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# **The Routledge Handbook of Phonological Theory**

*Edited by S. J. Hannahs and Anna R. K. Bosch*

First published 2018  
by Routledge  
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN  
and by Routledge  
711 Third Avenue, New York, NY 10017

*Routledge is an imprint of the Taylor & Francis Group, an informa business*

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*British Library Cataloguing-in-Publication Data*  
A catalogue record for this book is available from the British Library

*Library of Congress Cataloging-in-Publication Data*  
A catalog record for this book has been requested

ISBN: 978-1-138-02581-3 (hbk)  
ISBN: 978-1-315-67542-8 (ebk)

Typeset in Times New Roman  
by Apex CoVantage, LLC



Printed in the United Kingdom  
by Henry Ling Limited

## Contents

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<i>List of figures</i>	viii
<i>List of tables</i>	x
<i>List of contributors</i>	xi
1 The study of phonology in the 21st century: overview and introduction to <i>The Routledge Handbook of Phonological Theory</i> <i>S. J. Hannahs and Anna R. K. Bosch</i>	1
<b>PART I</b>	
<b>Theoretical frameworks</b>	<b>11</b>
2 Optimality Theory: motivations and perspectives <i>Pavel Iosad</i>	13
3 Current issues and directions in Optimality Theory: constraints and their interaction <i>Martin Krämer</i>	37
4 The phonology–phonetics interface in constraint-based grammar <i>Michael Ramsammy</i>	68
5 Stratal Phonology <i>Ricardo Bermúdez-Otero</i>	100
6 Rule-based phonology: background, principles and assumptions <i>Thomas Purnell</i>	135
7 Issues and prospects in Rule-Based Phonology <i>Bert Vaux and Neil Myler</i>	167
8 The syntax–phonology interface in Rule-Based Phonology <i>Heather Newell</i>	197

9	Government Phonology: Element Theory, conceptual issues and introduction <i>Tobias Scheer and Nancy C. Kula</i>	226
10	Syllable structure in Government Phonology <i>Tobias Scheer and Eugeniusz Cyran</i>	262
11	Interfaces in Government Phonology <i>Tobias Scheer and Eugeniusz Cyran</i>	293
12	Dependency Phonology <i>Harry van der Hulst and Jeroen van de Weijer</i>	325
13	Connectionist approaches to generative phonology <i>John Alderete and Paul Tupper</i>	360
14	Interfaces in connectionist phonology <i>Joseph Paul Stemberger</i>	391
	<b>PART II</b>	
	<b>Approaches</b>	<b>423</b>
15	Substance Free phonology <i>Charles Reiss</i>	425
16	The phonology of sign languages <i>Jordan Fenlon, Kearsy Cormier, and Diane Brentari</i>	453
17	Phonology as an emergent system <i>Diana Archangeli and Douglas Pulleyblank</i>	476
18	Laboratory phonology <i>Abigail C. Cohn, Cécile Fougeron, and Marie K. Huffman</i>	504
19	Articulatory Phonology <i>Nancy Hall</i>	530
20	Exemplar theories in phonology <i>Stefan A. Frisch</i>	553
21	Algebraic phonology <i>Iris Berent</i>	569

22	Statistical phonology <i>Michael Hammond</i>	589
23	Phonology and evolution <i>Bart de Boer</i>	617
	<i>Language index</i>	636
	<i>Subject index</i>	638

## 10

# Syllable structure in Government Phonology

Tobias Scheer and Eugeniusz Cyran

## 10.1 The core of GP: lateral relations

### 10.1.1 Lateralization of structure and causality in two steps

Traditionally, syllable structure is encoded by arboreal structure, i.e. the syllabic tree with the canonical constituent structure [Onset [Nucleus Coda]<sub>Rhyme</sub>]<sub>σ</sub>. The core of the research programme of Government Phonology (GP) is to show that the syllabic position of a segment is not defined by a constituent to which it belongs (and whose status is itself defined by the arboreal relations that it entertains with other constituents), but by lateral relations that hold among constituents.

This is where the name of the theory comes from, which is an indication (also from hindsight) that lateral relations are at the heart of GP: government is one such lateral relation, licensing is another. Government was introduced by Kaye et al. (1990) with explicit reference to government in the then current GB syntax where the well-formedness of movement was defined as a (lateral) relationship between the base (the trace, an empty constituent) and the target position of the displaced item called government. Syntactic government was sensitive to intervening structure (barriers).

Syllable structure and syllabic causality (i.e. the reason why a segment reacts on syllabic pressure) were lateralized in two steps, with an intermediate stage. Standard GP introduced lateral relations and shifted a certain amount of labour from the syllable tree to this new device. As a result, arboreal structure was severely impoverished, but remained in a depleted guise. This led to a hybrid model where on many occasions the same labour was done twice: by lateral and by arboreal structure. Conceptually, this kind of situation is undesirable, and this was made explicit early on by Takahashi's (1993) paper *A Farewell to Constituency* where the author shows that there is no need for arboreal structure when lateral relations are in place because the former can be read off the latter. Or, put differently, arboreal structure is a notational variant of lateral relations, which are primary. Hence the syllabic tree is a mere consequence of lateral relations and as such enjoys no theoretical status (but may help bridge the gap graphically between the old and the new for linguists who are familiar with trees). A trademark of GP, empty nuclei, are a direct consequence of this first step in the lateralization of structure and causality.

John Harris' (1997) Licensing Inheritance modifies the original hybrid model by adding more lateral relations, thereby completing the lateralization of causality – but without touching arboreal structure. This was a further step on the lateral trajectory that GP has initiated, but in a sense made the arboreal-lateral tension even more acute (see Scheer 2004: §§172, 186).

The last piece to be lateralized was thus the remaining arboreal structure itself. If it is understood that a theory cannot afford to have the same labour done twice, by (primary) lateral relations and (secondary) arboreal structure, the latter has to go if the lateral project is worthwhile at all. This is what Lowenstamm (1996) sets out to do: arboreal syllable structure is done away with altogether (constituency reduces to a strict sequence of non-branching onsets and non-branching nuclei), and lateral relations alone define syllabic positions. This is the lateral project described in Scheer (2004) (especially §165, where the evolution from Standard GP to CVCV is traced back in detail; on this transition see also Scheer 2012a), which is known as *CVCV* or *Strict CV* (see section 10.2 below).

More recently, syllable structure along the lines of Standard GP is used e.g. by Charette (2008). It also underlies GP 2.0 (Pöchtrager 2006; Pöchtrager & Kaye 2013), even though this approach focuses on melodic structure (aiming to further reduce the set of melodic primes by expressing their contribution in terms of arboreal structure; see Chapter 9, section 9.2.1).

### 10.1.2 A pre-theoretical fact: lateral relations encode the workings of syllabification

Syllable structure is a function of two and only two factors: the order of segments in the linear string and their sonority with respect to their neighbours. This is an uncontroversial fact which all phonological theories implement in one way or another (whatever formal guise 'sonority' might take). The two linear strings VTRV and VRTV (T is shorthand for any obstruent, R for any sonorant), for example, will end up syllabified as V.TRV and VR.TV because TR makes a good branching ONSET while RT does not. The well-formedness of branching onsets, in turn, is defined in terms of sonority: only rising sonority profiles qualify. What that means is that the decision on syllabification, i.e. the labour of syllabification algorithms in traditional theories, relies on the evaluation of the relationship that is entered into by adjacent segments, here by two adjacent consonants: the relative sonority of TR and RT produces different outputs. The decision is thus *lateral* in kind: given linearity, it is based exclusively on the comparison of the sonority values of the two items at hand.<sup>1</sup>

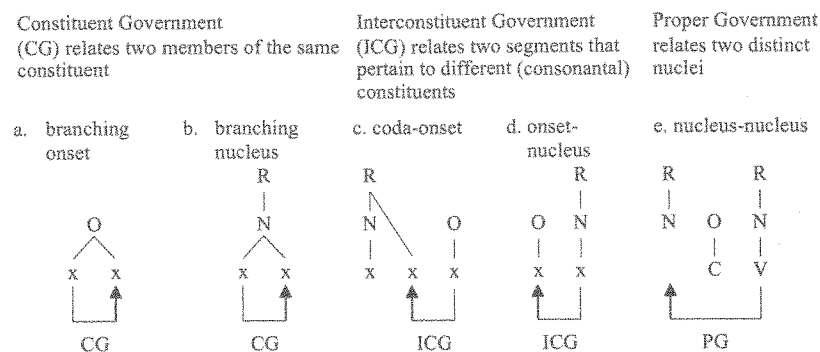
Rather than talking about the effect of syllabification (constituent structure), GP elevates to theoretical relevance its origin: the lateral relationship between two segments. Or, in other words, GP encodes the lateral cause of syllabification, rather than its vertical (arboreal) effect: it is the former that matters and that phonological theory should manipulate. GP thus offers a direct snapshot of the driving mechanism, rather than a picture of its indirect consequences (see Scheer 2004: §11). In sum, everybody is doing the same lateral computation when doing syllable structure, but only GP is making this explicit.

The relationship among two adjacent consonants regarding their sonority is encoded in Standard GP by two lateral forces: Constituent Government (CG) and Interconstituent Government (ICG). Sonority is encoded in terms of segmental complexity, i.e. the number of primes that a segment is made of (see Harris 1990; Chapter 9, section 2.2). The general rule, then, is that more complex segments (which are stronger because they bear more primes) are more important than less complex items when their relationship as neighbours is calculated: being more important means heading the cluster, and the asymmetric, hierarchical

relationship between a head and a complement is called government. Since obstruents are found to be systematically more complex than sonorants (see Chapter 9, section 2.2), they are the head of clusters where they occur with sonorants, to the effect that TR clusters are left-headed (CG), while RT clusters are right-headed (ICG).

Note that the name of the two kinds of government refers to the arboreal output of the computation (TR ends up as a branching ONSET, RT as a coda-onset cluster), rather than to their lateral properties, which are opposite in terms of direction: CG is progressive, while ICG is regressive. The directionality of government determines constituency more generally in Standard GP since complex nuclei (long vowels or heavy diphthongs) are also left-headed (and hence again within a constituent, where government is left-to-right), while government among different nuclei is right-to-left. Internuclear government has a special name, Proper Government, and is at the origin of vowel-zero alternations, as we will see shortly. For the time being, table (1) below recapitulates the different types of government that are recognized in Standard GP (a more detailed short guide to 1990 GP is available in Scheer 2004: §623).

(1) Government in Standard Government Phonology



10.1.3 Arboreal structure depleted: no ternary constituents, no syllable node, no coda constituent, no word-final codas

The lateral perspective on syllable structure has a number of consequences, which all concur to reduce arboreal structure (with respect to the traditional standard). For example, ternary constituents are ruled out. This follows from the fact that (Proper Government set aside, on which see section 10.1.5) relative sonority and hence lateral relations are only ever computed among two adjacent segments – an observation called *strict locality* in Standard GP (recall that this embodies the basic fact that syllable structure is a computation of the relative sonority of adjacent segments). For a putative ternary constituent  $[x_1 x_2 x_3]$ , strict locality requires  $x_2$  to be the head (otherwise two non-adjacent items would be related). However,  $x_2$  could not govern  $x_1$  because we know that within a constituent, government is always progressive (something that is called *strict directionality* in Standard GP). Hence the impossibility for the system to derive well-formed ternary constituents, which is known as the *Binary Theorem* (Kaye et al. 1990: 199f.; Kaye 1990: 306f.): all syllabic constituents are maximally binary.

