Licensing constraints in phonology[1]

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Abstract

In this article I firstly propose a general framework for formulating interconstituent relations that either 'license' or 'govern' the occurrence of empty-headed or branching constituents. The Government Phonology literature has put forth a variety of such relations, with different terminology being used by different authors. Here I suggest that the common function of all these interconstituent relations (which I simply all call interconstituent licensing constraints) is to control the distribution of 'marked' syllabic constituents (onsets and rhymes), where by 'marked' I refer to constituents that are empty (−1) or branching (+1), both deviating from the unmarked constituent that contains exactly one (1) segment. Allowing for some parametric variation, I show that each marked constituent must be licensed by the immediate following constituent as well as by the following constituent of the same type on the relevant projection: O←R, R←O, R←R, O←O. In all cases the licensor (to the right of the arrow; all relations are right-headed) cannot be empty-headed. Since the licensees are either empty-headed or branching, we arrive at eight types of licensing constraints. The discussion shows that of these eight, relations in which the licensee is an O, especially a branching O, are the least needed. The discussion of interconstituent licensing constraints is concluded by a brief discussion of long vowels (argued to be sequences of two rhymes, the second of which is empty) and a brief discussion of how cross-linguistic differences in the applicability of interconstituent licensing constraints should be handled. A tentative proposal is that OT-style ranking can be understood as a case of

1. I wish to thank Inkie Chung, Nancy Ritter and Tobias Scheer, and two anonymous reviewers for useful comments on an earlier version of this article. My understanding of these issues is also due to the discussion in a workshop on licensing in Vienna (October 31, 2002) where a rudimentary version of this paper was presented.

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dependency relations between licensing constraints. Secondly, this article will propose a framework for edge licensing constraints, that is constraints that license the occurrence of marked, especially empty-headed rhymes at the left and right edge of words. A tentative proposal involves the idea that such rhymes, rather than being empty, contain an 'anti-element'.

1. Introduction

In this article, I wish to propose a unified notion of licensing in phonology. I couch the proposal within the framework of Head-driven Phonology (van der Hulst and Ritter 1999, in prep), but I believe that the underlying idea generalizes to other representational frameworks. The framework of Head-driven Phonology combines insights from both Dependency Phonology (Anderson and Ewen 1987) and Government Phonology (Kaye, Lowenstamm and Vergnaud 1985, 1990). Models of this sort have proposed important changes in the conception of phonology as initially set up in Chomsky and Halle (1968; SPE). In this SPE conception, phonology is a theory about the mental or cognitive representations that underlie the production and perception of the outer form of language (being acoustic or optical events). SPE regarded this phonological representation as the 'underlying representation' and an important aspect of this theory involved the idea that this underlying representation had to be mapped into a 'surface or phonetic representation' by means of a set of, partially extrinsically ordered, rules. Both underlying and surface representation were stated in terms of sequentially ordered unstructured bundles of distinctive (articulatory) features. The surface representation, despite being called 'phonetic', was assumed to also be a cognitive representation, one that was 'close' to the phonetic reality of articulatory actions. Hence some sort of implementation system taking the phonetic representation to actual motor commands was assumed, and, presumably, a system taking a psycho-acoustic (or perceptual) representation to the surface phonetic representation, but both systems were not considered part of phonology proper. Given the articulatory nature of phonological features, for perception, this approach would then rely on a version of *the motor theory of speech perception* which claims that the identification of phonological units (being articulatory features) involves a 'reconstruction' of the articulatory events that caused the acoustic events that are being perceived. (In the case of sign languages, this theory is actually easier to understand since the articulation of the optical signal is itself visible.)

Both Dependency and Government Phonology (the latter more explicitly than the former), move away from the idea that there are two phonological levels, one underlying, and the other more surface-like. Instead, a single phonological level is postulated that is both the input to a system of phonetic (articula-

tory) implementation and the output of a perceptual system. In this *monostratal* and indeed *minimal* (Harris 2004) view of phonology there are no extrinsically ordered phonological rules. (The step of phonetic implementation (production) and phonetic decoding (perception) do not involve rules that produce a new level of representation; rather implementation and decoding directly link the phonological representation to the (psycho-)acoustic (or optical) signal in both directions.) Rather 'rules' (or whatever we call them, 'constraints', 'principles' or '(set) parameters') state the conditions for wellformedness of phonological expressions, and are not extrinsically ordered.

But even constraint-based models must deal with alternations. In a constraint-based approach, three basic approaches can be taken. Paradis (1988) and Calabrese (2005) combine constraints with *repair rules*. If a monostratal perspective is maintained, one could refer to such operations as intra-level operations, as opposed to operations that map one level into another (Goldsmith 1993). The latter, called inter-level operations, are not considered necessary in monostratal models. A second approach makes no appeal to repair rules, but rather builds the alternation into the lexical representation of the morphemes by allowing *disjunctive representations* (which includes underspecification), and approach that essentially goes back to the design of Natural Generative Phonology (Hudson 1974, Hooper 1976, van der Hulst 1977). Another constraint-based approach, Declarative Phonology (Scobbie 1997; Scobbie, Coleman and Bird 1996), offers, in my view the best way to formalize this disjunctive approach and thus it is my preferred choice to implement the monostratal aspirations of Government, Dependency and Head-driven Phonology. A third approach to alternation in a constraint-based model uses *constraint ranking* as in Optimality Theory (Prince and Smolensky 1993). OT offers an alternative to parameter setting by replacing choices between values by choices between rankings of independently motivated wellformedness constraints. To deal with alternations, OT ranks 'faithfullness constraints' (essentially 'anti-repair constraints') among each other and also with reference to the wellformedness constraints. For a critical assessment of OT's approach to alternations I refer to van der Hulst and Ritter 2000, 2002; van der Hulst 2004). It remains to be seen whether this idea can be developed in an interesting way to deal with crosslinguistic variation in the applicability of licensing constraints, perhaps in terms of dependency relations between such constraints, or blocks of constraints (see section 8, and van der Hulst, in prep.).

Dependency, Government and Head-driven Phonology do not only differ from the SPE-conception in terms of rejecting the notion of 'phonological derivation', they also have dramatically different views on *the nature of the phonological representation* itself. In SPE, features are binary valued (articulatory) entities, packed together into unordered bundles that are merely sequentially organized.

DP, GP and HDP postulate monovalent defined primes (that include an acoustic definition). As might be expected, several different proposals for the set of monovalent phonological primes are around. GP work has concentrated on reducing this set to as few as 6 'elements' (see Ritter 1997 for discussion and a proposal). In my own work (referred to as 'Radical CV Phonology), which follows ideas of DP, I have suggested that just two primes ('C' and 'V') are sufficient, granted that we allow a certain amount of grouping. I refer to van der Hulst (2000a, b, 2005, in prep.) for full statements of this position.

In addition to having specific views on the primes of phonology, these three approaches propose that constellations of primes (characterizing the intrasegmental structure of 'segments') associate to slots that are terminal nodes of hierarchical structures whose lowest constituents are onsets and rhymes (and/or nuclei). These notions (monovalent primes, intrasegmental grouping and suprasegmental grouping) were initially proposed in DP in the early seventies (Anderson and Jones 1974). Within 'mainstream' phonology only intrasegmental grouping and suprasegmental grouping, proposed in work that ignored DP proposals, became generally accepted (see van der Hulst 2004 for a brief historical review of post-SPE developments).

With regard to constraints bearing on the suprasegmental structure, Kaye, Lowenstamm and Vergnaud (1985; KLV) propose a distinction between *interconstituent* and *intraconstituent* relationships. The latter regard the head-dependency relationship between a constituent head and its dependent. In this article, I will refer to this relation as *government*. We find this relationship within branching syllabic constituents between, for example, onset head and onset dependent, between the strong and weak rhyme within a foot, and between the strong and weak foot within a larger unit, let us say the phonological word (cf. below). As for interconstituent relationships, KLV proposed a variety of types and then others were added in later work (e.g., Charette 1990). Some of these relations hold between two constituents, and some between the head of one constituent and the dependent of another, and a variety of labels can be found such as 'proper government', 'coda licensing', 'government licensing' and so on. The interconstituent relationships contrast with government (in the sense just defined) in not being part and parcel of a hierarchical constituent organization; they are, in a sense, 'flat' relationships.

Different authors define terms like 'government' and 'licensing' in different ways. Van der Hulst and Ritter (1999) make an attempt to arrive at a typology of both hierarchical and flat relationships. Details aside, they claim that all such relations are *head-dependency relations*. They propose to name the resulting approach *Head-driven Phonology* to underline the central importance of the notion 'head'. Scheer (2005) refers to the flat relations as *lateral relations* and he distinguishes between government and licensing. Government accounts for the absence of segmental content, while licensing accounts for the

presence of segmental content (see Cyran 2006 for a discussion of Scheer's theory).

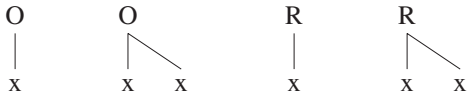
The proposal in this article is to suggest that all the interconstituent, i.e., lateral relationships (which, recall, do not define a constituent of any sort) can be subsumed under a single, overarching principle: they all serve the common goal of restricting the markedness of phonological sequences. I propose that in all cases the occurrence of a marked syllabic constituent requires the local licensing by a contentful constituent. My common denominator for this class of head-dependency relationships will be (*interconstituent*) *licensing constraints*. A marked constituent deviates from an unmarked constituent in either of two ways. I take an unmarked constituent to be an onset or rhyme that contains precisely one (1) segment. Given this definition, both an *empty constituent* and a *branching constituent* are marked. The former is one segment short (-1), whereas the latter has one segment too many ($+1$). Any occurrence of a -1 or $+1$ constituent requires the occurrence of an adjacent (specifically following) constituent that minimally contains one segment, and perhaps sometimes requires two segments (≤ 1). (Instead of using the term 'marked' I could use the term 'complex', but it strikes me as counterintuitive to refer to an empty constituent as being more complex than a contentful constituent.)

The theory that I envisage thus has at least two types of dependency relations, government (hierarchical) and licensing (flat, as just defined). These two types of dependency relationships do not exhaust all necessary head-dependency relationships. In addition, intrasegmentally, we must deal with relationship between primes or prime groups that account for the make-up of the segmental inventory (*inventory constraints*). We also need a type of relationship that captures the effect of vowel, nasal or tonal *harmony*, i.e., so-called unbounded 'spreading', and certain other content interactions between segments. I will label this type of relationship, which mediates between intra- and suprasegmental structure, *agreement constraints* (cf. van der Hulst and van de Weijer 1995; Piggott and van der Hulst 1997 for a discussion of the issues surrounding vowel harmony and nasal harmony, respectively). At higher levels in the hierarchy, in particular in the relationship between rhymes and feet, we have relationships that define restrictions on what may occur in head or dependent positions; we could refer to these *head-dependent asymmetries* in terms of *dominance constraints* (Dresher and van der Hulst 1998, van der Hulst and Ritter 1999). However, in this article, as of Section 3, I will confine my attention to licensing constraints. First, in Section 2, I will lay out the kind of hierarchical objects I assume.

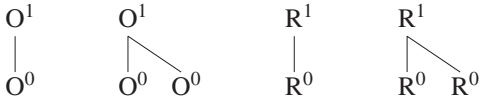
2. The framework

2.1. Syllabic constituents

Following Dependency, Government Phonology and Head-driven Phonology (Anderson and Ewen 1987; Kaye, Lowenstamm and Vergnaud 1990; van der Hulst and Ritter 1999; van der Hulst, to appear b), I assume the syllabic constituents *Onset* (O) and *Rhyme* (R), both maximally binary branching units. Given that this is so, we find four types of syllabic constituents:

(1) 

Note the absence of a 'nucleus' constituent (cf. below). Van der Hulst and Ritter (1999, in prep.) suggest a different notation for the units in (1):

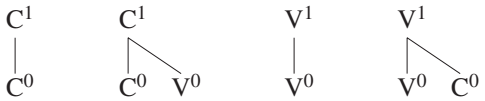
(2) 

The use of superscripts correctly reveals that syllabic constituents are maximal projections from their heads, while it also shows that 'complements' are minimal level units rather than, as in syntax, maximal projections. This accounts for the *non-recursive* nature of syllabic structure.

In Radical CV Phonology, the following notation is suggested, consistent with the claim that syllabic constituents (like segments themselves) are defined in terms of the primes 'C' and 'V':

(3) 

Here, it is expressed that onsets and rhymes are consonantal (specifically obstruents) and sonorant (specifically vocalic) projections, while complements have the opposite bias when compared to their heads. I suggest the following 'marriage' between (2) and (3):

(4) 

We do not, however, need to abandon familiar terms such as onset and rhyme as long as it is understood that their formal definition is as in (4).

