

Constituent Structure and Government in Phonology

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*Constituent structure and government in phonology**

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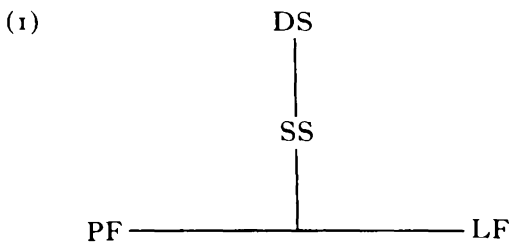
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o Introduction

Our aim in this paper is to address certain empirical and conceptual issues in the theory of Universal Phonology. Specifically, we will formulate a number of proposals aimed at characterising the notion ‘possible syllable’ and ‘possible word’. The principles we will lay out follow from what we see as a unified theory of phonological government.

The introduction of the notion of multi-levelled representations, as well as the recognition of constituent structure organisation in phonology, has allowed for a shift from mainly segment-internal, paradigmatic considerations to the study of syntagmatic relations holding between phonological units. What is now required is nothing less than a syntax of phonological expressions. Allowing for fundamental distinctions between the objects under study in sentence syntax and in phonology, such as the recursive nature of syntactic, but not phonological categories, it is conceivable that some of the same principles at work in syntax will be seen to be operative in phonology, and *vice versa*.

Consider the familiar inverted-T model of grammatical organisation proposed in Chomsky & Lasnik (1977), reproduced below:



One sometimes hears that phonology bears no closer relationship to the rest of grammar than it does to non-linguistic systems such as, say, vision. No such point is ever made about LF by proponents of the above model, a rather selective interpretation of the autonomy hypothesis. It should be kept in mind that such statements express personal opinions and carry just that weight. Indeed, they hardly rest on principled objections, and even less on arguments of an empirical nature.

Time will tell whether our research programme proves successful, the issue being of a strictly empirical nature. What is at stake here goes well beyond a mere search for interesting or suggestive similarities. Rather, if (some of) the same principles can be shown to underlie phonological as well as syntactic organisation, the idea that such principles truly express special, idiosyncratic properties of the mind (such as the kind of asymmetries typical of natural language) will be correspondingly strengthened. In fact, this sort of programme is by no means novel, one of its most notable results being the Principle of the Grammatical Cycle.

As well, we adhere to the following 'ground rules', mentioned below to provide the reader with a more comprehensive picture of our research programme, even though they will not be of primary importance in the remainder of this paper:

(2) a. *Privativeness*

Phonological oppositions that are privative at the level of lexical representation remain privative *at all levels*.

Consequences:

No default rules to 'fill in' missing features.

Only univalent spreading (harmony) processes.

'You can't spread something that isn't there.'

Unmarked values never spread directly.

In Trubetzkoyan terms, privative oppositions do not get converted to equipollent ones in the course of a derivation.

b. *Universality*

The set of available phonological processes behaves like a function mapping initial representations onto final representations.

Consequences:

The same physical object will receive uniform interpretation across phonological systems.

Markedness conventions are universal.

c. *Non-arbitrariness*

There is a direct relation between a phonological process and the context in which it occurs.

Example:

Consider a process that converts a high tone into a rising tone following a low tone. An autosegmental treatment of this

phenomenon satisfies the non-arbitrariness condition; a rule-based treatment does not.



- b. H → LH /L —
 *H → HL /L —
 *H → LH /— L

This article is organised as follows: in §1, we define and illustrate the kinds of issues we will be addressing. In §2, we define a notion of syllable constituent internal government. In §3, we extend the same notion to the relationship between heterosyllabic adjacent constituents. In §4, we elaborate on some of the major claims discussed up to that point.

1 On possible syllables and possible strings of syllables

1.1 What is a possible syllable constituent?

In order to give the reader an idea of the kind of issue that arises, we have given in (3) a number of forms from Aoki's valuable description of Nez Perce, a Sahaptian language, spoken until the late sixties (Aoki 1970):

- (3) *ʔatxcap̄tksa* 'I shot it lengthwise'
 weleykip̄ckse 'I tie up (top of basket)'
 ʔicap̄yo:ck̄t 'strip of tanned hide'

These forms exhibit sequences of consonants that can be analysed, according to Aoki, in terms of what he calls the syllable canon of Nez Perce, *viz.*:

- (4) C V (:)(C₁)(C₂)(C₃)(C₄)(C₅)

(4) specifies an obligatory onset consisting of a single consonant. Consequently, one can assume that the last of an intervocalic sequence of consonants is the onset of the following syllable, while the rest of the sequence constitutes the coda of the preceding syllable. Accordingly, the italicised strings of (3) constitute codas in Nez Perce.

The sheer length of such sequences makes one doubtful of their status as syllable constituents of one and the same syllable. Indeed, to our knowledge, no well-founded study has established the need for three-place codas. Consider now another set of 'codas' (italicised) of Nez Perce:¹

- (5) *qi:cqce* 'I take care of it'
 ʔinipox̄poq̄cna 'my great-grandparent' (OBJECTIVE)
 wic̄x̄k'oylahnapa (place name)
 wix̄c̄ʔutekey 'pillow, cushion'

<i>hicʔli:ce</i>	‘he is proud’
<i>ʔeleʔnu:t</i>	‘without paternal grandmother’
<i>kuʔxmac</i>	‘several’
<i>ta:xʔla:twisa</i>	‘I am tired from freezing’
<i>xɛʔpxɛʔp</i>	‘sneaky’
<i>cuʔʔnit</i>	‘emerge from timber’
<i>tiʔnax</i>	‘quick death’
<i>pikunʔmaʔyqa:l</i>	‘September’
<i>ce:peʔwse</i>	‘I select’
<i>yiʔye:wʔyew</i>	‘all of a sudden’
<i>cu:yeti:pitkse</i>	‘I make it smooth’
<i>tewli:kt</i>	‘tree’
<i>wasatqsa</i>	‘I whip’
<i>hiliwheqteqt</i>	‘dead timber’
<i>ʔini:tx</i>	‘to the house’
<i>muxtuxt</i>	‘small sucker fish’
<i>ʔa:cx</i>	‘go in!’
<i>he:yvxc</i>	‘cottontail’
<i>puxs</i>	‘inner skin’
<i>qila:sx</i>	‘otter’
<i>pitaxp</i>	‘man’s sister’s child’
<i>sipxsipx</i>	‘dirty’
<i>pisx</i>	‘tick’
<i>ʔemixsce</i>	‘I swallow it’

We saw from the forms of (3) that postvocalic sequences could be unusually long in Nez Perce. Our position, stated in §2 below, is that constituents can be maximally binary. The forms of (5) now reveal another facet of such putative codas: for any ‘coda’ of (5) its mirror image is also attested as a coda. Indeed, *ʔw* occurs as well as *wʔ*, *cq* as well as *qc*, etc. We will argue below that this behaviour is not only untypical of syllable constituents, but, in fact, constitutes a sure piece of evidence against CO-CONSTITUENCY.

Admittedly, the way we have chosen of addressing the issue is somewhat of a caricature. For one thing, most of the forms of (3) and (5) are polymorphemic. In addition, the syllabic parsing provided by Aoki is probably as superficial (in the technical sense) as can be – a point readily conceded by the author who states in his preface written some ten years after field work was conducted: ‘in terms of recent theoretical advances this work is an analysis of the “surface structure” of the Nez Perce language’. However, the real issue is not whether commonsense would

lead one to reject the parsings proposed above, but rather whether those can be categorically excluded in terms of current results in the theory of syllable structure. Such is not the case, to the best of our knowledge.²

1.2 What is a possible syllable?

By way of illustration of our second question, we turn to Ngizim, a language of the western branch of the Chadic family spoken in north-eastern Nigeria. All our information on Ngizim comes from Schuh (1971, 1972, 1978, 1981, ms).

Ngizim syllable structure is the same as that of Hausa, *viz.* CV, CVC, CVV. Schuh (1981) points out that 'long vowels don't occur in closed syllables, with a few rare exceptions, e.g. *kaaktlu* 'measure''. The correctness of Schuh's observation is so overwhelmingly general that one would want to know the analytical status of exceptionality before deciding whether the absence of long vowels in closed syllables is a mere tendency or a law in Ngizim. Surely, invoking lexical exceptionality, as has been done by some commentators, is, at best, gratuitous until the matter has been carefully investigated. Quite simply, the question is: is the set of exceptions aberrant, or is it structured according to one or several subregularities? If the later is true, then by all standards, an explanation should be sought, in terms of the overall system, for why apparent exceptionality occurs where it does.

In fact, a search of Schuh's dictionary (1981) has produced nine such exceptional forms. These are given in (6):

- (6) *kaaktlu* 'measure length, quantity, etc.'
paatku 'lick'
saaktu 'recover, come to'
haaptu 'mate mare to stallion'
caaktlu 'do small job quickly'
paaltu 'cross'
zaamtu 'jerk out, snatch up'
laamtu 'come away from eating, drinking, working, etc., with unsatisfied feeling'
taatku 'show, point out'

The forms of (6) display a long vowel before a cluster of two consonants (*tl* is a voiceless lateral fricative), thus presumably weakening the generality of their absence in closed syllables. At the same time, one cannot help being struck by the facts of (7):

- (7) a. All the forms of (6) are verbs
b. The offending vowel is always *a*
c. The cluster is always characterised by absence of spontaneous voicing
d. Such 'exceptions' never occur word-finally

Claiming that Schuh's generalisation expresses a tendency rather than

a law is, of course, begging the question of why exceptionality is so narrowly localised: why are all major categories not involved?; why are there no instances of long *o*, *i*, *u* or *e* in closed syllables?; why is the long vowel never followed by a cluster of voiced obstruents?; etc. The reader is referred to Lowenstamm (1988) for an analysis. The point we wish to make here is that a problem arises in connection with the forms of (6) *only in case* one can be sure that, say, *k* in *caaktlu* indeed closes the preceding syllable, a point that would require positive demonstration. Suppose, instead, that what is noted *caaktlu* is, in fact, *caakøtlu*, i.e. an empty nucleus is present between the two medial consonants, then the whole issue of the violations vanishes, the problem becoming one of defining the distribution of empty elements.³ Surely, the cues of (7) will aid us to answer the questions that appear in the paragraph following (7). In general, phonologists have assumed that the phonetic symbols that appear next to each other in phonetic transcriptions are strictly adjacent. There is nothing necessary in such an assumption, no more than in the assumption that the morphemes appearing in a sentence like *John is expected to win* are strictly adjacent simply because they are graphically so.