Another consequence of the lateral system is that there cannot be any constituent dominating the ONSET and the rhyme: there is no syllable node (Kaye et al. 1990: 200f.;

Brockhaus 1995). Were the ONSET and the rhyme sisters within a constituent, the former would have to govern the latter since CG is progressive. For one thing, this sounds awfully odd to a phonologist's ear since the fundamental asymmetry between consonants and vowels is the other way around: the centre of gravity of the syllable is the vowel; consonants are satellites. But setting aside intuition, this scenario would also violate the Binary Theorem since only segments are governors and governees. In a syllable with a branching ONSET and a branching nucleus, it is unclear which one of the two consonants would govern which one of the two vocalic slots, and strict locality would be violated anyway.

As a result, Standard GP thus claims that there is no syllable node. Instead there are onset-rhyme pairs. This situation has fed an urban myth saying that GP has no syllable or is against the syllable. In the 1990s, this myth was wide-spread among phonologists (and still persists in some quarters), showing that GP texts were not directly perceived in the community. Having no syllable node does not mean being uninterested in syllable structure, or being against this very concept. There are various theories of sound structure, namely found in phonetic quarters or in the trend towards a 'phonetically grounded phonology' that was popular in the early 2000s (Steriade 1999; Hayes et al. 2004), which truly propose that there is no such thing as syllable structure (since it may be predicted from phonetic cues). GP is quite the opposite of that (recall from Chapter 9.1.1 that for Kaye phonology is a system that computes cognitive units).

A further consequence of the lateral system is to demote the coda to a non-branching existence, and ultimately to a non-constituent (Kaye et al. 1990: 201f.). The bell-curve describing the syllable that was identified at least since Sievers (1885) has a rising sonority slope on the left side of the nucleus, but a falling profile to its right. That is, candidates for branching codas show a falling sonority slope (*carp*, *salt* etc.). Since obstruents are governors and sonorants governees, the only governing relation that could hold within the cluster *rp* of *carp* is one where the *p* governs the *r*. This, however, violates strict directionality: government within a constituent, hence within a putative branching coda, is head-initial. Another consequence of the lateral system is that the coda would be the only constituent that never governs anything (onsets govern preceding codas, nuclei govern their onsets). It is therefore denied the status of a constituent (Kaye et al. 1990: 201f.), and its skeletal slot is directly attached to the rhyme. Instead of *coda*, then, it is referred to as *postnuclear rhymal complement* or *rhymal adjunct* (for expository reasons, the word *coda* continues to be used below, though).

Finally, the status of coda consonants as being governed by the following ONSET prompts an obvious question: what about word-final codas? What would be their governor? It was mentioned that codas are only ever dependents, i.e. they never govern anything. From this Kaye (1990) draws the conclusion that codas cannot exist without being governed by a following ONSET. Which means that there are no word-final codas at all, in any language, since they will never be able to be governed. If word-final consonants cannot be codas, there is only one alternative: they are onsets. Which means in turn that there must be a nucleus to their right: the existence of an ONSET implies the existence of its nucleus. This nucleus, then, must be empty since the word is consonant-final on the surface. A word such as *cat* thus ends in a final empty nucleus (FEN): /katø/.<sup>2</sup> In this setting, the parametric decision for a language to allow for word-final consonants or not (English says yes, Italian says no, at least in its native vocabulary) is a decision about FEN, rather than about final consonants: languages that have final consonants allow final nuclei to be empty, while languages where all words are vowel-final require that final nuclei be phonetically expressed (Kaye 1990: 323ff.).

Up to this point, the purpose of lateral forces (except for Proper Government, on which more below) was to encode sonority relations among adjacent segments. There is no



obligation, however, for a consonant to enter in a sonority relationship with a neighbour: onsets may of course be non-branching and intervocalic. Hence Kaye's conclusion has a new quality: he derives the *obligation* for codas to be governed, i.e. to be unable to exist on their own, from their exclusive status as governees. This obligation is called *Coda Licensing* and introduces a new category of lateral forces, or at least a new word for a subset of them: *licensing*. What is meant is that licensing describes a situation where the target cannot exist in absence of the lateral force in question. But still, Coda Licensing is supposed to be a consequence, or an effect, of ICG: it is the latter that has the inherent virtue to rule over the existence of codas, and this inherent virtue is then called licensing. The relationship between government and licensing thus appears to be one of inclusion: licensing is a virtue, or an effect, of government.

An extension of the new licensing tool is *Government Licensing*, introduced by Charette (1990). Like Coda Licensing, it describes a well-formedness condition on the existence of dependent skeletal slots (these were first consonantal, but the concept was extended to vocalic slots by Yoshida 1993). The idea is that governors do not enjoy their governing ability per se: they need external support in order to be able to dominate their complement. Hence simplex, but not branching onsets, can be followed by an empty nucleus: only contentful nuclei qualify as government-licensors. For the same reason, a simplex ONSET that is called to govern a preceding coda must not be followed by an empty nucleus.

In practice, Government Licensing was developed through the analysis of Quebec French where the realization of schwa is optional unless it is preceded by a consonant cluster, in which case its presence is mandatory. The preceding cluster may either be a coda-onset sequence as in *forteresse* [fɔrtɛres], \*[fɔrtɛs] 'fortress', or a branching ONSET as in *autrement* [otrɛmɑ̃], \*[otrɛmɑ̃] 'otherwise'. In both cases, schwa cannot be dropped (in this variety of French) since the head of the preceding consonantal governing domain (the t in both cases) needs to be licensed in order to be able to govern its complement.

In more recent work, the idea of Government Licensing is further developed into licensing strength scales (Cyran 2010).

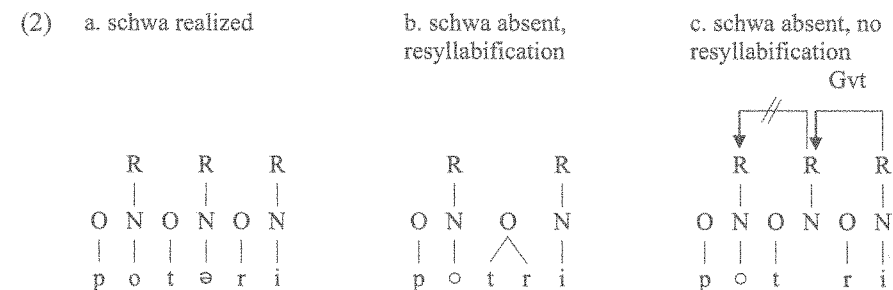
#### 10.1.4 Vowel-zero alternations, empty nuclei and resyllabification

Empty nuclei are a trademark of GP. Even though they were sporadically used outside of and prior to this theory (Anderson 1982; Angoujard 1982; Spencer 1986), only GP has given them a theoretical status with stable diagnostics and cross-linguistic properties. While word-final empty nuclei as described in the previous section have spread into the phonological landscape and today are broadly assumed (e.g. Kiparsky 1991; Dell 1995; Burzio 1994; Oostendorp 2005), internal empty nuclei were outcasts in the 1990s and today are still more or less confined to GP quarters.

Recall from Chapter 9.1.1 that in GP what you get is *not* what you see. Linguists in general and phonologists in particular teach that linguistic structure cannot be read off the surface but needs to be discovered through analysis. In phonemic analysis, for example, what you get may be quite different from what you see since e.g. two phonetic items (segments) may turn out to be just one phonological unit (a phoneme). Strangely enough, though, when it comes to syllable structure the same phonologists may well teach that what you get is only ever what you see: there are exactly as many phonological units (x-slots) as there are phonetic items (segments). Almost all of them will agree that there are empty onsets; some will also admit word-final empty nuclei, but rarely will phonologists provide for internal empty nuclei. Empty constituents, nuclei just as much as onsets, though, are predicted to

exist by basic autosegmental workings, whose central insight is that the relationship between syllabic constituents and segments is not one-to-one (Scheer 2015: §93ff.): there must be segments that are unassociated (floating segments), and there must be constituents that have no segmental content (empty onsets and nuclei).

Beyond these principled considerations, internal empty nuclei are the analytic alternative to resyllabification when a vowel alternates with zero. A French word like *poterie* 'pottery' may be pronounced either with (*pot[ə]rie*) or without (*pot'rie*) a schwa in the penult syllable. The form with realized schwa appears under (2a), while (2b) and (2c) show the two analyses of the schwaless pronunciation with and without resyllabification.



In this particular (optional) vowel-zero alternation found in French, we know for sure that there was no resyllabification of the two independent onsets *t* and *r* into a branching ONSET. This is because in relevant (southern) varieties of French, +ATR and -ATR versions of mid vowels are in complementary distribution (Durand 1990: 24ff.): the former occur in open (*f[ɔ]llie* 'madness', including before TRs: *se v[ɔ]trer* 'to lounge'), while the latter are observed in closed syllables (*div[ɔ]rcer* 'to divorce'). The resyllabified structure under (2b) should thus produce an [ɔ] – but what is really pronounced is [ɔ]: *p[ɔ]t'rie*, \**p[ɔ]t'rie*. Hence there was no resyllabification (Scheer 2015: §112f.). The -ATR pronunciation is thus consistent with (2c) where the melody of the schwa was deleted, but not its constituent.<sup>3</sup>

#### 10.1.5 Proper Government and structure preservation

This further depletes arboreal structure: what used to be a branching ONSET now identifies as two independent onsets that enclose an empty nucleus. The analysis also establishes a *lateral causality*: the vowel is -ATR because it is followed by an empty nucleus (contentful nuclei produce +ATR vowels: *f[ɔ]llie*). Hence the [ɔ] of *p[ɔ]t'rie* /potɛri/ occurs in a 'closed syllable' as much as the [ɔ] in *div[ɔ]rcer* /divɔʁɛs/ 'to divorce', that is in fact before a governed empty nucleus. The absence of lateral communication between the empty nucleus and the mid vowel is indicated by a barred arrow under (2c). The arrow is barred because (governed) empty nuclei (as opposed to contentful nuclei) cannot be the source of lateral relations.

The other lateral relation depicted under (2c), i.e. the one between the final vowel and the nucleus that hosts the vowel-zero alternation, indicates that schwa is deleted under government. In Standard GP, internuclear government was called Proper Government in order to be distinct from the other types of (interconsonantal) government mentioned. We will see in section 10.1.8 that the multiplication of distinct lateral forces was also a reason to move on to CVCV, where the lateral zoo boils down to government and licensing (or

even, in Cyran's model, to licensing alone; see section 10.2.1). But at this point two things are noteworthy: (i) Proper Government is the only lateral relation in Standard GP which is not strictly local: it relates two skeletal slots that are not adjacent; and (ii) Proper Government is the only type of government that does not describe the sonority relationship of segments: it is precisely independent of the sonority slope of consonants that surround the alternation site.

But let us return to the French case. Note that word-final 'closed syllables' are also covered: *folle* [fɔl] 'mad, fem.' displays a -ATR vowel before a word-final consonant. Recall that according to GP this consonant is the ONSET of an empty nucleus. Hence the overall description of the two positions where [ɔ] occurs is unified (i.e. non-disjunctive): [ɔ] is observed iff the following nucleus is empty.<sup>4</sup> This is the essence of what Kaye (1990) establishes on the grounds of vowel-zero alternations in Yawelmani and Turkish. Note that he did not take the step to identify  $\_C\{C,\#\}$  for what it classically is, though: a closed syllable. This is because Standard GP had remaining arboreal structure, including codas, which literally (and in the classical sense) closed the syllable. A consequence of this stance is that Standard GP had two distinct identities for vowels in closed syllables: they could occur 'before an empty nucleus' and 'before a coda'. It is this kind of redundancy that will lead CVCV to eliminate all remnants of arboreal structure in the 1990s, and hence to simply say that a vowel stands in a closed syllable iff the following nucleus is empty (see section 10.2.2 below).