Government Phonology furthermore postulates that:

(5) a. Os and Rs occur in strict alternation
b. Each word starts with an O
c. Each word ends with an R

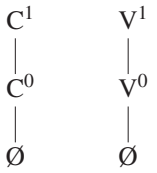
In other words, a word is defined as (where '*' means 'one or more'):

(6) (O R)*

Government Phonology does not assume a syllabic unit or node despite frequent reference to 'onset rhyme packages' (cf. 6).

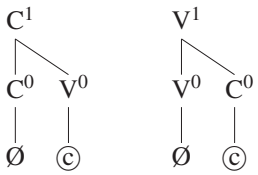
(5) and (6) together enforce the presence of so-called *empty-headed syllabic constituents* in those cases where words start with vowels or end in consonants, which brings the total number of constituents to 6:

(7)



The symbols 'Ø' and 'ⓒ' (cf. 8) represent the absence and presence of segmental content, respectively. The structure on the right is what in GP is often called 'an 'empty nucleus'. I will call it an empty-headed *rhyme* (meaning: the head position is present, but has no content). I avoid the term 'headless' because that term is, strictly speaking, inconsistent with the fundamental idea (in DP, GP and HDP) that all constituents *must* have a head. I will also not use the term 'empty rhyme' or 'empty onset' because the issue of having no segmental content in the head position does not entail that the rhyme is completely empty. We must also consider the following empty-headed structures:

(8)



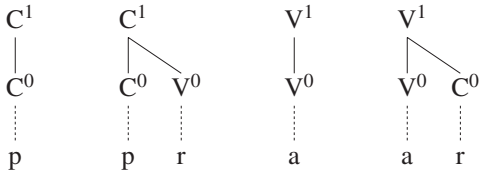
The structure on the left is an onset that consists of a sonorant consonant only, whereas the latter is a rhyme that consists of a sonorant consonant only; the sonorant consonants in both cases will be called *pseudoheads*. The second structure refers to the familiar notion of a 'syllabic consonant' (and I claim here, without further discussion, that only sonorants can be syllabic). I will not deal with the structures in (8) here (cf. van der Hulst, in prep.) but I will briefly

return to the distributional properties of these pseudo-heads below. In the remainder of this article I will mainly focus on empty-headed constituents that contain no (contentful) dependent, i.e., the structures in (7), as well as those in (4). Below, instead of *empty-headed* and *full-headed* I will also use *silent* and *audible*, respectively. (Empty dependents cannot exist in this model; if there is no content, there is no dependent node because dependents are never obligatory, unlike heads.)

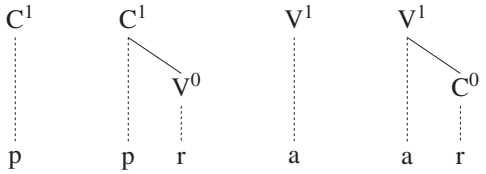
With reference to the first structure in (7), we need to clarify what this stands for: an onset that has no content. It has been argued, however, that a distinction can (and must) be made between silent onsets with and without a skeletal position. The former are onsets that are 'truly' empty, whereas the latter represent silent onsets that *behave as if* there is a consonant present (as, for example, so-called in the h-aspiré cases in French and various cases in Turkish; cf. Denwood 2006). This raises the question as to whether the first structure in (7) stands for the first or the second case. If we would say that it stands for the second case, then we must assume that it is, in fact, possible to have a C^1 node that does not dominate a C^0 node, namely to represent truly absents onsets. But if that is somehow inconsistent, we would have to assume that in the OR sequence O's can be missing (i.e., the truly empty ones).

I am strongly inclined to the view that there is an inconsistency in allowing ('drawing') a constituent that has no head *position*. Thus, if we would say that the first structure in (7) represent 'ghost' (i.e., 'as if') consonants, we would have to conclude that O's can be absent. Having said this, a comment should be made on a notational practice that is used in DP, which uses 'dependency graphs' rather than the more familiar constituent graphs. Hence, instead of the constituent graphs in (9a) the dependency graphs in (9b) would be used:

(9) a.



b.



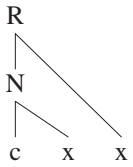
In this article, I am not using the dependency-graph-notation, but we should note that this notation excludes distinctions between empty-headed constituent with and without 'skeletal positions'. Although, I am not pursuing this issue

here, I would ultimately prefer the more minimal notation in (10). Consequently, I would be *forced* to conclude that if a distinction between truly empty onsets and onsets with ghost consonants must be made, the representation of truly empty onsets simply involves the complete absence of the onset node. Given what I remarked earlier about the inconsistency of allowing empty dependents, this conclusion follows also from the fact that onsets can be seen as dependents of the rhyme if a syllabic constituents that groups both together *is* assumed.

If we would favour the idea that truly empty onsets are simply absent onsets, there is one issue that then remains unaddressed which is the fact that onsets, although being dependents and thus not obligatory like heads are, are in fact preferred and in many languages obligatory nonetheless. I suspect that this fact requires an independent explanation which cannot be found in the head-dependent organization of syllables as such. It seems to me that the enforcing principle is, as in the case of foot structure, grounded in *rhythm* which exists by virtue of an alternation in prominence of some sort. This alternation can be brought about by the relative amplitude of onsets and rhyme or of weak and strong syllables.

Even though, then, we could (and perhaps should) adopt the idea that truly empty onsets are simply absent onsets, there are certain facts that suggest that the absence of onsets requires the same kind of licensing that seems to be required for pseudo-empty, i.e., ghost consonant onsets. For this reason, I will follow the 'party-line' in this article and assume that the alternation of Os and Rs *is* without exception. Hence, I will represent ghost onsets as in (7), with a skeletal position (C^0) and truly empty onsets as a bare constituent node (C^1). Even though I am not really content doing this, it seems to lead to a more consistent framework of licensing constraints.

Kaye, Lowenstamm and Vergnaud (1990) also postulate another syllabic constituent, the nucleus, which may or may not branch. The nucleus occurs under the rhyme node. They furthermore wish to limit the number of segments per rhyme to two, which means that the following structure must be ruled out:

(10) * 

To this end, KLV propose that a head must govern its complement under 'strict directionality' and strict adjacency'.

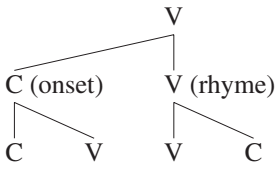
Van der Hulst and Ritter (1999) have proposed to eliminate the rhyme – nucleus distinction altogether, a proposal that I will here take as valid. In Sec-

tion 6, I will argue in favour of the major ingredient of this proposal: a bi-rhymal account of *all* so-called long vowels and diphthongs.

Languages, of course, differ in terms of the complexity of their syllabic constituents. Such differences, then, are *parametric*. They can be accounted for in terms of straightforward parameters that directly refer to branchingness or headlessness. Cyran (2003) proposes to deal with the differences that involve allowing or not allowing branching constituents in terms of strength requirements on licensors, the idea being that the presence of a branching constituent in some language calls for the presence of a licensor of a certain minimal 'strength'. I make no commitment to this idea in this article, but, I will return to it below.

Having made reference to the theory that Scheer (2005) proposes, let me make this brief survey of Government Phonology a bit more complete by including that Scheer's model is fundamentally based on the proposal made in Lowenstamm (1996, 1999) to completely exclude branching syllabic constituents, reducing the inventory to the first and third structure in (1). I do not follow that idea here, accepting the more traditional claim that branching onsets and rhymes are genuine phonological objects, but I refer to van der Hulst (in prep.) for an expression of Lowenstamm's 'radical' idea within Radical CV Phonology. Briefly, in RCVP, a syllable is represented as follows (cf. 3):

(11)



The simplest type of language does not allow branching (nor empty-headed) constituents so that each constituent has exactly one skeletal position, or 'one segment'. This is a 'strict CV' language. In RCVP this type of language would only have one occurrence of the CV unit. If branching is allowed for both onset and rhyme we get a combination of two CV packages (combined into a higher-order CV unit). But instead of having CVCV, we get CVVC, with an apparent 'reversal' of the second package. It is interesting that an in depth analysis of languages that do *not* seem to allow branching constituents appears to benefit from postulating CVCV templates (i.e., packages of two CV units); see for example Denwood (2006). It is tempting to speculate that there is a deep connection between Denwood's CVCV templates and the CVVC syllabic template that I suggest for languages with branching constituents, and I suggest that an interesting typology of syllable structure types could be developed on the basis of Lowenstamm's idea that the basic unit is strict CV (which, as shown is not incompatible with RCVP), while accepting the further idea that templates can

be formed by combining two CV units as either a CVCV templates (Turkish, Mongolian) or CVVC templates (Dutch, English). (A language that only allows apparent branching rhymes, showing CVC, would, in fact, be a CVCV language that allows empty-headed rhymes.)

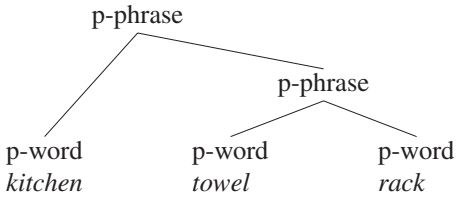
2.2. Higher phonological constituents

Before discussing the lateral relationship of licensing (which will account for the distribution of -1 and $+1$ constituents), we need to define the domain within which this relationship holds. I suggest that the domain is the *phonological word*.

The notion 'phonological word' is understood as a phonological string or domain that does not *require* morphological complexity, although it *can* be morphologically complex. Let us refer to this notion of word as *p-word*. In the terminology of Kaye (1995) a p-word is a **non-analytic domain**. The wellformedness of p-words is subject to phonological constraints only. Morphologically complex p-words involve so-called *cohering* (or 'level one') affixes (cf. Booij 1983).

In some languages, words in this sense (all of them, or only those belonging to major categories) are subject to a *minimal size restriction* such that a single CV string is too small to be a p-word. (This is one way in which the 'Turkish' CVCV template, discussed in the previous section, is motivated. It must be added that 'CVVC' languages, like English, may require that monosyllabic words contain the VC unit, a branching rhyme, but never seem to require that monosyllabic words contain a branching onset.) It is conceivable that there are, in addition, parameterized or universal *maximal size restrictions* on p-words, i.e., that the p-word is not an unbounded domain (cf. Helsloot 1993). If, for example, p-words are maximally binary (in terms of the number of feet), this would imply that p-words can be no longer than four OR-units. The English word *hippopotamus* would then be too long to be a single p-word, unless we allow an 'extraprosodic' final syllable, or limited ternarity. Van der Hulst and Ritter (2002) and van der Hulst (2003) suggest that in addition to p-words, two other phonological domains are necessary to account for the phonological wellformedness of 'syntactic words' (this is words as primitives for syntax, including all words that are morphologically complex due to derivation, compounding and inflection). Generally, members of compounds form separate p-words, organized into a domain that we might call the p-phrase. P-phrases are binary units (like, by hypothesis, all phonological, if not all linguistic, units) which means that compounds with more than two p-words must have recursion (showing that recursion in phonology occurs *iff* enforced by the morpho-syntax):

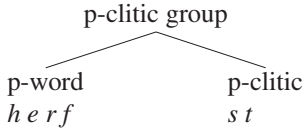
(12)



Complex p-phrases are headed and the phonetic exponent of headedness is (compound) stress (Rischel 1972; Liberman and Prince 1977). P-phrases can also be formed by non-compound words that contain a so-called 'heavy (or non-cohering or 'level two') affix', as in the English words *childhood* and *overdone*. Multiple embedding produces multiple prominence level, which, in practice, need not surface in the phonetic interpretation due to rhythmic principles (cf. Giegerich 1985; Visch 1989); this, in turn, calls the above-mentioned recursive structure into question, but that issue cannot be pursued here.

