Dutch Syllable Structure Meets *Government Phonology*

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1 Introduction

In this article[1], I present an analysis of certain aspects of syllable structure in Dutch monomorphemic words within the framework of Government Phonology (GP) (Kaye, Lowenstamm and Vergnaud 1990; cf. van der Hulst (in prep. a)) for an introduction to dependency and government approaches to phonology.

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), Kager (1990), Zonneveld (1993), Booij (1995), Kager 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 must occur in open rhymes. I will propose that the basic mechanism for enforcing the distributional properties of vowels is 'subcategorization'. Next, in section 3, I turn to so-called 'superheavy syllables'[2], i.e. syllables containing a rhyme that consists of a

[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,

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tense vowel followed by an apparent tautosyllabic consonant ($V_{Tense}C$); such $V_{Tense}C$ 'syllables', which are largely limited to word-final position, will be argued to be bisyllabic, the second syllable containing a silent empty nucleus. I then will propose an analysis which explains the absence of *non-final* $V_{Tense}C$ 'syllables'. In section 4, I consider an alternative analysis for the absence of non-final $V_{Tense}C$ 'syllables', based on the assumption that Dutch does not have word-internal empty nuclei. However, this analysis, as I will show in section 5, cannot work. Dutch contains intervocalic consonant sequences that implicate the presence of empty nuclei. Section 6 fits the distribution of $V_{Lax}CC$ 'syllables' into the analysis, while section 7 addresses the representation of the vowel schwa, which, as I will show, cannot in all cases be seen as an unlicensed empty nucleus. 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 an opposition which has received a number of different characterizations; cf. Moulton (1962) for an early important study. 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. The opposition can also be stated in terms of a distributional difference, sometimes associated with the terms *unchecked* and *checked*. The key observation here is that the vowels called checked (corresponding to short or 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	ɛi	œü	ɔu
	ɛ	œ	ɔ	e	ø	o			
			ɑ			a			

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while, strictly speaking, being inadequate within the analysis that is proposed here.

Phonetically, the high tense vowels are shorter than the non-high tense vowels, but that difference has no bearing on their behavior. In addition, there are the vowels [ɛ:, œ:, ɔ:] as well as [i:, ü:, u:] that 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, mentioned so far, can be stressed (if in the appropriate metrical position), Dutch has one *unstressable* vowel, called schwa, usually transcribed 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 never find lax vowels, as was pointed out in van der Hulst (1984, 1985), implying that the restriction on lax vowels applies throughout the word:

(4)

<chaos>	'chaos'	[χaɔs]
<hiaat>	'hiatus'	[hiat]
<video>	'video'	video]

In (4), 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. From the same examples, it also follows that the obligatory 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 1986), while occurring in two variants:

(5) a.  b. 

In this 'bipositional rhyme' account, tense vowels are those vowels that occupy the structure in (5a), i.e. they are bipositional, long vowels, whereas vowels are lax if they occur in the structure in (5b). Phonemically, then, Dutch is said to have long and short vowels, the latter being required to occur in a branching structure as in (5b). Kager (1990: 242) updates this analysis by referring to a *Bimoric Constraint*.

An account of this type fails to explain (3b) and (3c). The fact that the vowel contrast in the high, non-front region is neutralized toward the value tense suggests that laxness is marked. But the bipositional rhyme or bimoraic 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 1993, Zonneveld and Trommelen 1999). However, I will mention 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 1988 for a discussion of this claim). 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* is the relevant factor. The following facts support this point. In (6a) we find as number of words that have antepenultimate stress, which is irregular because words ending in two open syllables are regularly stressed on the penultimate syllable. However, words, such as in (6b), with a closed penultimate syllable (contain-

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

ing a lax vowel) are always stressed on the penultimate or exceptionally on the final syllable; there are no such words with stress on the antepenultimate:

(6)	a.	dóminee	'minister'	b.	agénda	'agenda'
		página	'page'		fiásco	'fiasco'
		áilibi	'alibi'		flamíngo	'flamingo'

This asymmetry shows that closed syllables cannot be 'skipped over', a fact that indicates their weight.

