Licensing Inheritance

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Abstract

The paper discusses the problem of how to unify the apparently disparate range of phonological contexts in which segmental weakening manifests itself. Several drawbacks with previous proposals are pointed out. An alternative is explored in which the autosegmental licensing power of a skeletal position is dependent on its status with respect to prosodic licensing.

1 Introduction

The problem addressed in this paper is that of how to unify the apparently disparate range of phonological contexts in which segmental weakening manifests itself. Phenomena coming under this rubric include dynamic processes such as vowel reduction, syncope and consonantal lenition as well as static phonotactic asymmetries in which the distributional latitude of certain positions is much more tightly constrained than that of others. Although it has long been recognised that certain phonological sites typically favour the occurrence of weakening more than others, it has not always been clear how this preference should be formalised. Some dimension of prosodic recessiveness is evidently involved, but the goal of providing a formal unification of weak contexts has proved somewhat elusive.

The classic sites which individually or collectively promote consonantal weakening are traditionally described as intervocalic (within the foot), word-final and preconsonantal. A widely held view is that all three contexts can be subsumed under a single syllabic context, that of the coda. Underlying this view are the following assumptions: the preconsonantal context corresponds to an internal coda-onset cluster; a word-final consonant is syllabified in a coda; and the consonant of a VCV sequence in a left-dominant foot can be captured into the coda of the first syllable. This paper discusses several examples of processes which have been analysed in this way, including vocalisation of liquids (e.g. Portuguese, Spanish), final obstruent devoicing (German), and the restriction of *h* to the onset of a stressed syllable (English).

The first part of the paper considers a number of problems with the coda approach. One problem stems from the view that a word-final consonant

occupies a coda, an assumption that fits uneasily with the observation that this position behaves anything but like a coda for various purposes. For example, the position fails to contribute to the quantity profile of the rhyme to which it supposedly belongs, as witnessed in its extrametrical behaviour in stress assignment and in its failure to trigger closed-syllable shortening. Another problem concerns the capture of an inter-vocalic consonant by the preceding rhyme. This transformation exemplifies a class of resyllabification operations which undo the effects of core syllabification, in this case onset maximisation. We will review some of the reasons for rejecting anayses of this type which overturn structural conditions established in lexical representation.

The second part of the paper suggests how the set of consonantal weakening contexts can be unified without resorting to resyllabification or compromising the extra-rhymal status of final consonants. The proposal invokes the principle of phonological licensing discussed in the work of Selkirk (1981), McCarthy (1982), Itô (1986), Goldsmith (1989, 1990), Kaye, Lowenstamm & Vergnaud (1990) and others. Under this principle are subsumed the dimensions of prosodic licensing, which sanctions the presence of constituents and skeletal positions within the phonological hierarchy, and autosegmental licensing, according to which the phonetic interpretability of a melody unit depends on association with a skeletal point. This paper explores the intimate relation that exists between the two mechanisms of licensing, the idea being that the ability of a skeletal position to autosegmentally license melodic material is inherited from its status with respect to prosodic licensing. Specifically, a prosodic licensing position has a greater degree of autosegmental licensing potential at its disposal than a prosodically licensed position.

The asymmetry in the degree of licensing power that is invested in different positions percolates throughout the phonological hierarchy. Common to the prime consonantal weakening sites is a configuration in which a position occurs relatively far down a prosodic licensing path and is thus identified as a weak autosegmental licensor. Weakening processes, such as the examples mentioned above, can now be treated as resulting from the withdrawal of autosegmental licensing from particular melodic units under certain prosodic licensing conditions.

The discussion proceeds as follows. The next section summarises the coda account of weak consonantal contexts (§2.1) and reviews the main arguments against its central assumptions, focusing on: the extra-rhymal status of final consonants (§2.2); the problematical nature of resyllabification rules (§2.3); and the misanalysis of certain internal consonants as codas (§2.4). §3 presents an alternative account based on phonological licensing which avoids

the pitfalls of the coda approach. The section begins with a brief summary of the relations of autosegmental and prosodic licensing (§3.1) and continues with a discussion of how these two mechanisms interact under the Licensing Inheritance principle (§3.2). §3.3 explores the melodic consequences of Licensing Inheritance and shows how the principle provides a means of unifying the weak consonantal contexts. In §4, I offer some speculations on how the Inheritance principle might be extended to other domains within the phonological hierarchy. §5 summarises the main conclusions.

2 The coda analysis of weakening

2.1 Braces and codas

One of the earliest motivations for the rehabilitation of syllable structure as an integral part of phonological representations stemmed from a dissatisfaction with the over-generating properties of brace notation in linear rewrite rules. Braces, employed as a formal means of conflating different environments within the same rule, suffered from a failure to evaluate a small set of recurrent combinations any more highly than an excessively large set of unattested combinations. The most frequently observed combination, the familiar {C, #} conjunction (consonant or word boundary), is widely regarded as the prime site for consonantal weakening. It is now generally acknowledged to be a cryptic characterisation of a context more perspicuously identified in terms of syllable structure (see, for example, the arguments in Vennemann 1972). The assumption that soon gained ground, largely as a result of work by Kahn (1976), James Harris (1983) and others, was that the relevant syllabic context could be identified as the coda. (Adopting a widely held view, I assume that the coda does not form an independent syllabic constituent but is simply an informal label for a post-nuclear rhymal position.) This view continues to be held by many phonologists and has achieved the status of something approaching textbook orthodoxy (see, for instance, Katamba 1989 and Durand 1990).

The forms in (1) and (2) illustrate some well-known examples of processes occurring in what was originally formulated as the {C, #} context but which have subsequently been reinterpreted in terms of the coda account. Those in (1) are drawn from James Harris's (1983) work on Spanish, those in (2) from a variety of sources including Kahn (1976) (2b) and Rubach (1990) (2c).

(1)

Spanish (James Harris 1983)

(a) *s*-Aspiration: s -> h

costa	co[h]ta	después	de[h]pué[h]

(b) Liquid gliding (Cibaeño): {r, l} -> y

revolver	revo[y]ve[y]	papel	pape[y]
carta	ca[y]ta	algo	a[y]go

(c) Lateral depalatalisation: λ -> l

be[λ]o	be[l]dad
donce[λ]a	donce[l]

(d) Nasal depalatalisation: ñ -> n

re[ñ]ir	re[n]cilla
desde[ñ]ar	desdé[n]

(2)

(a) *l*-vocalisation to *w* (Brazilian Portuguese): l -> w

sal	sa[w]	sa[l]eiro
salga	sa[w]ga	
papel	pape[w]	pape[l]ão
falta	fa[w]ta	

(b) *r*-vocalisation/loss (prototype non-rhotic English): r -> ∅

r	*r*	*r*
carry	car	card
rain	fear	board

(c) Obstruent devoicing (German): [-son] -> [-voice]

Ba[d]e	Ba[t]	Smara[kd]e (* [gd])
Ta[g]e	Ta[k]	Smara[kt] (* [gt])
Hau[z]e	Hau[s]	

The examples can easily be multiplied. I have selected those in (1) and (2) simply because they figure prominently in the literature classically taken to motivate the coda view. Additional examples of languages displaying more or less the same processes include: *l*-vocalisation to *y* (Austrian German); *l*-vocalisation to *w* (Serbo-Croat, English); *r*-vocalisation (German); obstruent devoicing (Catalan, Dutch, Polish, Russian, Wolof,...).

While the contexts in which the processes illustrated in (1) and (2) occur can be informally identified as weak, it is perhaps not immediately clear that every such process constitutes a case of segmental weakening. The traditional feature framework within which the analyses just mentioned are formulated provides no unified means of capturing the latter notion in any event. (For discussion of this point, see Harris 1990a.) In the second part of the paper, I will try to show that a formal relation can be established between the notions of weak context and segmental weakening. As part of this proposal, I will argue that all processes of the type exemplified in (1) and (2) are uniformly expressible as melodic reduction.

Once the coda had become identified as a weak environment, it was but a short step for some researchers to reanalyse cases of weakening occurring in other contexts along the same lines. Besides the preconsonantal and word-final contexts exemplified in (1) and (2), a third favourable site for lenition is formed by a consonant appearing intervocalically within a foot. By almost any phonologist's criteria, the core syllabification of such sequences must satisfy the requirement that onsets be maximised. According to a widespread view, weakening in this context can be unified with other manifestations of the phenomenon by assuming that the C of a core V.CV sequence can be moved into the coda of the first syllable. This resyllabification transformation ('coda capture' (3a)) may be achieved with or without severing the consonant's underlying affiliation to the onset of the second syllable. (The latter (ambisyllabic) alternative is favoured by, for example, Kahn (1976); for the opposing view see, for instance, Selkirk (1982).) Examples of analyses in which a weakening rule is fed by coda capture include those given in (3b) (Kahn 1976, Selkirk 1982) and (3c) (Borowsky 1986).

(3)

(a) Coda capture: V.CV -> VC.V / foot-internal

(b) Tapping (English): t -> D

pity pi[D]y get a ge[D] a

(c) *h*-deletion (English): h -> ∅

ve[h]icular ve[ɪ]icle
pro[h]ibit pro[ɪ]ibition

To summarise the discussion so far, the classic sites which individually or collectively promote consonantal weakening are traditionally identified as follows:

(4)

(a) preconsonantal,
(b) word-final,
(c) intervocalic within the foot.

It is now widely agreed that these three contexts, apparently disparate when viewed segmentally, are unifiable when viewed in terms of syllable structure. One implementation of this insight is the assumption that this unification can be achieved by reference to coda position:

(5)

The coda view: each of the contexts identified in (4) is a coda.

This claim is in turn dependent on the following assumptions:

(6)

Coda assumptions:

(a) A word-final consonant is syllabified in a coda.
(b) The consonant of a VCV sequence in a left-dominant foot can be captured into the coda of the first syllable.
(c) In any word-internal heterosyllabic C_1C_2 sequence, C_1 occurs in a coda.

In the rest of this section, we will consider the validity of the claims made in (5) and (6).