Between the p-word and the p-phrase lies the p-clitic group, which is typically formed by inflected words, or derivational affixes that are neither included within the p-word domain, nor heavy (such as English *-er*, or *-ing*) A p-clitic is a stretch of phonological material that cannot form a p-word, while, at the same time it does not cohere to the p-domain of another adjacent morpheme. In marginal cases, the p-clitic is not itself a morpheme, but rather a stretch of segments that simply cannot occur at the edge of a p-word; elsewhere such stretches have been called 'appendices' or 'extrasyllabic'. This is illustrated with the Dutch simplex word *herfst* 'autumn':

(13)



(I will leave undecided whether p-clitics can be heads and thus bear stress.) In the terminology of Kaye (1995), p-phrases and p-clitic groups are **analytic domains**. Polgárdi (1998) likewise proposes a principled distinction within the analytic domains between what I have called p-phrases and p-clitic groups. P-clitics can also be formed by two syntactic units, if one is a 'weak word (or syntactic clitic), i.e., a syntactic word that does not form an p-word by itself, typically articles (like *de* and *het* in Dutch or *le* in French), pronouns, prepositions or auxiliary verbs.

In this article, I will focus on the p-word domain and the interconstituent licensing relations that hold here. My goal is to unify the relationships that have been proposed in the Government Phonology literature. Subsequently, we will investigate special segmental options at the edges of the p-word.

3. Licensing empty-headed syllabic constituents

I have suggested that branching constituents as well as empty-headed constituents are *deviations* from the ideal, i.e., unmarked one-to-one relationship between constituents and segments (giving a regular CV string) and I have said that I will argue that such deviations need *licensing*, i.e., once parametrically allowed, the distribution of branching and headless constituents is typically not free. It turns out that in all cases this licensing can come from the presence of a contentful structure that follows the marked structures, so that in effect more marked and less marked structures alternate. At a general level, this makes sense. Marked structures are tolerated (in various degrees in different languages depending on parametric choices), but to prevent an accumulation of marked structures (and thus articulatory and perceptual obstacles), unmarked or less marked structures are required to intervene as licensors of the marked structures. We will see that the required licensor can, in some cases, be branching (thus marked itself). However, it cannot be empty-headed. In addition, we will see that structures that owe their markedness to being empty-headed *must* always be licensed, whereas certain types of branching structures, notably branching onsets are less demanding in this respect. Hence, empty-headed structures are doubly restricted: they must be licensed to the fullest degree and they cannot be themselves licensors. This strongly suggests that empty-headed constituents are more marked than branching constituents, a result that is intuitively unsurprising, but (so far) formally unexplained.

This section deals with licensing of empty-headed constituents. I show that licensing operates at two levels, between constituents of the same type (foremost between an empty headed rhyme and the immediately following rhyme) and between unlike constituents, that is, between O's and immediately following R's (and vice versa). The two types of interconstituent licensing are called *homogeneous* (Section 3.1.) and *heterogeneous* (Section 3.2.) respectively. Section 4 deals with both types of licensing with reference to branching constituents. Our results are summarized in Section 5. Section 6 deals with 'long' vowels and proposes that such events involve two adjacent rhymes, rather than a branching syllabic constituent. In Section 7, I investigate to what extent licensing constraints are 'parametrized', while Section 8 briefly looks at extra distributional properties of empty-headed and branching constituents at the edges of the p-domain, which leads to recognizing the notion of *edge-licensing*. Section 9 offers my main conclusions.

3.1. Homogeneous licensing

Let us now turn to the first type of deviation from the ideal, strict CV situation: empty headedness. A cornerstone proposal of GP lies in a principled account of the occurrence of so-called 'empty(-headed) nuclei'. To control the distribution of such entities, Kaye, Lowenstamm & Vergnaud (1990) propose that they can only occur as such if the following nucleus can license the empty-headed nucleus. Empty-headed rhymes are especially valuable in accounting for vowel–zero alternations. Such rhymes remain silent if licensed, while being filled, i.e., audible, if not licensed. They call the relevant form of licensing *Proper Government*. If no such licensing is possible, the empty-headed nucleus is 'phonetically interpreted' so that it is not phonetically silent, but instead *audible*. We could regard this 'phonetic interpretation' as a *repair strategy* (i.e., due to *intralevel* rules in the sense of Calabrese 2005) which involves the addition of a phonological element (sometimes called the 'cold' vowel, but it is also possible for full vowels to surface, as in, for example, Slavic languages). This is *not* the standard view in Government Phonology, where audibility of empty-headed rhymes is seen as a matter of 'phonetic interpretation' rather than phonological repair. (In KLV 1985 reference is made to 'ambient elements' being responsible for the realization of unlicensed empty-headed rhymes, with no explanation of what ambient means.) This 'phonetic interpretation' cannot be universal, however, since languages differ with respect to the realization of the empty-headed rhymes (which ranges from schwa-like sounds to high unrounded vowel sounds, to [u] or [i] sounds). I prefer to deal with the 'audibility' of empty-headed rhymes in terms of *disjunctive representations*. This means that the empty rhyme has a *variable element* that is not realized if the rhyme is 'properly governed (what I call licensed). Assuming the presence of a variable element in an 'empty-headed' rhyme suggest that the term 'empty-headed' is strictly speaking inappropriate. This is true, but I will continue to use it nonetheless to avoid some other elaborate term ('half-filled rhyme'?).

An empty-headed rhyme that is not licensed can act as a licensor, just like a rhyme that is lexically specified with an (invariable) element. In GP, a licensor is a full vowel *or* an empty-headed rhyme that is not licensed (hence audible). This is an unfortunate disjunction. By using a repair for unlicensed empty-headed rhymes or by using variable elements, we derive the generalization that licensors are contentful rhymes. (For his own reasons, Scheer 2005 proposes that empty-headed rhymes have vowels with a 'floating element' which we could see as a possible implementation of the idea of variable elements.)

Since I have rejected the nucleus, I will restate the constraint that triggers 'repair' in terms of the notion 'rhyme':

(14) *Empty-headed Category Constraint*
A variable element is not realized if the rhyme that contains it is licensed.

Standard Government Phonology recognizes the permitted occurrence of empty-headed rhymes in circumstances where Proper Government is not met. Below, we will see the case where apparent unlicensed empty-headed rhymes are permitted to occur finally, or, in special circumstances, initially, or even medially without having to become audible. This means that GP has invoked additional licensing principles that may be active in specific (not necessarily all) languages. I will especially discuss the cases where empty-headed rhymes that are not *interconstituentally* licensed (i.e., by locally present contentful constituents) seem to appear at p-word edges (under what we may call *edge-licensing*) or between certain types of consonants that form separate onsets (under what is called 'interonset licensing' or 'interonset government').

'Proper government' has been claimed to be impossible if intervening between the empty-headed or silent rhyme and the full-headed or audible rhyme we find a consonant cluster, either a *complex onset* as in (15b) or a coda-onset sequence (an *interlude*) as in (15c):

(15)	a.	. . . v C V	Proper Government possible
	b.	. . . v) (C C V	Proper Government not possible
	c.	. . . v C) (C V	Proper Government not possible

Charette (1990) analyzes the occurrence of non-realized schwa (schwa-deletion) in varieties of French in this framework. There has been some debate concerning the varieties that she is describing. She refers to 'Standard French' and 'St. Etienne French', but it has been suggested to me (Tobias Scheer p.c.) that the former is more properly referred to as Quebec French and the latter as Standard French. I will follow his advice. Cf. Lyche and Durand (1996) for a critical discussion of Charette's analysis of the French schwa.

The schwa in French is analyzed as an empty-headed rhyme (cf. Anderson 1982) that is not licensed; hence, in my account, it receives some kind of variable minimal element. The suppression of schwa is only possible if the rhyme in question is licensed (or 'properly governed'). The following examples illustrate the situation in Quebec French (i.e., what Charette calls 'Standard French'):

(16)	a.	rəvənu	rəv-nu
	b.	səcret	*s-cret

In (16a), the second schwa can be suppressed because it is licensed by the following rhyme /ü/. Given that the second rhyme is silent (indicated by a dash), the first schwa cannot be suppressed.

I will assume for the moment that a branching onset in (16b) (an instantiations of the case in 15b) blocks the occurrence of a silent empty-headed rhyme to its left. A case that instantiates (15c) is not available, given that schwa does not occur in closed syllables to begin with. Schwa in open syllables alternates with a full vowel in closed syllables. It would seem that intervening CC clusters indeed block Proper Government, but it must be added that the cases to support this idea are not abundant. (In fact, Tobias Scheer informs me that *s-cret is* possible in Standard French.) Henceforth I will refer to 'proper government' as **RR-licensing** (i.e., licensing from rhyme to rhyme).

Given the apparent need for RR-licensing, one might ask whether we also need **OO-licensing**, i.e., the licensing of an empty-headed onset by a subsequent full-headed onset. Some sort of OO-licensing (often called 'interonset government/licensing') has indeed been exploited in various GP analyses, but not to account for the occurrence of silent onsets. OO-licensing has instead been used as a relationship between two full-headed onsets that licenses intervening empty-headed rhymes that are not 'properly governed' but nonetheless stay silent (KLV 1990; Cyran and Gussmann 1999; Ritter 2006). I will briefly return to this kind of OO relationship in Section 8. If OO-licensing (in a form that is analogous to RR-licensing) were necessary to restrict the distribution of empty-headed onsets, one would expect to find restrictions on the occurrence of multiple hiatus (as in *Maui*, if pronounced *Ma-u-i*). However, it is far from clear that this kind of OO-licensing (i.e., paralleling RR-licensing) is needed, although it must be added that double hiatus is not widespread at all in languages that allow hiatus in the first place. (The English word *Maoism* would have double hiatus if we ignore the possible automatic glide between 'o' and 'i'.) An empirical study of this phenomenon seems called for. For the moment, let us conclude that OO-licensing is weakly, if at all, supported by the facts.

Recall that earlier I discussed the distinction between truly empty onsets and ghost consonant onsets. As suggested, the truly empty onsets appear to need no licensing (although, I repeat, double hiatus is not common). However, it would pay to take a closer look at the ghost consonant cases to see whether these need to be followed by a contentful onset. Given the relative rarity of ghost consonants it is difficult to assert with certainty that their licensing by a following contentful onset is required. In Denwood (2006) ghost consonants are postulated in an analysis of Turkish facts and in those cases the condition appears to be met.

So far, we have established that an empty-headed rhyme (in order to be *silent*) must be followed by an audible rhyme. Audible rhymes are either lexically filled with an invariable or a non-licensed variable element. I will use the

notation 'Ra' for such audible rhymes and 'Rs' for silent rhymes henceforth. We have also seen that a parallel licensing relationship for onsets does not seem to be necessary:

(17) a. Rs ⟵ Ra
b. ?Os ⟵ Oa

I consistently use the left-pointing arrow to mnemonically express that inter-constituent licensing is **regressive** or **right-headed** (as already stated in KLV 1990).

Licensing between constituents of the same type (such as two rhymes), as discussed in this section, was called **homogeneous licensing**. Let us now investigate whether it is perhaps the case that empty-headed constituents also require **heterogeneous** licensing, i.e., licensing by an immediately following headed constituent.

3.2. Heterogeneous licensing

The two relevant cases to look at are the following:

(18) a. Rs ⟵ Oa
(RO-licensing)
b. Os ⟵ Ra
(OR-licensing)

(Again, in choosing terms like RO-licensing and OR-licensing, I place the licensee, the theme or target of the licensing relation, first and the licensor, the agent, second.) (18a) says that a silent rhyme must be followed by an audible onset, while (18b) says that a silent onset must be followed by an audible rhyme.

It would seem that (18a) is necessary if we need to rule out 'hiatus' situations in which the left-hand rhyme is silent, as in (19a), where the silent rhyme and the silent onset is indicated by a small case 'v' and 'c'. This is precisely the type of case that Charette (2003) discusses as an additional situation where the French schwa cannot be suppressed: words like *dehors* 'outside' or *rehausser* 'to heigthen', with a unpronounced letter h, cannot suppress the schwa in the first syllable.

In addition, it has been argued in the GP literature that we need a principle called 'resolution' (Yoshida 1993) or 'reduction' (Gussmann and Kaye 1993) which applies in case a vowel-initial suffix is added to a consonant-final base, as in (19b) (The need to have a silent rhyme at the end of a consonant-final base is explained below with reference to 23a.). In both cases, to put it in down to

earth words, there is no reason why the full-headed onset C could not be an onset to the full-head rhyme V, even though (a) the empty-headed v is licensed by a following full-headed V, and (b) the silent (or perhaps absent) onset requires no licensing to begin with (cf. above):

(19) a. . . . C v c V
b. . . . V C v + c V

By adopting (18a), intramorphemic sequences like in (19a) are blocked, while resolution for (19b) automatically falls out (assuming that there is a principle that prevents 'v c' from occurring in the representation. In unpublished work, John Harris has suggested that the principle enforces 'morphemic overlap' such that c merges with C and v with V. Actually, this overlap could be seen as a natural consequence of **unification**, the key mechanism in Declarative Phonology (Scobbie 1997).