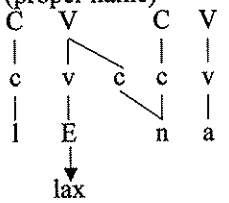
Maintaining that tense vowels are long requires extra stipulations such as saying that they are long but monomoraic (a position held in Lahiri and Koreman 1987) or that long vowels (on the assumption that these vowels form branching *nuclei*) cannot be seen because the stress rule looks at the rhyme node which only registers syllable closure. 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 idea that tense vowels are long 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.

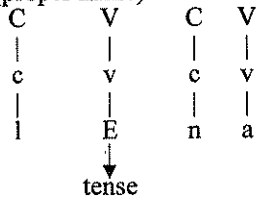
In an attempt to deal with (3a), van der Hulst (1985) and van der Hulst & van Lit (1988) suggest that the paradox can be solved if we assume that Dutch has short vowels only, unspecified for tense or lax. To derive the contrast between lax and tense vowels, it is suggested that vowels in open syllables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

[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.

(7) a. lax <Lenna[5]> [lɛna] (proper name)



b. tense <Lena> [lena] (proper name)



The 'virtual geminate' consonants, as in (7a), are often referred to as being 'ambisyllabic'. Van der Hulst and Smith (1982), in fact, proposed that ambisyllabic consonants *are* geminates, predicting that no language has a contrast between them.[6] Indeed, in addition to the ambisyllabic consonants Dutch does not have 'true' geminates that occur independently from the tense/lax distinction; thus there is no three-or four-way contrast:

(8) a. V_TCV
b. $V_LC_iC_iV$
c. $*V_TC_iC_iV$
d. $*V_LCV$

A necessary property of this analysis is that, since certain tense vowels do not correspond to a lax counterpart (cf. 3b), the phonetic rule must neutralize the underlying contrast between high and mid non-front vowels (cf. 1 above).

In support of the geminate analysis, we can refer to the fact that words like <dilemma>, having a virtual geminate in penultimate position can never be stressed on the antepenultimate syllable. Thus, such words behave exactly like the words in (6b), showing that their penultimate syllable is closed.

The alternative I propose here is to simply postulate the tense and lax vowel sets as underlying segments of the language (instead of deriving them by phonetic rule) and to account for the distributional difference in terms of the notion of 'subcategorization' (as suggested in van der Hulst 1981, van der Hulst and Ritter 1999, Anderson 2002).[7] One might say that lax vowels are

[5] Note that the Dutch spelling system 'acknowledges' the virtual geminates.

[6] The claim that geminates and ambisyllabic consonants are not contrastive is made in Vogel (1977).

[7] Vennemann (1991) suggests that German also has a *phonological* tense-lax distinction (rather than a phonological length distinction). Interestingly, English appears to be differ-

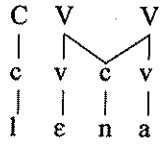
like transitive verbs in that they select a *complement*. Of course, tense vowels, given that they cannot occur in closed syllables, must also be provided with a subcategorization frame indicating that they cannot take a complement:

(9) a. lax vowels: $[\ -\ C]_{rhyme}$ b. tense vowels: $[\ -\ ]_{rhyme}$

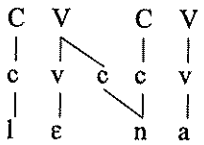
Given this analysis, we provide a basis for the fact that lax vowels are marked (cf. 3a), because they require a complement.

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 principle of 'onset maximization' (as is indeed assumed in Trommelen 1984, who 'encodes' subcategorization as 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 (10a) results. An alternative, however, is that we maintain the idea that single consonants following lax vowels are geminates phonologically, as in (7a), repeated here as (10b) in which the coda requirement for lax vowels and onset maximization are both maintained:

(10) a.



b.



A potential problem with (10a) is that Dutch is one of those languages that has *syllable* final devoicing.[8] The position of the /n/ could be taken by a voiced stop: *rabbi, Bobbie*, and no devoicing occurs in such cases. 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'

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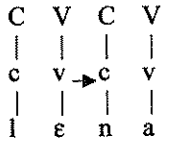
ent from German and Dutch in that tense vowels *are* phonologically long as indicated by their being heavy for stress.

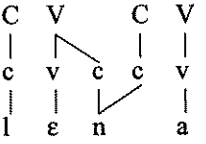
[8] Kooij (1978) shows that final devoicing in Dutch is 'syllable-final' devoicing, according to the traditional notion of what a syllable is.

the onset content.[9] 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 government-style analysis that will be proposed here. Hence, 'final devoicing' does not provide an argument against (10a).[10] There are, in addition, two more alternatives to consider, given in (11):

(11) a.



b.