Taken on its own, the view expressed in (5) begs the question of why it should be the coda rather than some other context that enjoys a privileged position with respect to weakening. A conventional rewrite-rule model, even one in which contexts are specifiable in syllabic terms, supplies no direct formal connection between codas and weakening. There is nothing to rule out the possibility that weakening might exclusively apply in, say, onsets. But such a rule does not coincide with the empirical record, at least not as an exhaustive characterisation of a weakening context. (As we will see in §3, any weakening that might be attested in onset position will either also be responsive to the location of the onset in foot or word structure or will also apply in other environments.) In the second part of the paper, I will attempt to provide an answer to the fundamental issue that is at stake here: why does weakening take place where it does?

A set of more specific problems surrounds the assumptions in (6) underpinning the coda view. Recent work on syllable structure, including much which has not been particularly concerned with the issue of weakening, has yielded results that undermine each of the claims in (6). In what follows, we will examine each assumption in turn, reviewing evidence which shows that (6a) and (6b) are untenable and that (6c) is not without its problems.

2.2 The extra-rhymal status of final consonants

Assumption (6a), that a word-final consonant occupies a coda, is difficult to square with the observation that this position systematically fails to display the characteristics which can uncontroversially be identified with morpheme-internal codas. Let us briefly note three respects in which this is true. Firstly, word-final position fails to contribute to the weight of the rhyme to which it supposedly belongs, as witnessed in its extrametrical behaviour in stress assignment (see, for example, Hayes 1982). Secondly, the same quantitative independence is manifested in its failure to trigger closed-syllable shortening (see Myers 1987). Thirdly, in languages with final consonant clusters, the alleged coda clusters frequently contravene otherwise general sonority sequencing constraints (as noted by Levin (1985) among others). In all three of these respects, final consonants pattern with internal onsets rather than internal codas, a point we will return to presently. Researchers have come up with various responses to this non-coda-like behaviour, the best established of which are the device of extraprosodicity and the syllabification of a final

consonant in the onset of a degenerate syllable. Let us briefly compare the two approaches.

According to the principle of licensing, the presence of skeletal positions within a phonological representation is sanctioned through integration into the prosodic hierarchy. Positions are licensed through integration into syllabic constituents which in turn are integrated into higher levels of projection, including the foot and the word. Any position which for one reason or another fails to be incorporated into prosodic structure at the end of a derivation is assumed to be subject to stray erasure, in which case it receives no phonetic interpretation (e.g. McCarthy 1979).

Extraprosodicity has been proposed as a supplementary licensing mechanism which immunises domain-edge segments against stray erasure while allowing them to remain, at least temporarily, unintegrated into prosodic structure. The special status of final consonants is acknowledged by designating them as extraprosodic during the early stages of derivation. According to Itô (1986), extraprosodicity holds obligatorily during the lexical phonology and optionally at word level. It is obligatorily disengaged at the postlexical level, where all segments must be prosodically licensed. At this point, a word-final consonant must either be syllabified into a preceding rhyme or stray-erased.

The extraprosodicity account is unsatisfactory in a number of respects. One concerns the principle of Prosodic Structure Preservation which is assumed with varying degrees of explicitness in approaches based on prosodic licensing (see, for example, Selkirk 1982 and Itô 1986):[1]

(7)

Prosodic Structure Preservation
Conditions on prosodic structure holding of lexical representation also hold of derived representations.

The effect of the principle is to prevent phonological processes from creating syllabifications which violate lexically established well-formedness conditions on prosodic structure. Under a restrictive interpretation, Prosodic Structure Preservation is assumed to hold at all stages of derivation, and this is the view I will adopt in the second part of the paper. According to a less restrictive

[1]As indicated in its title, this principle relates only to prosodic licensing relations, the usage that is implied in the work of Selkirk (1982), Itô (1986) and others. This distinguishes it from the use of Structure Preservation as a principle constraining the co-occurrence of feature specifications within melodic units (as proposed by Kiparsky 1985).

interpretation, the principle can be shut off at some point in derivation. After that point, there is a virtual free-for-all with respect to the set of prosodic structures that can be created. As we will now see, the more restrictive interpretation is incompatible with the notion of extraprosodicity.

In the work of Selkirk, Itô and others, the main condition on prosodic structure for a given language is defined in terms of a gross syllable template. As long as a word-final consonant remains extraprosodic, it lies outwith the purview of such a template. Once extraprosodicity shuts off later in derivation, the final consonant becomes available for syllabification into a coda. However, if Prosodic Structure Preservation is to continue to be respected, coda syllabification can only take place if provision is already made for such a position in the language's syllable template. This leads to the following testable prediction: the coda incorporation of final consonants is only possible in languages which have morpheme-internal codas. Since the latter are domain-internal, they are not subject to extraprosodicity and thus must be provided for in the language's template as defined in lexical representation. The prediction is in fact demonstrably wrong. As shown by Kaye (1990), whether or not a language possesses internal codas is entirely independent of whether or not it sanctions final consonants. Examples of each of the four attested language types resulting from the intersection of these two autonomous parameters are as follows:

(8)

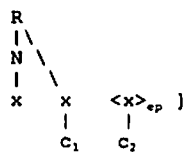
	Final C: NO		Final C: YES	
Internal coda: NO	Zulu	-V.CV]	Luo	-V.CV(C)]
Internal coda: YES	Luganda	-V(C).CV]	Portuguese	-V(C).CV(C)]

In practice, most incarnations of the extraprosodicity approach avoid this problem by assuming that Prosodic Structure Preservation ceases to be operative at post-lexical stages of derivation. As a result, there is little or no restriction on the set of possible syllabifications that can appear in final representations. This move towards the less constrained interpretation of Structure Preservation might prove justifiable, were the empirical record to warrant it. However, when it comes to accounting for the phonotactic properties of word-final consonant clusters, the less restrictive approach actually performs rather badly.

According to the extraprosodicity approach, in a final cluster containing two consonants, the first is syllabified in coda position and the second designated as extraprosodic. As depicted in (9), the independence of an

extraprosodic consonant (indicated by $<x>_{ep}$) from the preceding coda implies that the two positions should be phonotactically independent.

(9)



This too is incorrect. There are very strict distributional dependencies operating in this context. And significantly they are more or less identical to those holding either of internal coda-onset and/or internal branching onset sequences, depending on the language.[2] In English, for example, the dependencies are routinely of the coda-onset type. Compare the main distributional patterns that are evident in medial and final two-consonant clusters:[3]

[2]I exclude from the discussion those final consonants which have been analysed as occupying a word-level margin or appendix (see Selkirk 1982 and the references cited there). These typically coincide with analytic suffixation and have their own special distributional peculiarities which are quite independent of other types of final consonant. In Germanic, for instance, right-margin consonants are restricted to coronal obstruents, as in English forms such as <looped, boats, sixths>.

[3]The only distributional difference between the two contexts involves an independent development which bars the domain-final occurrence of *mb* and, in some dialects, *ŋg*. Thus we find medial *mb* in, say, <clamber> but not in, say, <climb> where the <b> corresponding to historical *b* is now silent.

(10)

English medial -C.C- and final -CC] clusters

Medial	**Final**	**Medial**	**Final**
Stop-stop		**Sonorant-stop**	
chapter	apt	pamper	damp
vector	sect	winter	flint
		wrinkle	rink
Stop-fricative		filter	guilt
mister	mist	scalpel	scalp
after	raft		
whisper	wisp	**Sonorant-fricative**	
whisker	brisk	cancer	manse
		dolphin	golf

We might try to formulate the phonotactic restrictions on the final clusters illustrated in (10) in terms of an interaction between an extraprosodic position and a preceding coda. This would amount to treating extraprosodicity as an independent constituent node. But distributional statements couched in these terms would simply duplicate statements relating to internal coda-onset clusters. Nor is the problem resolved when extraprosodicity is shut off and the final consonant gets incorporated into the coda of the preceding rhyme. This syllabification creates novel coda clusters; that is, sequences exhibiting phonotactic dependencies which are not catered for by lexically established constraints on internal codas. In short, under this type of analysis, the parallel between phonotactic conditions on internal -C.C- and final -CC] clusters remains no more than accidental.

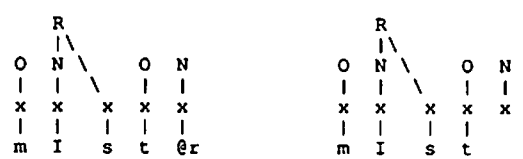
The problems of the extraprosodicity approach are further compounded when we turn to languages such as French and Polish. The challenge presented by languages of this type is that one set of final -CC] clusters displays the same distributional properties as internal -C.C- sequences (just as in the English examples in (10)), while those in the complementary set are distributionally identical to internal branching onsets. (For a presentation and analysis of the relevant facts, see Charette 1992.) On the latter parallel, compare the French medial and final clusters in forms such as <tableau - table>, <vitrine - vitre>. Under an extraprosodicity analysis, the final liquids in forms such as *tabl* and *vitr* would be marked extraprosodic and the preceding consonants syllabified in coda position. The phonotactic dependency

between the two positions is unaccounted for, as is their relation to internal branching onsets.

The simplest alternative is to assume that the distributional parallels between final and internal consonant clusters reflect parallel constituent structures. In other words, where a final -CC] cluster displays the same distributional properties as an internal -C.C- sequence, we assume that the second consonant occupies an onset position (as proposed, for example, by Kaye, Lowenstamm & Vergnaud 1990). This means that a form such as <mist> is syllabified as *mis.t*, with the final *t* occurring as the onset of a 'degenerate' syllable. (On the use of the latter term, see, for example, Selkirk 1981.) The final syllable is degenerate to the extent that it lacks anything corresponding to an audible nucleus. As we will see below, there are grounds for assuming that a final onset is sanctioned by the presence of a following empty nucleus. By the same token, any final -VCC] sequence which is distributionally equivalent to an internal branching onset will be syllabified as such, as in a form such as *vi.tr* <vitre>.

The immediate advantage of recognising domain-final onsets is that it allows us to unify the statement of phonotactic restrictions on medial and final consonant clusters. In the case of -C.C- and -C.C] sequences, both involve coda-onset interactions, as illustrated in the following representations of <mister> and <mist>:

(11)



Other advantages flow from the onset syllabification of final consonants. We thereby explain the other apparent peculiarities of final consonants alluded to at the beginning of this section. We account for the fact that consonants in this position behave exactly like internal onsets for the purposes of calculating rhyme weight. For example, the failure of final consonant clusters to respect otherwise general sonority sequencing constraints on codas follows trivially from the conclusion that they are not codas at all but either coda-onset or branching-onset clusters. Moreover, the quantitative independence that a single final consonant displays in relation to a preceding rhyme, as seen in its failure to induce closed-syllable shortening, follows directly from the fact that it never

forms part of the rhyme; a rhyme preceding a final onset is just as free to support a light-heavy contrast as one preceding an internal onset.