Finally, stepping back from the singular French pattern, there are certainly cases where the analyst is not as lucky as in this language, which allows him to control the syllabic status of the consonant preceding the alternation site by looking at the preceding vowel. A position according to which resyllabification occurs in absence of compelling evidence to the contrary (of the French kind) is thus empirically sound. Rather than menially following the empirical record, though, GP takes cases of the French kind as indicative of the true nature of vowel-zero alternations which may not be revealed in all languages. That is, vowel-zero alternations are purely melodic: they *never* modify syllable structure. When the zero occurs in an alternation site, its syllabic identity is always an empty nucleus.

This means that syllable structure is constant and remains unmodified under phonological processing. In syntax, this idea is known as *structure preservation*: it is not because you don't see an item that its structure (constituent) is not there. This was the basic insight that paved the way for a central tenet of syntactic theory: the well-formedness of a structure depends on the relationship between the place where an item is pronounced (after movement) and the place where it is interpreted (or base-generated, i.e. its trace). The passive transformation once deleted the original constituent of *Peter* in *Peter<sub>i</sub> is loved<sub>t<sub>i</sub></sub> by Mary* after having moved *Peter*. Structure preservation suspends deletion of unpronounced items (Emonds 1976) and thus produces the same effect as the GP ban on resyllabification. Kaye & Lowenstamm (1984: 125) explicitly refer to this syntactic precedent.

The prohibition against modifying syllable structure in the course of phonological computation is general and absolute in GP. Again in explicit reference to syntax, this was encoded in the *Projection Principle* (Kaye et al. 1990: 224f.). Another typical locus of resyllabification is the right edge of morphemes: on the traditional analysis,  $C_2$  of a  $C_1VC_2$  root will be a coda when pronounced as such (e.g. the *k* of *luck*), but becomes an ONSET if a vowel-initial suffix is added (as in *luck-y*):  $C_1VC_2V$ . This is ruled out in GP: a melodic object that is 'born' in a coda cannot surface in an ONSET (and *vice versa*). Since morpheme-final consonants are always onsets of empty nuclei, the root *luck-* will be /lʌkø/ and the *k* an ONSET no matter what happens during phonological computation. The suffix *-y* thus enters the FEN.

### 10.1.6 Syllable structure is recorded in the lexicon

This leads us to another salient property of GP that sets this theory apart from others: the fact that syllable structure is recorded in the lexicon (rather than built by a syllabification algorithm upon phonological computation). This perspective is first mentioned in Kaye & Lowenstamm (1984: 125): "all syllabic constraints, formal and substantive, are defined at the lexical level" (translation mine). If the Projection Principle rules out the modification of syllable structure (i.e. resyllabification), an obvious question is to which derivational stage this ban applies. In systems where computation is based on extrinsically ordered rules, syllabification is a regular piece of phonological computation that may be interleaved with regular segmental rules (say, palatalization). Hence there is no single reference point in the derivation where syllable structure is exhaustively established and then other rules apply. In GP, this reference point is the lexicon, i.e. the pieces that are stored in long-term memory. That is, all units which are stored in the lexicon are fully syllabified and syllabic affiliation may then not be altered during phonological computation. The fact that syllabic items are fully syllabified then extends the ONSET status of word-final consonants (that was established by Coda Licensing) to morpheme-final consonants: whether the final *-k* of the root *luck-* ends up being word-final, followed by a consonant or followed by a vowel on the surface is irrelevant – it is an ONSET in the lexicon and will have this syllabic affiliation all through.

A common misunderstanding in this context is the conclusion that GP does not have any syllabification algorithm. Of course it does: the soundwave does not come with syllabic marking. Hence infants when acquiring words and adults when learning new lexical items need to syllabify whatever comes their way. In other words, syllabification occurs upon lexicalization, and relevant decisions are made then. These may prove wrong and in this case will be corrected: recall from Chapter 9.1.1 that the syllabic status of the input [wat] in French is ambiguous: the *w* may belong to an ONSET or a (diphthongal) nucleus, and this produces two distinct lexical items, *watt* 'watt' and *ouate* 'cotton wool' (the former prohibiting, the latter requiring elision). When a child (or an adult) hears the string [nef wat] meaning 'nine cotton wools' (*neuf ouates*) and has never come across the word *ouate* before, s/he needs to decide whether the *w* will be lexicalized as an ONSET or as the first member of a (nuclear) diphthong. In case the former choice is made, this lexicalization will have to be corrected upon exposure to *l'ouate* 'the cotton wool' where the elision of the definite article *la* shows that the initial ONSET of *ouate* is empty.

### 10.1.7 The growing inventory of empty nuclei

Finally, let us discuss the inventory of empty nuclei that are recognized in Standard GP. Two locations have already been discussed: after morpheme-final consonants and in places where vowels alternate with zero in case the zero surfaces. To complete the picture, there are three more cases to be mentioned. In every instance, empty nuclei are the fall-back analysis when no other syllabic interpretation of a cluster is possible.

In English, word-internal *tl*, *dl* as in *atlas*, *Atlantic*, *butler*, *medley*, *bedlam* etc. are so-called bogus clusters (Gussmann 2002: 75). Their rising sonority slope qualifies them as branching onsets, but they do not occur word-initially (\*#tl, \*#dl is a pervasive distributional gap in many languages, including Romance and Germanic), a fact that counter-indicates ONSET status. Also, the *t* is not aspirated in pre-tonic position where voiceless stops always show aspiration when occurring in an ONSET: the *t* of *p<sup>h</sup>olitics* is unaspirated, but before a tonic vowel in *p<sup>h</sup>oliti<sup>h</sup>ician* it aspirates, and this is also true when voiceless stops occur in a branching

ONSET (*Pa<sup>h</sup>rícia*). In pre-tonic coda position, however, they remain unaspirated (*\*fac<sup>h</sup>tórial*, *\*doc<sup>h</sup>tórial*), and so they do in *\*A<sup>h</sup>lántic*. This indicates coda status for the *t*, which however is ruled out by the sonority slope of *tl*, *dl*. Therefore, if these clusters cannot be either branching onsets or coda-onset clusters, they must be two independent onsets (/atolas/ etc.).

A second case in point involves word-initial s+C sequences. Kaye (1992) shows that these notoriously misbehaving clusters consistently do not behave like branching onsets across languages (see also Harris 1994: 57ff. for English). In Classical Greek reduplication, for example, singleton consonants (*ly-oo – le-ly-ka* ‘to lose, present, perfect’) including *s* (*satt-oo – se-sag-mai* ‘to equip, id.’) reduplicate, as does the obstruent of regular branching onsets (*graf-oo – ge-graf-a* ‘to write, id.’). This is not the case with *s* when occurring in an s+C cluster: *spoudaz-oo – e-spouda-ka* ‘to haste, id.’, *stere-oo – e-steree-ka* ‘to deprive, id.’. Kaye (1992) concludes that s+C clusters do not instantiate a branching ONSET. This is also indicated by their sonority slope, which notoriously violates sonority sequencing in languages that otherwise restrict initial clusters to #TR. Solutions that have been favoured in the literature place the *s* outside of the ONSET either in a specific constituent (appendix, e.g. Kenstowicz 1994: 260f.) or as a floating item which after syllabification is directly attached to some higher constituent such as the syllable or the prosodic word (Rubach 1999: 292ff.). A status as a contour segment (parallel to affricates) is also sometimes argued for (Steriade 1982: 346ff.). All of these solutions (except the latter, but which does not work for the Greek pattern because it predicts that the entire contour segment will be reduplicated) recur to structures that do not belong to the general syllabic theory used, i.e. which are created only to put up the annoying s+C. The alternative is to stick to one’s theory, i.e. not to propose a specific patch every time there is a leak. Taking (their) theory seriously is the option that was taken by 19th-century neogrammarians: Sievers (1901: §534) concludes that #s+C clusters instantiate two distinct syllables, hence the leftmost being made of the #s and an empty nucleus. This is also Kaye’s (1992) conclusion: the #s is a coda, and the preceding nucleus and ONSET are empty. The fact that Greek reduplicates nothing with s+C then follows: in fact it faithfully reduplicates the content of the first ONSET of the word, which happens to be empty. With hindsight, Kaye’s (1992) analysis placing an empty nucleus at the left edge of the word is a forerunner of Lowenstamm’s (1999) initial CV (see section 10.2.3.5 below).

Finally, Gussmann & Kaye (1993: 448ff.) have devised a mechanism, Interonset Government, in order to account for cases where two empty nuclei occur in a row – a situation that cannot be managed by the tools of the theory as it stands (since Proper Government is not recursive, i.e. vowels can only govern one nucleus at a time). The initial cluster of Polish *mgl-a* [mgw-a] ‘mist Nsg’ and *pchl-a* [pxw-a] ‘flea Nsg’ does not qualify as a branching ONSET. It must therefore represent two independent onsets. The following cluster, *gl* [gw] and *chl* [xw], does make a good branching ONSET, but when looking at the genitive plural *mgiel* [mgiew], *pchel* [pxew] it turns out that it encloses a vowel-zero alternation. This means that the nominative singular hosts two empty nuclei in a row: /møgøt-a/, /pøchøt-a/. In this situation, Gussmann & Kaye propose that the leftmost empty nucleus is governed by the (suffixal) vowel, while the other empty nucleus is silenced by a governing relationship between the two onsets: since obstruents are governors and sonorants governees, *g* and *ch* [x] govern *l* [w]. This produces a well-formed structure where both empty nuclei have a reason to remain unpronounced, though at the expense of watering down the analysis of empty nuclei, which were supposed to be a consequence of an internuclear relation (Proper Government). Indeed, the cases at hand would be the only instance of empty nuclei that are due to an interconsonantal relation. Also, Interonset Government violates the directionality of government, which is progressive within a constituent but regressive among constituents (see section 10.1.2).

### 10.1.8 Increasing labour for the ECP

Summing up the development described, the workings of Standard GP mechanically produce more and more empty nuclei as the languages (and language families) analyzed increase (the Polish case), and as they are applied to notorious problems such as bogus and s+C clusters. Every time a new type of empty nucleus joins in, arboreal syllable structure is washed out a little more. And the growing empty nucleus inventory requires more and more contorted manoeuvres in order to keep everything under one roof: the problematic consequences of Interonset Government were mentioned, and the fact that the vowel following initial s+C clusters needs to govern the empty nucleus preceding the *s* led Kaye (1992) to talk about Magic Government: Proper Government was supposed to be unable to apply over another governing domain such as branching onsets or coda-onset clusters. If word-initial s+C clusters are coda-ONSET clusters, though, they are preceded by an empty nucleus whose only reason to remain silent is to be governed by the first expressed nucleus of the word: in /ø<sub>1</sub>ø<sub>2</sub>s.top/ where ø<sub>2</sub> is the nucleus of the coda *s* (and ø<sub>1</sub> its ONSET), ø<sub>2</sub> can only be silent because it is governed by the *o*. Since government over a coda-onset cluster is impossible, the solution that fits the empirical picture (*s* in #sC clusters is a coda) is incompatible with the theory. Therefore Kaye calls this government that should not exist magic – not to say that this is the solution and that there is some kind of magic in phonology, but to indicate that this is an unsolved conundrum.