In (11a), 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 vowel wants a following consonant, irrespective of whether this consonant belongs to the next syllable or forms a coda. More serious is that the structure in (11a) does not account for the fact that lax vowels are heavy for stress, at least less well than when lax vowels occur in closed syllables. Finally, (11a) 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 (11a). (11b), a variant of (10b) in a way, represents the geminate structures as *left-headed*, rather than right-headed. As the analysis presented here develops, I will later provide argument for preferring (10a), the 'closing consonant' analysis over the 'virtual geminate' analyses in (10b) and (11b).

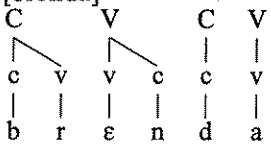
Let us now proceed by considering examples with intervocalic clusters. When a lax vowel is followed by a consonant cluster that is not a complex onset, the most straightforward representation is the one in (12a). (12b) provides an example with a complex onset:[11]

[9] 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.

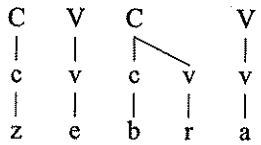
[10] It might also be argued that final devoicing is a 'late rule' that refers to a more surface-like 'phonetic' syllabification.

[11] The labeling of skeletal position follows RcvP (van der Hulst 2000, in prep.) in which onset dependents and rhyme dependents are opposite to their respective heads, i.e. more sonorant (i.e. V) and less sonorant (i.e. C), respectively.

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



b. <zebra> 'zebra' [zebra]



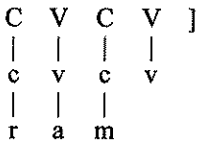
From (9b), we expect to find no tense vowels in closed syllables. This is true word-medially. Word-finally, however, before 'word-final' consonants, we *do* find a contrast between lax and tense vowels:

(13) a		b.	
	<ram> [rɑm] 'ram'		<raam> [ram] 'window'
	<ton> [tɔn] 'barrel'		<toon> [ton] 'tone'
	<karton> [kɑrtɔn] 'card board'		<persoon> [pɛrson] 'person'
	<divan> [divɑn] 'couch'		<banaan> [banan] 'banana'

Note that the spelling system reflects tenseness in final position by a geminate spelling.

Since we have assumed that tense vowels can*not* occur in closed syllables, final consonants that follow a tense vowel must form onsets:

(14)

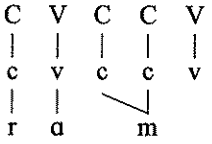


'window'

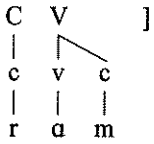
In the next section, I will turn to the idea that such 'stranded' final onsets are followed by an empty, silent nucleus as indicated in (14).

A word-final consonant following a lax vowel can be represented as a geminate (parallel to 10b, or 11b) or we might represent it as a closing consonant (parallel to 10a):

(15) a.



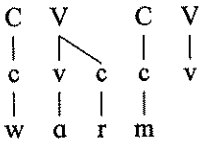
b.



(15b) would seem to clash with the idea of 'Coda Licensing' (Kaye 1990), which claims that every coda must be followed by an onset. Other than that it seems simpler than (15a). I will return to this choice later on.

We also have to reckon with words in which, word-finally, a lax vowel is followed by *two* consonants. These consonants always form a *falling sonority* cluster, which means that they are in line with constraints on coda-onset sequences. Hence, a bisyllabic representation seems entirely plausible for these cases:[12]

(16)



In certain styles of speech an epenthetic schwa vowel can appear between the /r/ and the /m/. I do not discuss this phenomenon here.[13]

In this article, I also omit a discussion of final clusters of even greater complexity, which, as has been observed widely, follows from the apparent possibility of adding a coronal (cluster) at the right edge of the word:

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

This cluster has been referred to as 'the appendix' (cf. Fudge 1969, 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. Head-driven Phonology (HDP; van der Hulst and Ritter 1999, in prep.) differs from GP, in not recognizing a distinction between a nucleus and a 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:

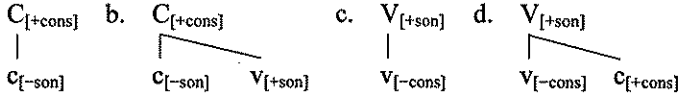
[12] Dutch doesn't have final clusters like ln], or rl] either, even though these have falling sonority. In van der Hulst (1984: 93), I attribute this to a 'minimal sonority distance' effect.