In subsequent sections, we will offer an account of the distribution of empty nuclei, which in conjunction with our theory of constituent and interconstituent government goes a long way towards defining possible phonological words.

2 On the notion of syllabic constituent

In this section we present a theory of syllable structure. The form and the substance of this theory follow from the nature of the objectives that we have set out in § 1.

2.1 Phonological government

Government is defined as a binary, asymmetric relation holding (for the current discussion) between two skeletal positions. For a governing relation to hold, two types of conditions must be met: formal and substantive. Formal conditions will involve the notions of locality and directionality. The substantive conditions define to what segmental material a skeletal point may be associated given its position within a governing domain. Put another way, certain segments have governing properties: they may be associated to governing skeletal positions. Other segments are governable: they may be associated to skeletal positions that are governees. Governing properties of segments will be discussed in a later section.

We are now in a position to define a syllabic constituent:

(8) *Syllabic constituents*

A syllabic constituent is a governing domain where the government relation is characterised as

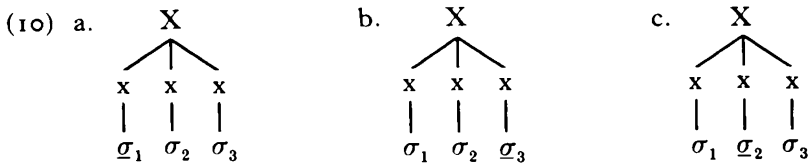
- a. Strictly local
- b. Strictly directional: head-initial

Strict locality requires that the governor be adjacent to the governee at the P_0 projection, i.e. the projection containing every skeletal point. Strict directionality defines a universal chirality for syllable constituents. Unlike syntactic constituents, this chirality is not subject to parametric variation. Thus, universally all syllabic constituents are head-initial.

Given the strict locality and strict directionality conditions, we derive the following theorem:

(9) All syllabic constituents are maximally binary

The proof of (9) goes as follows: consider first ternary constituents. They must be of the form (10a), (10b) or (10c). The constituent head is underlined:



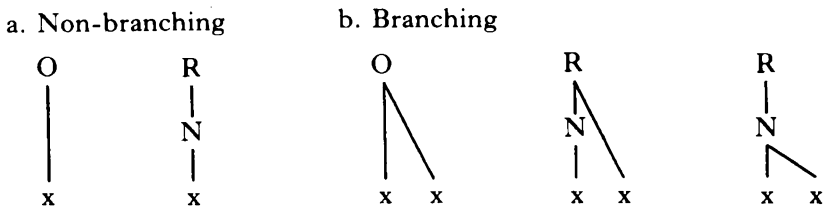
All three of the above structures are excluded by (8) above. Both (10a) and (10b) violate strict locality. σ_1 and σ_3 are not adjacent in these structures. In (10c) the governor, σ_2 , is adjacent to both σ_1 and σ_3 but in this case strict directionality is not respected. The governor σ_2 must simultaneously govern a position to its right (σ_3) and to its left (σ_1). By extension, all n -ary constituents, where $n > 2$, are ill-formed. Thus (9) is derived from (8).

2.2 The syllabic constituents

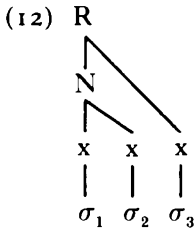
We propose the existence of three syllabic constituents: the Onset (O), the Nucleus (N) and the Rhyme (R). All three constituents are organised according to (8). Furthermore, we stipulate that the left branch of every Rhyme is the Nucleus constituent. Accordingly, the head of the Nucleus is also the head of the Rhyme. In syntactic terms, the Rhyme is the maximal projection of the Nucleus. Finally, a constituent head is not required to govern another position. There is no exact analogue of the θ -criterion. Constituents with single members are licit.

Given these principles, the following constituent structures are allowed for:

(11) *Syllabic constituents*



We claim that the structures of (11) exhaust the possible configurations of syllabic constituents. Note that each constituent O, R and N appears in branching and non-branching forms. One logical possibility shown in (12) below is excluded by the strict locality condition:



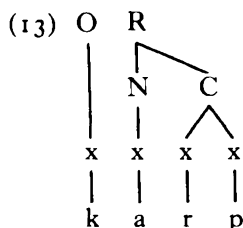
The structure in (12) represents a long vowel or heavy diphthong in a closed syllable. This structure was formerly ruled out by the principle of 'prosodic government' proposed in Lowenstamm & Kaye (1985). This configuration is now excluded by the more general locality condition in (8). Specifically, the head, σ_1 , is not adjacent to a member of the Rhyme constituent, σ_3 . Thus, we maintain the claim that branching nuclei are not found in closed syllables.⁴

A word should be said about two constituents, present in the standard syllable literature, that have no status in this theory: the syllable itself and the coda. Some authors (e.g. Aoun 1979) have already cast doubt on the status of the syllable as a constituent. Indeed there is a distinct absence of evidence indicating that the syllable behaves like a constituent. Further, if the syllable were a constituent and if we wish to conserve a parallelism of structure among constituents we would be obliged to posit the Onset as the head of the syllable. (Recall that constituents are head-initial.) There appears to be no evidence for such a conclusion. Secondly, we would have to relax the strict locality condition on this constituent. Syllables certainly exceed binarity in their maximal structure. Even in our very restrained theory of syllable structure we allow for branching onsets and branching rhymes. Combining these two into a constituent goes well beyond the maximally binary structure that we have posited above. Finally, syllables, unlike the other constituents that we have posited, do not display the distributional effects associated with a governing relation. As we shall see below, not any two segments may cooccur within a constituent. Their permitted position is determined by their governing properties. In contrast, a syllable is composed of any well-formed onset followed by any well-formed rhyme. This property was called the 'Principle of Free Cooccurrence' in Kaye (1985). Such a property is inconsistent with the government-based definition of a constituent presented above. Given the absence of motivation for a constituent 'syllable' and in view of the evidence militating against its existence, this constituent is not among the primitives of this theory.

Following an idea first proposed by Vergnaud (1982), rather than postulating a syllable constituent, we define a tier of representation which

conforms to the pattern (O R)* – that is an arbitrary number of repetitions of the pattern O R. (O R)* may simply be a stipulation of the theory. Alternatively, we may be able to derive this expression from the theory of charm. This possibility will be discussed below.

The second ‘missing’ constituent is the coda. There are several reasons for rejecting the coda *as a syllabic constituent*, where ‘constituent’ is to be understood as defined above. The three postulated syllabic constituents, O, N and R, are universally present in syllabic inventories. The same would not be true for the coda. All other constituents are head-initial governing domains. The coda is not a governing domain. Concretely, either the coda is to be analysed as inherently non-branching – a stipulation – or else if a branching coda is foreseen as a possible syllabic structure in some theory, it would have to be analysed as head-final rather than head-initial. Consider a word like English *carp*. A branching coda approach would involve the following syllable structure:





(14a) has none of the difficulties associated with a constituent 'coda'. We maintain the universal nature of syllabic constituents. The absence of the so-called coda in many languages is simply a parameter on branching that applies in parallel fashion to all constituents: onsets, nuclei and rhymes may or may not branch, depending on the syllabic inventory of the language.

2.3 The governing properties of segments

We have seen that syllabic constituents are defined as head-initial governing domains. The governing relation defined therein is subject to the strict locality and strict directionality conditions defined above. In order for a syllabic position to be properly formed, it must be associated with a segment having the appropriate governing properties. In this section we discuss the nature of these properties. In Kaye *et al.* (1985) (henceforth KLV), we presented a theory of phonological representations. All phonological segments are formed out of a pool of primitives called 'elements'. These elements may occur alone or in combination. Their combinatorial possibilities are defined in terms of a property called 'charm'. In KLV we proposed two values for charm: positive and negative. Segmental representations were elaborated for nuclear segments but little was said about non-nuclear segments.⁶ In order to proceed with the development of a comprehensive theory of syllable structure that has any hope of satisfying the objectives laid out in §1 of this article, we must extend the theory of phonological representations to consonant systems. We now propose three values for the charm property: σ^+ , σ^- and σ^0 . Segments may be positively or negatively charmed or they may be neutral (charmless). What was positively charmed in KLV remains as such. The negatively charmed segments of KLV are now considered neutral. We add a third category of segment: the negatively charmed segment. As a very rough first approximation we will consider obstruents and non-sibilant fricatives to be negatively charmed. All other consonantal segments are neutral. We now add the following principles:

- (15) a. Charmed segments may govern; charmless segments may be governed⁷
 b. Positively charmed segments may not occur in non-nuclear positions; negatively charmed segments may not occur in nuclear positions

Bearing in mind that this is a rather rough-hewn version of the theory, let us first consider well-formed onsets:



(16a) represents a non-branching onset. Given (15b), any neutral or negatively charmed segment can be associated to this position. Concretely, stops, fricatives, nasals, liquids and glides can occur here. (16b) represents the more interesting case of a branching onset. The head is the leftmost position (underlined). A negatively charmed segment must be associated to the head position and a charmless segment must appear to its right. Any other combination is ill-formed. Thus, a typical branching onset consists of a stop or (non-sibilant) fricative followed by a liquid or glide.⁸ The above account provides a reasonable fit between theoretical prediction and observed syllabic behaviour. Further refinements are possible and these will be discussed in later sections. At this point in the discussion it is worth indicating the nature of the evidence that may be brought to bear on questions of syllable structure.