Turning now to (18b), it seems clear that this constraint is also necessary: it rules out a totally silent 'syllable' (i.e. OsRs). To my knowledge, there is no explicit ban on such entities in GP, but it seems that, in practice, their use is excluded (except in Lowenstamm 1999 where an empty CV marks the beginning of each word; cf. Section 8). Silent syllables have been proposed in the context of metrical foot assignment, for example in Giegerich (1995) and in unpublished work of Paul Kiparsky who calls their occurrence catalexis. However, silent syllables can easily be replaced by silent beats, i.e., grid elements that do not dominate an actual syllable (cf. Selkirk 1984).

Again, however, we need to be aware of the distinction between truly empty onsets and ghost consonant onsets. It would seem that ghost consonants always occur with a following audible rhyme and that would be accounted for by (18b). However, if truly empty onsets are absent onsets, and we assume that their absence needs no licensing, what then prevents an empty rhyme that is not preceded by an audible onset, i.e., by no onset at all? If there is no constraint to prevent this, fully empty syllables would be possible, albeit onsetless ones. To know whether such entities can exist we need to investigate vowel–zero alternations to see whether hypothetical cases such as [en+ak] $\sim$ [ein] (*-ak* being a suffix, and *i* the realization of the empty-headed rhyme) exist, where the morpheme that alternates between [e-n] and [ein] contains a variable element in its second rhyme head. In section 6 I will provide one argument for why empty rhymes without a contentful onset should be considered illformed. If this is indeed so then alternations such as *ein – enak* are not expected to occur and it would then seem that even truly absent onsets (represented as a bare C^1 node) needs licensing by a following audible rhyme.

Assuming for the moment that both ghost consonant onsets and truly empty onsets need licensing by a following audible rhyme, we can conclude that both

heterogeneous RO- and OR-licensing are indeed necessary. An immediate consequence of needing both (17a) and (18a) is that, in general, a silent rhyme must be followed by TWO audible constituents, while a silent onset only requires the licensing presence of an immediately adjacent audible constituent:

(20) a. ◄——————————— (i)
Rs ⟵ (iii) Oa Ra
b. ◄——————————— (ii?)
Os ⟵ (iv) Ra Oa

Homogeneous:

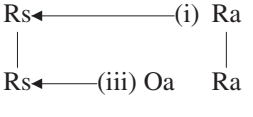
(i) *silent rhyme before silent rhyme (= Proper Government)
(ii) *double hiatus (is questionable at best and perhaps only needed to exclude double occurrence of ghost consonant onsets)

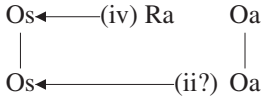
Heterogeneous:

(iii) *silent rhyme before hiatus (includes Resolution)
(iv) *silent 'syllable'

If all licensing is to be local, homogeneous RR licensing requires the presence of a **rhyme-projection**, which in itself seems independently justified by the fact that rhymes must enter into head-dependency relations for the purpose of foot structure. It is well known that foot structure is or can be sensitive to the internal properties of rhymes, while the internal properties of onsets, or, rather onsets as such, are irrelevant in this regard. This asymmetry between onsets and rhymes justifies a rhyme projection. In addition, we need a rhyme projection to account for vowel or nasal harmony and tonal phenomena (i.e., what I called 'agreement' earlier). (One might argue that the rhyme projection is equivalent to what others call the syllable level.)

The evidence for an onset projection level is much less pervasive, although there is some evidence for interaction between onsets. I therefore tentatively include an onset projection, referring to van der Hulst and Ritter (1999) who offer some evidence for an onset projection from consonantal interaction in Kammu. Also see Ritter (2006) and Section 8 of the present article. If we make explicit reference to a rhyme projection and onset projection we can replace (20) by (21):

(21) a.


b.


I place both projections on different 'tiers' so that they don't get in each others way.

A final issue that I mention in this section is that licensors may be required to have or lack certain properties in order to qualify as good licensors. There are two types of properties to look at. Firstly, we need to ask whether licensors can be (heads of) *branching* constituents and, secondly, whether licensors need to have certain minimal segmental properties. I will refer to these two kinds of properties as *structural* and *content* properties, respectively.

Let us first address the structural properties of licensors. For sure licensors must not themselves be empty. As for (21i), I do not know at the moment whether the Ra licensor *must* be branching or non-branching. It would seem that in most, perhaps all cases of 'Proper Government' (the GP name for i), the governing vowel occurs in open rhymes. (Cases in which 'long' vowels acts as proper governors do not count as branching rhymes in my model, since, as will be argued in Section 6, all long vowels will be analyzed as bi-rhymal.) With respect to (21iii) we need to take into account that branching onsets have been claimed to block Proper Government (cf. 15b and our remarks on that case above). This translates, with reference to (21iii), into the conclusion that in RO-licensing, Oa *cannot* be branching. With respect to (21iv) it seems certain that the Ra can be branching since there is no indication at all that the absence of an onset requires an open rhyme in any language. For (21ii) I simply lack evidence going one way or the other, but it seems reasonably to hypothesize that the licensor can be a branching onset.

The question of content properties has been addressed in Cyran (2003), who develops a theory of licensor strength which involves content requirements for licensors. Licensors, he argues, can be ranked on scales of licensing strength. In his model, licensing strength requirements replace parameter setting. Cyran's evidence for licensing strength is based on licensing of branching constituents, rather than of silent constituents, since he analyses the proper government (here RR) constraint on empty-headed silent rhymes in terms of a 'no lapse' constraint (cf. Rowicka 1998). I suggest maintaining parameter setting, but since structures that are parametrically allowed are not free in their distribution, we can still investigate whether the required licensors must meet certain 'strength' requirements. At this point it is not clear to me what kind of content requirements exist for licensors of empty-headed constituents, beyond the fact that they themselves cannot be silent.

It is likely that certain types of audible rhymes and audible onsets are too weak to act as licensors, notably schwas or /h/ (which arguably are both very close to be 'nothing'.). In Dutch, for example, truly empty onsets cannot be followed by a schwa (at least in major category words). This supports the idea that truly empty onsets need licensing. (Nor can schwa license an onset containing /h/ which itself suggests that /h/ is near to nothing).

Lacking sufficient ground to come up with any definite or even tentative proposal, I must leave an account of licensor strength for another occasion, again referring to Cyran (2003) for an exploration of these issues. The following table summarizes what I know (or rather speculate) concerning structural or content requirements of licensors ('b' stands for 'branching'; 'lar.' for 'laryngeal consonant'):

(22)

	Homogeneous	
	(i) RsRa	(ii) OsOa
Structure	Ra = *b	Oa = $\sqrt{}$b
Content	Ra = *schwa	Oa = */h/.
	Heterogeneous	
	(iii) RsOa	(iv) OsRa
Structure	Oa = *b	Ra = $\sqrt{}$b
Content	Oa = */h/	Ra = *schwa

In this section, we have established that empty-headed constituents require licensing at two levels, at the O^1/R^1-level (cf. 2) and at the level of rhyme (and perhaps onset) projections (i.e. O^2/R^2). We have also firmly established that licensors cannot be themselves empty-headed. It is safe to conclude that the subject matter of structural or content requirements on licensors is underexplored at this point. In the next section, I turn to the need for licensing the other type of 'deviation' from strict CV: branching constituents.

4. Licensing branching syllabic constituents

4.1. Heterogeneous licensing

We start this section with heterogeneous licensing. Syllabic constituents can branch if the language has the appropriate parameter setting. However, proponents of Government Phonology have argued that the parameter setting itself is not sufficient. Apparently branching constituents require further local conditions. Two constraints have been proposed that bear on this issue (the formulation in both cases is mine):

(23) a. *Coda Licensing* (Kaye 1990)
A coda must be followed by an audible onset.

b. *Government Licensing* (Charette 1990)
An onset head must be followed by an audible rhyme if
(i) it *governs* an onset dependent, or
(ii) it *coda licenses* a preceding coda.

According to the principle in (23a), branching rhymes (i.e., rhymes consisting of a vowel and a consonant) require a following audible onset. Word-medially, this captures the universal effect of **onset maximization**. A string as in (24a) will always be parsed V[CV, and a string (24b) will be parsed as VC[CV (unless CC is permitted as a branching onset): g

(24) a. V (C V
b. (i) V C (C V
(ii) V (C C V

A striking consequence of the coda licensing principle (one that was the focus of attention in Kaye 1990) is that words are not allowed to end in *coda* consonants. Hence, if a word ends in a consonant, this consonant must be an onset, which for Government Phonology implies that there is a following empty-headed rhyme as well; after all, onsets are not allowed to occur by themselves. This empty-headed rhyme needs licensing, but that cannot be RR-licensing and/or RO-licensing (since nothing follows the silent rhyme). Instead a notion of 'edge-licensing' is called for. I turn to this issue in Section 8.

Kaye (1990) points out that languages seem to allow word-internal codas and final consonants independently:

(25)

	$VC]_{\sigma}$	$V]_{\sigma}$
$VC]_{pw}$	Arabic	Gur
$V]_{pw}$	Japanese	Desano

Hence, there are languages that allow $C]_{pw}$ (word-final C), while disallowing $C]_{\sigma}$ (rhyme-final C) and vice versa. (The former case has sometimes been handled in terms of 'extrametricality' or 'extrasyllabicity'.) If this difference exists, having or not having final consonants is due to a separate parameter rather than being an automatic consequence of having or not having branching rhymes. But what evidence is there that word-final consonants are not codas? And how do we know that, if they are onsets, there is a following silent rhyme? Piggott (1995) and Harris and Gussman (1998, 2002) address the first question, while Polgárdi (1998) looks into the second question. For the moment, I will avoid these questions, assuming that at least all ***non***-final coda consonants must be followed by an audible consonant, but I will return to the representation of final consonants in Section 8.

Let us now investigate whether Coda Licensing can be construed as a condition on the occurrence of branching rhymes, and, I suggest that it can: if a coda is present, the rhyme is branching. Indeed, it would seem that we could say that in order to have a branching rhyme, there must be a following audible onset:

(26) *'Coda' Licensing* (revised)
A branching rhyme must be followed by an audible onset.

Given that, in the present approach, long vowels are represented as two rhymes (cf. Section 6), we do not have to address the question as to whether the constraint in (26) is also required for long vowels.

If my reformulation of Coda Licensing is tenable, we have established the need for the heterogeneous licensing constraint in (27a) ('b' again stands for 'branching' and 'a' still represents 'audible'):

(27) a. Rb ◄——— Oa
b. Ob ◄——— Ra

At this point, the obvious question is whether the analogous heterogeneous constraint in (27b) is also required. This leads us to the second constraint formulated in (23b). Charette (1990) shows that, in (Quebec) French, schwas must be pronounced if **preceded** by two consonants. This covers two different cases:

(28)	a.	li*br*əment	*li*br*-ment	(*CC* = branching onset)
	b.	pa*rv*ənir	*pa*rv*-nir	(*CC* = interlude)

In these examples, the onset heads /b/ and /v/ are involved in some sort of relationship with another consonant. The /b/ forms a branching onset with /r/ and, being the head of this constituent, /b/ **governs** the /r/. (Recall that I regard government as a constituent internal relationship between the head and the dependent of the constituent.) The /v/, on the other hand, as per (23a), licenses the preceding coda (according to the standard account in Kaye 1990). In these two cases, no schwa deletion is possible, which, according to Charette, is due to the fact that the onsets /b/ and /v/ need 'support' from a following audible rhyme in order to perform their government or licensing duties.

As shown, Charette's proposal does not exclusively bear on branching onsets; it applies more generally to an onset head that either governs an onset dependent or licenses a preceding coda. The formulation in (23b) already makes this point clear. Charette subsumes both cases under one constraint, but I will suggest treating the two cases separately, i.e., with different licensing constraints. I return to the *parvenir* case in the next section. Here I focus on the *librement* case which involves a condition on the occurrence of a branching onset. Hence I propose to formulate it as follows:

(29) A branching onset must be followed by an audible rhyme. (=23bi)

This, of course, is exactly the constraint in (27b), which means that both cases of heterogeneous licensing for branching constituents in (27) are motivated.

Case (27a) captures 'coda licensing' (23a), while (27b) captures one half of Charette's 'government licensing' (i.e., the one in 23bi).

Before we turn to homogenous licensing of branching constituents, a word must be said about the original formulation of Coda Licensing. As a relationship between a coda consonant and following onset, this condition could incorporate segmental conditions such that for the onset to license the coda it would have to have certain segmental properties. As shown below, we can capture these aspects by imposing content requirement on the licensor.