[13] 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).

(18) a. C b. C c. V d. V

The notation is that of RcvP: capital C and V stand for onset and nucleus/rhyme. We can also think of the symbols, as well as the lower case instances[14] as representing major class properties, as follows:

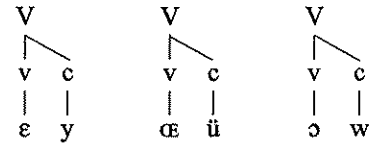
(19) a. $C_{[+cons]}$ b. $C_{[+cons]}$ c. $V_{[+son]}$ d. $V_{[+son]}$



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 b).

I further assume that syllable structure is part of the lexical representation of words, rather than being derived. This is in part because, as we have just seen, syllable structure encodes major class information and in part because, as we will see below, not all syllable structure corresponds to segmental material (and vice versa[15]). 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 syllables, they are heavy for stress:

(20)



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

[14] The case distinction has no theoretical significance.

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

der Hulst 1984: 95). In the case [œü], the first part is considered to be a rounded, front vowel, with frontness being the head element. Zonneveld and Trommelen (1980) provide a discussion of diphthongs in Dutch.

Finally, let me address the question as to whether we can *derive* the sub-categorization requirement from the internal segmental structure of lax vowels. In early versions of Government Phonology (as in Kaye, Lowenstamm and Vergnaud 1985, 1990), all lax vowels lack so-called '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*. Following this idea 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. In Radical cv Phonology (van der Hulst 1994ab, 1995, 1996, 1999, 2000, to appear, in prep.a), I explore an alternative (although not necessarily incompatible) approach based on the notion complexity.

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

In section 2, I mentioned that tense vowels can only occur in an apparent 'closed syllable', when this syllable is word-final (cf. 13):

(21) a. <banaan> [banan] 'banana' b. *<naamba> [namba]

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:

(22) <patent> [patɛnt] 'patent'

In Dutch such VCC superheavies are also limited to word-final position. There are, to be sure, 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. Trommelen 1983, van der Hulst 1984, van der Hulst and Ritter in prep.).

In the present analysis, both cases of superheaviness are **not** parallel in structure 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*. Thus, the syllabic structure of the two words in (21) and (22) is different:

(23) banaan: CVCVC
patent: CVCVCC

Despite this lack of parallelism, I will here propose a unified account that straightforwardly excludes both 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 an 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:

(24) 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	t	

The presence of 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 within a specific analysis, but this is not always the case. In Government Phonology, it is simply stipulated that every onset is accompanied by a nucleus (this stipulation is called *The Onset Licensing Principle* in Harris 1994). Here I will go along

with the idea.[16] 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 consonants will always be onsets (VCV => V.CV), a fact that otherwise must be explained by invoking a notion of onset maximization, but it also disallows words 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:

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

Given the principle of Coda Licensing all final consonants are onsets, which must come with an empty nucleus. Hence, languages that have a negative setting for the parameter in (25a) cannot have words that end in consonants.[17] (25b) says that internal empty nuclei are 'allowed' if they are **Properly Governed**. Proper Government holds if an empty nucleus is followed (or preceded[18]) by a nucleus that is 'audible' (or, more technically, that is unlicensed[19]). 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**.[20]

Let us now look at how we can account for the finality of superheavies in Dutch. If (25b) is universal, we would expect to find superheavy syllables word internally, since the string in (26) looks well-formed:

16 For a different view, see Polgárdi (1998).

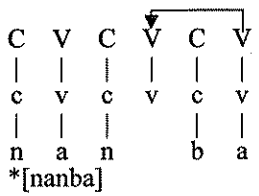
17 Kaye (1990) argues that allowing a final consonant is independent from allowing closed syllables.

18 Proper government is usually taken to be right-headed ('iambic'). In section 7.1, I discuss the option of left-headed (trochaic) government.

19 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.

20 Audibility is seen as resulting from phonetic interpretation rather than from inserting an element.

(26)

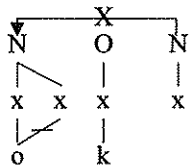


*[nanba]

But if we wish to ban medial tense vowels followed by an apparent closing consonant, (26) cannot be a well-formed representation. So what is wrong with it?