The principal point that we wish to make here is that syllable structure, in the absence of a theory, is not discernible by mere inspection. This point should not be controversial but it is often overlooked in discussion related to syllable structure. To sharpen this point let us consider a case from syntax. The various versions of X' theory make the claim that syntactic structure is invariable across constituent categories. Now Vata, a Kru language spoken in the Ivory Coast, appears to be a head-final language. It contains postpositions rather than prepositions. In noun phrases, nominal complements precede rather than follow the head noun, and so on. Given the tenets of X' theory, one would expect an SOV order rather than SVO. In fact the superficial order is SVO, and not SOV. Does this mean that X' theory must be abandoned? In fact, Vata is quite well behaved with respect to X' theory. As Koopman (1984) has shown, the superficial SVO order is the result of verb movement into the INFL position. The verb indeed started out from rightmost position of VP, precisely the position predicted by X' theory. One need not agree with all the details of Koopman's analysis. Our point here is a methodological one. The mere existence of forms that appear to contradict X' theory is hardly to be taken as a serious problem *in the absence of any analysis*. Either a well-motivated solution consistent with X' theory immediately presents itself as in the case of Vata, or one awaits further theoretical or empirical developments. In like fashion, useful contributions to discussions on syllable structure must involve a theoretical framework – what types of structures are allowed for, and an analysis. It is naive to expect that languages carry syllable structures on their sleeves. Analytic work is indispensable.

We have proposed an extremely restricted theory of syllable constituency. For example, a maximal onset consists of two segments: a negatively charmed segment followed by a neutral segment. To bring home the point that we have made above, let us consider one example

which seems to contradict the above claim. Italian, like English, has $s + C(+C)$ sequences. These sequences occur both word-internally and word-initially. Consider a word like *strage* 'massacre'. If the initial *str* cluster is an onset, this clearly violates the permissible structure indicated above: this putative onset has three members and its leftmost member *s* would be required to govern *t* (as well as *r*). This does not correspond to the governing properties of either segment. Notice however that the only reason to believe that $s + C(+C)$ clusters in general and *str* in particular constitute onsets is adherence to the following principle:

- (17) Word-initial consonant clusters always form onsets

Now there is no particular reason to believe that a principle like (17) is correct. Indeed, as we shall demonstrate below, (17) is spurious. The implications of this are that the mere existence of words in various languages that begin with all kinds of exotic sequences of consonants is completely irrelevant to discussions of syllable structure. Evidence must be provided that these sequences form onsets. In the case of Italian $s + C(+C)$ clusters, such evidence is lacking. In fact it is clear that $s + C$ sequences are not tautosyllabic. Let us proceed to the evidence.

We will first show that word-internal $s + C$ sequences are not onsets. In Italian stressed open syllables are lengthened:

- (18) a. fá:to 'fate' b. fá:to 'fact' c. ká:pra 'goat'
 mé:ro 'pure' má:to 'coat' sá:kro 'sacred'
 pé:lo 'hair' pá:rko 'park' ré:tro 'behind'

In (18a) we see that stressed open syllables are lengthened. In (18b) stress falls on a closed syllable and no lengthening occurs. The final syllable of the forms in (18c) contains a branching onset. Consequently, the preceding syllable is open and it indeed lengthens as in (18a). Consider now forms with $s + C$ clusters:

- (19) pá:sta⁹ 'pasta' vé:spa 'wasp' fyá:sko 'flask'
 pé:sta 'trail' mó:ska 'fly' kré:spo 'pancake'

Tonic lengthening never occurs before $s + C(+C)$ sequences in Italian. It is clear then that such sequences do not form onsets word-internally. This becomes a bizarre fact if one wishes to postulate $s + C(+C)$ onsets word-initially because of some principle like (17). One would be obliged to claim that $s + C$ are onsets word-initially but do not form constituents word-internally. This is not typical behaviour for Italian onsets. Clusters like *pr*, *tr*, *kr*, etc., behave like onsets both word-initially and word-internally.

In fact initial $s + C(+C)$ cluster do not behave like onsets either. We shall present two arguments for this assertion. Consider first the behaviour of the masculine definite article in Italian:

- (20) a. il costo 'the price' b. l'arco 'the arch'
 il lato 'the side' l'elenco 'the list'
 c. il piombo 'the lead' d. il solco 'the wake'
 il treno 'the train' il sale 'the salt'

The form of the masculine definite article varies according to the onset of the following noun. The form is *il* if the onset is not empty (20a) and *lo*¹⁰ if the following onset is empty (20b). This behaviour is constant whether the onset is branching (20c) or not (20a). An onset containing *s* behaves in a normal fashion (20d). Since the masculine definite article is sensitive to the following syllable structure this provides an excellent test for the status of initial *s* + C(+C) clusters. If these clusters are indeed onsets, then one would expect *il* to occur as the masculine definite article. Notice that Italian is indifferent to the number of consonants in the onset ((20a) *vs.* (20c)) and that word-initial *s* behaves like any other onset (20d):

- (21) lo straccio 'the cloth' lo sprezzo 'the scorn'
 lo scuro 'the darkness' lo slancio 'the elan'

The special behaviour of initial *s* + C(+C) clusters has been noted by Italian grammarians. The *s* of these clusters is called *s impuro*. In terms of the present discussion, the facts of *s impuro* indicate clearly that *s* may not be the initial member of a branching onset.

Additional evidence against the tautosyllabic character of *s impuro* comes from a phenomenon called *raddoppiamento sintattico* (RS).¹¹ Simplifying considerably, RS involves the gemination of a word-initial consonant following a word ending in stressed vowel:¹²

- (22) a. paltó pulíto [paltóppulító] 'clean coat'
 é caríno [ékkaríno] 'it is pretty'
 b. città trísté [tšittáttrísté] 'sad city'
 caffè fréddo [kaféffréddo] 'cold coffee'

The data in (22) show that RS causes gemination in branching onsets (22b) as well as non-branching onsets (22a). If *s* + C(+C) clusters were indeed to be analysed as onsets one would expect that the initial *s* geminate. In fact this is impossible. Chierchia (1986: 8) notes: 'An important fact to bear in mind is that *s* + C clusters under no circumstances undergo R[S]':

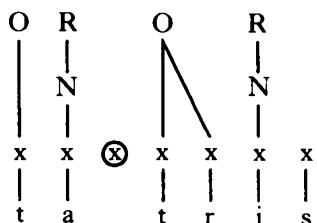
- (23) città straniéra [tšittástraniéra] 'foreign city'
 *[tšittásstraniéra]
 caffè spésso [kaféspésso] 'thick coffee'
 *[kafésspésso]

The failure of *s* to geminate in these forms is not due to some arcane property of this segment. When *s* occurs in an onset (i.e. alone) it behaves like any other segment:

- (24) città sánta [tšittássánta] 'holy city'
 caffè serále [kafésserále] 'evening coffee'

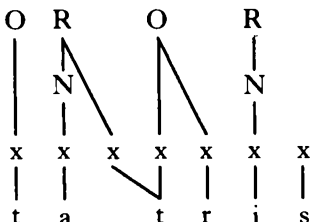
Such behaviour is quite incomprehensible under the assumption that *s* + C clusters are onsets. However, if these sequences are not tautosyllabic then the facts of RS fall out nicely. The initial *s* of such clusters could not

geminate since there would be no way of syllabifying the resulting form, as the following representations show:

(25) a. *città triste*b. *città straniera*

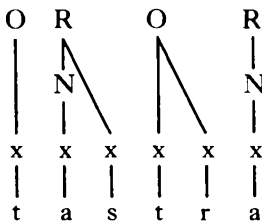
As has been noted by many authors, the idea of RS is to provide stressed syllables with branching rhymes whenever possible. RS extends phonological contexts beyond the word to the phrase level. In the case of *città triste* the word-initial *t* cannot close the preceding syllable. It is the head of a branching onset. Accordingly, an additional position is supplied and the onset head spreads onto it, providing segmental content for the post-nuclear rhyme position as in (26a). In the case of the form *città straniera* no adjustments are necessary. The initial *s* is not part of an onset and is thus available to fill the rhymal position of the preceding syllable, satisfying the branching constraint on stressed syllables. The resulting structure is shown in (26b):

(26) a.



Stress

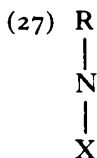
b.



Stress

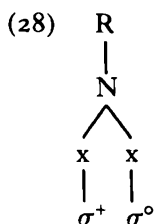
It is clear that such an analysis depends crucially on the rejection of (17) as a principle of syllable structure.

Returning to our discussion of syllable constituents, let us now consider the nucleus. The various charm requirements for this position as well as the associated parameters have been discussed in some detail in KLV. We limit ourselves here to some observations concerning the segmental properties of the various configurations in which nuclear segments occur. Segments appearing in structures like (27) are typically positively charmed,¹³ although this restriction is subject to parametric variation:



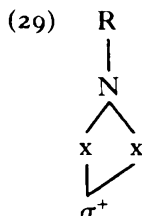
Nuclear segments contained within branching rhymes have no charm requirement. Specifically neutrally charmed segments may occur in such positions. In many cases this results in the tense/lax alternations sensitive to rhyme structure observed in many languages.

Finally, branching nuclei manifest charm configurations as defined in (14) and (15) above:



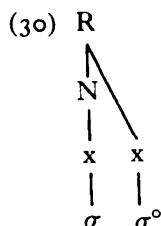
The structure in (28) represents a heavy diphthong. Typically, heavy diphthongs consist of a positively charmed segment in the head position which governs a neutral segment to its right. This is obviously a rough approximation of the situation. A number of apparent counterexamples come to mind.¹⁴ The fit of (28) is sufficiently good for us to be willing to live with a certain number of problematic cases.¹⁵

Another nuclear structure parallel to that of (28) exists in some languages. This structure differs from that of (28) in that only one segment occupies the two nuclear positions. This is the representation of a long vowel:



Typically, long vowels contain positively charmed segments. Once again apparent counterexamples are not difficult to find. Our remarks made above with respect to heavy diphthongs apply equally to the case of long vowels. It is to be expected that the number of counterexamples will decrease to the extent that the theory of phonological government is further refined.