The attempt to manage all these different empty nuclei that occur in different situations and for different reasons was then to say empty nuclei can only occur when there is a good reason for them to remain unpronounced. The idea to place the existence of empty nuclei under grammatical control is yet another borrowing from then current GB syntax: the proliferation of empty categories needs to be marshalled (otherwise they appear everywhere). Hence the Empty Category Principle (ECP) in syntax, whose phonological version in Standard GP simply lists the devices that are able to silence an empty nucleus: (i) word-final empty nuclei are licit upon a parametric decision (see section 10.2.3), and so are empty nuclei that (ii) are properly governed (vowel-zero alternations), (iii) are enclosed within an interonset governing domain and (iv) precede initial s+C clusters (Magic Government). Kaye (1995: 295, 303) coins another lateral relation that the four cases mentioned are supposed to be instantiations of: p-Licensing (where *p* stands for prosodic). Given this meta-lateral relation, then, empty nuclei are well-formed iff they are p-licensed.

Note that this time various forms of government are a form of (p-)Licensing, while Coda Licensing as described in section 10.2.3 appeared to be a form of government. The unclear relationship between the two major lateral forces, which ought to be distinct but turn out to be forms of one another, could only be managed by a number of patches in an amorphous list. This situation indicated that something is wrong with the theory itself and hence played an important role in the transition to CVCV (see Scheer 2004: §186; section 10.2.3 below).

## 10.2 Strict CV

### 10.2.1 Introduction

Strict CV is the final step in the process of lateralization of structure and causality. The elimination of the arboreal aspect of representation and recognition of CV as the only possible syllabic type is now common to a number of variants of Strict CV which differ mainly in how lateral relations between these units are arranged. In this section we look at some current



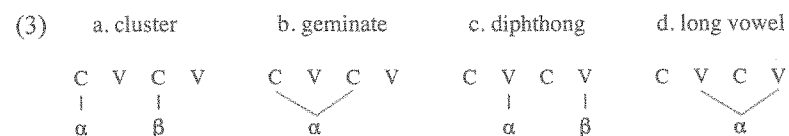
issues connected with the Strict CV model (Lowenstamm 1996, 1999), as developed later in, for example, Scheer (2004); Ségéral & Scheer (2001); Scheer & Ségéral (2008a, 2008b). As a starting point we take the latest version of this model, whose hallmark is Coda Mirror 2 (CM2) (Scheer and Ziková 2010; Scheer 2012a, 2012b). We concentrate on the empirical predictions of this model, its strong and weak points, refer to other 'dialects' of Strict CV, and finally offer some thoughts on a potential further development.

Work in Strict CV includes Lowenstamm (2000a, 2000b, 2003a, 2003b); Bendjaballah (1999, 2001); Bendjaballah & Haiden (2008); Faust (2014, 2015); Passino (2009, 2013); Lahrouchi (2003, 2008); Lahrouchi & Ségéral (2009); Zdziebko (2015); Fortuna (2015, 2016); Ulfsgjorninn (2014); Rizzolo (2007); Barillot & Ségéral (2005); Caratini (2009); and Kula & Marten (2009). The aforementioned dialects of Strict CV include the following. Szigetvári's VC approach holds that the basic building blocks are VC (rather than CV units) and hence the string starts with a V and ends in a C (Szigetvári 1999, 2001, 2007, 2008). Carvalho's Contour CV model defines major classes of segments in terms of a one-to-many association of melodic items to consecutive C- and V-slots (Carvalho 2002, 2004, 2008). Rowicka (1999) and Polgárdi (1999) implement lateral relations that are left-headed (instead of being right-headed). Polgárdi (2003, 2008, 2009) defines a Loose CV environment where the skeleton is strictly CV but ends in a C (there is no FEN). Finally, Cyran (2010) derives the lateral relation network in Strict CV from complexity scales in his Complexity Scales and Licensing model (CSL) where Licensing is the only lateral force (there is no government).

Complexity scales are discussed in section 10.2.4 below, but it is impossible in this chapter to do justice to the wealth of all works and dialects of Strict CV mentioned above.

### 10.2.2 What is strict CV?

Strict CV itself grew out of a general GP programme (Kaye et al. 1985, 1990; Kaye 1990; Charette 1990; Harris, 1994). Lowenstamm (1996) put forward a proposal that CV is the universal syllable structure, and that any surface departure from this pattern in fact has to be reanalyzed as a phonological sequence of such light syllables. Consequently, consonant clusters, geminates, diphthongs and long vowels must have the following representations. Note that all these configurations enclose an empty position, either C or V.



Basing his arguments on as diverse phenomena as the template structure of Classical Arabic, Compensatory Lengthening in Tiberian Hebrew or Danish *stød*, Lowenstamm demonstrates that a number of important generalizations are missed if the above representations are not assumed to be universal. Lowenstamm's paper marks the birth of CVCV, which in a way was a logical consequence of the development of GP. In fact, some Standard GP analyses dealing with, for example, complex consonantal clusters have produced results which were close to the CVCV paradigm, e.g. Gussmann & Kaye (1993) and Cyran & Gussmann (1999) for Polish. The problem, however, was with the proliferation of sometimes contradictory lateral forces to deal with the increased number of empty nuclei (cf. the discussion in section 10.1.8 above).

The simplicity and elegance of the CV assumption is one thing. However, this model dismantles the traditional prosodic structure relating to the syllable and syllabic constituents, which have been referred to as domains of phonotactic interaction between their members, for example, consonants interacting in complex (branching) onsets, or in coda-onset contacts, and vowels interacting with the following codas in closed syllable effects. Thus, with CV as the basic representational grid the main theoretical questions are what makes the different configurations in (3) grammatical, and what makes them behave the way they do in the new mode of speech sound organization? How are the empirical effects captured earlier by arboreal structure translated into the Strict CV model?

Given that in Strict CV all syllables are formally open, and all clusters in fact involve heterosyllabic consonants, the question is what allows some clusters, typically RT, to close the preceding syllable and preclude length of the preceding vowel, as in e.g. *reception*, and what makes vowel length possible in front of some TR clusters (branching onsets), e.g. in *cobra*? Also, what is the source of variation in the latter context? These questions are not trivial. In traditional models, it was the syllabic grouping of phonological strings that was made responsible for such effects. It is clear that the CV representation on its own is unable to address these questions and some mechanisms must be recognized, which are responsible for the syllabic effects known by such names as closed syllable shortness, open syllable lengthening, metrical lengthening, extrasyllabicity, coda effects, positional strength,<sup>5</sup> vowel-zero alternations, phonotactics, etc. This is precisely what CVCV is all about. It shifts the labour from arboreal to lateral structure which is due to a network of lateral relations established after morphemes are concatenated (cf. section 1.2).

Various incarnations of the Strict CV model, unlike Standard GP, are also strict on the number and type of computational mechanisms that may be part of phonology, recognizing only two familiar mechanisms of government and licensing as major organizing principles. The two lateral forces now have a precise definition in terms of what they do to their targets. But the ways in which these lateral relations are employed may differ across CV frameworks, and make markedly different predictions.<sup>6</sup> Below we look at a fairly well-established development of Strict CV called Lateral Theory of Phonology (LTP) in its most recent version.<sup>7</sup>

### 10.2.3 LTP with Coda Mirror 2 – main assumptions and predictions

Exactly how the C and V positions interact with each other to yield the observed syllabic effects is a matter of some debate, which is why we use one model to demonstrate what predictions such a restrictive phonological system can make. One way in which all versions of CVCV differ from Standard GP is in complete flattening of the phonological representation and replacement of traditional syllabic (arboreal) constituents with lateral relations between positions. Another difference lies in the elimination of the confusion as to what the two lateral forces can do. Government is assumed to be a relation that diminishes melodic material under the affected position. Thus, it may be viewed as a negative or destructive force. Licensing, on the other hand, supports melodic structure. It is a positive force. This distinction was not so obvious in Standard GP in which a governed position was said to be also licensed. Additionally, all lateral relations in LTP are right-headed. This follows from Standard GP directionality, which is regressive among constituents (ICG, as discussed in section 10.1.2).

#### 10.2.3.1 Vowels as a source of government and licensing

Lateral relations of government and licensing are by default discharged by melodically filled nuclei (vowels), which are sometimes called lateral actors. It is also assumed that both lateral

forces are universally present if a given nucleus is an actor. Also under special conditions empty nuclei may be lateral actors. This concerns mostly the word-final empty nucleus (FEN), which may be given the status of a lateral actor by means of a systemic parameter. The internal empty nucleus (IEN) may also be a lateral actor, but only if it is sandwiched within a cluster of rising sonority (TR), which involves an infrasegmental relation (see (9a) below). We begin by looking at lateral actorship of vowels and will extend the discussion to empty nuclei as actors in due course. The configurations in (4) show the targets of government.

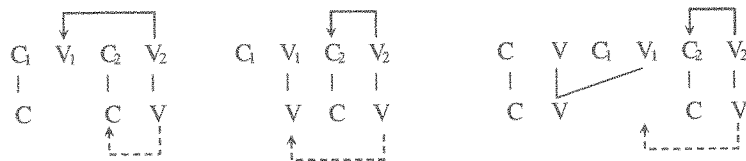
- (4) Targets of government  
 a. empty nuclei      b. intervocalic onsets



Government discharged from a vowel always falls on the preceding V or C. The choice depends on whether the preceding nucleus is empty, as V<sub>1</sub> in (4a), and requires government as per ECP, or not. If no empty nucleus precedes, government from V<sub>2</sub> is exhausted on the adjacent ONSET C<sub>2</sub> (4b).

The configurations in (5), on the other hand, show targets of licensing. By convention, licensing relations are shown by dotted arrows underneath the structures.

- (5) Targets of licensing  
 a. onset                      b. nucleus                      c. nucleus



There are two main principles governing the distribution of the two lateral forces. Firstly, no position is both licensed and governed at the same time. And secondly, government takes precedence. It goes to the preceding empty nucleus (5a), or to the preceding ONSET if the preceding nucleus is not empty (5b,c). Licensing, in turn, affects the position that escaped government. The licensing relation in (5c), in which we see a long vowel, is crucial in allowing length. Thus, the presence or absence of this licensing relation is directly responsible for the open vs. closed syllable effects mentioned earlier (see section 10.2.3.3 below for more details). Note, that the domain of application of government and licensing, namely, the preceding VC, involves the immediately adjacent preceding ONSET, and the immediately preceding nucleus, where the latter relation takes place at a nuclear projection. Thus, the lateral relations are local. Being local means that no V intervenes between the two nuclei related by a lateral relation.

### 10.2.3.2 Strong and weak positions in Strict CV, Coda Mirror

Formally defined positional strength of consonants determines their propensity to such phenomena as lenition or fortition. Given that relative strength may vary depending on position in the word, we expect from a theory to designate precise cut-off points for the scope of

particular processes. To be more precise, a theory should be able to predict which positions of varying strength may be affected by a given process and what implicational relationship between positions is at play.

The configurations of the destructive (government) and supporting (licensing) forces make clear predictions as to the positional strength of segments. Below we replicate a summary of cross-linguistically observed strong and weak positions from Scheer & Ségéral (2008b: 486). Recall that traditional syllable-based generalizations concerning prosodically strong and weak positions, which base the distinction on the segment's location in the 'coda' for weak and in the 'ONSET' for strong, fails to capture the fact that an intervocalic ONSET is nonetheless weak (6e). In fact, even the strong positions cannot be described by regular syllabic inventory. Not only are intervocalic onsets weak but also there is clear variation as to the strength of the word-initial consonants which may be strong or not. Additionally, there is a much ignored fact that post-coda consonants are strong. We intend to show how the disjunction {#,C}\_\_ can be captured in Strict CV, allowing also for variation in the word-initial context.