Both the final-onset and the extraprosodicity approaches acknowledge the non-coda-like behaviour of final consonants. Under the extraprosodicity account, final consonants achieve coda status late in derivation. According to the alternative, the parallel between internal onsets and final consonants is accounted for by assuming the latter retain onset status throughtout derivation. Both approaches challenge claim (6a), one of the pillars supporting the coda view of weakening. Acceptance of the extraprosodicity account leads to a weakening of the claim. Acceptance of the final-onset account leads to its rejection.

2.3 Foot-internal consonants

Let us now turn our attention to (6b), the claim that a foot-internal consonant can be captured into the coda of the preceding syllable. The purpose of this section is not to challenge the descriptive adequacy of coda capture. Rather it is simply to draw attention to the unconstrained nature of the theory of which it forms part. The onus is on proponents of such a theory to justify it against a more constrained alternative which does not countenance resyllabification transformations.

Under an approach which assumes Prosodic Structure Preservation, note that coda capture is only allowed for as long as the structure to be preserved is viewed solely in terms of a gross syllable template. One result of this is that the operation is only available to languages in which provision is made for a coda position in the syllable template, as defined over lexical representation. The resyllabification transformation will not be available in languages such as Zulu and Luo (see (8)) which lack independently established codas.

Another result of interpreting Structure Preservation purely in gross templatic terms is the possibility of creating novel associations between melodic units and syllabic positions during the course of derivation. This is not possible if the principle is assumed to hold over all conditions on phonological structure, including those regulating the types of melodic units that can occupy particular positions. (This remains true irrespective of how such restictions are expressed. In some approaches, they are couched in terms of positive or negative co-occurrence filters. In the latter part of the paper, I will assume that they take the form of universal constraints on the complexity of melodic expressions that can occupy particular positions.)

To take a concrete example: suppose we have a language with a syllable template allowing for codas but which operates a condition barring distinctive place specifications from such positions. (This is an example of a so-called 'Prince' language (Prince 1984, Goldsmith 1989), on which more in §3.) Any resyllabification process which coda-captures a single intervocalic consonant will potentially create a coda segment with an independent place specification. Such a tranformation will be evaluated differently according to how Prosodic Structure Preservation is interpreted. Under a purely templatic interpretation, the operation will proceed unhindered. If, on the other hand, the writ of the principle is deemed to run not only to templatic conditions but also to conditions on melodic association, the transformation will be ruled out. Note that the transformation cannot be salvaged by referring to word-final consonants (assuming the language in question sanctions such a structure). It is true that a single word-final consonant is more likely to support an independent place specification than is a coda consonant. However, if we follow the line argued for in the last section that such consonants are syllabified in onsets, then it is clear that they do not provide a model for the derivation of coda associations.

The most restrictive interpretation of Prosodic Structure Preservation is that (a) it relates to all conditions on prosodic structure and melodic association, whether these be universal or result from language-particular parametric settings, and (b) it holds throughout derivation. According to this view, the principle by which onset maximisation is achieved, for example, cannot be overturned during the course of derivation. As a result, the resyllabification of V.CV to VC.V is universally excluded. Generalising beyond this principle to all principles governing the well-formedness of prosodic structure, we conclude that Prosodic Structure Preservation, restrictively interpreted, rules out any form of resyllabification whatsoever.[4]

On a general methodological note, it is as well to bear in mind that the more restrictive theory represents a closer approximation to the null hypothesis that nothing happens to syllable structure during the course of derivation. The capture of an intervocalic consonant by the preceding rhyme exemplifies a class of resyllabification operations which undo the effects of core syllabification, in this case onset maximisation. This type of transformation forms part of a research hypothesis which, in the first instance, has to be weighed up in relation to the null hypothesis. The normal course of action in

[4]Kaye, Lowenstamm & Vergnaud (1990) express this ban on resyllabification in terms of the phonological instantiation of the Projection Principle.

any such research enterprise is to abandon the null hypothesis only when the empirical balance tilts decisively in favour of an alternative.

The question then is this: can the more restrictive theory cope with data which has previously been treated in terms of resyllabification? More immediately, can it cope with the sort of data cited as motivating coda capture which, as expressed in (6b), constitutes another of the pillars supporting the coda account of weakening? The contention in §3 is that it can.

2.4 Bogus consonant clusters

On the face of it, the third of the assumptions underpinning the coda account of weakening, that outlined in (6c), is the least controversial. This is the claim that an internal two-consonant cluster constitutes a coda-onset sequence if it does not form a branching onset. We can accept that there does indeed exist a core of cases where the claim is correct. However, there exists another set of cases for which the assumption cannot be taken for granted. The relevant point in the context of the present discussion is that the latter set includes cases where a coda reanalysis of the {C, #} conjunction has been proposed.

The following discussion proceeds on the premise that the existence of systematic phonotactic dependencies between positions is proof that they are adjacent a some level of projection. By the same token, lack of phonotactic dependencies signals lack of adjacency. Recognition of the relevance of this principle to consonants in coda-onset sequences is inherent in such notions as sonority sequencing and syllable contact laws. The phonotactic generalisation in this context is that the distributional latitude of the coda is always narrower than that of the following onset.

Apparent counterexamples to this generalisation take the form of cases where heterosyllabic consonant sequences contravene otherwise general syllable contact laws and indeed show no systematic phonotactic interactions whatsoever. The cases typically involve a pair of consonants flanking a site which displays a vowel-zero alternation. The following Turkish example is one of five processes occurring in the {C, #} context which Clements & Keyser (1983) reanalyse in coda terms. A vowel-zero alternation is observable in stems such as the following:[5]

[5]Thanks to Yilmaz Vural for supplying and discussing the Turkish data.

(12)

	acc.	nom.	abl.	
(a)	vakt-i	vakit	vakit-ten	'time'
	koyn-u	koyun	koyun-dan	'bosom'
	karn-ı	karın	karın-dan	'abdomen'
(b)	kısm-ı	kısım	kısım-dan	'division'
	azm-i	azim	azim-den	'resolution'
	hükm-ü	hüküm	hüküm-den	'judgment'
(c)	akl-ı	akıl	akıl-dan	'intelligence'
	kabr-i	kabir	karbir-den	'tomb'
	fikr-i	fikir	fikir-den	'idea'
	devr-i	devir	devir-den	'transfer'

Clements & Keyser assume the lexical representation of such stems to be equivalent to the form they take in the accusative; that is, they terminate in a CC cluster. An epenthesis rule then inserts a vowel to break up the cluster under certain conditions. (The quality of the vowel, which is in the main harmonically predictable, is not relevant to the point at hand.) Expressed in linear terms, the environment of the rule is the familiar _ {#, C} conjunction, the boundary referring to forms such as the nominative, the C to such as the ablative. In Clements & Keyser's syllabic reanalysis, the second of two consonants in a final cluster is identified as extraprosodic. Epenthesis is then formulated as the insertion of a nucleus between a coda C and a following extraprosodic C. The newly created syllable attracts the first consonant into its onset and the formerly extraprosodic consonant into its coda, thus rescuing it from stray erasure. A typical derivation thus runs something like this: *fik.<r>* -> *fik.i<r>* -> *fi.kir*. One problem with this account concerns the alleged coda status of the final consonant in derived representation, the sort of analysis that is incompatible with the conclusion reached in §2.2.

But a more immediate problem relates to the lack of phonotactic dependence between the consonants flanking the vowel-zero site. Some of the alleged sequences, such as those illustrated in (12a), do indeed coincide with well-formed coda-onset clusters. But this must be seen as entirely fortuitous in view of the fact that most of the sequences fail to show such a coincidence, since they violate the relevant sonority sequencing constraints. To treat consonant pairs of the latter type as coda-onset clusters is at best controversial (for example, *s-m*, *z-m*, *k-m* in (12b)) or downright impossible. Those in (12c)

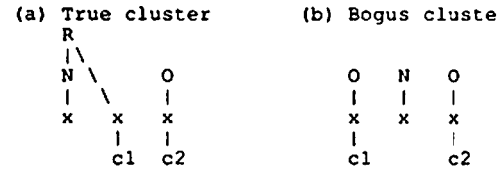
would actually make good branching onsets, were it not for the fact that Turkish lacks any motivation for recognising such a structure independently of the vowel-zero site.

According to the phonotactic principle referred to above, the lack of any systematic distributional interaction between consonants flanking the vowel-zero context must be taken as evidence that they are not adjacent. Under an account in which a nuclear position is epenthesied by rule, this non-adjacency is only acknowledged in derived representation. The opposite state of affairs obtains in other types of vowel-zero alternation which are analysed in terms of the syncope of a nuclear position. In the latter case, the non-adjacency of consonants straddling the vowel-zero site is only evident in lexical representation, where the phonotactic independence of the consonants is reflected in their occupancy of onsets separated by nucleus. Syncope of the nucleus triggers resyllabification, rendering the consonants adjacent. Both the syncope and epenthesis treatments of vowel-zero alternations fail to acknowledge that the surrounding consonants continue to demonstrate phonotactic independence throughout derivation.

Under an alternative analysis, the abiding phonotactic independence of consonants flanking a syncope/epenthesis site is captured by assuming them to be separated by a nucleus at all stages of derivation. This analysis is in any event the only one consistent with the strong interpretation of Prosodic Structure Preservation, according to which no resyllabification takes place during derivation. 'Syncope' then consists in the suppression of melodic material associated with a nuclear position, while the position itself remains intact as an empty nucleus. 'Epenthesis' takes the form of the interpretation of a stable nuclear position's melodic content, which under different circumstances remains uninterpreted. The specific conditions under which the melodic content of a nucleus fails to be made phonetically manifest are expressed in terms of the notion of proper government by Kaye, Lowenstamm & Vergnaud (1990) and Charette (1991).

Following this line of argument, it is necessary to conclude, contra (6c), that not all heterosyllabic consonant strings constitute genuine coda-onset sequences. Some certainly do (as in (13a)), but others are bogus clusters consisting of independent onsets separated by a nucleus with suppressible melodic content (as in (13b)).