The final structure to be discussed in this section is that of a branching rhyme, shown below:



Nuclear positions in branching rhymes do not appear to have any particular charm requirement. This may be due to the fact that the governed position is not in the minimal category of the governor, as was the case for branching onsets and nuclei. This may indicate that the governor in such cases is not the head position alone but rather the following configuration.

$$(31) \begin{array}{c} N \\ | \\ x \\ | \\ \sigma \end{array}$$

Nuclei of closed syllables may contain positively charmed and neutral segments. The latter type is frequently observed in cases where charm is not a lexical property of a segment but rather is present to satisfy the charm parameter of the vowel system in question. Concretely, consider a case of a system with five vowels:

$$(32) \begin{array}{cc} i & u \\ e & o \\ & a \end{array}$$

The presence or absence of the ATR element \mathfrak{I}^+ is not lexically significant. It is best to assume then, that this element is supplied to neutrally charmed expressions in order to satisfy the charm parameter of this system. If the vowel segment finds itself in a closed syllable, positive charm is not required. Therefore no ATR element associates to this segment and it remains neutral. The claim is then that tense/lax alternation following rhyme structure is not a case of closed syllable laxing but merely the absence of tensing (i.e. no association of the ATR element).¹⁶ Note that in such cases inherently positively charmed segments such as [a] = A^+ often occur in such contexts.

Let us now consider the governed rhymal position. We claim that this position, like its counterparts in onsets and nuclei, requires a neutral segment. If so, this may well be the motivating factor for such processes as syllable-final devoicing. This point will become clearer when we discuss the internal structure of consonantal segments. It is well-known that the so-called coda position is rather restricted as to its permitted segmental inventory. It is our belief that these restrictions may be ultimately tied to the governing properties associated with this position. Our discussion of Korean in a later section will explore this possibility in more detail.

This concludes our discussion of the theory of syllabic constituent structure. We have shown how a reasonably small set of universal principles allow for a reasonable fit with the observed syllabic structure in the world's languages. It is to be expected that any interesting proposal will be confronted with a significant number of apparently contradictory data. This theory is certainly no exception. We repeat the point made above that raw, unanalysed, fragmentary data extracted from a given

phonological system are of very limited utility. This theory is by no means immune from criticism but its replacement would require a theory of the same scope with a still better fit. Given the essentials of the theory of constituent structure and phonological government described above we now turn to another domain where such governing relations are found: government across constituent boundaries. We call this domain INTER-CONSTITUENT GOVERNMENT.

3 Interconstituent government

Consider the case of French syllable structure. French has both branching onsets and branching rhymes. Let us take this line of research a bit further and inquire about the behaviour of these syllable types in the interior of a word. We begin with the most naive assumption concerning syllable structure and will proceed to show that this assumption is untenable. Finally we shall show that syllable constituent distribution within a word is controlled by the same principles of government that apply within a constituent.

3.1 Interactions between syllable constituents

The most naive assumption that one can make regarding interconstituent constraints is that there are none. This is tantamount to making the following claim:

(33) A word (real or potential) is any sequence of well-formed syllables

A theory embracing a principle like (33) runs into a serious problem.¹⁷ This problem is expressed in terms of French syllable structure for concreteness but is quite general. Given that the syllables [sa] *sa* 'his/her', [krɛ] *craie* 'chalk', [sak] *sac* 'bag', [rɛ] *raie* 'ray' are well-formed in French, why isn't a word like [sakrɛ] *sacrait* 'crowned' syllabically ambiguous? Principle (33) predicts that two competing structures are available for this form:



The ambiguity involves the sequence *kr*. In (34a) this sequence constitutes a branching onset; in (34b) the *k* closes the initial syllable and the *r* occupies the lone onset position of the following syllable. Note that all syllables in both forms are well-formed in French. Principle (33) allows for both analyses. Yet only forms corresponding to (34a) occur in French.

A syllabification of the type (34b) is impossible. Indeed syllabic ambiguity of the above type does not appear to be a property of human languages.¹⁸ For example, in Canadian French, which laxes high vowels in closed syllables, one does not find contrasts involving sequences interpretable as onsets. No *i* before, say, *br* will lax (*vibrer*, not **vibrer*). This problem has not passed unnoticed in the phonological literature. Various proposals have been made to account for the absence of structures like (34b). They usually involve a principle along the following lines:

- (35) Given a choice, select a permissible syllabification that maximalises the onset position

In other words, a structure like (34a) is favoured over that of (34b) since it involves a branching (maximal) onset whereas (34b) does not. A principle along the lines of (35) would indeed account for the absence of (34b),¹⁹ but the problem does not end here. At this point we will propose an alternative theory that excludes categorically (34b). We will then explore the empirical differences between a theory incorporating (35) and the one we present here.

3.2 Interconstituent government

Let us make the following claim: a governing relation exists between contiguous skeletal positions. This is, of course, true in the case of sister members of a constituent. These cases were discussed in the previous section. To further cut down the possibilities we propose the following two principles:

- (36) a. Only the head of a constituent may govern
b. Only the nucleus (or a projection thereof) may govern a constituent head

Given (36) we have now reduced interconstituent government to three configurations. These are shown below:

- (37) *Interconstituent governing contexts*

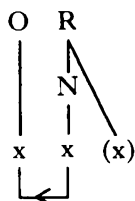
- a. Government between an onset and a preceding rhyml position



- b. Government between contiguous nuclei



c. Government between a rhyme and an onset



Interconstituent government is defined exactly as before. The one difference between interconstituent government and constituent government is the direction.

The configurations of (37) are governing domains where the government relation is characterised as (i) strictly local and (ii) strictly directional: head-final. The notions ‘strictly local’ and ‘strictly directional’ are to be understood as defined above. Locality in the strict sense is to be defined on the skeletal tier. Adjacent skeletal points satisfy the strict locality condition. The same segmental constraints are applicable as in the case of constituent government. The crucial difference between the two types of government is the position of the head. In constituent government the governor *precedes* the governee while in interconstituent government the governor *follows* the governee.

In principle, then, interconstituent sequences of the form (37a) should be mirror images of well-formed branching onsets. In fact, there is an implicational relationship holding between these two configurations. However, the relationship is *not* bidirectional:

- (38) a. If $\sigma_1\sigma_2$ is a segmental sequence of a well-formed branching onset, then $\sigma_2\sigma_1$ is a well-formed segmental sequence of type (37a) [TRUE]
- b. If $\sigma_2\sigma_1$ is a well-formed segmental sequence of type (37a), then $\sigma_1\sigma_2$ is a segmental sequence of a well-formed branching onset [FALSE]

By way of an example, consider Italian onsets. Branching onsets in Italian are listed below:²⁰

- (39) pr tr kr fr pl kl fl
 br dr gr bl gl
 prora tratto krine freddo
 plaga klasse flauto breve
 drago grappa blu globo

In each case the mirror image is a well-formed interconstituent sequence:

- (40) rp rt rk rf lp lk lf
 rb rd rg lb lg
 arpa torto parko orfano
 alpino solkare golfo orbe
 korda largo albo alga

On the other hand, it is certainly not the case that the mirror image of an interconstituent cluster constitutes a well-formed onset. To take but one example, sequences of nasal-homorganic stop are well-formed interconstituent sequences. The mirror images of these sequences are not well-formed onsets:

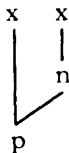
- (41) mp nt ŋk mb nd ŋg
 *pm *dn *kŋ *bm *dn *gŋ
 kampo kanto kaŋkro
 ambo andare angolo

It is clear then that the principles presented in §2 do not suffice in themselves to exhaustively define well-formed onsets. One needs to add a further proviso which will take the form of a stipulation here. We strongly suspect that this additional condition should be derivable from some more primitive theoretical notion. For the time being we leave it as a stipulation:

- (42) Elements may not spread within an onset

Put another way, (42) states that no segment or part of a segment may occupy more than one position in an onset. Obviously, this stipulation excludes geminates from onset positions. Homorganic stop-nasal clusters are likewise ill-formed onsets.²¹ The mechanism which imparts the point of articulation of the stop onto the nasal involves spreading of a phonological expression, *contra* (42). We illustrate this below:²²

- (43) *The sequence pm*



The labial articulation is expressed by the U° element present in the representation of *p* (see Kaye *et al.* 1989: app. for consonantal representations). The assimilation of the nasal segment would involve the spread of this element to the governed position to its right. Such spreading violates (42). Note that with the governing properties normally associated with the segments in question, (43) cannot be interpreted as an interconstituent sequence. To do so would require that *n*° govern *p*° since this type of government runs from right to left. A neutral segment cannot govern a charmed one. We shall return to further discussion of interconstituent government later in this section.

Let us now go back to the question of the syllabification of the form [sakre]. Recall that in principle two possible analyses were available for this form: (34a) and (34b). We concluded that (34a) was the correct representation for this form. The problem was to find a principle by which (34b) could be excluded. The traditional literature contains a principle which we formulated as (35) above. This principle instructs one

to produce the syllabification maximalising the material contained in an onset position. Applying (35) to [sakrɛ] yields (34a) as the correct result.

We have now introduced the notion of interconstituent government. It must first be shown that a government-based theory also predicts (34a) as the only possible outcome for the form under discussion. The sequence *kr* consists of a negatively charmed segment *k* followed by a neutral segment *r*. Accordingly, the government must proceed from left to right. Now left-to-right government is a property of syllabic constituents. Therefore, *kr* must form a syllabic constituent. The only constituent which permits a negatively charmed segment as its head is the onset. We conclude then that *kr* must be interpreted as a branching onset. The structure (34a) is thus derived. It remains to show that (34b) is not a possible syllabification. The *kr* sequence in (34b) forms a domain for interconstituent government. This being the case, the governor must occur in the rightmost position. Therefore the position occupied by *r* must govern the position occupied by *k*. Neither *r* nor *k* has the appropriate governing properties for the positions which they occupy; *r* cannot govern *k*. Therefore (34b) is not a possible representation for [sakrɛ].