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 his analysis, these languages do not have closed syllables. All apparent codas are analyzed as onset followed by an empty nucleus. For arguments, I refer to Kaye's article. Given this analysis, long vowels cannot be said to shorten in closed syllables, rather it must be said that *long* vowels cannot be followed by an empty nucleus. This rather mysterious generalization was later shown to be a case of **government-licensing** (attributed to Shohei Yoshida): the head of long vowels needs to be licensed by a following non-silent nucleus to govern its dependent half (Charette 1990). That condition is not met in the following configuration; hence the vowel must shorten:

(27)



In Turkish and Yawelmani long vowels are thus prohibited before both internal and final empty nuclei.

If we extend this idea to Dutch, we would have to say that only *non-final* empty nuclei have the effect of laxing the 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 of turning tense

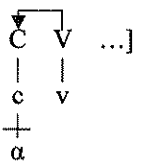
vowels into lax vowels would face the problem of there being more tense vowels than lax vowels; the process would have to neutralize the distinction between high and mid round vowels. If this is indeed undesirable, we could simply have a constraint that bars tense vowels before a **non-final** empty nucleus, without assuming a 'repair' that makes them lax. The difference between tense and lax vowels in Dutch is purely distributional. There are no tense-lax *alternations* (comparable to long-short *alternations* in Yawelmani and Turkish). Hence a laxing rule is not required. According to this reasoning, the structure in (26) would simply be rejected as ill-formed. Alternatively, one might say that there *is* a repair, viz. realizing the empty position as a schwa. Indeed *nanəba* would count as a well-formed word; cf.:

(28) molecuul 'molecule' [moləkül]

Whatever the merit of this analysis, it seems obvious that it does not really explain the absence of tense vowels before empty nuclei. Since in my proposal tense vowels in Dutch are not long, it is absolutely unclear why they would need to be licensed by a following unlicensed nucleus.[21]

Let us therefore explore another route to exclude the structure in (26). Let us say that internal empty nuclei in Dutch are unable to license the *content* of their onset:[22]

(29) a. A licensed non-final empty nucleus cannot license any onset content

b. 

In Government Phonology it is in general assumed that every onset must be

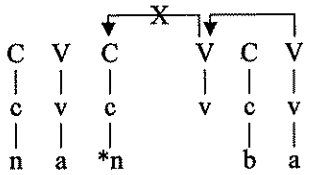
[21] Kaye rejects the parallelism between languages like Yawelmani and Turkish, and English primarily on the basis of the fact that vowel shortening occurs both before final and internal empty nuclei, while, in English, final superheavy syllables are allowed. English is more like Yawelmani/Turkish than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

[22] I am grateful to Klaus Abels for suggesting that the illformedness of the structure in (26) might have something to do with the consonant preceding the empty nucleus.

licensed by a following nuclei (The Onset Licensing Principle). In particular, apart from The Onset Licensing Principle, 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, specifically nuclei that are non-empty or licensed. Thus, it has been demonstrated that nuclei can differ in terms of their licensing potential such that full vowels can license the full array 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 with respect to their licensing potential (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 (26), repeated here as (30):

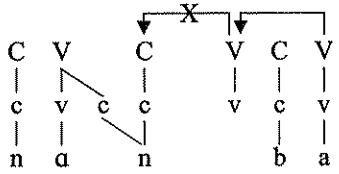
(30)



Again, we might assume that this structure is illformed and thus rejected, or that it is rescued by realizing the empty nucleus as schwa (cf. 28).

So far so good. But now we have to account for the fact that a lax vowel *can* occur in a similar structure:

(31)

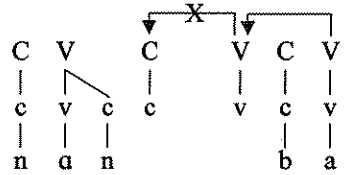


This is the point where the distributional difference between tense and lax vowels, that we captured in terms of a difference in subcategorization, crucially enters the picture. Assuming the right-headed geminate representation for 'single' consonants that follow a lax vowel, we might now say that (31) does not violate (29), because the content of the onset preceding the non-final empty nucleus is co-linked to the preceding coda position. In fact, it would seem that this follows from the 'inalterability constraint' proposed in Hayes (1986). According to this constraint a geminate structure is not

affected by a constraint or rule unless specific reference is made to the doubly-linked structure. Since the constraint in (29) makes no reference to geminate structures as such, it is not applicable.[23]

