration of a wider array of facts. But before I turn to these facts let me sketch another alternative that, perhaps, might strike one as even simpler. However, this idea too, will be shown to be incompatible with the same data that frustrate the suggestion that we just considered.

4. An alternative that does not work

4.1. Suppose proper government is absent

It might have occurred to the reader that an alternative to excluding medial tense vowels before an apparent closing consonant would be to simply disallow non-final empty nuclei in Dutch. We could say this directly (i.e. empty non-final nuclei are disallowed), or we might say that Dutch does not have Proper Government, taking this to be a parameter rather than a principle. In the latter case, we allow empty nuclei but predict that they will always be audible. A plausible candidate for the audible empty nucleus would be the schwa-vowel, a vowel that can only occur in unstressed positions. Let us explore this option.

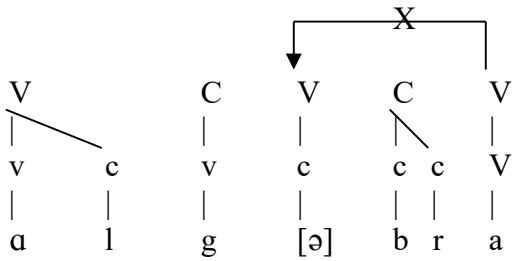
If empty nuclei are allowed but there is no proper government, the form in (31) would be realized with a schwa vowel in the third nucleus, which is a possible word in Dutch (cf. the words in 29):

(35) 

cf. k a m [ə] r a ‘camera’ (cf. 31)

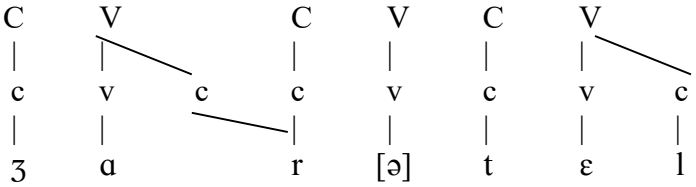
Likewise, when a lax vowels is followed by a falling sonority cluster a schwa *must* emerge:

(36) <algebra> ‘algebra’ [ɑlɤəbra]

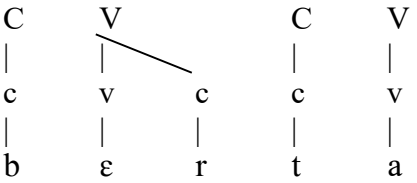


However, following a lax vowel we find that there is a potential contrast:

(37) a. <jarretel> ‘garter belt’ [ʒɑrətɛl]

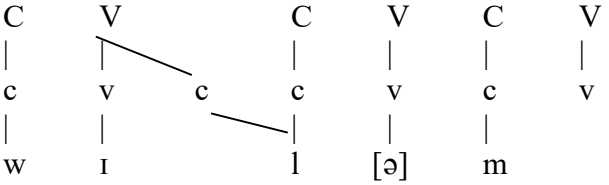


b. <Berta> (proper name) [bɛrta]

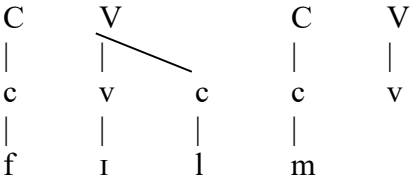


A contrast also arises in the following pair that involves a word-final consonant sequence:

(38) a. <Willem> (proper name) [wɪləm]



b. <film> ‘movie’ [fɪlm]



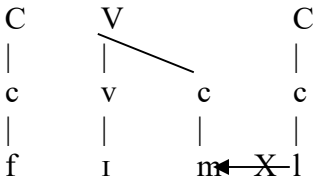
The presence of these contrasts is not problematic. We can simply represent the contrast in terms of the presence versus absence of an empty position, as we did in (37) and (38).