In sum, we now have two analyses that correctly predict (34a) as the only syllabification for [sakrɛ]: the maximal onset approach and the government approach. Is there a way of deciding which approach is more adequate? The two theories do make different predictions that may be tested in a variety of cases. Consider the following situation: a language may have branching rhymes but no branching onsets. Any consonant sequence must be an interconstituent one in such systems. The only constituent permitting a consonantal head is an onset, and onsets do not branch in the case now under study. What do the two theories say about interconstituent sequences? In the case of the maximal onset hypothesis, there is really no reason why a form like [sakrɛ] should not exist with a syllable structure like that of (34b). This is not to say that the maximal onset principle (35) would not be operative in such a language. (35) would still insure that a form, say *kita*, would be syllabified as *ki-ta* and not *kit-a*. What has changed is that the maximal onset of such systems contains one and not two positions. Therefore, [sakrɛ] can well be syllabified as *sak-rɛ*, and principle (35) is still respected. The onset of the final syllable contains *r* and as such is saturated. Indeed a theory based on (35) would claim that *sak-rɛ* is the only possible syllabification for this form. In a government-based theory, on the other hand, the prediction is quite different. The governing relations are universal and immutable. In an interconstituent sequence, the rightmost member must govern the position to its left, regardless of whether or not the onset may branch. Thus (34b) is universally illicit in such a theory. Since the alternative syllabification (34a) is not available, a government-based theory predicts the absence of stop-liquid sequences in languages with no branching onsets. There are a considerable number of such languages in the world: Arabic, Hungarian, Korean, Quechua, to name but a few. It is interesting to note that although each of the above languages is rich in interconstituent

clusters, stop–liquid sequences are entirely absent or quite rare in these languages. Once again the reader is reminded that the mere presence of such sequences on the so-called phonetic level does not constitute a proof of their existence. This point will become obvious in the context of our discussion of the Projection Principle in phonology. To give but one example of what we have in mind here, let us consider Moroccan Arabic (MA). MA is one of the languages containing branching rhymes but no branching onsets. A maximal onset approach incorporating principle (35) makes no prediction concerning the existence of interconstituent stop–liquid clusters as in (34b). In fact, the expectation would be that these clusters occur, since there is no *a priori* reason to exclude them. The theory of government, on the other hand, makes the claim that such should not be found in this language. At first glance it appears that the government theory had made the wrong prediction. MA abounds with apparent stop–liquid sequences:

- (44) bigrā ‘cow’ xidrā ‘green’ sirrā ‘yellow’
 diflā ‘spittle’ hiflā ‘holiday’ xitrā ‘once’

Do the above forms represent instances of structure (34b)? There is good evidence to believe that this is not the case.²³ In the first place short vowels are regularly syncopated in MA. This occurs when a phonetically expressed vowel occurs to the right of the vowel in question. The formal properties of this process do not concern us here. What is important is that we have a test for determining if a syncopated vowel intervenes between successive consonants. For example, consider the form [kitbu:] ‘(they) write’. The final *-u:* is a plural suffix. The question is whether the sequence *tb* is genuine or merely the result of the syncopation of a vowel. The corresponding form without this suffix should provide the answer. A vowel should appear between the final two consonants if the cluster is spurious. This is indeed the case. The corresponding singular form is [ktib]. Stop–liquid sequences work in exactly the same way: cf. [a:klu:] ‘(they) eat’ and [akil] ‘(he) eats’. Note the appearance of a vowel between the stop and the liquid in the singular form. Suppose that we represent the syncopated vowel by *v*. What we are saying, then, is that all apparent surface sequences of stop plus liquid (CL) in MA are in reality C*v*L. The stress pattern of the forms of (44) offers additional evidence for the claim that the initial syllable is open. If the initial syllables were closed they would be stressed, as are the following forms:²⁴

- (45) gɪlta ‘puddle’ dɪrba ‘a blow’
 fɪrda ‘one of a pair’ kɪlba ‘bitch’

The forms of (45) are characterised by an internal cluster constituting a well-formed interconstituent sequence. Note that the governing properties of the segments involved are appropriate for the governing relations involved. In the form [gɪlta], the initial segment may be closed by *l*, causing initial stress placement, since the *l* is governable and is im-

mediately followed by a governor, *viz.* *t*. Accordingly the syllable structure of (34b) (without the segments of course) may be assigned to all of the forms of (45). There is a way of verifying, independently of the stress facts, that the sequences in (45) are genuine and do not contain a syncopated vowel. The form [kɪlba] 'bitch' consists of a stem followed by the feminine suffix *-a*. If the representation of the stem 'dog' were really [kɪlɔb], one would expect the vowel intervening between the final two consonants to surface in the masculine form (i.e. the non-suffixed form). The fact that this form is realised as [kɪlb] and not *[kɪlb] shows that *lb* constitutes a genuine interconstituent sequence.

The conclusion is that MA interconstituent sequences behave in exactly the way predicted by the theory of phonological government.²⁵ Similar arguments can be made for apparent stop-liquid clusters in Hungarian. Note that the MA phonotactic restriction on stop-liquid sequences is expressible in the maximal onset approach. One can propose an ad hoc phonotactic constraint excluding these sequences from MA. But there is no particular reason why stop-liquid sequences are excluded, rather than, say, liquid-stop sequences. This approach makes the prediction that it would be equally probable to find a language identical to MA except that while for example, *kl* is a possible interconstituent cluster, *lk* is not. Phonological government denies the existence of such a system. To our knowledge no such system exists.

3.3 The neutral obstruents

In our informal discussion of the charm values of consonantal segments we noted that stops and fricatives were negatively charmed and hence potential governors. It should be the case that one never find stops in governed positions. This, as we shall see, is false and the following discussion will deal with refinements to the theory of charm in order to account for obstruent sequences that are present in a number of languages.

There are languages in which obstruent clusters are excluded. In Italian interconstituent sequences involving obstruents are geminates. The same may be said for Pulaar, Wolof and Japanese. This is what the rough approximation of governors and governees sketched out above would lead us to expect.

It is not the case however that obstruent sequences are universally excluded from the world's languages. Let us consider the situation in French. French contains the obstruent sequences *pt* and *kt*: *adopte*, *dikte*. The first question that arises is whether a governing relation exists between the two members of the internal cluster of these forms. It might be the case that interconstituent government is optional in French, applying only when the appropriate governing properties of the segments involved occur. If such were the case one would expect that no word-internal phonotactic constraints should be observed in French. This is false. While *pt* and *kt* occur in French, *tp* and *tk* do not. That is, **adotpe*

and **ditke* are not possible words in French. This fact is incompatible with the claim that interconstituent government is optional in French. Notice that one cannot claim that the absence of *tp* and *tk* in French is accidental. The same gap exists in English and Greek.²⁶ Furthermore, this asymmetry is mirrored in stop-sibilant clusters in these languages. Thus, *ks* and *ps* occur but not **ts*.²⁷

We are led to postulate *kt* and *pt* clusters as authentic interconstituent sequences. It must then be the case that there exists a series of stops that are governable. This neutral series would lack the element that imparts negative charm on segments. Leaving aside for the moment the identity of this element, let us examine the evidence for the existence of such a series of stops. This neutral series must be phonetically distinguishable from the governing stops. The clearest evidence concerning the identity of this series comes from Korean.²⁸ Korean contains three series of stops: a tense (or 'glottalised') series, C', an aspirated series, C^h, and a neutral (or lax) series, C°. As Lee (1987) notes, the distribution of these series is quite simply expressed in terms of government. All three series may occur in positions that are neutral with respect to government – neither governing nor governed positions.²⁹ Only the tense or aspirated series may occur in governing positions. Only the neutral series may occur in governed positions. Considering just stops, the above allows for the following configurations:

(46) a. C°-C' b. C°-C^h

Let us now make the following assumption:

(47) Negative charm is a property of elements whose hot feature involves the state of the vocal cords. Two elements (in the sense of KLV) are proposed: H⁻ (stiff vocal cords) and L⁻ (slack vocal cords). These elements control (non-spontaneous) voicing properties in consonants and represent tone on vowels.³⁰

It is postulated that the Korean tense and aspirated series contain the element H⁻. Each segment of these series has negative charm. The neutral series has neither H⁻ nor L⁻ and is thus neutral with respect to charm. The configurations of (49) can now be unified as one sequence with respect to charm:

(48) C°-C⁻

(48) is of course nothing more than the charm configuration for interconstituent government. Once the correct charm values have been assigned to the segments, pretty much all has been said concerning their distributional properties. It should be mentioned that Korean possesses the *full* series of neutral stops: *p*°, *t*°, *c*°, *k*°. Interestingly, unlike French or English, Korean has governable coronal obstruents.³¹

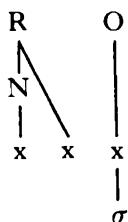
The implications of this hypothesis are that, for example, the *p* in *adopte* is phonetically distinct from the *p* in *alpin*. The latter stop contains the

element H^- , while the former does not. This follows from the fact that p must be governed in the form *adopter*, while it must govern in *alpin*.

3.4 Government between charmless segments

The theory of government that we have laid out to this point allows for government between a charmed segment (the governor) and a charmless or neutral one (the governee). It has already been noted that this characterisation of the governing relation is insufficient to correctly describe the observed facts. This theory will now be extended to encompass a substantial class of governing relations. Let us start with the case of geminates. Our claim is that a geminate consonant always involves an interconstituent structure with the governed position being initially empty:

(49) *The syllabic structure of geminates*



It is quite natural to consider the governed empty position to be charmless, hence governable. The governor of this configuration, σ , need not be charmed. In other words, it is not generally the case that geminates are invariably negatively charmed. Indeed, one must allow for the possibility that *any* non-nuclear segment may be the head of a geminate. Arabic provides such a case. In Arabic, neutral segments such as glides, liquids and nasals may geminate. Stops, fricatives and sibilants geminate as well. As a first approximation we propose the following principle:

(50) Any phonetically expressed segment may govern an empty position

We add the proviso that the governor be phonetically expressed to exclude geminated empty positions whose existence has not been demonstrated. (50) allows the greatest freedom of occurrence for the various geminated consonants. It is clear however that (50) must be subject to some sort of parametric variation. It is not the case that every language with geminates allows for gemination of every consonantal segment. Tiberian Hebrew (Lowenstamm & Kaye 1985) does not have geminated 'gutturals' (i.e. uvular, pharyngeal or glottalic segments). All other consonants may geminate. In Pulaar only [–continuant] consonants may geminate. These include the stops, affricates, implosives, nasals and *l*. We will not pursue the question of determining the exact nature of the parameters involved in

gemination. It is clear that such parameters involve the ability to govern empty positions.