(13)



In some langs, all apparent non-onset CC clusters straddle a syncope/epenthesis site (see, for example, the discussion of Yawelmani in Kaye 1990). Under an analysis in which these alleged sequences remain separated by a nuclear position througout derivation, such languages simply lack codas. In other languages, however, only a subset of apparent CC clusters arise in this way, while other heterosyllabic clusters represent genuine coda-onset clusters. In some cases, this state of affairs is responsible for superficial contrasts between otherwise similar consonant pairs which are differently syllabified. In some types of English, for example, there is a distinction between onset *tr* (as in <petrol>), in which aspiration from the stop is released onto the liquid, and heterosyllabic *tr* (as in <batt'ry>), in which the stop is unreleased (and sometimes glottalled) and the liquid unaspirated. From the perspective of the present discussion, a significant point about the latter type of sequence is that the first consonantal position represents a favourable weakening context.

The heterosyllabic *tr* pair in <batt'ry> of course straddles a vowel-syncope site. In English, one of the conditions on syncope of this type restricts the second consonant to a sonorant. Other examples appear in (14a). Under the resyllabification analysis outlined above, the *t* of a form such as <batt'ry> allegedly winds up in coda position, in spite of the fact that the resulting coda-onset sequence flagrantly violates just about every sonority sequencing constraint in the book. Not all heterosyllabic obstruent-sonorant pairs of this type involve an active vowel-zero alternation; others, exemplified in (14b), never contain an intervening audible vowel.

(14)

(a)	battery	ba[tr]ry	(b)	atlas
	bottling	bo[tl]ing		chutney
	lightening	ligh[tn]ing (v)		lightning (n)

Forms such as those in (14b) are frequently also assumed to constitute coda-onset clusters, again in violation of sonority sequencing. The susceptibility of consonants to weakening in this context, it has been claimed, justifies a coda-

syllabification analysis. It is undeniable that this context does indeed promote consonantal lenition (and not just in English, as we will see in §3). The *t* in both the alternating and non-alternating forms in (14) is subject to a number of weakening processes, including the two just alluded to: loss of audible release and loss of supralaryngeal closure, yielding in the latter case a glottal-stop reflex.

Under the alternative account outlined above, the failure of heterosyllabic consonant pairs to respect the sonority sequencing contraints associated with coda-onset clusters reflects the fact that the consonants occupy separate onsets throughout derivation. This configuration remains constant irrespective of the fact that the vocalic content of the intervening nucleus may be suppressed, either variably (as in (14a)) or permanently (as in (14b)). The challenge for this account is to explain why the first onset in such sequences favours weakening. If we reject coda-resyllabification, we evidently have to attribute weakening to the following empty-nucleus context. This is the view to be argued for in the second part of the paper.

Summarising the findings reviewed in this section, we must conclude that not all heterosyllabic consonant clusters constitute coda-onset sequences. Some undoubtedly do, however, which means that the third pillar supporting the coda account of consonantal weakening remains standing, even though it shows distinct signs of wear and tear.

2.5 The coda view: the verdict

As a result of the work on syllable structure reviewed in the previous three sections, we have seen how the various strands in the fabric of arguments supporting the coda analysis of weakening have begun to unravel. As they relate to the three classic weakening sites, the central claims of the coda view are as follows (repeated from (6)):

(15)

(a) A word-final consonant is syllabified in a coda.
(b) The consonant of a VCV sequence in a left-dominant foot can be captured into the coda of the first syllable.
(c) In any word-internal heterosyllabic C_1C_2 sequence, C_1 occurs in a coda.

Having examined each claim in turn, we conclude that (a) should be rejected, that it is premature to accept (b), and that the judgment reached in (c) is at

best unsafe. On (a), the evidence supports the assumption that a final consonant occupies an onset rather than a coda. On (b), we should resist accepting a resyllabification analysis until simpler accounts which dispense with the device are proved to be empirically underpowered. On (c), only a subset of heterosyllabic consonant clusters can be assumed to constitute coda-onset sequences; others correspond to independent onsets separated by a potentially empty nucleus.

Now we seem to be threatening to throw the baby out with the bathwater. Having undermined the central tenets of the coda account of weakening, we are in danger of losing the original insight that the arbitrary {C, #} conjunction is an evasive way of referring to a single context more transparently identified in terms of syllable structure. The purpose of the next part of the paper is to argue that the insight remains essentially correct and can be salvaged by invoking a principle which establishes an intimate relation between the ability of a skeletal position to license melodic material and its status in the prosodic hierarchy.

3 Autosegmental and prosodic licensing

3.0 The presentation in this part of the paper proceeds as follows. In §3.1, I briefly outline the principles of autosegmental and prosodic licensing which figure in the later discussion. In §3.2, I introduce the notion of Licensing Inheritance, which establishes an asymmetry in the ability of different positions to autosegmentally license melodic material. §3.3 illustrates the melodic consequences of Licensing Inheritance in a variety of contexts and shows how the principle provides a means of unifying the three contexts classically associated with the {C, #} conjunction.

3.1 Principles of phonological licensing

According to the phonological implementation of the licensing principle, the phonetic interpretability of units within a representation depends on their being legitimised through integration into the phonological hierarchy. Under this principle are subsumed the mechanisms of prosodic licensing (**p-licensing**) and autosegmental licensing (**a-licensing**). (In what follows, I will simply use the term **licensing** when the context makes it clear which mechanism is involved.) P-licensing sanctions the presence of positions at different levels of projection, ranging from the skeletal tier through successively higher domains at the level

of the syllabic constituent, the foot, the word, and so on throughout the prosodic hierarchy (Selkirk 1978, McCarthy & Prince 1986, Nespor & Vogel 1986).[6] According to a-licensing, the phonetic interpretability of a melody unit depends on association with a skeletal point.

Licensing relations between units in a representation conform to the fundamental principles of locality and directionality. (On the role of these principles in licensing, see Itô 1986 and Kaye, Lowenstamm & Vergnaud 1990.) Locality requires that units in a licensing relation must be adjacent on their projection. For example, the p-licensing relation between the two positions of a branching constituent (an onset, say) satisfies this condition, as does the relation between nuclear positions on the foot projection. Locality in a-licensing is respected by virtue of the fact that association lines between positions and melody units cannot cross.

Directionality manifests itself in the headedness of licensing relations; the head of a licensing domain sanctions the presence of any other unit that might occur in that domain. Within the domain of a branching nucleus, for example, the lefthand position licenses its sister by virtue of the fact that it is the head of that domain and is thus projected up to the next (nuclear) level of structure. Within an a-licensing domain, it is the skeletal position that licenses its associated melodic expression (Goldsmith 1989). The inherent asymmetry of licensing relations is reflected in the following formulation of phonological licensing (Kaye 1990):

(16)

Phonological Licensing Principle
Within a domain, all phonological units must be licensed save one, the head of that domain.

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[6]It is beyond the scope of the present paper to undertake a comparison of the skeletal and moraic approaches to phonological timing. All that needs to be said at this point is that a direct and uniform characterisation of licensing relations at all levels of phonological structure requires access to a single dimension on which positions are deployed. This is impossible in a framework in which the assignment of timing units is calculated exclusively on the basis of rhyme weight. The latter arrangement is assumed in moraic theory, in which onset material is adjoined either to the first mora of a syllable (e.g. Zec 1988) or directly to the syllable node (e.g. Hayes 1989). The primacy of quantitative considerations in this approach precludes a unified account of phonotactic dependencies which would cover not only rhyme-internal relations but also extra-rhymal relations, such as those contracted within branching onsets or between a coda and a following onset. Under the alternative approach, all such relations are calculated with reference to a single dimension, the skeletal tier.

The unlicensed head of a domain is itself licensed at some higher level of projection.

The direction of the p-licensing asymmetry can be seen to vary according to the level of projection at which it operates. (For a discussion of the various instantiations of phonological licensing within different domains, expressed in terms of governing relations, see Kaye, Lowenstamm & Vergnaud (1990).) Directionality within syllabic constituents (onsets, nuclei, rhymes) is universally left-to-right. Between constituents (i.e. in onset-nucleus and coda-onset domains), it proceeds universally from right to left. At both of these levels, directionality is potentially revealed in the phonotactic asymmetries that hold between adjacent positions. For example, in line with the left-headedness of intra-constituent licensing, the distributional latitude of the righthand position of branching onsets and nuclei is much more tightly constrained than that afforded the head position on the left. This is the opposite of the situation obtaining in the inter-constituent relation contracted by an onset and a preceding coda; in this context, it is the righthand position which enjoys a greater degree of distributional freedom than that on the left.

Nuclear head positions are projected up to higher levels of the prosodic hierarchy where they form domains including the foot and the word. The directionality of licensing relations at these levels is parametrically variable, as revealed in metrical relations involving stress assignment, where left-headedness is evident in some systems but right-headedness in others (Hayes 1981, Halle & Vergnaud 1987). The same kind of variability is evident in other inter-nuclear phenomena, including harmony and vowel syncope.

Inter-constituent licensing involves the following sub-clauses (see Kaye 1990 on (17b)):

(17)

(a) **Onset Licensing**: an onset head position must be licensed by a nuclear position.

(b) **Coda Licensing**: a rhymal adjunct position must be licensed by an onset position.

(The term **rhymal adjunct** identifies the post-nuclear rhymal position informally referred to as the **coda**.) The condition in (17a) reflects the widely held assumption that it is the nucleus that licenses a preceding onset rather than vice versa. Although onset-nucleus sequences do not display the sort of phonotactic dependencies that are evident in coda-onset clusters, this directionality seems justified in view of the pivotal role played by the nuclear

head and its projections in the phonological hierarchy. (On the reasons for treating nuclei as head constituents, see for example Levin 1985.)