- (6) Strong and weak positions

position	usual name	
a. #_V	word-initial	} strong positions
b. VC_V	post-coda	
c. V_CV	internal coda	} coda
d. V_#	final coda	
e. V_V	intervocalic	} weak positions

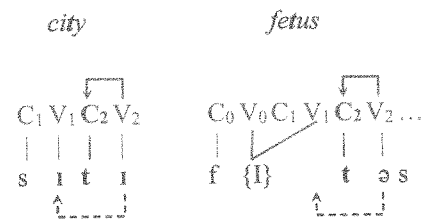
What needs to be noted about (6) is that two contexts exhibit cross-linguistic variation. The word-initial consonant may or may not exhibit strength, while the word-final consonant may or may not exhibit typical coda effects. The two contexts 'ONSET' (6a) and 'coda' (6d), which happen to occur at word edges, will be discussed in detail shortly.

Let us now take a detailed look at how some of the empirically observed patterns with respect to positional strength from (6) correspond to the various configurations of government and licensing defined above in (4) and (5). We temporarily omit the left edge of words (6a), as well as clusters with rising sonority (TR). However, we introduce the FEN which is parametrically set to be a lateral actor in, for example, English.

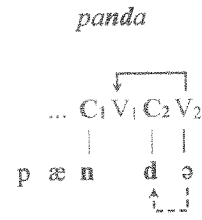
The positional prosodic strength of consonantal segments is directly deducible from the arrangement of the lateral forces. In the most recent version of LTP, a position can be governed, licensed or unaffected by any of the forces. Beginning with (7a), we see that V<sub>2</sub> is a melodically filled nucleus and therefore a lateral actor. Since V<sub>1</sub> does not call for government because it is not empty, this lateral force is exhausted on the ONSET C<sub>2</sub>. Licensing, in turn, cannot land on a governed position, therefore it goes to V<sub>1</sub>. The governed C<sub>2</sub> is in a prosodically weak position, in which we expect lenition. Additionally, the arrangement in (7a) defines open syllables in LTP: a syllable is open if its nucleus is licensed. This will have consequences for vowel length, which typically requires licensing, as in the first vowel in *fetus* [fi:təs].

(7) Strong and weak positions in English: three degrees of positional strength

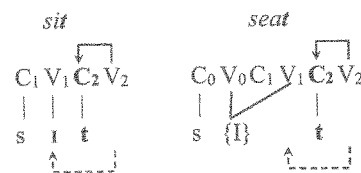
a.  $C_2$  – intervocalic: weak



b.  $C_1$  – internal coda: neutral  
 $C_2$  – Coda Mirror: strong



c.  $C_2$  – word-final = intervocalic: weak



In (7b) we are dealing with a ‘coda–onset’ contact of falling sonority (RT cluster). The two consonants are separated by an IEN, which in a sense determines their respective positional strength. Beginning with  $C_1$ , we observe that it is followed by a governed empty nucleus which, for this reason, is not a lateral actor itself (hence, no arrows stem from  $V_1$ ). Therefore,  $C_1$  is neither licensed nor governed. Note that this consonant corresponds to what is traditionally called an internal coda. Formally, it finds itself in a better position than the intervocalic consonants in (7a). Whether this prediction is correct remains to be seen, and some discussion will be offered shortly. It should be noted, however, that we can now provide a formal definition of what a ‘coda’ consonant is. It is an ONSET followed by a governed empty nucleus, i.e. a nucleus which is not a lateral actor: it cannot govern or license. We will see the consequences of that shortly.

Turning now to the second consonant in the RT cluster in (7b), it must be said that the post-coda consonant is prosodically strong (cf. 6b). This correlates with, for example, its diminished propensity to lenition. The question, however, is how this fact can be captured formally. Recall that pre-vocalic context is insufficient in defining strength of onsets, because intervocalic onsets are pre-vocalic and they are weak (6e). Note also that  $C_2$  is not governed by its nucleus because government is needed to sanction the IEN in  $V_1$ . Therefore  $C_2$  is licensed. Ségéral & Scheer (2001) and Scheer & Ségéral (2008b) call this position Coda Mirror, which has a double meaning. Firstly, unlike codas, it is strong. And secondly, unlike codas, which precede a governed empty nucleus, the consonants in Coda Mirror follow one. Thus the pre-theoretical mirror:  $\_ \{ \#, C \}$  vs.  $\{ C, \# \} \_$ , corresponds to a mirror effect, i.e. that the opposition in behaviour (strong–weak) can hardly be accidental given the mirror in the structural description. The presence of the governed empty nucleus in RT clusters is crucial. It deflects government from  $C_2$ , which in turn is licensed and strong. Below, we will see that the Coda Mirror position may also occur word-initially and may be responsible for the strength of word-initial onsets in some languages.

Let us now turn to the last two representations in (7c). The new aspect here concerns the FEN in  $V_2$ , which is parametrically allowed to be a lateral actor in English. There are a number of diagnostic criteria allowing us to establish this parameter setting. For example, the

existence of word-final clusters in words like *bend*, *act* tell us that the FEN can govern the intervening empty nucleus in the final cluster. Similarly, the presence of long vowels followed by one word-final consonant is only possible if the FEN is a lateral actor, e.g. *beat*, *wise*, because the long vowel requires licensing. Thus, given that the FENs in (7c) are lateral actors, the configurations are formally the same as in (7a) in that  $C_2$  is governed. The relevant consonant  $C_2$ , therefore, behaves as if it were intervocalic with respect to its positional strength. The difference between (7a) and (7c) is substantive: the final nucleus is or is not melodically filled, which influences the types of lenition that may take place in the two respective contexts.

10.2.3.3 Long vowels, closed syllable shortness and extrasyllabicity

Since vowel length is licensed by the following nucleus, we must look at such effects as closed syllable shortness and extrasyllabicity from a different perspective. Consonants do not close syllables. It is the absence of internuclear licensing that does it.

Above, we discussed some examples of how government and licensing can determine the positional strength of consonants. Here, we look at how the same lateral forces determine what effects we should expect on the targeted preceding V. Recall that the preceding V is governed if it is lexically empty (7b), and licensed if it has melody (7a,c). Of the main two effects of internuclear relations, that is, vowel-zero alternations and vowel length effects, we only concentrate on the latter now.<sup>8</sup>

As we saw in (7a,c), vowel length requires licensing from the following nucleus. In fact, the so-called open syllable is defined as one in which the nucleus is licensed. It follows that no length will be possible if that licensing is absent. In general, this takes place in two situations.<sup>9</sup> Firstly, such licensing is missing if the following nucleus is empty and governed, as in *panda* (7b). Since the IEN  $V_1$  is not a lateral actor, the preceding nucleus cannot be licensed, and cannot be long. This situation is what we refer to as closed syllable shortness, which may have different concrete outcomes. It refers to a static situation, but also to closed syllable shortening and impossibility of tonic lengthening. The second situation in which licensing may be missing is at the right edge of words, when a consonant is followed by a FEN which is systemically set not to be a lateral actor. Since such FEN neither governs nor licenses – precisely as the internal governed empty nuclei – the word-final consonant will behave like a coda. In other words, the consonant will not be extrasyllabic like in English *feet*, and we expect closed syllable shortness effects mentioned above. Note that in this model, the actual explanation of this effect does not really refer to the consonant but to the type of relation that the FEN contracts with the preceding nucleus. It is not that the final consonant acts (non-extrasyllabic) or does not act (extrasyllabic) like a coda. Extrasyllabicity in LTP terms means that the FEN is an actor, and the preceding C is thus in an intervocalic position, that is, governed. This definition is important when we want to understand the variation related to word-final consonants, which may behave as codas or not (Piggott 1999; Scheer 2012a), as opposed to word-medial coda consonants, which invariably close the preceding syllable. This is because internal codas are followed by an IEN, rather than by a FEN, and only FENs are a locus of variation: morpheme edges are subject to parametric influence. Thus, extrasyllabicity is no longer an extraneous mechanism attempting to capture the unexpected invisibility of final consonants. Rather, it is a result of a parametric choice to grant FEN actorship or not, neatly corresponding with the empirical fact that in some languages the final coda does behave as if it were extrasyllabic, while in others it does not.

Let us illustrate word-final closed syllable shortness with two examples, which in fact show interesting additional variation that Strict CV can cover. Kaye (1990), in his article defending the proposal that all words ending in a consonant in fact end in an empty nucleus,



used two workbook examples of languages exhibiting closed syllable shortness (Turkish and Yawelmani) both word-medially and word-finally. We mention these two cases because they both differ from English, which exhibits word-final extrasyllabicity, but they also differ from each other in an interesting way. We take the same examples as Kaye (1990: 302) for simplicity. Kaye identified the precise context for shortness in these forms as occurring before an empty nucleus in the following syllable.

(8) Yawelmani

Aorist Pass.	Aorist	Fut. Pass.	
sa:p-it	sap-hin	sap-nit	'burn'
pana-t	pana:-hin	pana:-nit	'arrive'

Turkish

NOM.	POSS.	ABL.	NOM. PL.	
merak	mera:k-i	merak-tan	meraklar	'law'
sevap	seva:b-i	sevap-tan	sevaplar	'good deed'

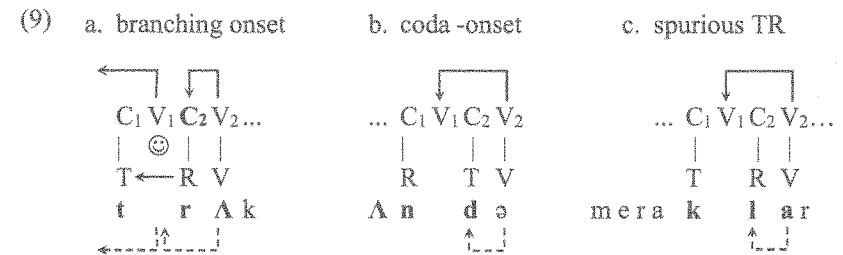
Beginning with Yawelmani, and applying the lateral forces of LTP, [panat] </pana: +tə/ is a case of shortening a lexical long vowel in front of FEN, while [saphin] </sa:pəhinə/ shows shortening before a medial governed nucleus (IEN). We may conclude that both IEN and FEN are not lateral actors in Yawelmani. That this is correct can be demonstrated by the fact that this language does not allow word-final clusters or clusters of three consonants. It is interesting that the rules for vowel shortening and vowel epenthesis are identical in terms of the following triggering context (cf. shortening: VV → V/\_ {C#, CC} and epenthesis: ə → V/C \_ {C#, CC}). Note that CC# translates into Strict CV /CəCə#, that is, a sequence of IEN and FEN. The two separate rules follow from the same cause: the FEN and IEN are not lateral actors in Yawelmani. Therefore, vowel length is not licensed, resulting in 'closed syllable shortness', and IEN cannot be governed by the FEN, so it has to be realized phonetically (epenthesis).

Turkish appears to work in an identical way, except that it has word-final clusters of falling sonority (RTs), e.g. [sarp] 'steep, nom.'. How is this possible? The presence of these clusters suggests that the FEN in fact is an actor and it can govern the preceding IEN. If so, then the question is what causes the 'closed syllable shortness' in [merak]? The paradox is only apparent. It is an established fact in GP that empty nuclei are weaker licensers than nuclei with melody (Charette 1990; Harris 1994; Cyran 2010). Thus, all we need to say is that the FEN in Turkish is not a strong enough licenser to support vowel length in the preceding nucleus. In other words, formally speaking, Turkish is like English in that FEN is a lateral actor. Only the licensing strength of that type of nucleus does not allow for licensing vowel length. This situation is not special in any way. A similar situation is observed in dialectal English. In the so-called Aitken's law in Standard Scottish English FEN is unable to license vowel length in the preceding syllable depending on the nature of the intervening consonant (e.g. Zdziebko 2012). Thus, both in Turkish and in Yawelmani the FEN cannot license long vowels, but for different reasons. In the former, the FEN is an actor but a weak licenser, while in the latter, it is not a lateral actor at all.