Now, if the analysis presented so far is correct, it is predicted that the consonants surrounded empty nuclei are 'free', i.e. that no restrictions hold on the consonant that precede and follow the schwa. This prediction is borne out. For medial and final cases, both rising and fallling sonority makes possible words as shown in (39a):

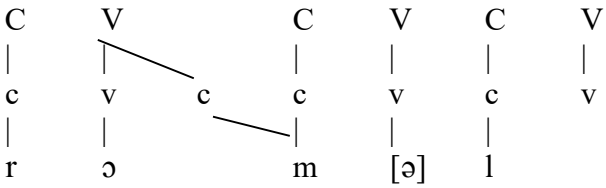
(39)	a. with schwa	b. without schwa
Medial		
falling sonority	*jarretel*	*halma*
rising sonority	*zeppelin*	*kremlin*
Final		
falling sonority	*Willem*	*film*
rising sonority	*rommel*	**roml*

In (39), I have included the examples that demonstrate the potential contrast between presence and absence of schwa.[22] Next to *film* we do not find **roml*, because in that case /m/ and /l/ cannot form a coda-onset sequence; cf. (40a).[23] Hence this string could only be analyzed as in (40b) and thus emerge as [rɔməl].

(40) a.



b.



What is, however, much more striking is that words like *zeppelin*, with a falling sonority contour surrounding the schwa, have a schwaless counterpart. In (39b), I have included the intervocalic sequence *ml* (in *kremlin*) to demonstrate this possibility. This form is actually worth our special attention since it includes an intervocalic cluster of rising sonority *which is not an onset*. In the following section I show that the word *kremlin* is not an isolated example, and, moreover that forms of this sort invalidate the analysis that we have just explored, i.e. an analysis that is based on the idea that Dutch does not have proper government.

[22] It needs to be said that perfect minimal pairs are not to be found; cf. section 6.

[23] Dutch also doesn't have final clusters like ln], or rl] even though these have falling sonority. Van der Hulst (1984: 93), I attribute this to a 'minimal sonority distance' effect.

4.2. Why Proper Government is necessary

The following data (many from Trommelen (1983) and Zonneveld (1993)) document 'heterosyllabic' intervocalic consonantal sequences:

(41)

sonorant - obstruent

parkiet	bamboe	portret
kalkoen	agenda	pelgrim
Gibraltar	canvas	
orkest	menthol	
perzik		

sonorant - sonorant

r - nasal	*l - nasal*	*nasal - nasal*	*r -l*	**l - r*
marmot	almanak	hymne	charlatan	…..
ornaat	halma	amnestie	Carla	
Soekarno	kelner		orlam	
inferno			Orlando	
Birma				
scharnier				

**r - glide*	**l -glide*	**nasal - glide*	**nasal - liquid*	*l - h*
Arjan	miljoen	banjo	kremlin	Alhambra
	biljet	anjer	Hanlo	
	Alwin		Komrij	

***obstruent - sonorant**

obs - nasal	*obs - liquid*	*obs - glide*
dogma	atlas	atjar
magneet	atleet	Oswald
fragment	Hitler	
Dubrovnik	butler	
slatagmiet		
prisma		

ritme	Oslo
algorime	Israel
acne	moslim
sarcasme	
drachme	
Daphne	
drachme	
orgasme	
chiasme	
pleonasme	

enthousiasme
X-isme (suffix)

obstruent - obstruent

fric - fric	*fric - stop*	*stop - stop*	** stop - fric*
asfalt	kaftan	wodka	bliksem
fosfor	kristal	reptiel	oksel
Pascha	asbest	Egypte	absurd
	masker	labda	hetze
	kluster	elektron	Rutger
	custard	oktrooi	abces
	aspect	spektrum	upsilon
	aspro	directoir [ktw]	
	diskreet		
	mistral		
	biscuit [skw]		

I did not list clusters of rising sonority here that form a potential complex onset: obstruent (except /s/) plus liquid or /w/ (except /tl/). In these cases we always find a preceding tense vowel:

(42) ze.bra me.tro a.pril etui [e.twi]

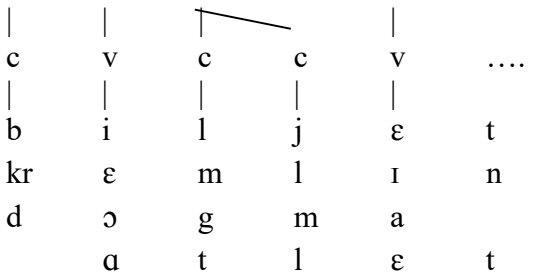
It seems obvious that Dutch allows a fair number of **rising sonority** interludes that do not form complex onsets witnessed by the fact that they are all preceded by a lax vowel (all cases marked with an asterisk involve such non-onset rising sonority clusters). GP maintains that a coda and following onset head in order to be a well-formed interlude must enter into an inter-constituent relationship in which the onset head is the head. The head must be able to govern its dependent, based on its segmental content, which must be such that the head is less sonorous (or more complex, according to Harris 1990, 1994). All interludes marked with an asterisk do not fulfill this requirement and the clusters can thus not be coda-onset sequences (cf. 43a). The structure in (43b) is also out because the consonant sequences do not form proper onsets which are always preceded by a tense vowel (cf. 42)[24]:

(43) a.