It is via the Onset Licensing principle that we derive the result whereby the onset occupied by a word-final consonant must be sanctioned by the presence of a following empty nucleus (Kaye, Lowenstamm & Vergnaud 1990). The difference between the type of language which permits final consonants and that which does not (see the illustration in (8)) is thus parametrically expressible as a choice between whether a language independently licenses a final empty nucleus (the former type) or does not (the latter type). Let us refer to this as the Final Empty Nucleus Parameter:

(18)

Final Empty Nucleus Parameter
Licensing of final empty nuclear positions: [OFF]/ON

By means of Coda Licensing, we derive the facts of onset maximisation. The exclusion of VC.V syllabification follows from the requirement that a coda be licensed by a following onset. A syllabification such as * *pit.i* <pity> is ill-formed in terms of (17b), since the coda *t* is unlicensed. It is also by means of Coda Licensing that we derive the syllabification of word-final consonants in onset position, as opposed to coda position, as per the discredited view discussed in §2.2. In addition to the empirical motivation outlined in that section, we now see that the coda-syllabification of a final consonant must in any case be rejected on theory-internal grounds: there is no following onset to license a coda in this position.

To summarise: the Phonological Licensing Principle manifests itself in different domains as a-licensing or as p-licensing. In the case of the latter, it operates within constituents, between constituents and between the projections of nuclear head positions. For each language, these universal licensing mechanisms, supplemented by particular settings on parameters controlling such matters as whether individual constituents may branch, define a set of well-formed prosodic templates. The grammaticality of a phonological representation is then dependent on its being parsable in terms that satisfy these templates. According to the strong interpretation of Prosodic Structure Preservation, the conditions embodied in these templates remain in force throughout derivation.

3.2 The Licensing Inheritance principle

The a-licensing power of a position may be understood as its ability to support a particular set of melodic contrasts. Viewed from this perspective, segmental weakening reflects asymmetries in the a-licensing power of different positions: some positions are able to support a greater range of melodic contrasts than others. This phenomenon is most vividly illustrated in the phonotactic inequalities that hold between adjacent positions. For example, as pointed out earlier, the distributional latitude accorded the left-hand slot of a branching onset is much greater than that accorded its sister position. In coda-onset clusters, it is the right-hand slot that enjoys the greater degree of distributional freedom. A typical situation within a binary foot is to find a maximal vocalic inventory in the dominant nucleus but a reduced inventory in the recessive nucleus.

One specific question raised by asymmetries of this type concerns the nature of the melodic units that fail to be sanctioned in positions with weak a-licensing power. Cross-linguistic evidence shows that a particular subset of phonological primes consistently recurs in such constraints. Some of the restrictions apparently reflect absolute or relative universals; others are due to language-specific constraints. For example, even if there is no absolute ban on oral stops appearing in nuclei, associations of this type are strongly disfavoured. Codas display a widespread and possibly universal inability to support a voice distinction. In many languages, those in which coda-onset clusters are restricted to geminates and/or partial geminates, codas are also unable to support an independent place specification.

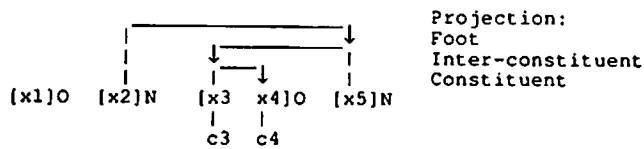
The literature contains various proposals for formally capturing facts such as these, including persistent delinking rules (e.g. Myers 1991), charm (Kaye, Lowenstamm & Vergnaud 1990), and positive and negative filters expressed as co-occurrence constraints (e.g. Selkirk 1982, Clements & Keyser 1983) or coda and cluster conditions (e.g. Itô 1986, Yip 1991). Goldsmith was the first to formalise restrictions of this type in terms of autosegmental licensing (1989, 1990: ch 3), and I will attempt to build on this insight in the following sections. According to his proposal, each node in syllable structure is specified for the particular distinctive features it is able to sanction in the positions it dominates. Whatever the relative merits and demerits of these formal devices might be, they remain no more than stipulative as long as they leave unanswered the question of why it is that a particular subset of features or elements consistently figures in such restrictions rather than any other random set. It is for future research to address this issue, and I will have nothing further to say about it here.

Another weakness of attempts to characterise phonotactic restrictions in terms of rules, filters or diacritics is that they fail to address the issue of why these restrictions hold of particular positions rather than others. This raises an even more fundamental question, the one I wish to take up here: why do distributional asymmetries exist in the first place? The line to be pursued here is that distributional asymmetries can be explained by reference to an intimate connection that exists between the autosegmental and prosodic aspects of licensing. The basic insight is that the ability of a position to support melodic contrasts depends crucially on its place in the prosodic hierarchy. Specifically, inequalities in the distributional latitude of adjacent positions reflect the directionality of the p-licensing relations between them. All other things being equal, the paradigm of melodic contrasts supported by an unlicensed position is potentially greater than that of a licensed position.

The Phonological Licensing Principle establishes licensing paths which extend throughout the phonological hierarchy. At the lowest level, we have a-licensing between a skeletal position and its melodic content; at higher levels, we have p-licensing between positions and their projections at the level of the constituent, the foot, the word, the phonological phrase, and so on. The head of a given representation can be identified as that position which is not licensed at any level of the hierarchy. This position corresponds to the designated terminal element of earlier arboreal representations of metrical structure. The designated terminal element, recall, is that position from which a path can be traced through successively higher levels of projection, such that the path intersects no node labelled weak (Liberman & Prince 1977).

To take an example, consider the licensing relations holding within a word such as <Audrey>, consisting of two nuclei gathered into a left-dominant foot. As illustrated in (19), the designated terminal element here is the dominant nuclear position x2, which is unlicensed at all levels of projection. (For graphic purposes, constituency in (19) is represented in terms of labelled bracketing rather than arboreally.) The dominant position p-licenses the nuclear slot x5 on the foot projection; x5 itself licenses the preceding onset head x3 on the inter-constituent projection. Position x3 in turn constituent-licenses its complement x4. Within the branching onset (the *dr* of <Audrey>), x3 and x4 a-license melodic expressions c3 and c4 respectively.

(19)



In order to develop the idea that the place of a given position within the p-licensing hierarchy is directly reflected in its ability to a-license melodic material, it will be useful to refer to the position's **a-licensing potential**. This may be defined as follows:

(20)

A-licensing potential
The a-licensing potential of a skeletal position refers to its ability either
(a) to directly a-license a melodic expression, or
(b) to confer a-licensing potential on another position.

The claim I wish to make here is that a fundamental asymmetry exists in the a-licensing potential of licensed as opposed to unlicensed positions, an asymmetry that is due to the directionality of p-licensing. Specifically, an unlicensed position has a greater degree of a-licensing potential at its disposal than a licensed position. Two assumptions will help give this notion formal substance. Firstly, as suggested in (20b), a licensed position inherits its ability to a-license melodic material from its licensor. Let us formulate this as the Licensing Inheritance principle:

(21)

Licensing Inheritance
A licensed position inherits its a-licensing potential from its licensor.

Direct a-licensing (condition (20a)) and inherited a-licensing (condition (20b)) are both illustrated in (19) where position x3 p-licenses position x4 on the constituent projection. Position x3, unlicensed within its onset, directly a-licenses the melodic expression c3. The same position bestows on x4 the ability to a-license the expression c4.

Let us make the further assumption that the stock of a-licensing potential invested in an unlicensed position is fully realisable only in case of

direct a-licensing but is depleted through transmission to a licensed position. A licensed position can thus be thought of as a resistor whose effect is to attentuate the a-licensing charge delivered by its licensor. This notion, together with the principle of Licensing Inheritance, derives the reduced distributional leeway of a licensed position as compared to that of its licensor. The defective distributional property of the righthand position of a branching onset, for example, thus reflects the fact that its a-licensing potential is diluted as a result of being acquired from another position, namely the licensor on the left.

3.3 The melodic consequences of Licensing Inheritance

3.3.1 In this section, we will explore the impact that Licensing Inheritance has on the a-licensing potential of different positions. Although the focus will be on those positions which correspond to the classic consonantal weakening sites, it is worth emphasising that the principle extends beyond these to all levels of prosodic structure. As will become clear in the following discussion, it is also seen to be operative, for example, within branching onsets and between nuclear heads on the foot and word projections.

Thus far I have been speaking of the melodic consequences of a-licensing in terms of the paradigms of segmental contrasts that may appear in different positions. According to this essentially phonemic-segmental view, the greater the a-licensing potential a position possesses, the larger the inventory of contrasts it is able to support. The problem with this notion, and indeed with any segmental conception of distinctiveness, is that a-licensing potential is not directly coded in phonological representations but has to be calculated externally by reference to segment inventories. (For a recent critique of segmental-phonemic approaches to distinctiveness, including that embodied in Contrastive Specification, see Archangeli & Pulleyblank 1991.) It would be preferable if the a-licensing potential of a position could be directly related to some structural property that is locally present in the representation.

A structural interpretation of the idea that the a-licensing power of a position depends on its p-licensing status is most directly implemented within a theory in which phonological oppositions are uniformly cast in terms of privative features or elements. The particular version of this model I will adopt here is one in which every element has an independent phonetic signature that manifests itself whenever the element appears in isolation. That is, a melodic expression may be composed of a single element, in which case it is fully interpretable as the independent phonetic signature of that particular element. This notion is either wholly or partially implemented in approaches which treat

vowel contrasts in terms of elements defined as the vocalic primes *a*, *i* and *u* (e.g. Anderson & Ewen 1987, Goldsmith 1985, van der Hulst & Smith 1985, Kaye, Lowenstamm & Vergnaud 1985). The same type of arrangement can be extended to consonantal representations (see for example Smith 1988). Following Kaye, Lowenstamm & Vergnaud (1985), I will assume that the phonetic signature of an element is composed of a salient property and one or more background properties. The salient property is what an element contributes to melodic expressions in which it combines with other elements; the function of background properties is to enable the realisation of the salient property in simplex expressions. For example, the salient property of the element which independently manifests itself as *i* is palatal resonance; the relevant background properties include the periodicity that characterises vocalic segments.

One of the advantages of this conception of melodic structure is that it permits a simple characterisation of a-licensing potential. In particular, the a-licensing capacity of a position is reflected in the complexity of the melody units that can attach to it. For most purposes, complexity can be straightforwardly calculated in terms of the number of elements contained in an expression. This means that, under Licensing Inheritance, no melodic expression associated to a p-licensed position can be more complex than the expression associated to its p-licensor. Viewed in these terms, segmental weakening consists in a diminution in the complexity of a melody unit, a process that results from the withdrawal of a-licensing from one or more of its elements under specific p-licensing conditions.