4.2. Homogeneous licensing

We have thus far (in Sections 3.1, 3.2 and 4.1) consider six type of interconstituent licensing constraints. To complete the paradigm, we now need to ask whether branching constituents are also subject to homogeneous licensing:

(30) a. (i) Rb ◄——— Ra
(ii) Ob ◄——— Oa

To show that (30a) is necessary we return to the *parvenir* case in (28b). In this case the schwa must be audible according to Charette because it must give the /v/ power to coda-license /r/. However, another perspective that amounts to the same result is to say that the branching rhyme /ar/ must be followed by an audible rhyme and this is precisely what (30a) states. This reformulation may be more difficult to grasp, so let me spell it out as clearly as I can. In Charette's proposal we get the following licensing chain: (pa) r ⇐ v ⇐ ə (nir). The first arrow represents Kaye's coda licensing, while the second represents her government licensing. My proposal is to restate this chain as follows (p) ar ⇐ ə (nir), i.e., as a relation at the rhyme projection level. The necessary presence of an intervening onset (/v/ in this example) is already guaranteed by coda licensing or rather constraint (27a) (i.e., my reinterpretation of coda licensing).

Whether the OO analogue to RR-licensing, i.e., (30b), is also required is not obvious. (30b) seems to be easily violated in syllables like 'cleo'. In short, there is some indication that branching constituents need both homogeneous and heterogeneous licensing in case of branching rhymes, while branching onsets only require heterogeneous licensing (i.e., licensing by a following audible rhyme, 27b). (31) summarizes our results:

(31) a. ◄——————— (i)
Rb ⟵ (iii) Oa Ra
b. ◄——————— (ii?)
Ob ⟵ (iv) Ra Oa

Homogeneous:

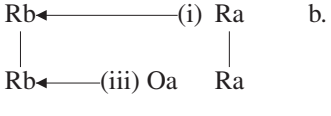
(i) ***VC**. Cv (*parvenir*)
(ii) ***CC** V. cV (not empirically supported)

Heterogeneous:

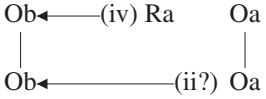
(iii)***VC**. {V, #} ('coda licensing')
(iv)***CC** v (*librement*)

We could explain the absence of (ii) if we were to question the onset projection level (cf. 21), for which the evidence is not so strong anyway. However, as before, I tentatively assume that there is an onset projection which means that the absence of (ii) requires some other type of explananation (not provided here):

(32) a.



b.



Splitting up the *librement* and the *parvenir* cases finds some support in the fact that, according to Charette, Standard (her St. Etienne) French treats both cases differently:

(33) *Standard French*

parv-nir	schwa-deletion allowed	(cf. 32ii)
librəment	schwa-deletion disallowed	(cf. 32iv)

This point brings to the surface that languages can differ in terms of their adherence to the licensing constraints, and that thus a certain amount of parameterization is necessary. I return to that issue in Section 7.

As in the preceding section, we need to investigate whether licensors can be heads of branching constituents (a structural requirement) as well as whether licensors must meet certain segmental strength (content) requirements. We start again with the structural requirements. For homogeneous licensing it seems unlikely that the licensor must be a non-branching rhyme. French words like *alterner* 'to alternate', *colporter* 'to give a second hand information', *intervertir* 'to reverse', *perturber* 'to disturb', where closed syllables are following each other, show this. In the case of heterogeneous licensing it certainly seems possible for a branching onset to license a coda (Dutch *mantra*), while it is also clear that a branching rhyme can be preceded by a branching onset (Dutch *brinta*).

As for content requirements in homogeneous licensing, I am not aware of specific requirements on the licensor. As mentioned at the end of the preceding

section, in the heterogeneous case, Kaye (1990) has argued that the onset consonant that licenses the preceding coda (in our case interpreted as the preceding *rhyme*) and the coda consonant itself must have certain segmental properties for the licensing relation to be possible. Essentially, the onset consonant must be less 'sonorous', or as Harris (1990) puts is 'more complex' than the coda consonant. This requirement may be an artefact of allowing non-sonorant consonants to occur in coda positions. In RCVP (van der Hulst 2005, in prep.), this is not allowed and as a result codas cannot so easily be less sonorant than following onsets in the relevant sense. As for the remaining cases, Cyran (2003) clearly shows that rhymal heads can be required to be a full vowel, as opposed to an audible schwa in order to be able to license a branching onset. This, in fact, holds for Dutch, where a schwa cannot, as in French, license a branching onset:

(34)

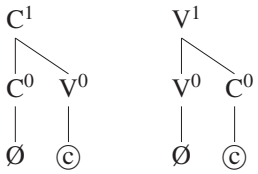
	Homogeneous	
	(i) RbRa	(ii) ObOa
Structure	Ra = $\sqrt{}$b	(no licensing required)
Content	Ra = ?	
	Heterogeneous	
	(iii) RbOa	(iv) ObRa
Structure	Oa = $\sqrt{}$b	Ra = $\sqrt{}$b
Content	Oa = <sonorous	Ra = *schwa

The fact that branching onsets cannot be followed by a schwa in Dutch may instead be due to different parameter settings for head or dependent domains. 'Schwallables' are necessarily dependents in the foot structure and it has been suggested in van der Hulst and Ritter (2002) that the notion of 'head-driven parameter setting' is relevant here. Dependent domains typically require unmarked settings of parameters, which in the case of schwallables would require non-branching onsets. In other words, head-dependent asymmetries in the sense of Dresher and van der Hulst (1998) typically manifest themselves in parameter-settings, such that head constituents allow (or even require) marked settings, while dependent constituents require unmarked settings.

4.3. Licensing of branching empty-headed constituents

I mentioned earlier that empty-headed constituents can have dependents. Here I repeat (8) for convenience:

(8)



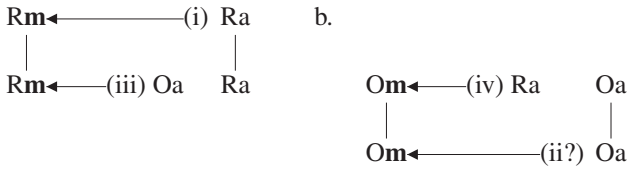
It is reasonable to ask whether these constituent types are subject to distributional restrictions which call for licensing requirements, but the issue has not been explored much. Empty-headed *branching* onsets have, in fact, not been proposed by many, but their existence is a necessary consequence within RCVP because in that model sonorant consonants cannot be heads of onsets. Hence if an onset consists of a sonorant consonant only the sonorant must be dependent. (A problem that I have not solved regards languages, which do not allow branching onsets with both positions filled. Such languages do not block their sonorants from onset positions and this seems to imply that in such cases sonorants somehow occupy the onset head position. The same problem, by the way, arises for the representation of syllabic consonants if these can occur in languages that do not allow closed rhymes.)

As for empty-headed branching rhymes, these entities, as stated above, yield 'syllabic sonorants'. I have not checked this systematically (yet) but it seems to me that such entities require licensing by a following headed onset and headed rhyme, i.e., sequences of syllabic sonorants do not seem to exist and so are sequences of syllabic sonorant and silent rhymes. This issue too needs further investigation.

5. Summary

It seems obvious that we can collapse the schemas in (21) and (32) into a single schema that brings out the parallelism between the licensing requirements for empty-headed silent constituents and branching constituents. All we need to say is that in both cases the licensees are *marked*:

(35)



Recall that 'm' means marked or more straightforwardly: ∼1 (either −1 or +1). (35) says that (branching or empty-headed/silent) constituents *must* be followed by a constituent with an audible head.

Since, at least in some cases, the licensors can themselves be marked (in the sense of branching), see (22, 34), we cannot simply conclude that the overarching generalization is that at each level of representation (i.e., O^1/R^1 and projection levels O^2/R^2), marked and unmarked constituents must strictly alternate. Nonetheless, (35) expresses that empty-headed/silent constituents are severely restricted in their distribution not only in their need to be licensed (they share that with branching constituents), but also in their complete inability to act as licensors (a property that they do not share with branching constituents). In terms of freedom of distribution, then, constituent types can be ranked as follows:

(36) a. Full-headed, non-branching > branching > empty- headed/silent
b. $1 > +1 > -1$

This scale can be seen as the product of two independent scales:

(37) a. Non-branching > branching ($1 > +1$)
b. Full-headed > empty-headed ($1 > 0$)

Several issues need further investigation. I mentioned that the properties of licensors (in terms of structure and content) have not been fully spelled out (cf. 22, 34). A second important issue is whether the licensing constraints are universal principles or parameterized. The latter issue is taken up in Section 7.

All marked onsets, whether branching or silent, appear to be universally *free* in terms of homogeneous licensing. This might suggest that the onset projection level is questionable.

At this point it is probably useful to show how the various government and licensing relations in standard Government Phonology have been 'relocated' in the present proposal. This amounts to combining the tables in (20) and (31):

(38) a. *Licensing of empty-headed constituents*

Licensee	Licensor	Standard GP
Empty-headed rhyme	rhyme (RsRa)	Proper Government
Empty-headed rhyme	onset (RsOa)	Resolution
Empty-headed onset	rhyme (OsRa)	"NoSilentSyllable"
Empty-headed onset	onset (OsOa)	Double hiatus?

b. *Licensing of branching constituents*

Licensee	Licensor	Standard GP
Branching rhyme	rhyme (RbRa)	Government Licensing (ii)
Branching rhyme	onset (RbOa)	Coda Licensing
Branching onset	rhyme (ObRa)	Government Licensing (i)
Branching onset	onset (ObOa)	Not supported

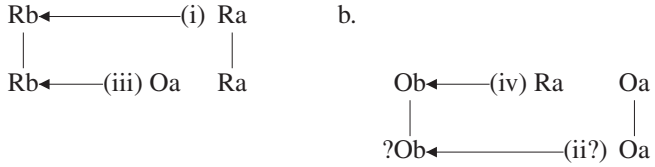
As mentioned before, the only licensing case that has not been explicitly mentioned in GP (although it has been assumed) is the ban on completely silent syllables.

As pointed out to me by Krisztina Polgárdi, the parallelism between empty-headed and branching constituents could be brought out even further if we were to except the point made in a variety of Government Phonology developed in Lowenstamm (1996, 1999) and further developed in Scheer (2005), mentioned in Section 1. In this approach *all* branching constituents are banned. In particular 'branching onsets' are replaced by sequences of two (simple) onsets with an intervening silent, empty-headed rhyme. The empty-headed rhymes in question are never involved in vowel–zero alternations (unlike the 'classical' empty-headed rhymes in standard Government Phonology), but we can still say that they must be licensed. In fact, whatever it takes to license a branching onset in the present proposal can be said to necessarily license the extra empty-headed rhymes.

6. Long vowels

The above proposal presupposes that long vowels are not accounted for in terms of branching nuclei. There is, however, one consideration that might suggest that long vowels qua branching nuclei or rhymes would perfectly fit within the licensing theory proposed here. In his discussion of certain phenomena in Yawelmani phonology, Kaye (1990) attributes the phenomenon that, in traditional terminology, long vowels shorten in closed syllables, to the fact that long vowels are not permitted if the following rhyme is silent. (Yoshida 1993 points out that this is an instant of what Charette 1990 calls *government licensing*.) If long vowels would be treated as a branching structure within the rhyme, the relevant licensing constraint could be the one in (32i), repeated here in (39i):

(39)



In this case it would seem that long vowels behave just like branching rhymes in requiring *homogeneous* licensing (although strictly speaking they are branching nuclei within non-branching rhymes).

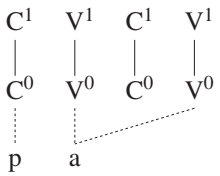
However, when we look at *heterogeneous* licensing, it seems clear that long vowels do not require an immediately following audible onset. If this were so, we would expect to find that long vowels are prohibited to the left of hiatus. I am not aware of any empirical support for such a constraint. On the contrary,

long vowels before hiatus are in open syllables and for that reason often must be long.

Hence, according to homogeneous licensing, long vowels behave just like closed rhymes, while they fail to show such behaviour with respect to heterogeneous licensing. If, as has been suggested earlier, all long vowels are represented as *bi-rhymal* (a move that allows us to eliminate the nucleus/rhyme distinction; cf. van der Hulst and Ritter 1999), the latter point is expected. However, we now need to give an alternative account for the 'closed syllable shortening' effect.