*	C	V		C	V	
	c	v	c ← X — c		v	….
	b	i	l	j	ɛ	t
	kr	ɛ	m	l	ɪ	n
	d	ɔ	g	m	a	
		ɑ	t	l	ɛ	t

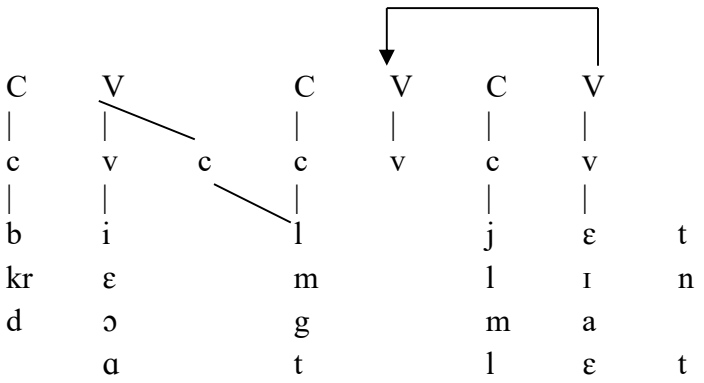
b. * C V C V

[24] Harris (1994) discusses similar examples in English, also concluding that these forms must contain a governed empty nucleus.



This means that these words require an intervening empty nucleus **which is silent**, which implies that Dutch must have Proper Government:[25]

(44)



If silent empty nuclei are possible, the analysis suggested in section 4.1, which relies on Dutch not having Proper Government cannot be correct. As for the other suggestion (due to Nancy Ritter; cf. above) which implies that empty nuclei do not arise in between consonants that form a falling sonority sequence, whether valid or not, this will also not help preventing Dutch from having empty nuclei in between consonants with rising sonority. Thus, having established that Dutch *does* have empty nuclei that do not surface as schwa, we *are* facing the problem of having to exclude tense vowels before empty nuclei. The crucial ingredient of our original analysis was that, in Dutch, empty non-final nuclei do not license onset content (cf. 30). This, indeed, excludes tense vowels before empty nuclei (cf. 32). What now remains to be explained why the constraint in (30) does not also rule out the structures in (44).

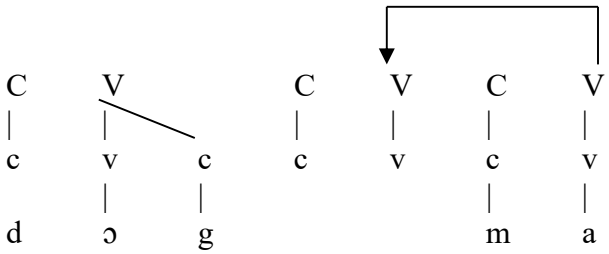
This is the point where the distributional difference between tense and lax vowels, that we captured in terms of a difference in subcategorization, crucially enters the picture. Assuming the geminate representation, we might now say that the requirement of lax vowels to be followed by a consonant (position, or coda) provides a license to the onset material that precedes an empty nucleus. In fact, we might perhaps derive this from the 'inalterability constraint' (cf. Hayes 1986) which would predict that onset content that forms part of a geminate structure is not affected by a constraint that refers to that same content when occurring in a singleton structure.