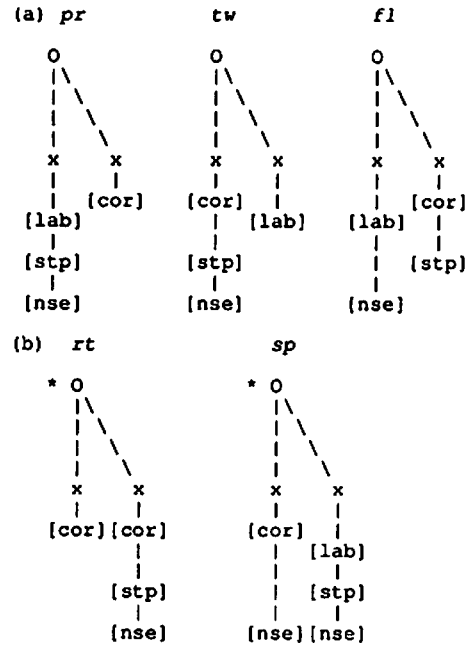
An earlier instantiation of this idea is to be found in Kaye, Lowenstamm & Vergnaud 1990 and in the Complexity Condition discussed in Harris 1990a. The condition refers to differences in the a-licensing ability of positions, based on their status with respect to government, a more stringent sub-case of licensing. According to the condition, a governed position cannot contain more elements than its governor. By this principle, we correctly derive the melodic complexity gradients that are observed to exist between pairs of positions standing in a direct licensing relation. The phenomena that submit to this account include the sonority sequencing characteristics of intra-onset, intra-nuclear and coda-onset clusters as well as harmony and reduction effects involving inter-nuclear relations (on which more below). One shortcoming of the Complexity Condition is that it does not cater for certain pairs of positions which, although not standing in a relation of government, nevertheless display a systematic complexity differential. This is true of two of the classic consonantal weakening contexts. Of the three reduction sites listed in (4), only the coda-onset context directly involves government. In this case, the governed

coda displays a lower degree of melodic complexity than the governing onset. The other two sites, word-final and foot-internal, involve onsets whose tendency towards low melodic complexity cannot be directly attributed to governed status. Rather, their weakness stems indirectly from licensing relations involving other positions in the neighbourhood.

Armed with the Licensing Inheritance principle, we are now in a position to address this problem. Complexity effects can now be seen as derivative of a more fundamental property -- the intimate relation between autosegmental and prosodic licensing. We will first consider how the present proposal accounts for the contexts for which the Complexity Condition was designed, in particular those corresponding to branching onsets, foot- or word-level relations between nuclei, and coda-onset clusters (§3.3.2 - 3.3.4). Then I will go on to show how Licensing Inheritance extends to contexts involving less direct licensing relations (§3.3.5 - 3.3.7).

3.3.2 Branching onsets. The licensed slot of a branching onset is identified as a weak position by virtue of the fact that it inherits its a-licensing power from its p-licensor, the onset head to its left. Its curtailed distributional latitude reflects the fact that, univerally, it can support only one element (representing *r* or a glide) or at most two (*l*). Thus in this position, we find either (a) a glide represented by the element [pal(atal)] (independently manifested as *i/y*) or [lab(ial)] (*u/w*), or (b) *r* (the independent exponent of [cor(onal)]), or (c) *l* (composed of [cor] and [st(o)p]). (I follow the practice here of labelling elements by reference to their salient properties. See Appendix 1 for phonetic specifications of the relevant elements and Harris 1990a for a full discussion of the elementary content of consonantal representations.) As illustrated in (22a), this distributional defectiveness is in marked contrast to the onset head, which directly a-licenses expressions of a greater degree of complexity. (The phonetic exponent of the element [n(oi)se] is the aperiodic energy that characterises fricatives and the release burst of plosives.)

(22)



Compare the well-formedness of the structures in (22a) with the malformedness of those in (22b) which display an upward complexity slope (viewed from the left), implying a greater degree of a-licensing power invested in the licensed position.[7] In some languages, a maximum of one element is tolerated in the weak onset position. Witness, for example, the historical reduction of *l* in this position to a simplex segment in some Romance languages: *r* ([cor]) in Portuguese and *y* ([pal]) in Italian, cf. French <plat>, Portuguese <prato>, Italian <piatto> 'dish'.

The branching-onset facts illustrate the more general point that the defective distribution of melodic units in weak contexts is a reflection of a p-licensed position's inability to a-license more than a subset of elements.

---

[7]The literature is full of apparent counterexamples, involving alleged onset clusters such as *sp, pn, ft*,... These can be shown to constitute misanalyses of sequences that are actually coda-onset clusters or, as mentioned in §2.4, configurations of onsets separated by an empty nucleus. See Kaye, Lowenstamm & Vergnaud (1990) for a full discussion.

3.3.3 Foot/word relations between nuclei. Turning now to inter-nuclear relations on the foot or word projection, we may identify dominant nuclei as powerful a-licensors by virtue of the fact that they are unlicensed within their domain. A recessive nucleus, *qua* p-licensee, possesses correspondingly less a-licensing power. Hence the recurring pattern where a maximal inventory of vocalic contrasts manifests itself in dominant nuclei, while a reduced inventory shows up in recessive nuclei. Phenomena such as vowel reduction, syncope and reduction harmony, which recur in weak nuclei, are all expressible as the suppression of particular elements when the inherited a-licensing power of the position to which they would otherwise be attached is insufficient to ensure their interpretation. (Reduction harmony refers to a situation in which the melodic complexity of recessive nuclei within a harmonic span is dependent on that of the dominant nucleus. See Harris 1990b for discussion.)

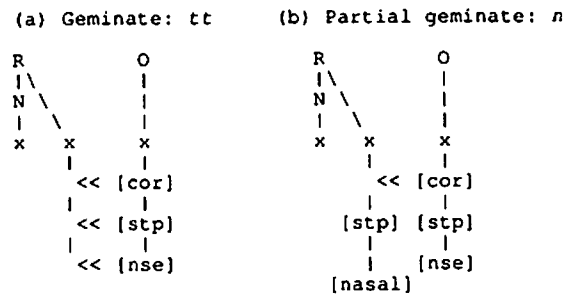
Vowel syncope is simply a more extreme manifestation of the differences that exist in the a-licensing potential of nuclei. Syncope results from the inability of a p-licensed position to support any melodic material whatsoever. The p-licensing of an empty nucleus that obtains under such circumstances constitutes a case of the proper government relation mentioned in §2.4.

3.3.4 Codas. In the following discussion, the interpretation of phonological phenomena occurring in coda position is guided by three general principles. Firstly, under Coda Licensing (17b), every coda position must be licensed by a following onset. Secondly, phonological processes occur freely wherever their conditions are satisfied. Thirdly, under Strict Cyclicity, processes which change melodic structure are restricted to morphologically derived contexts (Mascaró 1976, Kiparsky 1982). These three assumptions come together to force the following conclusion: phonological events in codas are only ever of the static distributional type. Under Coda Licensing, codas never coincide with an absolute domain-final context (in which position, as per the arguments in §2.2, a consonant occurs in an onset). As such, they are never exposed to a morphologically derived context in which dynamic alternation processes are premitted to occur without violating Strict Cyclicity. In other words, codas never exhibit the sort of alternation evidence that would justify the positing in lexical representation of melodic material which manifests itself under certain conditions but not under others. Thus, while some processes may simultaneously affect codas and certain other positions (processes including some which operate in the classic weakening sites), their operation in the former context will only ever be vacuous.

The distributional space of codas is systematically pinched, due to a phonotactic dependence on the following onset. In terms of the approach being developed here, the diminished a-licensing potential of a coda position reflects the fact that it is inherited from the following onset position, the coda's p-licensor within the inter-constituent domain. This curtailed distributional freedom is reflected in such patterns as homorganicity and voice agreement in coda-onset clusters. Elsewhere in the literature, this defectiveness is expressed in terms of filters such as coda conditions (Itô 1986) or cluster conditons (Yip 1991). One of the weaknesses of such devices, alluded to in §3.2, is their failure to explain why filters systematically select particular positions rather than others. For example, they offer no reason why it is always the case that the distributional latitude of a coda is dependent on that of the following onset, rather than vice versa. Under the view adopted here, the curtailed distributional freedom of codas follows straightforwardly from the directionality of the inter-constituent licensing relation: the onset, *qua* p-licensor, enjoys a greater degree of a-licensing power than the coda, *qua* p-licensee.

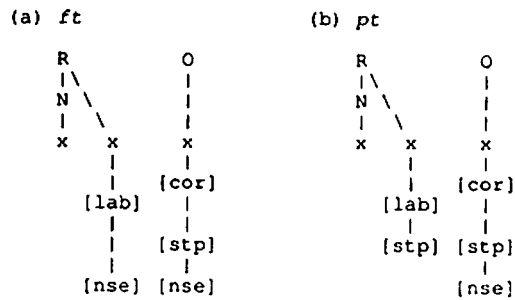
The diminished a-licensing power of codas is most strikingly illustrated in Prince languages, those in which coda-onset clusters are resticted to geminates and/or partial geminates. Adopting a widely held view, we may assume that the occurrence of adjacent identical melodic expressions is prohibited under the OCP and that the melodic content of a true geminate is lexically specifed in the onset and spreads automatically into the coda. Spreading is to be understood as resulting in the identification of a licensed position with its licensor with respect to melodic material that is lexically specified in the latter. In a full geminate, the coda position fails to a-license any elements of its own, and its realisation depends entirely on its identification with the melodic content of its onset licensor. Partial geminates reflect the failure of a coda to a-license all but those elements that are responsible for defining nasals and/or liquids. These structures are illustrated in (23).