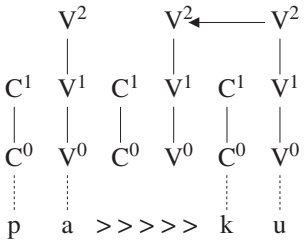
Under the bi-rhymal account of vowel length, a phonetic event [paː] would have the following representation:

(40)

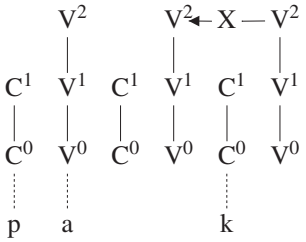


Lowenstamm (1996) who proposes to eliminate all branching structure, is, in fact, committed to this type of analysis. Perhaps then we can be inspired by *his* explanation for the 'closed syllable effect'. The following account thus shares some features with his analysis of 'closed syllable shortening'. Consider the following two representations for a hypothetical alternations between [paːku] and [pak]:

(41) a.



b.



Given the representations in (41) we have to say that in (41a), [paːku], a long vowel is permitted when its second rhyme, an empty-headed position, is licensed. Being licensed this empty rhymal position is allowed to exist in the representation. Normally this means that the position is silent. However, in this case the empty position is preceded by a contentful rhyme and there is no intervening onset content. I will assume that in such a case the empty position is *necessarily* interpreted as the continuation of the preceding contentful rhyme (indicated by the notation '> > > > >'). (This would be a reason for not expecting to find [ein]–[enak] type of alternations since in the second form we would get spreading of the *e* melody leading to [eːnak], since there is no reason why a unassociated variable element, which are here assumed to be present in case of a vowel–zero alternation, could be said to block such spreading.) We would have to assume, furthermore, that the rhyme that owes its content to spreading is able to license the preceding empty onset. Languages that do not allow long vowels can be said to disallow licensing of a silent onset by a rhymal head that owes its content to spreading.

In (41b), the second half of the long vowel is not licensed. Normally, unlicensed rhymes become audible, but we see that this is impossible in this case. Why? Firstly, there is no variable element here to begin with because there is no vowel–zero alternation. However, the more fundamental reason is, as has been argued in Section 3.2, that empty-headed rhymes that do not co-occur with a contentful onset are simply ill-formed. To save the representation the completely silent syllable is then 'removed' from the representation as per heterogeneous licensing in (21b). What 'removal' means formally remains to be established. We cannot just leave the empty CV unit where it is because a representation containing it is formally illformed.

7. Crosslinguistic differences in the applicability of interconstituent licensing constraints

In this section, we will take a systematic look at all the interconstituent licensing constraints (summarized in 38) to establish whether we know of evidence that they are parametrized.

All licensing constraints that apply to empty-headed silent constituents apparently apply obligatory (indicated by using bold face in 42, which recaptures 38a). It seems to be the case that silent rhymes are always required to be both heterogeneously and homogeneously licensed. I have also suggested that silent onsets *must* always be licensed by an audible rhyme, but the evidence for saying that they must also be licensed by a following audible onset (to avoid double hiatus) is weak and perhaps only fully true for ghost consonant onsets:

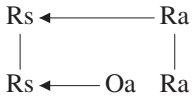
(42) *Licensing of empty-headed constituents*

Licensee	Licensor		Standard GP
Empty-headed rhyme	rhyme	(**RsRa**)	Proper Government
Empty-headed rhyme	onset	(**RsOa**)	Resolution
Empty-headed onset	rhyme	(**OsRa**)	NoSilentSyllable
(Empty-headed onset	Onset	(OsOa)	Not clearly motivated)

To be sure, as mentioned earlier, there are problematic cases in which silent rhymes apparently are needed in contexts where RO or OO licensing is not met, and the Government Phonology literature does therefore contain auxiliary licensing constraints such as 'interonset licensing', 'magic licensing', and 'final licensing'. The kind of 'interonset licensing' that is involved here is not to be confused with the OO-licensing that we have discussed in this article. Interonset licensing (sometimes called interonset government) is a relationship that licenses a silent rhyme that intervenes between two audible onsets and that is not licensed in terms of RR licensing ('Proper Government') (being squeezed in between two audible onsets, the silent rhyme is necessarily licensed in terms of RO licensing). I refer to Ritter (2006) for a discussion of the interonset licensing of silent rhymes. As for 'final licensing' I will incorporate this kind of licensing in a more general framework of *edge licensing*, to be discussed in the next section. I will suggest in that section that at least some of the cases that have been used to motivate interonset licensing can be incorporated into edge licensing. Perhaps, magic licensing (Kaye 1992) can be incorporated into this framework as well, but I will not pursue this point much.

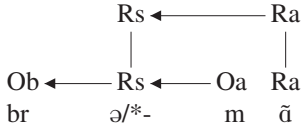
Returning to the main question of this section, namely whether there is cross-linguistic variation in the applicability of licensing constraints, let us now turn to the licensing constraints that bear on branching constituents. To initiate the discussion let us take a look at Charette's (1990) discussion of an interesting interaction between homogeneous licensing (Proper Government) and heterogeneous licensing (her Government Licensing). Recall that an empty-headed rhyme is permitted if followed by an audible rhyme and an audible onset:

(43)



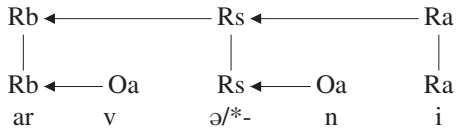
But now re-examine the French case *librəment* in which the silent rhyme is *preceded* by a branching onset:

(44)



In discussing this form we focused on the point that schwa suppression is not possible (indicated by '*-') because a branching onset **must**, as we have seen, be heterogeneously licensed by a following audible rhyme. However, it is nonetheless true that, at the same time, schwa detetion is fine as far as it is followed by an appropriate licensor at both O and R levels. In other words, the heterogeneous licensing relationship that permits the branching onset /br/ *overrules* the homogeneous and heterogeneous licensing relationships that would otherwise permit the suppression of the schwa. We see the same 'conflict' in the *parvenir* case:

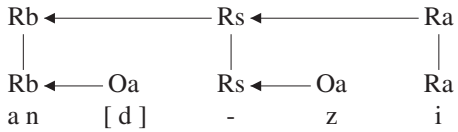
(45)



In this case the schwa cannot be suppressed because it must license the branching rhyme /ar/. This means that, in the present account, there is a conflict between the homogeneous licensing requirement on branching rhymes (whch enforces the realization of the schwa) and the homogeneous and heterogeneous licensing relationships that would otherwise permit the suppression of the schwa. (In Charette's account the schwa must license the /v/ to coda-license the preceding /r/, but that does not take away the fact that there is a conflict between licensing requirements.) In both cases, so it seems, the licensing of a branching constituent (onset or rhyme) takes precedence of the potential licensing of an empty-headed rhyme.

Charette suggests that this is not a universal state of affairs. She discusses two other possibilities, said to occur in Tangale and in Polish. The example from Tangale (Kaltungo dialect) forms a minimal pair with the way that French treats the *parvənir* case and here the conflict is allegedly resolved by deleting the /d/ so that the rhyme material can be 'resyllabified':

(46)



*landa + zi > *landzi > lanzi*

Because the /d/ deletes, the /n/ must be an onset. This is a 'suspicious' case because Standard GP does not allow 'resyllabification'. Polgárdi (1998) argues that this deletion is not phonological but rather a morphologized phenomenon.

In Polish, the following situation obtains:

(47) u.br-.da.c- 'imagine'
var.x-.la.k- 'boarlet'

The first form contrasts with *librement* (it has a silent rhyme that is preceded by a branching onset), while the second one contrasts with *parvenir* (it has a silent rhyme that is preceded by a branching rhyme). Charette (1992) explains the difference between French and Polish by proposing that in Polish licensed empty-headed rhymes can in fact themselves government-license onset heads that are in need of such licensing. The line of thought has been further developed in Charette (1998), Scheer (1998) and Cyran (2003) in terms of the notion 'licensing strength'.

Alternatively, it could be said that the need to license a branching onset or branching rhyme by a following rhyme is simply 'turned off' in Polish. In other words, branching constituents are completely free in Polish. Adopting this type of parametric approach, we can describe the situation in Polish by saying that branching onsets require no OR-licensing, while they do in both varieties of French. Branching rhymes must be licensed in Quebec French, but not in Standard ("St. Etienne") French and Polish. Both licensing constraints must then be assumed to be parametric. A parametric approach (as mentioned in Section 1) is still 'constraint-based' because a parameter, once set, *is* a constraint.

Finally, RO-licensing is obligatory (as it captures the fact that a VCV sequence is always syllabified with the C as an onset). We summarize all this in (48) which recapitulates 38b):

(48) *Licensing of branching constituents*

Licensee	Licensor	Standard GP
Branching rhyme	rhyme (RbRa)	Government Licensing (ii) Yes: Quebec French No: Standard French, Polish
Branching rhyme	onset (**RbOa**)	Coda Licensing
Branching onset	rhyme (ObRa)	Government Licensing (i) Yes: Quebec and Standard French No: Polish
Branching onset	onset (ObOa)	Not supported

An interesting alternative to either of these two parametric approaches (i.e., Charette's which appeals to licensing strength and my alternative) is developed in Polgárdi (1998) who proposes an analysis that appeals to Optimality Theory-style ranking. Although in general I have favoured the parametric approach, which yields a more restrictive theory than one that allows language-specific ranking of constraints, I now believe it might be worthwhile to explore the idea that constraint ranking can, in fact, be construed as dependency relations between constraints. With the notion of dependency being so pervasive in Head-driven Phonology, there is perhaps no reason to exclude the possibility of constraints that apply in the same domain, and interfere, to enter into de-

pendency relations. I refer to van der Hulst (in prep.) for an exploration of this kind.

8. Edge licensing constraints

In the preceding section, I have mentioned that in some cases silent rhymes fail to be licensed in terms of RR licensing. In this section, I will look at some of these cases and suggest that we might be able to develop a general framework of edge licensing constraints.

It has of course long been observed that edges of words allow 'extra material' to appear, or rather syllabic constituents that are not and cannot be licensed in terms of the interconstituent licensing constraints that we have discussed in the preceding sections. Such effects have been noticed for both edges of the word. In this section, I will first discuss right edge effects.

According to the RbOa-licensing constraint ('Coda Licensing'), a branching rhyme must be followed by an audible onset. Word-finally, such an onset is not available. Hence a final VC sequence cannot be a branching rhyme, but must instead be a non-branching rhyme V followed by an onset C. Following the principles in (5) and (6) this final onset must be followed by a rhyme which in this particular case is silent. How is its silence licensed? One answer might be that we simply 'allow', parametrically, a right edge silent rhyme, an option that is called 'final licensing' in the government literature. I will call this 'edge licensing' (e-licensing), as opposed to 'interconstituent licensing' (i-licensing):

(49) Rs]$_{pw}$ yes no (e-licensing)

If we allow the notion of e-licensing, we might perhaps just as well say that the right edge allows, as a parametric choice, a 'stranded' branching rhyme that is not i-licensed (assuming that the branching rhyme parameter is set to YES to begin with). This would imply that we do not require 'coda licensing' in final position, i.e. RbOa is switched off in final position:

(50) Rb]$_{pw}$ yes no (e-licensing)

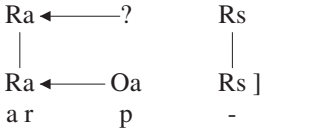
Thirdly, we might say that even though the final consonant is an onset, there is no following silent rhyme, in which case we reject (5c). This is proposed in Polgárdi (1998):

(51) O]$_{pw}$ yes no (right-peripheral onset parameter)

It turns out that (49) is the best option if we consider more complex cases involving final VCC]$_{pw}$. Here we have to consider two cases: the CC forms an interlude sequence (creating a so-called superheavy syllable as in English

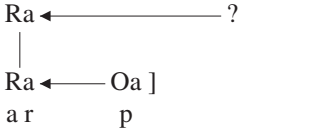
harp) or it forms a branching onset (as in French *table* and *arbre*). In both cases, option (50) would not be adequate since the right edge shows *more* than a branching rhyme, namely a branching rhyme plus an extra consonant. We start by taking a closer look at the interlude, i.e., coda-onset case:

(52) a.



(e-licensing of edge Rs by 49)

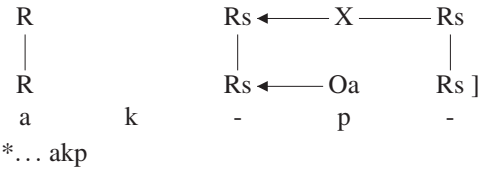
b.