A nicer account arises, however, if we adopt the 'closing consonant' representation that we considered in (8a). If, consonants that follow a lax vowel are 'attracted' into the coda position, the

[25] In none of these cases is there any independent evidence for postulating the empty nucleus, however. It is simply demanded by the principles of GP.

constraint in (30) is simply not violated, and we do not need to rely to an 'inalterability connstraint' at all:

(44)

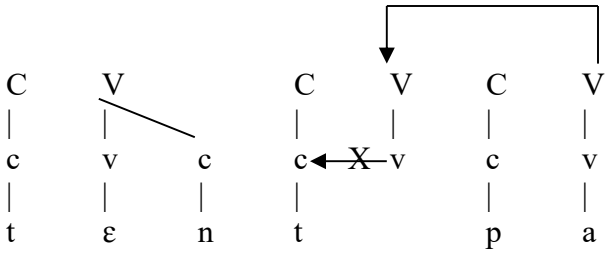


I therefore suggest that we adopt the closing consonant representation.[26]

5. VCC

In section 1, I showed that VCC rhymes (lax vowel plus two consonants) are also ill-formed word-internally. Let us check whether the current analysis excludes this.

(45) *



Clearly, a structure of this sort cannot surface with a silent nucleus because the medial /t/ is not licensed, as per constraint (30). Hence, such a structure would either be rejected ort interpreted with a schwa (cf. *alg[ə]bra*).

At this point, let us consider how final 'superheavies' behave with respect to stress. By and large, such syllables are stressed, primary stress being penultimate or antepenultimate[27] if the final syllable is not superheavy. In the present analysis final $V_TC]$ and $V_LCC]$ are predicted to behave alike for stress purposes because in both cases will the final C form an onset to a silent empty nucleus. Both sequences then are 'bisyllabic', forming a foot that will be the head foot of the word (cf. van der Hulst 1984). There is one problem, however. The generalization that final $V_TC]$ is stressed has few exceptions, while there are many exception in which final $V_LCC]$ is not stressed. This is not what one would expect given the way in which the two sequences have been analyzed:

(46) $V_TC]$: $V_T.CV]$ (light syllable followed by empty nucleus)
$V_LCC]$: $V_LC.CV]$ (heavy syllable followed by empty nucleus)

[26] I leave it for further research whether the consonant position that precedes the empty nuclei is somehow interpreted in terms of the content of the coda consonant, so that, in effect, the representation in (9a) may be relevant.
[27] The choice is predictable but I do not discuss the details here; cf. van der Hulst (1984).

One would expect final $V_LCC]$ to be 'heavier' than final $V_TC]$. I have no solution for this paradox.

Be this as it may, final $V_LC]$ is definitely lighter than either $V_TC]$ or $V_LCC]$. This provides us with another reason for preferring (8a) over (8b). As shown in van der Hulst (1984), final $V_LC]$ does not count as a branching foot. Adopting the structure in (8b), or indeed (9b), would, however, depict final $V_LC]$ as a branching foot. Therefore, I conclude that the 'closing consonant' analysis of consonants that follow a lax vowels is superior.

6. Why it can't be that all schwas are empty nuclei

Zonneveld (1996) argues for treating all schwas in Dutch as epenthetic, but it would appear that this is only possible in cases in which there is no contrast. In section 4.1, we have seen that we cannot regard all instances of schwa as unlicensed empty nuclei. The reason is simply that schwa occurs in licensed internal positions, creating a contrast with silent empty nuclei. This implies that internal schwas that occur in licensed positions must be lexical. Only in those cases in which the onset of empty nuclei cannot be saved, it might be argued that realization of the empty nucleus as schwa is enforced. Thus the schwa in *camera* (in 35) and *algəbra* (in 36), as *rommel* (in 40b) can be seen as derived (because schwaless parallels are ill-formed sequences), but the one in *jarretel* (in 37a) cannot because of the (relevant) contrast with *kremlin* (in 38a).

Schwa also occurs word-finally, both after lax and tense vowels, where its presence is in potential contrast with its absence:

(46) <antenne> 'antenna' [antɛnə] <pen> 'pen' [pɛn]

<dame> 'lady' [damə] <ram> 'window' [ram]

Harris (1994: 181 ff.) discusses the same problem with respect to English, where consonant final and schwa-final words occur side by side. He even cites a minimal pair <dine>, <Dinah>. His solution to this contrast is to make a distinction between a final nucleus dominating a segmental expression that is headed by the neutral element [@], for <Dinah>, and final nucleus that is non-headed, for <dine>. His approach, then, recognizes a neutral element, and furthermore assumes that this neutral element is latently present is every phonological expression (as in Kaye, Lowenstamm and Vergnaud 1985). However, the distinction is made, it is clear that it must be made, not only in final position, but also medially. Thus, it would appear that we cannot argue that all schwas in Dutch are derived; some *must* be lexical.[28]