Aside from the gemination cases, other interconstituent sequences involving neutral segments commonly occur in a variety of languages. These clusters typically display 'sonority hierarchy' effects. Well-formed clusters consist of a relatively more sonorous segment followed by a less sonorous one. We present in (51a) a number of well-formed neutral interconstituent sequences. These sequences illustrate the oft noticed sonority effects. In (52b) we see that these sequences display the asymmetrical behaviour typical of governing relations. If $\sigma^{\circ}_1 \sigma^{\circ}_2$ is a well-formed neutral sequence, then $*\sigma^{\circ}_2 \sigma^{\circ}_1$ is ill-formed:

- | | | | |
|---------|--------------------|----|-------|
| (51) a. | -rl- | b. | *-lr- |
| | -rn- | | *-nr- |
| | -rm- | | *-mr- |
| | -lm- | | *-ml- |
| | -ln- ³² | | *-nl- |

Charm theory, which allows only a binary division per category (nuclear position/non-nuclear position) is clearly inadequate to account for the distribution of the neutral sequences. The theory of representations presented in KLV provides another criterion for classifying segments: that of complexity. Segments consist of a head and one or more operators. The complexity of a segment can be calculated in terms of the number of operators occurring in its representation. Our proposal concerning the representation of consonants can be found in the appendix to Kaye *et al.* (1989). Inspection of these segments reveals the following complexity hierarchy:

- (52) *Complexity hierarchy of neutral segments*
 {glides, r} < l < nasals

We can now stipulate the following:

- (53) A neutral segment may govern if it has a complexity greater than its governee

(50) may now fall out as a special instance of (53). Since an empty position has zero complexity it may be governed, in principle by any segment. It should be clear that (53) applies only in contexts of interconstituent government. We emphasise that a post-nuclear rhyml position and a following onset do *not* form a constituent. This then is the case where a governor need not be the head of a branching constituent. This, in part, explains the asymmetry observed between governing relations within onsets and those of interconstituent sequences. Heads of onsets must be negatively charmed and thus do not fall under (53). In conclusion, (42) in conjunction with (53) permits us to account for the various differences in governing relations with and across constituent boundaries.

4 Principles and conditions

In this final section, we return to two principles we have invoked in the preceding discussion, the Empty Category Principle (§4.1) and the Projection Principle (§4.2). In §4.3, we discuss Charette's Minimality Condition.

4.1 The Empty Category Principle

In §3.2, in the context of our discussion of interconstituent government, we demonstrated the non-genuineness of stop–liquid clusters in Moroccan Arabic. The point was crucial since, MA lacking branching onsets, such sequences must be analysed as heterosyllabic; on the other hand, the governing properties of the segments involved render their adjacency impossible. In this section we would like to return to some aspects of that analysis. We argued, the reader will recall, that forms such as *bigra:* and *difla:* are, in fact, *bv°gv°ra:* and *dv°fv°la:*, resting our demonstration on accentual evidence, as well as on a comparison of similar sequences within the verbal paradigm, where the spurious character of the cluster becomes obvious from alternations such as *a:klu:/a:kil*.

One question remains to be addressed: what controls the presence/absence of the vowel *-i*? Here we appeal to two notions: 'government between contiguous nuclei' and 'proper government'. The first notion, a special case of interconstituent government, has already been introduced in §3.2. Proper government, a stronger form of government, is defined below:

- (54) *Proper government*
- a. The governor may not itself be governed
 - b. The domain of proper government may not include a governing domain

In addition, all the other conditions necessary for a governing relation, as discussed in the preceding sections, are required (directionality, locality, adequate charm properties of segments).

Moreover, we assume the existence of a principle, the Empty Category Principle, defined as in (55):

- (55) *Empty Category Principle*
 A position may be uninterpreted phonetically if it is properly governed³³

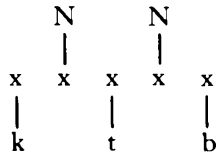
As we proceed with the evidence from MA, the import of the two added provisos of Proper Government, the exact meaning of the Empty Category Principle, as well as the interaction between the two, will become clear.

Consider the forms of (56):

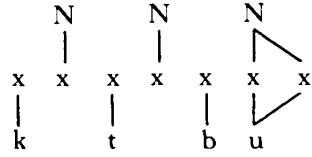
- (56) tan ktib 'I write' tan kitbu 'we write'

Following Kaye (1990) we assume that the structures corresponding to the forms of (56) are those indicated in (57):

(57) a. *Singular*



b. *Plural*



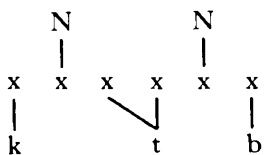
The stem portions of both forms contain empty nuclei only. None of these nuclei will be realised phonetically as long as it is followed (properly governed) by a phonetically realised nucleus appearing immediately to its right. The final nucleus of (57a), not being properly governed, will be pronounced. It, in turn, properly governing the preceding nucleus, renders the pronunciation of the latter unnecessary. A different situation obtains in the case of (57b). The final nucleus of the stem is now properly governed by the plural marker *u*; and consequently no vowel appears between the last two consonants of the root. But now, the initial nucleus of the form is not properly governed, and must accordingly be pronounced. We have thus derived the alternating pattern we observed within stems, *viz. kitb.../kṭib...*

We now turn to the 2nd binyan, or causative, characterised by the gemination of the root medial consonant, exemplified in (58):

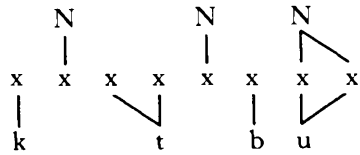
(58) *kittib* ‘he made *x* write’ *kittbu* ‘we made *x* write’

The representations corresponding to the forms of (58) are given in (59) below:

(59) a.



b.



As before, the final nucleus of (59a) must be realised, as it is not properly governed. Will it now enable the initial nucleus to dispense with phonetic realisation as in the case of (57a)? Recall that the difference between (57a) and (59a) is the presence in the latter of a geminate. Such a configuration constitutes a domain of interconstituent government, as we saw in §3.3 above. As such, it makes proper government between the two nuclei impossible, as per (54b), thus making the phonetic realisation of the initial nucleus compulsory.

In (59b) the suffixal vowel *u*: properly governs the preceding nucleus, and, as in (57b), no vowel is heard for the last nucleus of the stem. As in (59a), the initial nucleus of (59b), not being properly governed, must be pronounced.

The observant reader will have noticed that all the alternations discussed

in this section involve the presence/absence of vowel *i*, traditionally known as the epenthetic vowel of the modern Arabic dialects of the Maghreb. Thus, a suspicion might arise that we have simply recast in a different framework familiar patterns of syllabically conditioned epenthesis, which earlier analyses had dealt with, with a certain amount of success. We refer the reader to Kaye (1990) for an analysis of deverbal forms, the so-called *masdars*, showing that our approach is essentially different and more successful.

While it is true that the cold vowel is only involved in the alternating patterns discussed above, we want to claim that the relevant dichotomy is not of a functional nature, i.e. it does not pit the 'full', 'true' vowels of MA against its 'helping' vowel. Rather, the meaningful difference is one of length: *a*, *i*, and *u* are phonologically long vowels, whereas *i* is short. As such, the latter only can be associated with properly governable positions, *viz.* short nuclei. If this is correct, one would expect to observe similar patterns of alternations in languages in which the central/peripheral distinction does not coincide exactly, as it does in MA, with the short/long distinction.

Tangale, a Chadic language first studied by Jungraithmayr (1956, 1971), is such a language. We refer the reader to Nikiema (1989) for a reanalysis of *Kidda* (1985).

As a final comment on proper government, we would like to point out that the case discussed in this section represents a special case of proper government. Indeed, we identified three types of proper government: (i) gemination; (ii) long vowels; (iii) internuclear government.

The most obvious difference between internuclear government and the other two types is that the former represents the only type of proper government in which the governee is not phonetically identified by the governor, hence the Empty Category Principle. Further research on the nature of spreading domains can be expected to rationalise this discrepancy, thus allowing us to eventually derive that principle.

4.2 The Projection Principle

In §3.2, once more in the context of our analysis of pseudo *vs.* genuine consonant sequences in MA we briefly mentioned the Projection Principle, which we now define as in (60):

- (60) Governing relations are defined at the level of lexical representation and remain constant throughout a phonological derivation

The Projection Principle defines a two-pronged state of affairs: for any two objects, either they stand in a government relationship defined at the level of lexical representation,³⁴ or not. If they do not, no such relationship can be created in the course of a phonological derivation. If they do, the relationship is inalterable. The first point will be illustrated by means of a discussion of Tigrinya infinitives. Regarding the second point, it should be noted that inalterability effects are familiar from a rich literature on the

integrity of geminates, cf. Guerssel (1978), Schein & Steriade (1986), Hayes (1986), etc. In our terms, geminates are but a special case of government (proper government). Since their behaviour has been abundantly discussed, and falls within the scope of our predictions, we choose to focus here on plain government cases.³⁵ That other facet of the Projection Principle will be illustrated by a discussion of Mooré nominals, based on Nikiema (1986).

4.2.1 *Tigrinya infinitives*.³⁶ Tigrinya, a member of the northern group of the Ethio-Semitic family, displays the classical type of Semitic template-based morphology. Moreover, and crucial to our point, its syllable structure is no different from that of other Semitic languages. In particular, it has no branching onsets.

Tigrinya infinitives for regular triradical roots have been assumed to be formed on the pattern given in (61), an assessment which turns out to be incorrect, as we will see:

(61) $mi + C_1C_2aC_3$

As an example, root /sbr/ 'break' will yield in the infinitive *misbar*. Since *any root* can form an infinitive on the pattern of (61) the types of consonants apt to appear in positions C_1 and C_2 will be unrestricted, giving rise to all kinds of possible sequences. In (62), though, we have limited ourselves to combinations involving obstruent and liquids, as those are sufficient for our purpose. The reader is referred to Lowenstamm (in preparation) for a fuller discussion encompassing the whole gamut of consonant combinations, as well as type B and C verbs:

(62) ROOT	INFINITIVE	
frh	mifrah	'to be afraid'
rfd	mirfad	'to be late'
fth	miflah	'to boil'
lfɿ	milfaɿ	'to soften'
blɿ	miblaɿ	'to eat'
lbs	milbas	'to dress'
brq	mibraq	'to rise (sun)'
rbh	mirbah	'to produce'

We interpret this absolute indifference to the constitution of medial consonant 'sequences' as meaning that no government relation obtains between C_1 and C_2 of (61). This has important consequences on the syllabic structure of binyan (61). Indeed, one might have thought based on examination of a form such as *misbar* that infinitives are made up of two closed syllables. If such were the case, C_1 would be the rhymlal consonant of the first syllable, and C_2 the onset of the second syllable, with the expected government relations obtaining. This analysis is, of course, impossible, as it would rule out every other infinitive in (62), *viz.* **mifrah*, **miflah*, **miblaɿ* and **mibraq*, since the liquid does not have the required charm properties to govern the preceding obstruent.