(e-licensing of edge stranded Oa by 51)

Under either alternative, there seems to be no RR-licensing of the branching rhyme /ar/. If (52a) is adopted, however, we could say that e-licensed silent rhymes have the potential to license a branching rhyme (unlike their internal i-licensed colleagues). We do not want to say that *silent* rhymes can also be licensed by an edge licensed silent rhyme because we would then allow final clusters that can be neither coda-onset sequences nor branching onsets:

(53)

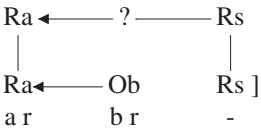


*… akp

If we adopt (49) we are left with the stipulation, which is that an e-licensed silent rhyme can license a branching rhyme, but not an empty rhyme. The asymmetry is not mysterious, however, since, as we have seen, silent constituents are more needy licensees than branching constituents. But if we adopt (51) we have no account for the occurrence of /ar/ at all. So (49) is the best option.

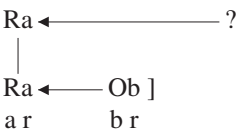
Let us now turn to the case in which two final Cs form a branching onset (as in French *arbre*; the final letter ⟨e⟩ is not pronounced in French), an option that is not permitted in English. The fact that forms like *arbre* are possible does, in itself, support the idea that a silent rhyme can be a licensor of branching constituents, i.e., both the rhyme /ar/ and the onset /br/ (in a form like *table* licensing only concerns the onset /bl/):

(54) a.



(e-licensing of edge Rs by 49)

b.

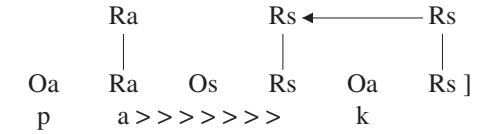


(e-licensing of edge stranded Ob by 51)

Again, with the alternative in (54b), we have no account for the occurrence of /ar/ and, in addition, we have to assume that a stranded onset can even be branching. But if we use (54) we can simply state that an e-licensed Rs can license a preceding branching constituent. This seems to point to the conclusion that it is simpler to postulate final e-licensed silent rhymes (i.e., 49) that not only need no i-licensing, but that also themselves have licensing potential. In French they can license any type of branching constituent, while in English they cannot license a branching onset (hence the absence of the *arbre*-case in English). In neither language, these final silent rhymes can license a preceding empty rhyme, however. This seems to imply that e-licensed rhymes do not license preceding silent rhymes, but that must be restated more carefully.

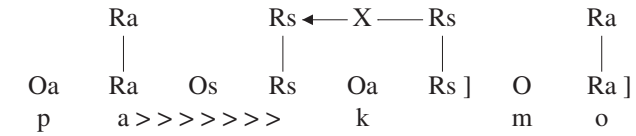
In languages that allow long vowels, we have observed that their occurrence internally is limited by the closed syllable effect. In traditional terminology: 'superheavy VVC-syllables' are excluded. However, in some languages such 'units' are allowed finally only, as for example in Arabic languages. How can we account for that? In (41b), I showed how long vowels are precluded if their second rhyme (which is empty-headed) is followed by a silent rhyme. To allow final superheavies we apparently must conclude that final e-licensed silent rhyme can, parametrically, license a silent nucleus, as in (55a), while an internal i-licensed silent rhythm can never do that (as in 55b):

(55) a.



. . . pa:k]

b.



*. . . pa:kmo]

Even though we apparently must allow a final, e-licensed silent rhyme to RR-license a preceding silent rhyme that is part of a long vowel, we do not, as already observed above, want to allow silent rhymes that are not the second half of a long vowel to be licensed in the same way (cf. 53). Thus, e-licensed silent rhymes cannot license silent rhymes that are preceded by an audible onset. The latter rhymes, which need to license an onset, call for a more powerful licensor, namely an audible vowel. In other words, the licensing power of final silent rhymes stretches out from branching constituents to silent rhymes, but in the latter case only if that silent rhyme is preceded by a silent onset. (In the spirit of Charette's government licensing, we might say that these silent rhymes are needier than silent rhymes that have a preceding audible onset, precisely because they must OR-license their onset.)

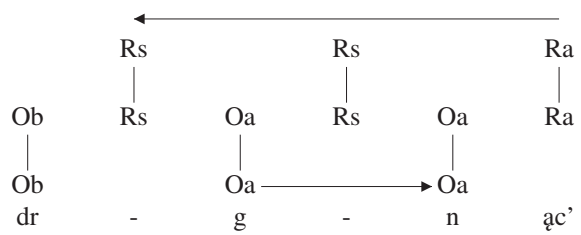
Before we turn to the left edge of the word, let me remind the reader that additional complexity at the right edge involving extra coronals, sometimes called the 'appendix' (as in Dutch *herf-st* 'harvest') involves the phonological clitic option (see Section 2.2).

To start our discussion of the left edge, consider the following forms in Polish (Cyran and Gussmann 1999); the dashes represent empty-headed rhymes:

(56) t - k - n ą ć 'touch'
dr - g - n ą ć 'shudder, perf.'

If it is correct, as the authors assume, that /kn/ and /gn/ cannot be branching onsets (since only obstruent liquid combinations can form a branching onset), we have too many empty-headed rhymes here. Cyran and Gussman make the point that the circumstances in which this occurs always involve clusters consisting of obstruents + nasal sonorant, or stop + fricative (cf. /t - k - f'ić/; their 19), in short clusters with a rising sonority profile. For ease of reference, I will refer to such sequences as 'pseudo-onsets'. Cyran and Gussman propose that pseudo-onsets involve a left-headed interonset relationship which is assumed to 'license' an intervening silent nucleus:

(57)

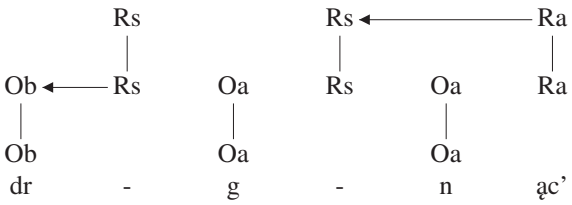


In addition, Cyran and Gussman must assume that the very first silent rhyme is licensed ('properly governed') by the third rhyme, crossing over the second silent rhyme which is said to be licensed in terms of 'interonset *government*';

they assume that, as in true branching onsets, obstruents govern to the right. If, as an alternative, we would say that homogeneous RR-licensing of silent rhymes is parametrically turned off in Polish, we would expect consonant clusters of unlimited length.

The proposal that Cyran and Gussman make is interesting but it forces us to accept both interonset government as well as non-local homogeneous licensing. An alternative would be to simply allow one unlicensed empty-headed rhyme at the beginning of the word. Such a proposal would, in fact, capture the insight in the extrasyllabicity analysis of Polish in Rubach and Booij (1990) who argue that initial clusters allow one extrasyllabic consonant. If the first silent rhyme is thus e-licensed, and if we assume, as before, that such rhymes can license branching constituents, we no longer need the interonset relation to license the second silent rhyme. This is RR licensed by the third, contentful, rhyme:

(58)



If we allow edge licensing of initial silent rhymes we note that, in Polish at least, such silent rhymes can license (heterogeneously) a branching onset.

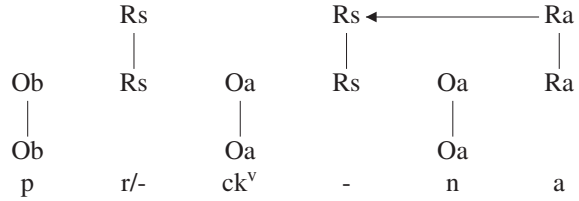
Now, it remains true that the second and third onset always show a rising sonority profile, and it therefore is possible that an interonset relation of some sort can capture this. This would support the notion of an onset projection just like vowel harmony support the notion of a rhyme projection. Relations of this sort, which deal with constraints on segmental content are needed. My point is that this relation is not needed to account for the silent nucleus.

Another notorious case of initial complex consonants involves Georgian (cf. Butskhrikidze 2002). The longest possible cluster appears to be:

(59) p r c k v n a ‘to peel’

A cluster of this type can be ‘decomposed’, as proposed in Butskhrikidze on historical and comparative grounds, in three ‘syllables’. In (60) I offer the licensing structure of this cluster following her proposed decomposition:

(60)



a. The /r/ appears to be both optional and, if appearing, syllabic.
b. The sequence /ck/ forms a so-called 'harmonic cluster', which we may regard as a *complex segment*.
c. The /v/ appears to be a secondary articulation ('labialization') so that in effect /ck^{v}/ is one segment.

In a related form, we note that a vowel may appear preceding the nasal:

(61) /ga + vpcken + i/ 'I peeled'

This means that the empty-headed rhyme in (60) is involved in a vowel-zero alternation, assuming that, for some unknown reason, the final /-i/ is unable to govern an empty-headed rhyme, which therefore must be audible. (Note also that the /v/ element is subject to a metathesis process, which I do not discuss here.)

Ritter (2006) offers a government-based analysis that relies on positing interonset relationships that license intervening silent rhymes, but if, as suggested here, initial 'edge licensing' is an option (a parameter), even Georgian clusters do not exceed the limit.

A third type of situation that calls for left edge licensing comes from languages like Dutch where initially certain types of consonant clusters appear (such as /kn/ *knap* ' handsome', /fj/ *fjord*) that, if occurring intervocalically are always split up; cf. Trommelen 1983 and van der Hulst 1984 for extensive discussion).

Summarizing, we seem to need edge-licensing, at least of silent rhymes (and perhaps only that):

(62) [Rs (. . .) Rs]

Edge-licensed silent rhymes can, parametrically, be licensors, either homogeneously (for final VC.Cv), as in English) or both homogeneously and heterogeneously (as in French for final VC.CCv] and V.CCv]). (A language in which final Rs can only be a heterogeneous licensor, allowing V.CC], while disallowing VC.CC], is not known to me.). In languages that allow final superheavy syllables (like VVC), the silent final rhyme can also license the preceding silent rhyme (i.e. the second half of the long vowel) which is 'needy' because it needs to license its silent onset. On the left edge, silent e-licensed rhymes can license

a preceding branching onset, as in Polish. (Homogeneously licensing at the left edge is not at issue since the e-licensed rhyme is not itself preceded by yet another silent rhyme.) Finally, let us be clear about the fact that edge-licensing is a parametric option, not a universal necessity.

Before concluding this section, I will, firstly, connect the present proposal to two other proposals put forward in the government literature, and, secondly, suggest an apparently 'crazy' alternative to the whole notion of edge licensing.

We mentioned Kaye's (1992) idea of magic licensing which has been put forward to explain the occurrence of extra initial /s/ in languages such as English (*spring*). This /s/ is represented by him as a coda that 'magically' licensed the preceding empty vowel position. The occurrence of /s/ being a left edge phenomenon, it seems attractive to try and incorporate this phenomenon into the framework of e-licensing. How this can be done is not clear to me at the present time, however. Perhaps, if incorporation into e-licensing is inadvisable, we should look at the option of treatment the /s/ as a phonological pre-clitic in which case it would be treated just like the string /st/ in *herf-st*.

The second proposal that seems to be connected to the issue of left-edge licensing is the idea put forward in Lowenstamm (1999) that, universally, the left edge of (major category words) has a completely silent CV unit. Again, I am not sure how this proposal can be incorporated into the proposed framework for e-licensing, but there certainly seems to be a connection. Languages that allow extra consonants on the left side (such as Polish, Georgian and Dutch) can be said to use Lowenstamm's CV unit for that purpose (see Cyran 2006 for a discussion of Lowenstamm's proposal). Languages that do not allow extra consonants may use the CV unit for other purposes (see Lowenstamm's article for several examples), or perhaps may not use it at all.

Lowenstamm's silent CV unit, in those cases where it is not used at all, would seem to violate the OsRa licensing constraint (No Silent Syllable). Before concluding this section I would like to make an apparently 'crazy' and undeveloped suggestion which would take care of that problem, as well as several other issues that involve the apparent licensing potential of final silent rhymes.

Suppose that what is special about edges is not that a silent rhyme is, or can be licensed, but rather than edges allow the occurrence of a rhyme that contains an 'anti-element', which is an *inaudible element*. By attributing an actual element (albeit one whose phonetic interpretation is silence) to these silent rhymes we explain at the same time that these silent rhymes do not need to be licensed themselves (they are not empty-headed) and that they have licensing potential (ditto). And we no longer have the problem that an entirely empty CV unit would be permitted. We can do away with edge licensing as discussed so far and replace it by the stipulation that the anti-element can only occur at edges, which means that, effectively, a rhyme with an anti-element is a boundary marker, a theoretical reconstruction of the SPE-word boundary '#'.