10.2.3.4 Complex onsets (TR)

Rising sonority clusters (TRs) exhibit varying behaviour with respect to the preceding vowel. They either act like single consonants leaving the preceding syllable open and allowing for vowel length, e.g. in English, or they close the syllable like RT clusters, e.g.

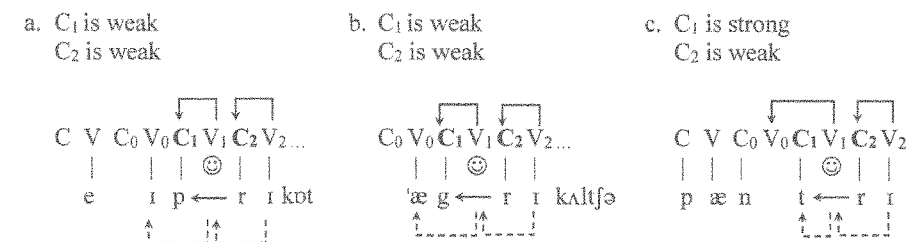
in Turkish and generally Semitic languages.<sup>10</sup> The former type of TR corresponds to the traditional branching ONSET and has a special structure in LTP, involving Infrasegmental Government (IG) (Scheer 1996, 2004). It is a relation between a sonorant and the preceding obstruent (9a). This relation allows the intervening IEN to remain empty and be a lateral actor, which we mark with the happy face symbol ☺ (see below). The spurious TR clusters, on the other hand, result from government of the intervening IEN (9c). In this sense, they are formally identical to RT clusters (9b), and they behave like RT. This is visible in, for example, Turkish [mera:ki ~ meraklar] 'law, nom.pl.', where the vowel is shortened before TR. True branching onsets allow for vowel length as in Italian [pi:gro] 'lazy', or Icelandic [ne:p<sup>h</sup>ja] 'cold weather'. The representation of the branching ONSET below incorporates the proposal of Brun-Trigaud & Scheer (2010) into Coda Mirror 2, whereby V<sub>1</sub> is a lateral actor.



One important difference between the fate of V<sub>1</sub> in (9a) and (9b,c) is that the former is not governed. The ECP is satisfied in (9a) by the fact that the surrounding consonants have contracted an infrasegmental governing relation.<sup>11</sup> Since that relation sanctions the IEN's emptiness, V<sub>1</sub> does not call for government from the following nucleus, and that lateral force is expended on C<sub>2</sub>. Thus, V<sub>1</sub> in (9a) is in fact licensed by V<sub>2</sub> like any ordinary vowel in open syllables. This in turn means that it is itself a lateral actor. The arrows of government and licensing are deliberately not targeted at any position, but it is obvious that their arrangement will depend on what precedes, just as we saw with single consonants in (7). Details will come shortly. The important thing to note, however, is that in languages which do not allow for Infrasegmental Government, surface TR clusters will have the structure as in (9c) and will behave in the same way as RTs in (9b), namely, the V<sub>1</sub> will be governed and will not be able to act as a lateral actor itself. This will have consequences, for example, for the distribution of long vowels.

Below, we look in more detail at various configurations involving TRs in English with special focus on the positional strength of the two consonants. We look at the same contexts, that is, following a long vowel, a short vowel and an empty nucleus.

(10) Branching onset in different post-nuclear contexts in English



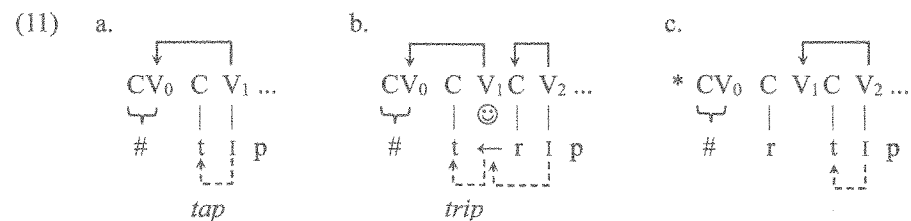


In all the structures in (10) the relevant empty nucleus  $V_1$  is made silent by Infrasegmental Government and does not require government. This force is directed to  $C_2$ , while  $V_1$  is licensed and, like any ungoverned nucleus, it is a full-fledged lateral actor that can govern and license. Note that the sonorant in  $C_2$  is always in a prosodically weak context (intervocalic), that is, it is governed but unlicensed. This may be the reason why this position in branching onsets is so restricted melodically. The situation of  $C_1$  changes depending on the nature of the preceding nucleus. In (10a,b)  $C_1$  is weak. It is governed because the preceding nucleus does not require government, and in return that nucleus receives licensing. This is what makes TR clusters behave like single consonants in some languages in that this cluster does not cause closed syllable shortness. Note that the fate of  $C_1$  is different only in (10c). In fact it is in Coda Mirror position: it is licensed but ungoverned. Thus we should expect weakening phenomena in TRs in (10a,b) as opposed to (10c). This prediction seems to be borne out in the way Latin TR clusters developed into Modern French, as shown in Brun-Trigaud & Scheer (2010). The obstruents of the intervocalic TRs were lenited, while post-coda ones were not, for example, Lat. *capra* > Fr. *chèvre*, but Lat. *comprend(e)re* > Fr. *comprendre*. There is a general shortage of empirical studies and information on the specific behaviour of TRs in lenition. It is only in CVCV that attempts have been made to come by stable cross-linguistic data. What appears from the French case, but also from the other phenomena quoted in Brun-Trigaud & Scheer – Celtic and Gorgia Toscana, but also the dialectal evidence from French – points to the following pattern: T in TRs is strong after consonants and weak after vowels, exactly as singletons – as if there were no R.

10.2.3.5 At the left edge of words

We saw that the relationship between government and licensing in different configurations allows us to make certain generalizations concerning the phonotactics at the right edge. The situation is no different at the left edge.

Lowenstamm (1999) proposed that major syntactic categories begin with an empty CV. In the LTP version of Strict CV the empty CV site is parametrically present or absent and the decision may be limited to particular syntactic structures, for example, phrase level (Scheer 2012b). Since the initial CV site has to be phonologically interpreted – the empty nucleus calls for government – the presence or absence of the initial CV divides linguistic systems into two empirical situations with respect to word-initial phonotactics. Systems like Polish, which do not have the initial CV, enjoy relative freedom as to the sonority profiles of initial clusters. Words can begin with TR, RT, RR and TT, e.g. Polish *trawa* ‘grass’, *rtęć* ‘mercury’, *lnu* ‘flax, gen.’, *kto* ‘who’. It is because initial clusters that contain an empty nucleus requiring government will be grammatical. This is not true of systems which possess the initial CV, as can be seen in (11) below. English, which has an initial CV site, can only allow for clusters of rising sonority (TR), that is, the true branching onsets with Infrasegmental Government (11b). The initial consonant in such systems is strong, as per Coda Mirror (11a,b), while initial RT is banned (11c).



The empty nucleus  $V_0$  can only be governed in (11a) and (11b). In (11c)  $V_1$  is not a lateral actor because it is governed by  $V_2$ . The structure with an ungoverned  $V_0$  is ungrammatical. It is crucial to note that the absence of initial RT clusters in languages like English is caused by exactly the same principles that rule out vowel length in closed syllables. Any RT contains an empty nucleus which requires government from the following vowel. This excludes the possibility of having another empty nucleus in front of RTs. In Polish, on the other hand, clusters like (11c) are possible because there is no initial empty CV. There are other effects and predictions associated with the presence of the initial CV. Scheer (2004) connects the stability of the first vowel with their role as governors of the initial CV, as well. Thus we are dealing with a convergence of seemingly unrelated phenomena at the left edge, which stem from one aspect. As for predictions, the model makes it clear that #TR-only languages, which possess the initial CV, must also show strength of single consonants, e.g. English, and vice versa. #Cs are weak in anything-goes languages, e.g. Greek.

To sum up, the parametric presence of the initial CV site allows us to make a distinction between languages with relative phonotactic freedom at the left edge and those with a very strict shape at the left edge. Additionally, we identify the reason why word-initial position is strong in some languages. This fact goes hand in hand with the above mentioned phonotactic patterns, and the initial strength is defined in exactly the same way as post-coda strength. It is due to Coda Mirror. The strong consonant is licensed. Thus, what is captured in this model is not only the parametric nature of initial strength (6a) but also the disjunction  $\{#,C\}$ , which is neatly reduced here to one causality, something that regular syllable structure is unable to do. It is also important to note that the two contexts form an exact mirror of the coda  $\{C,\#\}$  and have the exact mirror effect: strength as opposed to weakness.

In conclusion, it must be stressed that, unlike in many syllable-based models, in Strict CV lateral forces do two jobs at the same time: they define structure (who is a coda, who is an ONSET) as well as designate strong and weak positions. In regular models, the theory of syllabification remains unmodified, while whether codas could be strong or initial consonants weak is a matter of a separate theory of lenition. In Strict CV, the fate of both aspects, that is, structure and causality, is connected. As a result, Strict CV makes predictions that others do not make.

10.2.4 Some challenges and current issues

10.2.4.1 Positional strength and contradictory phenomena

Recall that the following types of nuclei can be actors: (a) filled nuclei by default, (b) FEN by parameter and (c) IEN inside TRs, of which the last one is the most special and rare situation. The typical non-actors are (a) FEN by parameter and (b) governed IEN (in RTs and bogus TRs). Thus, the generalization is that all governed nuclei and only those are non-actors, while all ungoverned nuclei and only those are actors. With respect to positional strength, there are only three types of configuration in which a consonantal segment can find itself (12). Note that we are now in a position to explain the variation at word edges mentioned in (6a) and (6d). On the left edge, the variation comes from the parametric distribution of the initial CV, while the right edge variation is due to the parametric decision whether FEN is a lateral actor. The existence of variation at edges, as opposed to non-variation morpheme-internally is an important empirical generalization, which goes unnoticed in the non-GP literature: the word-internal piece of the mirror conjunctions  $\{#,C\}$  and  $\{C,\#\}$  is invariable, while the one touching the edge is variable.<sup>12</sup>

- (12)
- |    |  |                                    |
|----|--|------------------------------------|
| a. | governed (weakest) –                       |                                    |
|    | i. intervocalic                            | <i>city</i> [sɪʔɪ]                 |
|    | ii. final single C when FEN=actor          | <i>sit</i> [sɪʔ]                   |
| b. | unlicensed and ungoverned (neutral/weak) – |                                    |
|    | i. internal coda                           | <i>witness</i> [wɪʔnɪs]            |
|    | ii. final coda when FEN≠actor              | [panat] in Yawelmani <sup>13</sup> |
| c. | licensed (strongest) –                     |                                    |
|    | i. post-coda                               | <i>panda</i> [pændə]               |
|    | ii. word-initial                           | <i>tip</i> [tʰɪp]                  |

A comment is in order concerning (12a) and (12b). Often these two formal positions pattern together in phonological processes, even though they are two disparate contexts in LTP. One example where the two contexts act uniformly is in English t-glottalization. The phenomenon may be found in intervocalic (*better* [beʔə]), final (*bit* [bɪʔ]) and internal (*chutney* [tʃʌʔnɪ]) coda contexts. What unites these contexts is only the fact that they are not strong, that is, licensed. There are, however, processes which distinguish the intervocalic onsets from the final and internal codas. This is a challenge for this model because the effect is found in context (12b) and only in half of (12a). Namely, it does not occur intervocalically. Not only that: the two contexts in which it does occur are not equal. This concerns, for example, the allophonic distribution of clear and dark /l/ in English. Recall that we find dark [ɫ] word-finally and in front of a consonant, but not intervocalically. Clearly we are dealing with some other conditioning here; something to do with the presence or absence of melody in the following nucleus.<sup>14</sup> Note that word-final dark [ɫ] may become clear [l] in front of vowel-initial words, e.g. *fail* vs. *fail it*, or *oil* vs. *oil on troubled water* (Gussmann 2002: 12). It is therefore quite possible that the lateral allophony has nothing to do with government and licensing relations established inside words, unless we postulate that such relations are also established across words in English. What this means is that the lateral allophony could be non-phonological in nature.