The only alternative analysis compatible with the observation that C₁ and C₂ stand in an intrinsically governmental relation is given in (63), which consists of two open syllables followed by a closed one:

(63) $mi + C_1vC_2aC_3$

Notice that the postulated medial empty nucleus is perfectly legitimate in terms of the notions laid out in §4.1. It is properly governed by a following phonetically realised nucleus. As such it will not be pronounced under normal circumstances. We now proceed with positive evidence in favour of (63) as the analysis of the infinitive binyan.

Tigrinya has a series of labio-velar consonants: [k^w g^w q^w], as well as a series of pharyngeal and laryngeal consonants: [ʕ ħ ʔ h]. These consonants regularly round and lower neighbouring non-branching nuclei. Accordingly, they should prove crucial in the detection of empty nuclei. Consider the forms of (64):

(64)	ROOT	INFINITIVE	
	q ^w rc	muqurac	'to cut'
	g ^w rĥ	mugurāĥ	'to be cunning'
	rg ^w d	mirug ^w ad	'to become fat'
	bĥt	mibāĥat	'to be the 1st day of the month'
	ĥbt	miĥābat	'to swell'

The labial appendix of the labio-velars of (64) has spread onto adjacent non-branching nuclei. Similarly, the guttural ĥ has coloured an adjacent nucleus, turning it into a low central vowel, the so-called first-order vowel of the Ethiopian syllabary. (See Lowenstamm in preparation for details, and in particular for why the empty nucleus following the labio-velar or the 'guttural' gets realised even though properly governed.) Of particular interest to us are two facts: (i) Our hypothesised medial nucleus has reacted in quasi-chemical fashion when put to the test of colouring by labio-velars and laryngeals. Note that any alternative analysis of Tigrinya infinitives now meets an interesting challenge, that of accounting for the fact that the binyan is sometimes $mi + CCaC$, and sometimes $mi + CvCaC$, and moreover that the selection of the template is conditioned by the type of root involved, a rather exotic coincidence. (ii) Sequences of a liquid followed by a labio-velar obstruent would in principle constitute perfectly good government chains. Yet they do not stand in a government relationship in the cases at hand, to wit the constant presence of the empty nucleus. The fact that no governing relationship has been established where one might have expected one shows that such relationships (absence thereof, in this particular case) remain constant throughout phonological derivations, in conformity with the Projection Principle. We now turn to Mooré nominals.

4.2.1 *Mooré nominals*.³⁷ Mooré, a Gur language spoken in Burkina Faso, contains nominal classes. Every nominal radical belongs to a given nominal class, and always appears with the suffix(es) characteristic of its

class. Examples of the *re/a* class, to which we will limit ourselves, are given below in (65):

(65)	RADICAL	SINGULAR	PLURAL	
	kag-	kagre	kaga	'kind of fruit'
	tub-	tubre	tuba	'ear'
	sig-	sigre	sigá	'fétiche'

Certain radicals of form CVCC such as *wagd-*, *kigb-*, etc., raise a problem, particularly in the context of singular suffixation. In such cases, a vowel appears between the last two radical consonants or between the last consonant of the radical and the suffix. Both strategies are acceptable and constitute a case of free variation, as shown in (66):

(66)	RADICAL	SINGULAR	PLURAL	
	wagd-	wag-idre/wagd-ire	wagda	'thief'
	kigb-	kig-ibre/kigb-ire	kigba	'buttock'

There exists a sub-type of CVCC radicals in which the first consonant of the cluster is a nasal. Two logical possibilities exist concerning the existence of a governing relation binding these two consonants: either they stand in such a relationship, or they do not. If they do not, nasals will occur freely before any consonants, and, say, *nb*, *ng*, *mg*, *md* will be just as legitimate as homorganic clusters. As it turns out, homorganic clusters only are acceptable. This exceptionless generalisation constitutes telling evidence for government. If so, and since these forms pose the same problem as the forms of (66), when the singular suffix is attached, they can be expected to resist epenthesis, for inserting a vowel between the last two consonants of the radical would, of course, amount to destroying the government relationship in which they stand. Indeed, the wavering behaviour of (66) is impossible, as predicted. This is represented in (67):

(67)	RADICAL	SINGULAR	PLURAL	
	kumb-	kumb-ire/*kum-ibre	kumba	'eggplant'
	pond-	pond-ire/*pon-idre	ponda	'bullfrog'
	lenj-	lenj-ire/*lenj-igre	lenja	'wooden dish'

The situation in Mooré complements the Tigrinya facts and represents another facet of the Projection Principle effects: governing relations defined at lexical level are inalterable.

4.3 The Minimality Condition

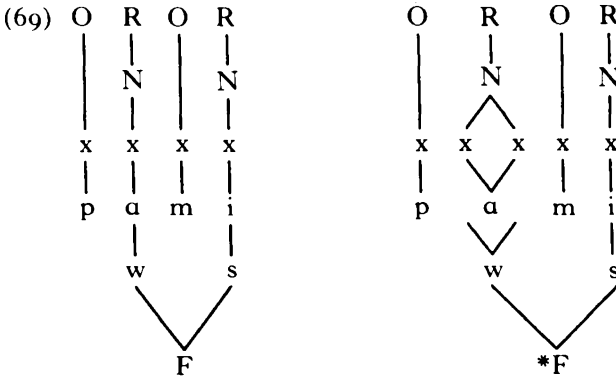
In our discussion of Proper Government above, we indicated that in order for Proper Government to obtain, it is essential that no government domain be included in the putative domain of Proper Government. From a broader perspective, one would want to know whether general conditions regulate the possible interactions between the various kinds of government discussed up to this point. Major headway in this direction appears in Charette (1987), from which we draw heavily in this section. The reader

is invited to consult that work directly for more detailed and encompassing discussion.

Charette observes that the Korean umlaut occurring in causative or subject forms affects short radical vowels (68a) but is blocked in the case of long vowels (68b):

(68) a.	RADICAL	CAUSATIVE	
	cap-ta	cap-hi	'to take'
	sum-ta	sym-ki	'to hide'
		SUBJECT	
	pam	pam-i	'night'
	tam	tam-i	'wall'
b.	pa:m	pa:m-i	*pa:m-i 'chestnut'
	ta:m	ta:m-i	*ta:m-i 'energy'

Charette interprets this differential behaviour in terms of the different kinds of government characterising the potential targets of umlaut. Long vowels, i.e. branching nuclei, constitute domains of government. Specifically, the head of the Nucleus (properly) governs the skeletal position immediately to its right. Such is not the case with non-branching nuclei, the head of which governs nothing within N, as can be seen in (69):



Since umlaut, i.e. propagation of the element I from the suffixal vowel, is nothing but an instance of internuclear government, the recalcitrant, island-like behaviour of long vowels with respect to external government readily finds an explanation in terms of the Minimality Condition put forth in Chomsky (1986: 42), which we reproduce here as (70):

- (70) *The Minimality Condition*
 In the configuration ... α ... [γ ... δ ... β ...]
 a. α does not govern β in the above configuration if γ is a PROJECTION of δ excluding α
 or
 b. α does not govern β in the above configuration if γ is the IMMEDIATE PROJECTION of δ excluding α

Thus one would expect, given Minimality, that long vowels or heavy diphthongs would systematically resist recessive positions in harmonic (including umlaut) contexts. We are aware of the existence of potential counterexamples. German umlaut would be a case in point since long as well as short nuclei seem to undergo umlaut. However, a number of comments are in order:

a. The nature of German umlaut is still a subject of debate, in particular as regards its current synchronic status. By contrast, Korean umlaut is totally productive.

b. It is not clear that the seemingly long vowels of words like, say, *rot* 'red' are not due to the kind of word-final lengthening pervasive throughout Germanic. Significant in this respect is the fact that the umlauted vowels themselves are not long, regardless of whether they were pronounced with phonetic length or not prior to submitting to umlaut.

c. Finally, if a language existed, nevertheless, in which long vowels undergo umlaut, the Minimality Condition leads us to expect things to fall out as follows: (i) There will be languages in which *only* short vowels undergo umlaut; (ii) There may be, given circumstances under which minimality is irrelevant, languages in which long *as well as* short vowels can undergo umlaut; (iii) *No* language will umlaut long vowels *only*, to the exclusion of short vowels.

5 Conclusion

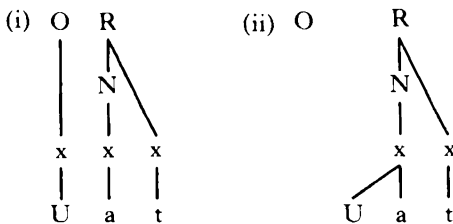
In this article we have attempted to lay out the leading principles of a government-based phonological theory. It is clear that only the first, perhaps haltering steps have been made here. An article-sized presentation can only present an *avant-goût* of what this theory is like. The basic ingredients are present, however, and the reader should have a reasonable idea of the objectives we are seeking to attain and the way we go about attaining them. It goes without saying that there is an impressive number of problems to be resolved in this framework. We are encouraged by the fact that there is also a growing accumulation of results that display a fine fit between theoretical predictions and empirical findings. We remain convinced that a principle-based approach to phonology (whether in our framework or some other) will well reward those who choose to follow it. The gems are perhaps half buried in the ground and dirt covered but they are not far away.

NOTES

- * This article was written in 1987. As can be expected, a number of changes have occurred since the time of its writing. We include this article here because it is the first general statement of the principles of Government Phonology, and has served as a starting point for much of the work done in this framework, both in this volume and elsewhere. A slightly different German version has appeared as Kaye *et al.* (1989).