The boundary marker, always being present, can just sit there or be recruited for various segmental phenomena such as the occurrence of extra consonants and sandhi processes. I will leave an exploration of this crazy idea for another occasion, however (cf. van der Hulst, in prep).

9. Conclusion

In this article, I have presented a general theory of licensing, incorporating interconstituent licensing and edge licensing, taking proposals made within the theory of Government Phonology as my point of departure. By showing that there is a unifying notion of i-licensing that controls the distribution of marked constituents, I have in some sense demystified central portions of Government Phonology. The underlying idea has been that marked configurations, i.e., syllabic constituents that contain either less (-1) or more ($+1$) than one (1) segment need licensing from the immediate (following) environment. This support must come strictly locally at the OR-level, or at the R-projection (and perhaps O-projection) level. We have seen that the need to be licensed is greater for empty-headed constituents than for branching constituents. Some licensing constraints that bear on branching constituents are parametric which accounts for the fact that languages differ in phonotactic complexity. This cross-linguistic variation may be seen as evidence for postulating dependency relations between constraints, a move that, from my point of view, demystifies the central idea of Optimality Theory. Certain other cross-linguistic differences remain due to the parameterization of structural constraints on syllabic constituents (i.e., whether branching or emptiness is allowed or not in the first place), although (as argued in Cyran 2003) it is perhaps possible to also formulate the relevant facts in terms of variation in licensing strength of licensors. After having discussed i-licensing, I turned my attention to edge licensing. We have seen that both the left and right edge of words allow for extra consonantal material in some languages and I have suggested that all these phenomena involve the licensing of a silent rhyme that is licensed simply by virtue of being on an edge. The idea that such silent rhymes are special because they contain a special, anti-element remains mysterious at the present time.

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References

Anderson, John M. and Colin J. Ewen (1987). *Principles of Dependency Phonology*. Cambridge: Cambridge University Press.

Anderson, John M. and Charles Jones (1974). Three theses concerning phonological representations. *Journal of Linguistics* 10: 1–26.

Anderson, Stephen R. (1982). The analysis of French schwa; Or, how to get something from nothing. *Language* 58: 121–138.

Booij, Geert (1983). Principles and parameters in prosodic phonology. *Linguistics* 21: 249–280.

Butskhrikidze, Marika (2002). The consonant phonotactics of Georgian. Ph.D. dissertation, University of Leiden.

Calabrese, Andrea (2005). *Markedness and Economy in a Derivational Model of Phonology*. Berlin/New York: Mouton de Gruyter.

Charette, Monik (1990). Licence to govern. *Phonology* 7: 233–254.

— (1992). Mongolian and Polish meet government licensing. *SOAS Working Papers in Linguistics and Phonetics* 2: 275–291.

— (2003). Empty and pseudo-empty categories. In *Living on the Edge: 28 Papers in Honour of Jonathan Kaye*. Stefan Ploch (ed.), 465–480. Berlin and New York: Mouton de Gruyter.

Chomsky, Noam and Morris Halle (1968). *The Sound Pattern of English*. New York: Harper and Row.

Cyran, Eugeniusz (2003). *Complexity Scales and Licensing Strength in Phonology*. Lublin: Wydawnictwo KUL.

— (2006). Review of Tobias Scheer, A lateral theory of phonology. *The Linguistic Review* 23: 505–542.

Cyran, Eugeniusz and Edmund Gussmann (1999). Consonant clusters and governing relations: Polish initial consonant sequences. In *The Syllable: Views and Facts,* Harry van der Hulst and Nancy A. Ritter (eds.), 217–247. Berlin/New York: Mouton de Gruyter.

Denwood, Ann (2006). A template for Turkish. Templates or syllables? *The Linguistic Review* 23: 465–504.

Dresher, B. Elan and Harry van der Hulst (1998). Head-dependent asymmetries in prosodic phonology. *Phonology* 15: 317–352.

Giegerich, Heinz (1995). *Metrical Phonology and Phonological Structure*. Cambridge: Cambridge University Press.

Goldsmith, John (1993). Harmonic phonology. In *The Last Phonological Rule*, John Goldsmith (ed.), 21–60. Chicago/London: The University of Chicago Press.

Gussmann, Edmund and Jonathan Kaye (1993). Notes from a Dubrownik café: I. The yers. *SOAS Working Papers in Linguistics and Phonetics* 3: 427–462.

Harris, John (1990). Segmental complexity and phonological government. *Phonology* 7: 255–301.

— (2004). Release the captive coda: the foot as a domain of phonetic interpretation. In *Phonetic Interpretation: Papers in Laboratory Phonology* 6, John Local, Richard Ogden and Rosalind Temple (eds.), 103–129. Cambridge: Cambridge University Press.

Harris, John and Edmund Gussmann (1998). Final codas: Why the west was wrong. In *Structure and Interpretation: Studies in Phonology*, Eugeniusz Cyran (ed.), 139–162. Lublin: Folium.

— (2002). Word-final onsets. *University College London Working Papers in Linguistics* 14: 1–42.

Helsloot, Karijn (1993). The prosodic word: An endless domain? *IFA Proceedings* 17: 129–146. Institute of Phonetic Sciences, University of Amsterdam.

Hooper, Joan (1976). *Introduction to Natural Generative Phonology*. New York: Academic Press.

Hudson, Grover (1974). The representation of non-productive alternations. In *Proceedings of the First International Conference on Historical Linguistics* (Volume II), J. Anderson and C. Jones (eds.), 203–229.Amsterdam: North Holland.

Hulst, Harry van der (1978). Recent developments in phonological theory. *Lingua* 49, 207–38.

— (1984). *Syllable Structure and Stress in Dutch*. Dordrecht: Foris publications.

— (2000a). Features, segments and syllables in Radical CV Phonology. In *Phonologica 1996: Syllables!?*, John Rennison (ed.), 89–111. The Hague: Thesus.

— (2000b). Modularity and modality in phonology. In *Phonological Knowledge: Conceptual and Empirical Issues*, Noel Burton-Roberts, Philip Carr and Gerard Docherty (eds.), 207–243. Oxford: Oxford University Press.
— (2003). Structure paradoxes in phonology. In *Living on the Edge: 28 Papers in Honour of Jonathan Kaye*, Stefan Ploch (ed.). 75–94. Berlin/New York: Mouton de Gruyter.
— (2004). Phonological dialectics: A short history of generative phonology. In *Linguistics Today – Facing a Greater Challenge*, Piet G.J. van Sterkenburg (ed.), 217–243. Amsterdam: John Benjamins.
— (2005). The molecular structure of phonological segments. In *Headhood, Elements, Specification and Contrastivity*, P. Carr, J. Durand and C. Ewen (eds.), 193–234. Amsterdam: John Benjamins.
— (2006). On the parallel organization of linguistic components. In: *Phonology and Syntax – The Same or Different*, special issue, Ricardo Bermudez-Otero and Patrick Honeybone (eds.). *Lingua* 116 (5): 657–688.
— (in prep.) Dependency in phonology. Ms., University of Connecticut, Storrs.
Hulst, Harry van der and Nancy A. Ritter (1999). Head-driven Phonology. In *The Syllable: Views and Facts*, Harry van der Hulst and Nancy A. Ritter (eds.), 113–167. Berlin/New York: Mouton de Gruyter.
— (2000). The SPE-heritage of OT. *The Linguistic Review* 17: 259–290.
— (2002) Levels, constraints and heads. In *Asymmetry in Grammar*, Vol 2, Anna-Maria di Sciullo (ed.), 147–188. Amsterdam: John Benjamins.
— (in prep.). The syntax of segments. Ms., University of Connecticut, Storrs.
Hulst, Harry van der & Jeroen van de Weijer (1995). Vowel harmony. In *The Handbook of Phonological Theory*, John A. Goldsmith (ed.), 495–534. Oxford: Blackwell.
Kaye, Jonathan (1990). 'Coda' licensing. *Phonology* 7: 301–330.
— (1995) Derivations and interfaces. In *Frontiers of Phonology: Atoms, Structures, Derivations*, Jacques Durand and Francis Katamba (eds.), 289–332. London/New York: Longman.
— (1992) Do you believe in magic? The story of s+C sequences. *SOAS Working Papers in Linguistics And Phonetics* 2: 293–313. [Also in: *A Festschrift for Edmund Gussmann from His Friends and Colleagues*, Henryk Kardela and Bogdan Szymanek (eds.), 155–176. Lublin: The Catholic University of Lublin Press, 1996.]
Kaye, Jonathan, Jean Lowenstamm and Jean-Roger Vergnaud (1985). The internal structure of phonological representations: A theory of charm and government. *Phonology Yearbook* 2: 305–328.
— (1990) Constituent structure and government in phonology. *Phonology* 7: 193–231.
Liberman, Mark and Alan S. Prince (1977). On stress and Linguistic rhythm. *Linguistic Inquiry* 8: 249–336.
Lowenstamm, Jean (1996). CV as the only syllable type. In *Current Trends in Phonology: Models and Methods*, Vol. I, Jacques Durand and Bernard Laks (eds.), 419–443. European Studies Research Institute (ESRI) and Manchester: University of Salford Publications.
— (1999) The beginning of the word. In *Phonologica 1996: Syllables!?*, John Rennison and Klaus Kühnhammer (eds.), 153–166. The Hague: Thesus.
Lyche, Chantal and Jacques Durand (1996). Testing government phonology ou pourquoi le choix du schwa. In *Current Trends in Phonology: Models and Methods*, Jacques Durand and Bernard Laks (eds.), 443–471. Manchester: European Studies Research Institute (ESRI) and Manchester: University of Salford Publications.
Paradis, C. (1988). On constraints and repair strategies. *The Linguistic Review* 6: 71–97.
Piggott, Glyne (1995). Phonological government and segmental licensing. In *Leiden in Last: HIL Phonology Papers I*, Harry van der Hulst and Jeroen van de Weijer (eds.), 315–353. The Hague: Holland Academic Graphics.
Piggott, Glyne and Harry van der Hulst (1997). Locality and the nature of nasal harmony. *Lingua* 103: 85–112.

Polgárdi, Krisztina (1998). *Vowel Harmony: An Account in Terms of Government and Optimality*. The Hague: Holland Academic Graphics.

Rischel, Jørgen (1972). Compound stress in Danish without a cycle. *ARIPUC* 6. University of Copenhagen.

Ritter, Nancy A. (1997). Headedness as a means of encoding stricture. In *Phonology in Progress – Progress in Phonology*, Geert Booij and Jeroen van de Weijer (eds.), 333–365. Leiden: Holland Academic Graphics.

— (2006). Georgian consonant clusters: The complexity is in the structure, not the melody. The Linguistic Review 23: 429–464.

Rowicka, Grazyna (1998). The audibility and visibility of Mohawk ghosts. In *Structure and Interpretation: Studies in Phonology*, Eugeniusz Cyran (ed.), 247–260. Lublin: Folium.

Rubach, Jerzy and Geert Booij (1990). Syllable structure assignment in Polish. *Phonology* 7: 121–158.

Scheer, Tobias (1998). Governing domains are head-final. In *Structure and Interpretation: Studies in Phonology*, Eugeniusz Cyran (ed.), 261–285. Lublin: Folium.

— (2005). *A Lateral Theory of Phonology. What is CVCV, and why should it be?* Berlin/New York: Mouton de Gruyter.

Scobbie, James (1997). *Autosegmental Representation in a Declarative Constraint-based Framework*. New York and London: Garland press. [Original dissertation: Attribute Value Phonology. Edinburgh. 1991]

Scobbie, James, M., John S. Coleman and Steven Bird (1996). Key aspects of declarative phonology. In *Current Trends in Phonology: Models and Methods, Vol. II*, Jacques Durand and Bernard Laks (eds.), 685–710. Manchester: European Studies Research Institute (ESRI) and Manchester: University of Salford Publications.

Selkirk, Elisabeth O (1984). *Phonology and Syntax: The Relation between Sound and Structure*. Cambridge, MA: The MIT Press

Trommelen, M. (1983). *The Syllable in Dutch: With Special Reference to Diminutive Formation*. Dordrecht: Foris.

Visch, Ellis (1989). A metrical theory of rhythmic stress phenomena. Ph.D. dissertation, University of Utrecht.

Yoshida, Shohei (1993). Licensing of empty nuclei: The case of Palestinian vowel harmony. *The Linguistic Review* 10: 127–159