(23)



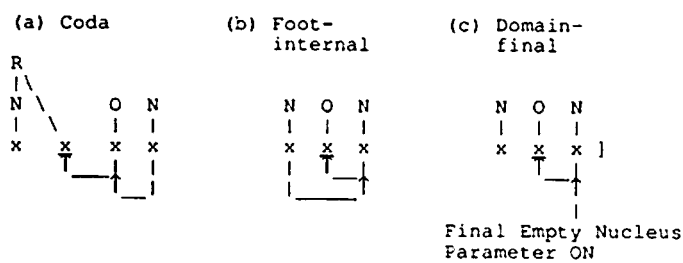
The melodic complexity differential that is evident in geminates is also to be observed in non-Prince languages, i.e. those that permit obstruent clusters which are not necessarily homorganic. In such sequences, we must conclude that a place-defining element is distinctively present in the coda, since obstruents in this position contrast with respect to this dimension in languages of this type. In English, for instance, we have a contrast between *s* and *f* before *t* (for example, <castor> versus <after>), as well as between *p* and *k* before *t* (<chapter> versus <factor>). Nevertheless, the diminished a-licensing potency of codas is also evident in obstruent clusters and is reflected in the inability of codas to a-license independent laryngeal or release elements. A characteristic of oral stop clusters is that the second but not the first consonant is released. In terms of melodic content, the licensing onset position contains an element, [noise], which is absent from the licensed coda position. Abstracting away from the laryngeal dimension for the moment, we can see from the following structures how an upward complexity gradient (viewed from the left) is maintained in such clusters:

(24)



3.3.5 Indirect licensing. The foregoing discussion of coda-onset clusters covers one of the consonantal weakening sites identified in (4). The question now is whether the licensing inheritance proposal allows for the unification of this context with the other two classic weak positions, foot-internal and domain-final. The key to the answer lies in an observation that can be made with respect to codas: as shown in (25a), the position in question is licensed by an onset which is in turn licensed by a following nucleus.

(25)



The particular structure in (25a) manifests a more general configuration that is common to all three weak contexts: each of the underlined positions in (25) is licensed by a position which is itself licensed. In (25b), the foot-internal context, the relevant onset position is licensed on the inter-constituent projection by a following nucleus which is itself licensed on the foot projection by the preceding nucleus. In (25c), the domain-final context, the weak onset position is onset-licensed by a following empty nucleus which in turn is licensed by virtue of the Final Empty Nucleus Parameter (18) being set at ON.

In all three configurations shown in (25), the underlined position occurs relatively far down a p-licensing path and is thus identified as a weak a-licensor. Specifically, the source of the a-licensing potential inherited by each position is separated by one licensed position from the point at which it is discharged. Pursuing the metaphor employed earlier, we might say that the a-licensing charge passes through two resistors before its point of discharge. The a-licensing potential is thus depleted at two stages on a licensing path. Being inherited at two removes, the a-licensing capacity is thus expected to be correspondingly diminished, with the result that the complexity of melodic expressions occupying such a position is liable to be curtailed. In short, it is the lowly licensing status of the three positions that marks them out as favourable reduction sites.

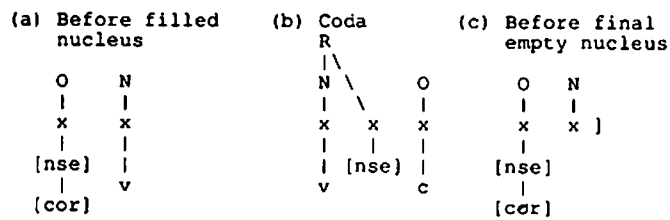
It is with this model in mind that we can now return to the examples in (1) through (3) of processes featuring the problematical {C, #} conjunction. These can all be reanalysed as involving a reduction in the complexity of melody units under one or more of the conditions represented in (25). Specifically, the a-licensing of particular elements is granted or withheld according to particular p-licensing conditions. Let us first of all deal with the processes in (1) and (2), those in which weakening operates simultaneously in coda and word-final position. Having already discussed the first of these contexts in some detail in §3.3.4, we focus now on the second. As depicted in (25c), the weak a-licensing power of the onset position occupied by a final consonant reflects the fact that it is inherited from the following parametrically licensed empty nucleus.

3.3.6 Empty nuclei as weak a-licensors. The weak a-licensing potential of domain-final consonant positions is confirmed by a range of phenomena indicating curtailed distributional latitude. Restrictions operating in this context in various languages include a ban on non-nasal consonants (e.g. Japanese), non-coronals (e.g. Lardil (Kenstowicz and Kisseberth 1979)), voiced obstruents (e.g. German and any other language with final devoicing), and *h* (e.g. English, French).

In the case of phenomena of the type exemplified in (1) and (2), the word-final context provides the alternating context in which a lexically present element is contingently unlicensed (Goldsmith's term (1989)). That is, the element is phonetically interpreted only if it acquires an a-licence as a result of specific p-licensing conditions becoming available during the course of derivation; otherwise it is suppressed. The process by which a particular element is delinked also expresses the failure of the element to be licensed in the non-alternating coda context. This state of affairs is illustrated by *s*-

aspiration in Spanish, exemplified in (1a) and represented in (26). (A slash through an element indicates delinking, resulting from a withdrawal of a-licensing. v and c stand for vocalic and consonantal expressions, the specific composition of which is irrelevant to the discussion.)

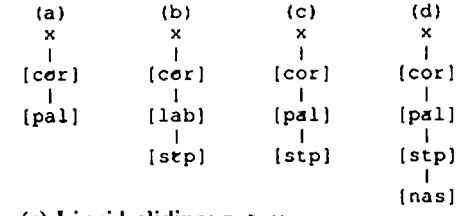
(26)



The melodic unit comprising the elements [coronal] and [noise], which together define *s*, is fully expressed before a phonetically realised nucleus (26a). Debuccalisation of *s* to *h* consists in a delinking of [coronal] when the position to which it would otherwise be associated inherits insufficient a-licensing potential to support it. As shown in (26c), this leaves the lone element [noise], which, when not harnessed to some place-defining element, is independently realised as *h*. Delinking of [coronal] applies vacuously in coda position (26b).

Liquid vocalisation and depalatalisation, illustrated by the Spanish and Portuguese forms in (1b-d) and (2a), involve similar patterns of melodic reduction. In the case of the various gliding processes affecting coronal liquids, we may assume that the vocalic outcome reflects the secondary resonance characteristics of the liquid. Thus vocalisations to *y* and *w* indicate respectively a palatalised and a labial-velarised ('dark') source. In element terms, a palatalised *r* is composed of [coronal] and [palatal]. As shown in (27a), Cibaeño Spanish gliding to *y* involves the delinking of [coronal]; the residual [palatal] element is independently manifested as *y*. Coronal laterals are made up of [coronal] and [stop]; to this can be added a secondary resonance component, for example [palatal] or [labial]. As shown in (27b), vocalisation to *w* involves the suppression of all but the [labial] component.

(27)

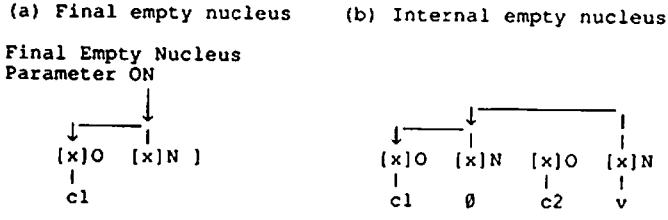


(a) Liquid gliding: r -> y
(b) Lateral gliding: l -> w
(c) Lateral depalatalisation: λ -> l
(d) Nasal depalatalisation: ñ -> n

In element terms, the difference between the primary and secondary resonance characteristics of consonants is expressed by means of the head-dependent relation. (On the headed nature of privatively represented melodic expressions, see Anderson & Ewen (1987), den Dikken & van der Hulst (1988), and Kaye, Lowenstamm & Vergnaud (1985).) For example, the presence of a head [palatal] in a melodic unit indicates primary palatality; the same element with dependent status on the other hand indicates secondary palatalisation. The lateral and nasal palatals shown in (27c) and (27d) are of the first type. Depalatalisation of these consonants, illustrated by the Spanish forms in (1c,d), results in the delinking of [palatal].

All of the delinking processes shown in (27) are triggered by the weakness of the a-licensing potential at the disposal of the position to which the consonants are otherwise attached. As shown in the position occupied by c1 in (28a), this weakness is attributable to the fact that it is inherited via the following empty nucleus, which, being parametrically licensed, is itself a weak a-licensor. If this analysis is correct, we should expect similar behaviour to be displayed in the other context where an onset is licensed by an empty nucleus, namely before a word-internal syncope site, as in the position occupied by c1 in (28b). Empty nuclear positions of the latter type are identified as potentially weak a-licensors for the reason that they are p-licensed by another nucleus (the relation of proper government described in §2.4).

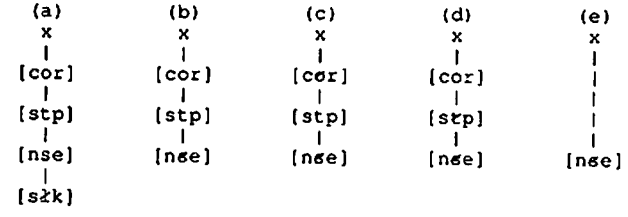
(28)



There is indeed evidence that final and internal empty nuclei do often constitute a single conditioning site for weakening. A couple of examples will serve to illustrate the parallel.

Brockhaus (1992) shows how obstruent devoicing in German can be analysed as the suppression of the element [slack vocal cords] ([slk]) in an onset when this is followed by an empty nuclear position (see (29a)).

(29)



(a) Obstruent devoicing, e.g: d -> t
(b) Loss of release, e.g: t -> t̚
(c) Glottalling: t -> ʔ
(d) Tapping: t -> D
(e) Defective *h*: h -> ø

In terms of the present proposal, her analysis implies that the onset fails to inherit sufficient a-licensing potential from its p-licensor, the empty nucleus, to support the element in question. The general pattern in German is for this phenomenon to occur in domain-final position, as illustrated by familiar alternations such as those in (30a) (where ø indicates an empty nucleus). The element [slack] is a-licensed when the onset to which it is attached is licensed by a phonetically realised nucleus, as in <Ba[d]e>; it is, however, suppressed when the licensing nucleus is empty, as in <Ba[t]>.