- [1] As we will see below, not only do we reject the possibility of three-place branching syllabic constituents in general, but we deny the very existence of a coda constituent. However, since the arguments have not yet been presented, and since we cannot presume that they will immediately enrol the support of the readership, the coda will serve our illustrative purposes.
- [2] In fact, explicit proposals have been made in the literature to the effect that a parameter will determine whether syllabification may or may not apply across boundaries. In addition, the literature on Stray Adjunction opens the possibility of gathering under syllables segments that have been left out in the course of the initial parsing(s).
- [3] For a definition of the distribution of empty elements, in a somewhat more primitive framework, see Kaye & Lowenstamm (1984).
- [4] We are of course cognizant of the fact that this principle appears to be confronted with many apparent counterexamples. Languages as well-known as English, Arabic and Quebec French (which unlike standard French maintains a vowel-length distinction) exhibit apparent cases of long vowels or heavy diphthongs in closed syllables. It is of course impossible to deal with such cases here. This question is dealt with in greater detail in Kaye (this volume). It is worth noting that the overwhelming majority of such putative counterexamples occur in word (or cycle) final position or are created as the result of vowel syncope. We will show in a later section that such cases are only apparent counterexamples and not real ones.
- [5] An apparent counterexample to this claim would be the case of English shortening. Based on alternations like *keep-kept* one might wish to claim that English shortening is sensitive to the branching/non-branching status of the coda (i.e. shortening occurs when the coda branches). In reality these facts have no direct relation to the coda. Shortening in non-final syllables occurs in syllables closed by a single consonant. Cf. *wild-wilderness*, *Christ-Christmas-Christian*, *child-children*, etc. The observed effects of final-syllable alternations are due to the special status of this position. Indeed, it is also characterised by unusual consonant distribution, which has led to the postulation of an appendix at word edges.
- [6] In this approach terms like 'consonant' and 'vowel' have no theoretical status. Syllabic properties are not a function of segmental representation but rather are derivable from the syllabic position to which a segment is associated. The relevant notions are thus nuclear *vs.* non-nuclear position, where nuclear is to be interpreted as 'nuclear head'. For convenience we shall continue to employ the terms 'consonant' and 'vowel' but it should be understood that they are merely abbreviations for segments associated with non-nuclear and nuclear positions, respectively.
- [7] Or more technically, charmed segments may be associated to a governing position; charmless segments may be associated to a governed position.
- [8] In fact, a glide is simply a lax high vowel in a non-nuclear position. See KLV for details. In the above account nasals are predicted to occur in governed positions in onsets. The absence of nasals in governed onset positions will be discussed in a later section.
- [9] The importance of this form has been noted by van Riemsdijk & Williams (1986).
- [10] The vowel of *lo* is syncopated when followed by another vowel, yielding [l].
- [11] See Nespor & Vogel (1979) and Chierchia (1986), among many others, for a discussion of this phenomenon.
- [12] This is but one context in which RS occurs. Further details of this extremely interesting phenomenon do not concern us here. Many examples used here are taken from Chierchia (1986).

- [13] Positively charmed vowels are either [+ATR] or [+low]. Technically speaking they contain the ATR element \uparrow^+ or they have A^+ as their head. See KLV for details.
- [14] For example, the English heavy diphthong *oi*, which is generally transcribed with a lax *o* as its head. In Quebec French, where vowel length is maintained, heads of branching nuclei are positively charmed with the exception of long *e*. Cf. *fêter* 'celebrate' [fɛtɛ]. Interestingly, when long *e* is diphthongised its head is lowered by many speakers (*fête* 'birthday, party' [fæ't]) or tensed by others ([fɛ't]). Both processes yield nuclear heads with positive charm.
- [15] There is a more general problem that requires some comment. The formulation of (22) allows for any neutral segment in the governed position of a nucleus. In fact, clear cases of heavy diphthongs involve *non-complex* neutral segments – segments consisting of a single element. Thus, while $A^+I^0 = [ay]$ is widely attested, the existence of a diphthong of the form $A^+\{A^+, I^0\}^0 = [aɛ]$ is doubtful. If this is indeed the case, a still more restricted theory of segments occurring in governed positions is required.
- [16] A word must be said concerning the source of this ATR element. We would like to claim that all phonological phenomena involve composition and decomposition (spreading, delinking) of elements present at lexical representation. If a segment is modified by composition in the course of a derivation there must be a source for the element added. In fact there appear to be a limited number of cases where no discernible source exists for the element in question. We call such instances cases of ambient elements. It appears then that \uparrow^+ may be an ambient element. As such it is added to an expression in order for that expression to satisfy the charm requirements determined by the parameter settings of the system in which it occurs as well as its syllabic context.
- [17] The existence of cross-syllabic constraints has not escaped the attention of linguists. For a most interesting discussion of such constraints in Vinzelles Occitan, see Morin (1987).
- [18] This is not to say that no syllabic ambiguity exists. Ambiguous forms differing in their number of skeletal points are such examples. Thus *ouate* [wat] 'wad (of cotton)' in French is ambiguous. Structures (i) and (ii) are both possible and both exist.



The ambiguity of this form is revealed by (among other things) the variation in the behaviour of the definite article. Both *la ouate* and *l'ouate* are acceptable forms. It will be seen below that such ambiguity, in contrast to the *sacrait* case, causes no difficulty for the theory.

- [19] Some authors might hedge their bets. Syllabifications maximalising onsets would be the unmarked cases. Nevertheless, structures such as (34b) would be allowed in the marked instances.
- [20] Italian obstruent–glide sequences are problematic. The glide of a word like *piazza* may be analysed as either the governed member of a branching onset, or else as part of a light diphthong. We choose not to deal with this question here.
- [21] Sequences of stop plus nasals are typically heterorganic. Cf. initial sequences in Greek: *pn, kn, gn*; German: *kn, gn*, as well as the conspicuous absence of **pm*,

tn, etc. It is our view that even these sequences are not branching onsets. For one thing, they mirror the stop clusters to be discussed later in this section. English stress placement treats them as heterosyllabic (the stop closing the preceding syllable) although examples are not easy to come by: English *aráchnoid*, **árachnoid*.

- [22] No attempt is made here to express the internal structure of the consonantal segments.
- [23] This evidence is presented in detail in Kaye (1990).
- [24] These stress facts are taken from El Mejjad (1985). The analysis differs from that of El Mejjad, who was working in a different theoretical framework.
- [25] It should be noted that the argumentation used here is based on a theory of government that includes the phonological equivalent of the Projection Principle. This principle will be treated in a later section. What is involved is that governing relations defined at the level of lexical representation remain constant throughout a phonological derivation. This offers a different view of 'phonetic representation'. We are now dealing with a notion of 'enriched phonetic representation' which includes entities like empty positions – the phonological equivalent of traces.
- [26] The existence of word-initial *pt* and *kt* in Greek is in no way evidence that they form a branching onset. Significantly, **tp* and **tk* are absent in Greek both in word-initial and medial position. These clusters are analysed as interconstituent sequences. Their occurrence in word-initial position is no more significant than that of *s*+*C* clusters in Italian, English or French.
- [27] It should be clear that we are talking about these clusters as manifestations of *interconstituent sequences* having the structure of (34b). One finds *ts* in English (leaving aside cases that arise through the inflectional morphology) in words like *pizza*. Notice however that the preceding vowel is long (tense). Long vowels do not appear to occur before English *ps* and *ks* sequences: cf. *vixen*, *lapse*, etc. Quebec French provides further evidence for the structural difference between *ks* and *ps* sequences on the one hand, and *ts* on the other. High vowels may be lax in closed syllables, cf. *vide* 'to empty'; *vid* 'empties'. It is possible to lax the initial vowel in *fikse-fíkse* 'to set'. Such laxing is absolutely impossible before *ts* or *dz* (< It. *zz*), *mitsu* (**mitsu*) 'Mitsou (woman's first name)', *pidza* (**pidza*) 'pizza'. Stem-final *-p* and *-k* behave in a dramatically different fashion than *-t* before the suffix *-si* in Modern Greek. Cf. *pleko* 'I knit'–*pleksi* 'knit'; *strefo* 'I turn'–*strepsi* 'turned'; but *plito* 'I am bored'–*pliksi* 'bored'; *θeto* 'I place'–*θesi* 'placed' (data supplied by Brili Panayota). Plural forms in Gascon are also suggestive of a coronal–non-coronal asymmetry. Cf. *sak* 'bag'–*sats* 'bags'; *kap* 'head'–*kats* 'heads' but *malat* 'sick'–*malats* 'sick (pl.)' (data supplied by J. Kaye).
- It seems best to analyse *ts* as a complex segment, i.e. two segments associated to a single point – the consonantal equivalent of a light diphthong. As a complex segment, *ts* would not be expected to behave like an interconstituent sequence.
- [28] The following discussion as well as many of the examples are taken from Lee (1987).
- [29] A non-branching onset position which is either initial or preceded by a nuclear position can be characterised as a neutral position with respect to government.
- [30] This phonetic interpretation has been inspired by Halle & Stevens (1971).
- [31] The French sequence *tl* and the English sequences *tl* and *θl* are interesting. *tl* seems to be a genuine interconstituent sequence in words like *Atlantic* and *atlas* in both languages. English contains a *θl* sequence in *athlete*, *decathlon* but many speakers break up this sequence with an intervening schwa. Note that *tl* is not a possible onset as one might expect. *t* and *l* are isomers, that is two segments with the same composition in terms of elements but organised in a different

fashion. Such a sequence may run afoul of the OCP and/or (53), which may explain its absence as a possible onset.

- [32] The *-ln-* sequence is quite rare and highly unstable. The nasal element often spreads from the governing position, yielding surface *-nn-*. Alternatively the governor may undergo decomposition with the loss of its nasal element, yielding *-ll-*. These adjustments occur in such diverse languages as Arabic, Korean and Mooré.
- [33] This is but one of a variety of possible formulations. The discussion here is intended to state the *existence* of the principle, not its precise formulation.
- [34] By level of lexical representation, we mean the level at which the stem is attached to accompanying affixes, if any.
- [35] Similar cases are discussed in Guerssel (1978).
- [36] Only type A verbs will be considered here. For a discussion of the various types of verbs in Tigrinya, see Leslau (1940) or Voigt (1977).
- [37] We draw from Nikiema (1986) for the data and analysis of Mooré nominals.

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