Another process which seems to cut across the distinctions in (12) in the same, albeit reversed, way is t-tapping in English. It occurs intervocalically, excluding the formally identical context before FEN. So again, here the distinguishing factor is presence or absence of melody in the following nucleus and not the formal configuration that follows from the model. Admittedly, these conclusions hang on the assumption that the FEN in English is a lateral actor. There are good reasons to believe that the assumption is correct. Firstly, final consonants are extrasyllabic and allow for preceding long vowels, which, when translated into LTP, means that long vowels are licensed by the FEN. Secondly, English exhibits word-final clusters, e.g. *act*, *belt*, *lisp*, etc., which suggests that the FEN governs the empty nucleus inside these clusters. Thus, the status of the FEN in English as actor can be established independently of the lenition phenomena, and on the basis of stronger diagnostics than lenition. This in turn forces us to reconsider the status of some of the lenitions, or to rethink the relation between nuclei and their onsets.

Examples of the sort mentioned above can be multiplied, and the solution seems to be at hand. Some licensing relation needs to be recognized between onsets and their nuclei regardless of the arrangement of lateral forces in current LTP. For example, it may be the case that we need to go back to the Standard GP distinction between prosodic (p-licensing) and autosegmental (a-)licensing. And only p-licensing is the lateral force interacting with government, while a-licensing is always present within each CV pair and takes into account

the melodic shape of the nucleus. This possibility must be further studied, as some formal analysis needs to be proposed for cases where not only the arrangement of the lateral forces but also the nature of the nucleus is included. Note that at this point the intervocalic and final single consonant is governed in languages where the FEN is an actor, and it is in no licensing relation with it. Thus, the relation between this consonant and the following nucleus with or without melody is at this point not expressible in phonological/computational terms. This still leaves the possibility that some phenomena, for example, clear [l] in pre-vocalic sandhi contexts, may be interpretational rather than phonological.

#### 10.2.4.2 Licensing with no government?

One possibility which is worth considering is that we are dealing with one lateral force too many, an option that seems to be valid at least for languages with no clusters. Kula & Marten (2009) question the assumption that lateral actors must universally both govern and license. They attempt to demonstrate on the basis of Bantu languages that clusterless languages also do not use the initial CV. Thus, the two prime reasons for having government (no empty nucleus in initial CV site and none inside clusters to govern) are missing in such languages. This leaves the question as to what accounts for the positional strength of initial consonants and positional weakness of intervocalic consonants in such systems. Kula and Marten propose that since there is no government in such systems, the first vowel in the word licenses its ONSET because it is not governed, and so this ONSET is in exactly the same situation as the one in languages with government sanctioning the initial CV. A Coda Mirror effect for the initial context can be therefore achieved without government.

The relative intervocalic weakness of consonants in clusterless languages, on the other hand, is assumed to follow from Licensing Inheritance known from Standard GP (Harris 1997). The suggestion is that every nucleus receives its licensing potential from the following one. Intervocalic consonants are licensed by vowels that need to also license the preceding nucleus, which is not the case word-initially because there is no preceding nucleus to license. Therefore, initially, the consonant gets all the licensing while intervocalic onsets share licensing received from the following nucleus with the nucleus that precedes them. That licensing seems to be 'divided' for both positions in the preceding VC has also been noted in English (Zdziebko 2012) and Polish (Cyran 2014a).

There are a few problems connected with this proposal. It is not clear what would happen if a clusterless language is found to use an initial CV site, whose presence would be indicated, for example, by morphological considerations, or phenomena unrelated to lenition, e.g. gemination of the consonant. Government would also need to be 'activated' in cases of diachronic evolution where vowels start to alternate with zero and fall out, creating clusters. The licensing-only proposal also makes a prediction that the initial consonant in clusterless languages is always strong, while LTP predicts that it may be strong or weak, depending on the distribution of initial CV. The model with no government also does not extend easily to languages possessing clusters in which the initial as well as post-coda strength indeed depend on the presence of the government with respect to the preceding empty nucleus.

Another alternative to LTP, which in a sense provides an answer to how government is activated in systems with clusters, is one in which licensing is a lateral force that is expended only by nuclei, in fact, all types of nuclei, while government is limited to interconsonantal relations. An example of this option is Cyran's (2010) Complexity Scales and Licensing model (CSL), which in many respects translates Standard GP governing relations from obstruent to sonorant (T→R, R←T) into a CVCV framework. The governing relations are

subject to Government Licensing (Charette 1990) in that each such relation must be licensed by the following nucleus. The interconsonantal government 'locks' intervening empty nuclei and makes them invisible phonologically (cf. Szigetvári 1999). Cyran also eliminates inter-nuclear government, reducing vowel-zero alternations to the operation of the NoLapse constraint (\* $\emptyset$ - $\emptyset$ ) disallowing sequences of two visible empty nuclei (Rowicka 1999).

One clear advantage of CSL is that it is able to formally express the implicational relationship between RT and TR clusters in languages (see section 10.2.4.4 below), but the elimination of internuclear government and the invisibility of empty nuclei inside RT clusters makes this model incompatible with the findings of Coda Mirror. Positional strength must somehow be redefined, possibly along the lines of Harris (1997). One aspect, however, which it emphasizes, and which seems to be lacking in current LTP, is that every active nucleus, whether filled or empty, must be in some licensing relation with its ONSET, albeit only in terms of autosegmental rather than prosodic licensing.

#### 10.2.4.3 Direct and indirect effects of government and licensing

The two lateral relations in LTP are responsible for a whole range of phonological phenomena including static phonotactic patterns as well as observable phonological processes. One of the direct effects of government and licensing is vowel-zero alternation, which may be understood as epenthesis or syncope depending on the system. The force that is responsible for these phenomena is internuclear government. Another directly observed phenomenon is vowel length alternation, which can take the form of closed syllable shortening of lexically long vowels (Turkish, Yawelmani, English) or tonic lengthening (Italian, Icelandic). This set of phenomena is directly due to licensing, but also indirectly to government, in the sense that governed empty nuclei (IEN) do not provide licensing that is required by long vowels. Another set of phenomena which are directly observable and which are due to the arrangement of government and licensing are all sorts of weakening processes. These are, as shown above, typically related to the distinction between filled nuclei and empty nuclei and their relation to the preceding ONSET (e.g. t-glottaling, t-tapping, l-allophony, to name but a few familiar phenomena from English, but also voicing alternations in e.g. Polish).

The indirect effect of the arrangement of the lateral forces mainly lies in the fact that the forces define relative positional strength of consonantal positions and so determine the probability of, for example, lenition processes in particular positions as well as make predictions as to the implicational relationships between these effects. Exactly what is lenited and in which set of non-strong positions as opposed to non-weak positions is a systemic decision. Positional strength, however, is not absolute, but relative. It is predicted that lenition also occurs in strong positions. What is systemic is the decision concerning when something lenites, what lenites, how it lenites and in which positions – the choice of the position, though, is universally constrained by an implicational hierarchy defined by positional strength. If a process lenites an item in a stronger position, the same item will also be lenited at least as much in all weaker positions. Hence voiceless stops affricate in the high German consonant shift in strong position, and they lenite more (to fricatives) in intervocalic and coda position. The same goes for fortition: if fortition occurs in a position X, it will also occur in all stronger positions. The actual effects are additionally constrained by the nature of the melodic representation used in LTP. Thus, for example, synchronically speaking, positional fortition which does not involve spreading of elements from the surrounding context can only be interpretational, that is, a case of a shift in phonetic interpretation of the same representation, and not computational, that is, phonological. This is due to how Element

Theory is constructed, which precludes non-local sources of melodic categories. Changes in the interpretation of objects in such contexts may be followed by lexicalization/phonologization. Only in this diachronic sense may elements be added from 'nowhere' to strengthened objects (see Chapter 11, or Cyran 2014b).

#### 10.2.4.4 TR vs. RT

One hitherto unexplored linguistic pattern within LTP is the phonotactic relationship between rising sonority (TR) and falling sonority (RT) clusters across languages. There is a well-established implicational relationship between the two types of clusters which goes back to Kaye & Lowenstamm (1981), whereby the presence of TRs seems to be more marked and implies the existence of RTs in a given system, but not the other way round. This relationship is particularly visible in word-final position. Languages like English or Turkish do not allow for TRs finally, while accepting RTs. Polish and Icelandic, on the other hand, possess both types of clusters. Above, we saw that in Turkish word-internal RTs and some TRs involve a governed empty nucleus, which should make these structures formally equal, in the sense that it does not matter what the melodic profile of the consonants surrounding the governed IEN is. However, if LTP may be modified a little to accommodate the fact that all onsets are in some licensing relation with their nuclei, albeit only autosegmental, and that the various types of nuclei exhibit varying onset-licensing strength, then even the formally identical R $\emptyset$ T and T $\emptyset$ R become different. All that needs to be assumed, like word-finally, is that when first introduced into the system, empty nuclei are weak onset-licensors. If so, given that obstruents are more complex representations than sonorants in terms of the number of elements, it is understandable that it will be easier to license a sonorant in R $\emptyset$ T than an obstruent in T $\emptyset$ R. It should be emphasized, however, that we are not talking about the prosodic licensing which is targeted at different positions depending on its alignment with respect to government, as standard LTP would have it. For the purpose of this discussion we call this 'new' and additional licensing 'autosegmental', for want of a better term, and it is present in each CV. It is a matter of further study what this relation is, and whether LTP can in fact do without it.

Recall that true TRs additionally involve a relation of Infrasegmental Government T $\leftarrow$ R, and as a result behave as if they were a single consonant in that they keep the preceding syllable open. This additional mechanism may be responsible for the fact that true TRs are even more marked than RTs and bogus TRs. Hence their restricted distribution word-finally, when followed by a FEN – clearly a weaker licensor than a melodically filled nucleus. In other words, the universal phonotactic patterns involving RT vs. TR are to a great extent predicted in LTP, but some modification of the system is required, namely, we need to admit that there is no such thing as a non-actor nucleus. Every nucleus is an actor of sorts, but its lexical representation and its place in the network of lateral relations determines its varying licensing potential.<sup>15</sup>

#### 10.2.4.5 At the right edge

As we have just seen, LTP is able to capture quite a range of phenomena at the right edge of words with just the two lateral forces: licensing and government, which organize phonological representation in all positions. The parameter designating the FEN as a lateral actor makes a very interesting prediction concerning the right edge of words. If the FEN is not an actor, this immediately means a few things. Firstly, the preceding nucleus will not be licensed or governed. This means that the preceding nucleus is not in an open syllable



situation and vowel length is not possible before word-final single consonants (Yawelmani). Secondly, the final C finds itself in a relatively neutral position (neither strong, nor weak), that is a typical coda. And thirdly, the absence of the lateral force of government disallows word-final 'complex codas', that is, RT clusters, which must contain a governed IEN as in English *bend* /benədə/ and *act* /æktə/, or Turkish [sarp] 'steep, nom.'. Thus, a system with a non-actor FEN may end its words in one consonant which closes the syllable just as the internal codas do. This system may have clusters and long vowels, but only before filled nuclei in the following syllable.