An even nicer account arises, perhaps, if we adopt the 'closing consonant' representation that we considered in (10a). If consonants that follow a lax vowel are 'attracted' into the coda position, the constraint in (29) is simply not violated, and we do not need to rely on an 'inalterability constraint' at all:[24]

(32)



I conclude therefore that the uniform closing consonant analysis gives the best account for consonants that follow lax vowels. Thus, we can also select (15b) over (15a) for lax vowel-consonant sequences in final syllables.

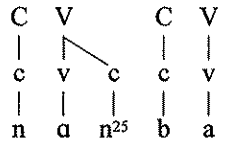
This, then, is the Government-style analysis that I wish to propose. In the next section I will consider two alternatives.

4 Alternatives that do not seem to work

4.1 No empty nucleus between consonant clusters with a falling sonority profile

One might say that for a sequence like [nɑmba] there is no need for an empty nucleus in the first place because lax vowels can occur in closed syllables:

(33)



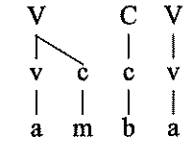
[23] One could imagine that the empty nucleus in (31) is realized with a schwa in order to allow satisfaction of (29).

[24] I leave it for further research whether the consonant position that precedes the empty nucleus is somehow interpreted in terms of the content of the coda consonant, so that, in effect, the representation in (11b) may be relevant.

[25] The nasal would in that case be homorganic with the following stop, hence /m/.

But even though the structure in (33) is of course well-formed, and, in fact, entirely plausible, given an intervocalic sequence of falling sonority, the theory still needs to explain why the structure in (26) 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 (as Dutch apparently does; cf. 12). This is an interesting idea since it does not only rule out (26), it would also render (29) 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) *



According to this reasoning, 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 (26) 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, discussed in section 5. But before I turn to these facts let me sketch another alternative that, perhaps, might strike one as even simpler. This idea too, will be shown to be incompatible with the same data that frustrate the suggestion that we just considered.

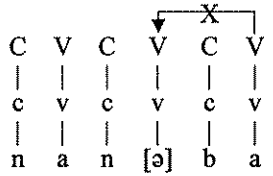
4.2 Suppose there is no Proper Government in Dutch

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.

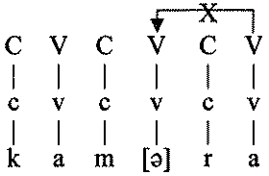
If empty nuclei are allowed but there is no proper government, the form in (26) would be realized with a schwa vowel in the third nucleus, which is a possible word in Dutch (cf. the words in 28):

(35)



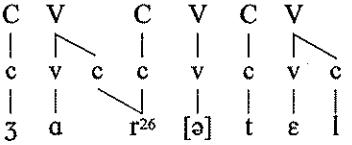
Likewise, when a lax vowel is followed by a rising sonority cluster a schwa *must* emerge:

(36) <camera> 'camera' [kaməra]

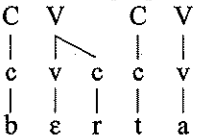


However, following a lax vowel we find that there is a potential contrast:

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



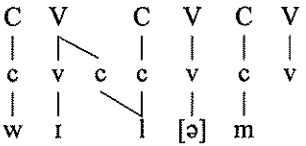
b. <Berta> (proper name) [bɛrta]



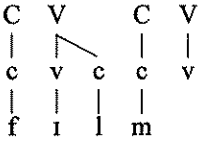
A contrast also arises in the following pair that involves a word-final consonant sequence:

[26] In this case, the onset content is licensed. In fact, onset content is obligatory here since schwallables must have an onset.

(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 surrounding empty nuclei are 'free', i.e. that no restrictions hold on the consonants 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):

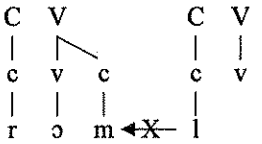
(39)

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

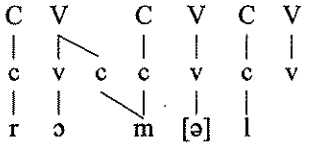
In (39b), I have included the examples that demonstrate the potential contrast between presence and absence of schwa.[27] Next to *film* we do not find **roml*, because in that case /m/ and /l/ cannot form a coda-onset sequence; cf. (40a). Hence this string could only be analyzed as in (40b) and thus emerge as [rɔməl].