This is not the last word about the schwa. It has been observed (cf. Kager and Zonneveld 1983) that clusters preceding a final schwa all are potential word-final clusters. In other words, schwas do not support a branching onset.[29] Kager and Zonneveld (1983) draw the conclusion that schwas behave

[28] In RcvP, it is not obvious how a schwa *can* be represented as non-empty. This, as suggested by Klaus Abels, might lead one to explore a purely structural representation of schwa by *adding* empty nuclei to words that have schwas contrastively. I do not explore this issue here.

[29] Exceptions are words like *oeuvre*, or names like *Sartre*. Some initial schwas can have branching onsets: *plezier* 'pleasure', *brevet* 'license'.

like ‘word boundaries’. However, as argued for in Cyran (2002), it could more plausible be said that schwas do not have enough ‘body’ to license complex onsets. A fuller discussion of ‘schallables’ form part of van der Hulst (in prep.)

7. Two alternatives that might work

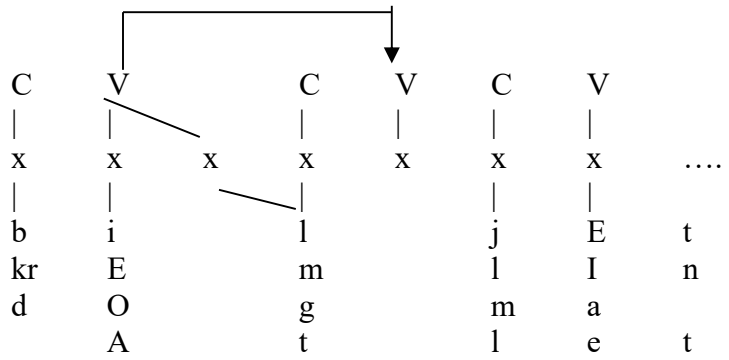
Certain aspects of the above analysis are negotiable in ways that do not (necessarily) effect our treatment of the way in which tense vowels are excluded before licensed empty nuclei. Here, I will show that Proper Government *could* be left-headed (allowing us to switch off final licensing), or that as far as rhymes are concerned the idea of a strict CV analysis could be adopted (necessitating the use of interonset government).

I provide these alternatives in view of ongoing discussions in Government Phonology with respect to two major properties of the standard framework, viz. the direction of government and the availability of branching syllabic constituents.

7.1. Left-headed government

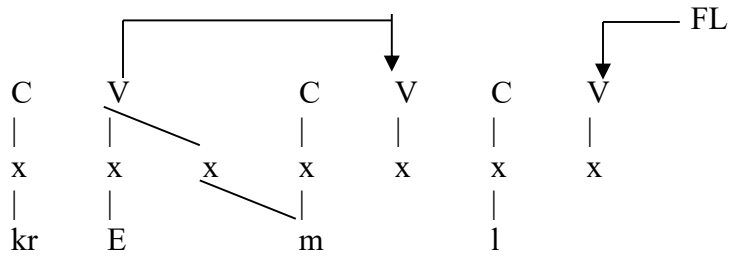
Suppose we say that PG is a left-headed relationship, assuming that the head-orientation of PG is parametric. The idea of postulating left-headed PG relationship is not unprecedented.[30]

(47)



As it stands, this analysis would predict the possibility of having final cluster with rising sonority if we combine left-headed proper government with final licensing:

(48)



[30] Proponents of GP generally assume that PG is right-headed. Gibb (1992), van der Hulst and Rowicka (1997), Rowicka (1999) and Yoshida (1999) have explored left-headed PG.

Thus, if left-headed PG is used, we would have to say that Dutch has no final licensing. Thus, left-headed government seems a viable alternative to right-headed government and it even allows us to do without final licensing. This does not mean, of course, that final licensing can be dispensed with, unless it would turn out that PG is left-headed always.[31]

We might now furthermore be tempted say that proper government of internal empty nuclei is restricted to lax vowels, which would immediately take care of the fact that tense vowels cannot occur before empty nuclei.