The positive setting of the parameter on FEN actorship makes radically different predictions. Firstly, word-final single consonants are extrasyllabic and allow for preceding long vowels. The word-final single consonant is extra weak because it is governed, as any intervocalic consonant. Additionally, this system allows for word-final RT clusters like English *act* and *bend*, in which the last consonant is in a strong position because it is licensed. And this is where some problems appear to arise concerning static phonotactics of the right edge. Of course it should be borne in mind that LTP does not aim to directly express static patterns. Rather, it makes predictions for where and how phonological processes such as lenition and fortition are likely to occur. However, it is also true that some static patterns have resulted from historical processes whose application we do predict. Thus, returning to static patterns at the right edge of words, we predict that systems with FEN actorship will have robust RT clusters – with the T in strong Coda Mirror position (licensed) – and very weak single final consonants (governed). Additionally, we predict that word-final single consonants (simplex codas) in a language like English are prosodically weaker than the internal codas. This implication follows from the fact that in a system in which the FEN is an actor, the final consonant is governed, while the internal coda is neither licensed nor governed. It remains to be seen if there is an empirical echo of these predictions. In some cases, however, it appears that the opposite seems to be true. Namely, that some lenitions affect internal codas, but not final C#. One case in point might be the retention of [l] in word-final context in the shift from Latin to French, e.g., *sal* > *sel* 'salt', and l-vocalization in internal codas, e.g., *alba* > *aube* 'dawn' (Scheer 2012a). According to LTP, final C# can be equal in strength to internal codas, but never stronger.

Again, it seems that these apparent problems of the theory could be overcome if we assume that there are no 'naked' consonants and that each CV is a licensing relation regardless of the type of nucleus. Under this assumption we could say that empty nuclei can only ever be used in a system if they are allowed to license some melody in the preceding ONSET. Otherwise they are not used.

All in all, the recurring theme in segmental phenomena seems to involve the relationship between substanceless and substanceful nuclei and their onsets.<sup>16</sup> This relation cannot be given justice as long as no relation of licensing can be recognized in contexts other than Coda Mirror. It should be noted that most of the above problems are connected with static phonotactics and what we call indirect effects of government and licensing, that is, cases where, on top of the formally defined positional strength, a separate systemic decision is required whether a particular weakening or strengthening phenomenon is to be effected. Otherwise, it is rather encouraging that such a wide range of prosodic phenomena as those discussed in this text can be handled by such a small number of assumptions concerning the phonological representation above the melody, namely, that the skeleton is reduced to sequences of CVs, and that the entire job of organization of these positions is done by just two types of lateral relations: government and licensing, where the latter might need to be broken down into two types: a-licensing and p-licensing.

### 10.3 Further reading

Kaye, Jonathan 1990. 'Coda' licensing. *Phonology* 7: 301–330.

The central paper for constituent structure in Standard GP: this is where the idea comes from that word-final consonants are always the onset of an empty nucleus, in all languages.

Harris, John 1994. *English Sound Structure*. Oxford: Blackwell.

Summary of Standard GP: syllable structure (chapters 2 and 4.6), segmental structure (chapter 3), Licensing (chapter 4).

Scheer, Tobias 2004. *A Lateral Theory of Phonology: Vol.1: What Is CVCV, and Why Should It Be?* Berlin: Mouton de Gruyter.

§165 contains a description of the typology of lateral relations in Standard GP, critique thereof and transition to Strict CV where only two lateral relations are left which have stable effects (something that was not the case before): government and licensing. This book also proposes a short guide to Standard GP (§623).

Pöschtrager, Markus Alexander, and Jonathan Kaye 2013. GP2.0. *SOAS Working Papers in Linguistics and Phonetics* 16: 51–64.

The article exposes the workings of GP 2.0, where constituency and lateral relations are quite different from other versions of GP.

Lowenstamm, Jean 1996. CV as the only syllable type. *Current Trends in Phonology: Models and Methods*, Vol. 2, edited by Jacques Durand and Bernard Laks, 419–441. Salford, Manchester: ESRI.

The paper contains the original proposal that CV is the only syllable type and provides several arguments based on templatic and non-templatic languages.

Ségéral, Philippe, and Tobias Scheer 2001. La Coda-Miroir. *Bulletin de la Société de Linguistique de Paris* 96: 107–152.

Offers one of the most important theoretical advances on the treatment of the strong and weak positions in GP, deriving causality of lenition and fortition from the arrangement of government and licensing in a Strict CV phonological representation.

Scheer, Tobias, and Marketa Ziková 2010. The Coda Mirror v2. *Acta Linguistica Hungarica* 57.4: 411–431.

Provides a revised version of Coda Mirror, which also includes the behaviour of branching onsets.

Cyran, Eugeniusz 2010. *Complexity Scales and Licensing in Phonology*. Berlin: Mouton de Gruyter.

The book introduces an alternative version of a CV model which incorporates the main aspects of Standard GP, including especially the concept of Government Licensing and scales relating both to formal complexity of syllabic configurations and relative strength of licensors.

### Notes

- Of course the detail is more intricate: individual languages make sovereign decisions as to what exactly is a good branching onset among those clusters that have a rising sonority profile (see Clements 1990). And of course parametric decisions control syllabification: some languages (Semitic for example) do not provide for branching onsets at all, and hence VTRV and VRTV will both end up with a heterosyllabic cluster (VT.RV and VR.TV).
- Note that here and henceforth the symbol "ø" refers to an empty nucleus (rather than to a front rounded vowel).
- Harris (1994: 184ff.) discusses similar evidence against resyllabification from English syncope, which is possible in *sep(a)rate* and *fam(i)ly*, but not in *\*ball(o)ting*.
- Note that the same pattern holds for the two other mid vowels: *b[e]tise* 'silliness', *m[e]trique* 'metrical' vs. *al[e]rter* 'to alarm', *b[e]t(e)* 'silly'; *gu[ø]ler* 'to shout', *p[ø]pler* 'to populate' vs. *s[œ]rfer* 'to surf', *gu[œ]l(e)* 'snout'.
- Positional strength expressed in syllabic terms by referring to such constructs as onset (strong) vs. coda (weak) is inadequate. Intervocalic onsets are notoriously weak and subject to lenition. A more precise model will be described in section 10.2.4 below.



- 6 In fact, there are a number of CV models entertained currently in which the major differences lie precisely in how the two lateral forces of government and licensing are utilized. The reader is referred to Bendjaballah (1999); Szigetvári (1999); Rowicka (1999); Kula & Marten (2009); Cyran (2010); Zdziebko (2012); Scheer (2004, 2012a) for more information.
- 7 For a wealth of argumentation and wide empirical coverage of LTP, as well as the diachronic development of this model, the reader is advised to read Scheer (2004) before Scheer (2012b).
- 8 There is a huge body of literature concerning vowel-zero alternations within Standard GP and Strict CV which is why this aspect of lateral relations is omitted here. The reader is referred to Kay et al. (1990); Charette (1990); Gussmann & Kaye (1993) for the former, and Rowicka (1999); Scheer (2004); Cyran (2010) for different takes within the latter. For more recent developments within LTP, see Scheer (2012c).
- 9 There is an additional complication which is discussed, for example, in Zdziebko (2012). Licensing of vowel length seems to be conditioned by the nature of the intervening consonant if the licenser is an empty nucleus (FEN), and to some extent even if the licenser is a full vowel. See also Bednarska (2015) for similar phenomena in Welsh and Breton.
- 10 We leave aside a third option, where the mono-positional behaviour gets a mono-positional representation (e.g. Lowenstamm 2003a; Rennison 1998). For a full discussion of this typology see Ségéral & Scheer (2005).
- 11 Details concerning the conditioning of this relation remain to be worked out. Clearly what is crucial is the nature of the two consonants in the TR sequence, and their melodic adjacency. There is also some conditioning connected with the nature of the following nucleus, in that some languages allow TRs to occur only before vowels, not before empty nuclei. This suggests that a relation of licensing is involved, but it is still unclear how. There are existing proposals concerning licensing of governing relations within Standard GP (Charette 1990), as well as within later models using the CV skeleton (e.g., Cyran 2010), which might be taken into account.
- 12 Broselow (2003) is an interesting exception.
- 13 This example really refers to the behaviour of the final C in Yawelmani as a coda, in that it closes the syllable and does not allow for a preceding long vowel. Of course, as with anything in this model, this follows from the activity or inactivity of the following nucleus, in this case the FEN.
- 14 A similar problem is found in the allophonic distribution of [w] and [v] in Belorussian (Scheer 2012a), where [w] seems to occur before empty nuclei, e.g. [korowka] 'cow, dim', [korow] 'cow, gen.pl.', and [v] in front of a vowel, e.g. [korova] 'cow, no.sg.', [vada] 'water', [barva] 'colouring'. Note that the 'stronger' [v] occurs in the weakest, intervocalic, context. Thus it is not positional strength that governs the distribution but rather the nature of the following nucleus (for more details see Chapter 11).
- 15 That IENs must be licensers also follows from a recent analysis of licensing of laryngeal specifications in Polish (e.g. Cyran 2014a), in which both true and bogus TRs retain the laryngeal category on the obstruent.
- 16 There is a substantial body of evidence showing that nuclei license their onsets as well as the preceding nucleus at the same time, and that the two 'loyalties' are mutually dependent. See, for example, Kula & Marten (2009); Zdziebko (2012); Cyran (2014a), and references therein.

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# Interfaces in Government Phonology

Tobias Scheer and Eugeniusz Cyran

## 11.1 Interface with morpho-syntax

### 11.1.1 General (and pre-theoretical) settings

#### 11.1.1.1 Distinct computational systems and their communication

Before describing the specific contribution of Government Phonology (GP) to the workings of the interface with morpho-syntax, it is useful to recall a number of general issues that all interface theories need to address. The broadest of these is the modular architecture of grammar that lies at the heart of the generative enterprise since *Aspects* (Chomsky 1965; see Chapter 9.2.1). That is, grammar is made of a number of distinct computational systems, each of which operates over a proprietary vocabulary that is distinct from the ones used by other systems. Taking these vocabulary items that are stored in long-term memory as an input, computational systems build structure (e.g. trees in syntax) following hard-wired instructions (among others, Merge in syntax) in online processing (active memory). The output may then be communicated to other modules for further processing, but the distinct vocabulary sets (called *domain specificity* in cognitive science) blocks direct transmission of information. Hence the output of a donor module needs to be translated into the idiom of the receiving module prior to transmission. This is what we call the interface, or interface operations: making information legible for the recipient.<sup>1</sup>

For the purpose of this chapter, it is enough to agree that morpho-syntax and phonology are distinct computational systems, one operating over lexical items such as number, person, animacy etc., the other working with labiality, occlusion and the like (no overlap). A further point is the fact that in production morpho-syntax feeds phonology in the (functional) sense that it concatenates items retrieved from long-term memory; the product of this gluing-together is linearized and enters phonological computation as a linear string.<sup>2</sup> Phonology itself does not concatenate anything, nor create linearity: it interprets whatever is delivered. Hence morpho-syntactic activity necessarily occurs prior to the workings of phonology (in production).