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

(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 two alternative analyses that we have just explored.

5 Why Proper Government is necessary

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

(41)

sonorant - obstruent

parkiet	bamboe	portret
kalkoen	agenda	pelgrim

sonorant - sonorant

r – nasal	*l – nasal*	*nasal – nasal*	*r – l*	**l – r*
marmot	almanak	hymne	charlatan	.....
ornaat	halma	amnestie	Carla	
Soekarno	kelner	omnibus	orlam	

**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	butler	

obstruent - obstruent

fric – fric	*fric – stop*	*stop – stop*	** stop – fric*
asfalt	kaftan	wodka	bliksem
fosfor	kristal	reptiel	oksel
Pascha	asbest	Egypte	absurd

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 fail to meet this requirement and the clusters can thus not be coda-onset sequences (cf. 43a). The structure in (43b) is also ruled out because the consonant sequences do not form proper onsets which are always preceded by a tense vowel (cf. 42)[28]:

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

(43) a. *

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

b. *

C	V	C		V	
c	v	c	c	v	...
b	ɪ	l	j	ɛ	t
kr	ɛ	m	l	ɪ	n
d	ɔ	g	m	a	
	ɑ	t	l	e	t

This means that these words require an intervening empty nucleus **which is silent**, which implies that Dutch must have Proper Government:[29]

(44)

C	V		C	V	C	V	
c	v	c	c	v	c	v	
b	ɪ	l			j	ɛ	t
kr	ɛ	m			l	ɪ	n
d	ɔ	g			m	a	
	ɑ	t			l	e	t

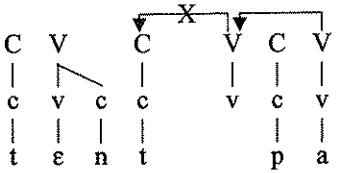
If silent empty nuclei are possible, the analysis suggested in section 4.2, which relies on Dutch not having Proper Government cannot be correct. As for the other suggestion, explored in section 4.1, viz. that empty nuclei do not arise in between consonants that form a falling sonority sequence, whether 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 and this means that our original analysis still stands.

[29] 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.

6 VCC

In section 3, 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 (29). Hence, such a structure would either be rejected or interpreted with a schwa, which would indeed give us a well-formed word (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[30] 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 the final C will 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 exceptions 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)

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 (15b) over (15a). As shown in van der Hulst (1984), final $V_LC]$ does not count as a branching foot.

[30] The choice is predictable but I do not discuss the details here; cf. van der Hulst (1984).

Adopting the structure in (15a) would, however, depict final $V_LC]$ as a branching foot. Therefore, I conclude that the 'closing consonant' analysis of consonants that follow lax vowels is superior.

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

Zonneveld (1993) 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 words like *algəbra* and *rommel* can be seen as derived (because schwaless parallels are illformed sequences), but the ones in (36a) cannot because of the (relevant) contrast with the words in (36b).

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

(47)	<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>.[31] 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 a 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 in 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.[32]

[31] Nancy Ritter suggests 'comb' and 'coma' as another example.

[32] In RcvP, it is not obvious how a schwa *can* be represented as non-empty. This, as

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.[33] Kager and Zonneveld (1983) draw the conclusion that schwas behave like 'word boundaries'. However, as argued for in Cyran (2002), it would be more plausible to say that schwas do not have enough 'body' to license complex onsets. A fuller discussion of 'schwallables' form part of van der Hulst (in prep.)

8 Conclusions

We have shown that Dutch must have internal empty nuclei in order to account for the presence of medial consonant clusters that show a rising sonority profile (while not being complex onsets). A crucial challenge was 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 content. Lax vowels can be followed by an empty nucleus because they 'attract' the content of the following onset that precedes the empty nucleus.

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

Meanwhile, various further issues 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/. For details on these, and other issues, as well as for discussion of alternative government-style analyses that adopt slightly different principles, such as the strict CV framework proposed in Lowenstamm (1996, 1999), I must refer to

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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.

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

van der Hulst and Ritter (in prep.).

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