However, in addition, to saying that only lax vowels can govern internal empty nuclei, we have to allow all vowels as proper governors for final empty nuclei. This alternative would make the constraint in (30) superfluous. It is not obvious that having to make a distinction between internal and final empty nuclei in terms of what can govern them is any worse than attributing different licensing power to these two types of empty nuclei in terms of the constraint in (30).

7.2. An analysis without closed rhymes

If we assume (following Lowenstamm 1996, 1999) that there are only CV structures, we have to revise the structures for falling sonority interludes and final falling sonority sequences:

(49) a..

C	V	C	V	C	V
|	|	|	|	|	|
c	v →	c	v	c	v
|	|	|		|	|
p	ɑ	n		d	a

b.

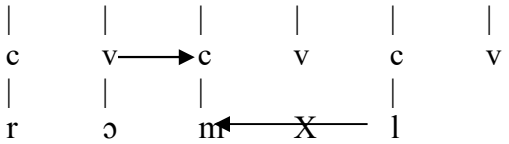
C	V	C	V	C	V
|	|	|	|	|	|
c	v →	c	v	c	v
|	|	|		|	
w	ɑ	r ←		m	

The form *warm* would tell us that in a strict CV analysis empty nuclei that occur in between consonant sequences of falling sonority do not need to be properly governed in order to be silent, because they are contained in a right-headed interonset relationship. This excludes *roml* (or rather causes it to surface as *romm[ə]l*):

(50) *.

C	V	C	V	C	V

[31] In general, this may raise certain question about silent empty nuclei in initial positions. If these occur, they could not be licensed by PG and some form of 'initial licensing' would have to be postulated. Dutch may require initial silent nuclei to account for unusual clusters that do not appear as well-formed onsets medially. Since, in these cases the clusters are always rising in sonority (e.g. /fn/, /fj/, etc.) it would be argued that some form of interonset licensing alows these empty nuclei to be silent. These issues are discussed in van der Hulst and Ritter (in prep.).



With respect to intervocalic consonant sequences it is not relevant whether an interonset relation holds, because both opposite sequences (to the extent that they are attested, like *kremlin*) are possible.

Diphthongs get a binuclear structure in a strict CV approach:

(51)

Ignoring how it will work for complex onsets, the strict CV analysis works, and is compatible with both left-headed PG (minus final licensing, and with or without constraint 29) and right-headed PG (plus final licensing and interonset licensing).

8. Conclusions

We have shown that Dutch must have internal empty nuclei in order to account for ill-formed medial consonant clusters. Licensing of these empty nuclei can be from the left or from the right. The latter option requires, in addition, that final empty nuclei be licensed independently.

In addition to necessarily analyzing ill-formed clusters as a sequence of two onsets (with intervening empty nucleus), a similar analysis could be given to well-formed clusters (thus adopting a strict CV approach which denies closed syllables). In that case, irrespective of whether PG is left- or right-headed, it must be assumed that interonset relations can licensed an intervening empty nucleus.

A crucial challenge (for all variants of the analysis) is to explain the absence tense vowels before medial empty nuclei. In order to explain this gap, it has been proposed that, in Dutch, medial empty nuclei cannot license their onset. Lax vowels can be followed by an empty nucleus because they license the (content of the) onset of the following empty nucleus through their requirement that they must be followed by a consonant which is always an onset in the strict CV analysis. If branching rhymes are allowed, the following consonant is always a coda if 'ambisyllabic consonants' are geminates, else the following consonant is a coda in case of well-formed interludes and an onset in case of single intervening consonants.

With respect to the schwa, I have shown that this vowel cannot be analyzed as an unlicensed empty nucleus, at least not in those cases in which there is a potential contrast between schwa and licensed empty nucleus, a situation that arise both medially (in some cases) and finally (always).

Finally, I considered various alternatives that seem worth exploring further. It seems clear that, at this point, no unique analysis can be offered, especially with regard to excluding tense vowels before internal empty nuclei. Meanwhile, various further issues also need to be dealt with such as the **exceptions** to the ban on internal occurrence of 'superheavy' rhymes (both tense vowel plus consonant, and lax vowel plus two consonants), as well as initial 'onsets' that do not consist of obstruent (other than /s/) and liquid or /w/.

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