(30)

(a) Ba[d]e - Ba[tØ], Lo[b]e - Lo[pØ]
(b) Dialect A: Han[d]el - Han[dØ]lung, ei[g]en - Ei[gØ]nung
(c) Dialect B: Han[d]el - Han[tØ]lung, ei[g]en - Ei[kØ]nung

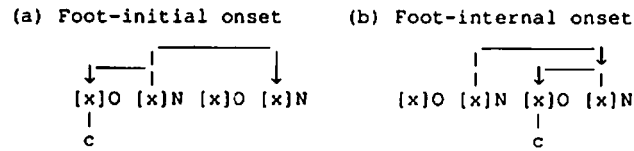
Empty nuclei also occur word-internally in German in a syncope site which elsewhere is occupied by schwa; compare <Hand[Ø]lung> with <Hand[@]l>. According to one of the specific conditions under which syncope operates, the nucleus must be p-licensed by a filled nucleus occurring to its right (a restricted form of proper government). In some dialects, onset obstruents appearing before empty nuclei of this type are immune to devoicing; hence forms such as those in (30b). However, significantly for the present discussion, other dialects treat this context exactly like the word-final context; hence the forms in (30c). Thus in type-B dialects, as pointed out by Brockhaus (1992), final and internal empty nuclei behave identically with respect to devoicing. In our terms, the indirect a-licensing potential of the two types of nucleus is identical, irrespective of the fact that the former are p-licensed by parameter (18) and the latter by another nucleus.

The same pattern of internal and final empty nuclei operating in tandem is evident in the lenition of English *t*. Dialects which display unreleased or debuccalised reflexes before the syncope site illustrated in forms such as <batt'ry> and <atlas> in (14) show the same reflex word-finally when a consonant or pause follows, as in <get by>. Lack of audible release reflects the absence or suppression of the [noise] element (see (29b)). As shown in (29c), further loss of [coronal] yields a stop consonant devoid of any supralaryngeal gesture, i.e. *?*, the independent manifestation of [stop] when not combined with any place-defining element. In all three cases in (29a-c), the suppressed elements have their a-licences withheld as a result of the onsets in which they occur failing to inherit sufficient a-licensing power from a following licensed empty nucleus.

3.3.7 Foot-internal onsets. Finally, let us consider the third of the weakening contexts in (4), that involving a foot-internal onset. The distributional asymmetry between nuclei within a foot is potentially mirrored in the distributional properties of the onsets they license. That is, just as the distributional latitude of the recessive nucleus of a foot is more tightly constrained than that afforded the dominant nucleus, so the onset licensed by the recessive nucleus displays a diminished distinctive potential when compared to that of the onset licensed by the dominant nucleus. Hence the tendency for particular distinctions holding in foot-initial onsets to be

neutralised foot-internally. This asymmetry can be seen to follow from Licensing Inheritance, if we compare the licensing paths involved in the two contexts:

(31)



As shown in (31a), the source of a foot-initial onset's a-licensing potential occurs at one remove from from its p-licensor, the dominant nucleus of the foot. By contrast, the diminished a-licensing potential of a foot-internal onset (31b) reflects the fact that it is inherited at two removes.

One of the significant advantages of this conception of foot-internal onsets as weak a-licensors is that it enables us to dispense with coda resyllabification. By way of illustration, consider how the two English examples in (3b,c) can be reanalysed without resorting to the coda-capture transformation (3a) employed in earlier accounts. As shown in (29d), tapping of *t* consists in the suppression of all of the consonant's melodic content save [coronal], which, when not fused with a manner-defining element, manifests itself as a tap *r*. Suppression in this case reflects the weak a-licensing potential that the licensed nucleus in (31b) transmits to the lenition-prone onset.[8] The defective distribution of *h* consists in the failure of a lone [noise] element to be licensed in the same kind of onset (see (29e)).

4 Extensions to Licensing Inheritance

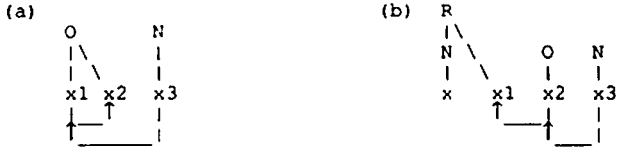
The focus of this paper has been on the autosegmental consequences of Licensing Inheritance. However, inherent in the proposal is the possibility that it might be extended to the prosodic licensing potential of a position. That is, we might ask whether asymmetries exist in the ability of positions to p-license

[8]Intervocalic tapping in English can also occur word-finally in other than a foot-internal context, as in <ge[D] úp>. A full account of the process thus needs to take into consideration cyclic structure as well as whether a following word-initial onset is occupied or not. See Harris (1990a) for a full element-based treatment of these issues. A similar point can be made with respect to the Spanish data in (1); see James Harris (1983) for discussion.

other positions. Although lack of space precludes me from developing this notion fully here, let me mention a few pointers which suggest that this is a potentially fruitful line of inquiry.

The relevant evidence involves the unequal ability of different nuclei to support complex prosodic structures in contiguous constituents. As shown in (32), the two potential configurations in question involve a nucleus preceded either by a branching onset (32a) or by a coda-onset sequence (32b).

(32)



(32a), illustrated in the *tr@* of sequence of <citrus>, contains a two-stage p-licensing path: the nuclear position x3 licenses the onset head position x1 which in turn licenses its complement x2. In (32b), exemplified by *lti* in <guilty>, nuclear x3 inter-constituent-licenses the onset x2 which in turn inter-constituent-licenses its complement x1. (The two configurations can co-occur, as in the *ntri* of <pantry>.)

Of course the occurrence of each of the structures in (32) necessarily depends on the parametric settings required for branching rhymes or onsets. However, even amongst languages possessing the relevant parametric values, there exist systematic differences in the distribution of these configurations in various prosodic contexts.

By way of illustration, compare French, English and southeastern dialects of Brazilian Portuguese, systems which share the following parametric settings: Final Empty Nucleus ON, Branching Onset ON. As shown in (33a), all three languages display branching onsets in tonic syllables.[9]

[9]Thanks to Thaïs da Silva for supplying and discussing the Brazilian Portuguese data.

(33)

(a) Tonic N	(b) Final empty N	(c) Weak N
French		
entrér	vítre	bretélle
bléu	cércle	climát
English		
trée	****	séntry
pláy		placénta
southeastern Brazilian Portuguese		
práto	****	p[ɾ]ateléira
livréto		lív[ɾ]o

Of the three systems, only French shows branching onsets in word-final position (see (33b)). Charette (1992) attributes this difference to a parameter controlling the ability of a final empty nucleus to license a preceding onset head to govern its complement. The parameter thus makes reference to the licensing path that exists in the configuration in (32a). In this sense, the notion is clearly reminiscent of Licensing Inheritance, except in this case it is the p-licensing potential of a position that is at stake rather than its a-licensing potential. In terms of the present proposal, we might say that the onset head position x1 inherits its ability to p-license its complement x2 from its nuclear p-licensor x3.

The asymmetry that emerges from a comparison of (33a) and (33b) apparently reflects an implicational universal. To the best of my knowledge, there is no language that has final branching onsets without also showing them internally before a filled nucleus. This indicates that certain types of nucleus are better p-licensors than others. Specifically, a parametrically licensed empty nucleus has less p-licensing potential at its disposal than an unlicensed nucleus. Extending the comparison to include the forms in (33c), we see that southeastern Brazilian Portuguese, unlike the other two systems, fails to sanction branching onsets in unstressed syllables. This suggests the existence of a yet more general p-licensing asymmetry, namely one involving the difference between licensed nuclei (filled or empty) and unlicensed nuclei. This in turn indicates that the Licensing Inheritance principle might be amended to cover both the autosegmental and prosodic aspects of licensing:

(34)

(Extended) Licensing Inheritance
A licensed position inherits its licensing potential from its licensor.

Further support for this extension comes from Charette's (1992) work on sequences involving the configuration in (32b) in languages which have branching rhymes and final empty nuclei. We might expect all such languages to display final -C.C] clusters, in which the first (coda) position is sanctioned by the branching-rhyme setting and the second (onset) consonant by the final-empty-nucleus setting. However, only a subset of such languages actually permits C.C clusters in final position. French, for example, has both internal and final types, e.g. *rt* in <porter> and <porte>. In Wolof, on the other hand, coda-onset clusters occur internally but not finally, e.g. *dakk@* 'village', but * *dakk*. Once again, we are in all likelihood dealing with an implicational universal, since there appear to be no languages which display C.C clusters finally but not internally. Thus in structure (32b) we find the same kind of asymmetry between unlicensed and licensed nuclei as is evident in (32a). In this case, the ability of a licensed nucleus to transmit to an onset the ability to license a coda is potentially less than that of an unlicensed nucleus.

The remarks in this section are admittedly speculative. It remains to be ascertained whether the extended version of the Licensing Inheritance principle correctly applies to the p-licensing capabilities of positions at all levels of projection. Nevertheless, the parallels between autosegmental and prosodic licensing potential briefly explored here warrant further research.

5 Conclusion

The problem we started out with was that of trying to unify the range of contexts that favour consonantal weakening. The original insight of Vennemann (1972), Kahn (1976) and others was that all of these sites, apparently quite disparate when viewed segmentally, cohere when viewed in terms of syllabic structure. A further contention was that the syllabic context in question could be identified with a single position, the coda. The findings of subsequent research, reviewed in the first part of this paper, have shown that the set of assumptions underlying the latter claim lead up a cul-de-sac. Nevertheless, as is so often the case, the route leading to dissatisfaction with a once promising solution to an old problem does not necessarily take us back to square one. What at first may seem like a retreat in fact turns up the hope of new solutions (to say nothing of new problems).

In the second part of the paper, I have tried to develop an account of weak contexts which builds on some of the very insights that motivate a rejection of the coda view. One such insight involves the principle of licensing, in accordance with which the interpretability of any unit in a representation is dependent on its being fully integrated into phonological structure. Drawing on this principle, I have attempted to provide a formal link between a skeletal position's ability to support melodic material and its place within the prosodic hierarchy. The specific proposal is that this potential is transmitted from unlicensed to licensed positions and is progressively diluted the further from its point of origin it is discharged. The asymmetry that is inherent in this arrangement produces variations in the complexity of melodic units that can appear in various positions. A common feature of the weak consonantal positions is their occurrence at some distance from the source which ultimately licenses their melodic content. The weakening phenomena associated with these contexts are thus a reflection of the diminished complexity of the melodic units that are sustainable in such positions.

Appendix 1: definition of cited elements

Element	Salient property	Independent realisation
[pal]	Palatality	*i/y*
[lab]	Labiality	*u/w*
[cor]	Coronality	*D*
[nse]	Aperiodic energy	*h*
[stp]	Occlusion	*ʔ*
[nas]	Nasality	*ĩ*
[slk]	Slack vocal cords	Low tone

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