SOME CONSTRAINTS ON GOVERNING RELATIONS IN PHONOLOGY

by

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Abstract

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In this thesis I investigate the crucial role played by government in phonology in explaining various processes such as epenthesis, vowel deletion, vowel harmony, consonant assimilation, as well as the syllabification of skeletal points along with their segments into constituents, and the organization of these constituents in the word. It is argued that all these phonological processes are determined by governing relations units contract with each other.

Given that government applies in phonology defining the constraints under which it operates is an integral part of such a research program. The aim of this thesis then, is to analyze different phonological processes in terms of government and to determine what the relevant constraints are. The processes that are considered involve governing relations between nuclei that are adjacent at the level of nuclear projection. I show that in considering branching constituents as governing domains, government within such domains is subject to a special constraint, viz. the Minimality Condition that has been proposed by Chomsky (1986). In addition I demonstrate that only the immediate projection of a given head counts as a barrier to government from the outside.

Another proposal of this thesis concerns the treatment of the alternations between schwa and zero in French in terms of a relation of proper government. From such a perspective, I show that an empty nucleus is realized as zero when it is properly governed by a following nucleus. Proper government is a stronger case of government and is subject to certain additional conditions. Among them are the following: the proper governor must have phonetic content and subject to parametric variation, it can only properly govern one empty governee.

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Résumé

SOME CONSTRAINTS ON GOVERNING RELATIONS IN PHONOLOGY

Cette thèse examine le rôle crucial que joue le gouvernement dans l'explication de différents processus phonologiques tels que l'épenthèse, l'élision vocalique, l'assimilation vocalique et consonantique ainsi que la syllabification des segments et points du squelette dans les constituants syllabiques et l'organisation de ces constituants dans le mot. Il est proposé que chacun de ces phénomènes est régit par les relations de gouvernement qu'entretiennent entre elles, certaines unités.

Mon principal objectif est de découvrir les contraintes auxquelles sont sujettes les relations de gouvernement. Les phénomènes phonologiques considérés sont analysés en termes de relations présentes entre des noyaux adjacents au niveau des projections nucléaires. Suivant la proposition que les constituants branchants sont des domaines de gouvernement, il est proposé que le gouvernement à l'intérieur de ces domaines est sujet à la condition de minimalité proposée pas Chomsky (1986). De plus je démontre que seule la projection immédiate d'une tête est une barrière au gouvernement de l'extérieur.

Les relations de gouvernement entre noyaux ne sont pas restreintes au gouvernement d'un noyau ayant un contenu phonétique. Une autre proposition faite dans cette thèse est d'analyser le comportement de schwa en français en termes d'une relation de gouvernement propre. La representation sous-jacente de schwa étant un noyau vide, je démontre que cette position ne reçoit aucun contenu phonétique si elle est proprement gouvernée par un noyau adjacent. Les différentes propriétés de schwa découlent des conditions qui régissent les relations de gouvernement propre dans la théorie. Un gouverneur propre doit avoir un contenu phonétique, et sujet à des variations paramétriques, ne peut gouverner qu'un seul complément.

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A mon père, disparu beaucoup trop tôt....

et à Jonathan, bien sûr.

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Cette thèse n'aurait jamais vu le jour sans l'aide de Jonathan Kaye et mes directeurs Glyne Piggott et Jean Lowenstamm qui, chacun à sa manière, ont eu une grande influence sur mon travail.

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Ma formation en phonologie n'aurait pas été complète sans Glyne Piggott. C'est lui qui sans relâche, a commenté chaque version de cette thèse en y scrutant l'argumentation dans ses moindres détails. L'apport de ses commentaires judicieux m'a permis de renforcer plusieurs aspects de l'analyse développée dans ce travail. Je lui suis reconnaissante de m'avoir soutenue jusqu'à la fin avec une patience, une rigueur, une générosité et un intérêt constants.

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Pendant la rédaction de cette thèse, j'ai bénéficié d'une bourse d'études doctorales du Conseil de Recherche en Sciences Humaines du Canada numéro 453-87-1030.

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PREFACE

With a few exceptions, linguists have generally assumed that the phonological component is organized along completely different lines from the other components of the grammar. Phonological phenomena were mainly viewed as accidental, language specific, and unprincipled. Whereas some theoretical parallels between syntax and phonology have been drawn (e.g. the role of the cycle in both components and the extensive literature on ordering), there have been few attempts to see if principles of Universal Grammar could be found in phonology as well as in syntax. Increasingly, however, phonology is now being regarded as a system of principles along with parameters, defining the class of human phonological systems. In such a framework there are no rules of the sort: A -> B / C__D.

Along these lines, it is proposed by Anderson & Jones (1974, 1987) that the relations of dependencies that determine how syntactic constituents are organized also determine how segments are grouped together in a given structure. For their part Lowenstamm & Kaye (1982) proposed that a theory of government based on the notion of c-command could account for certain phonological processes such as vowel shortening in closed syllables. S. Anderson (1982) and Levin

(1985) have proposed that X-bar principles govern the representation of syllables. Specifically, they have proposed that the rime and the syllable as a whole are projections of the syllabic head: the nucleus.

Recently, the tendency to formulate phonological explanations in what were exclusively syntactic terms is even more pronounced. Kaye, Lowenstamm and Vergnaud (1985, 1988), henceforth KLV, have proposed that words are constituted of linear sequences of segments and of skeletal points which are syllabified into constituents determined by the governing relation they contract with each other. These syllabic constituents are organized in the word in terms of similar relations of government. The theory of phonological government, in explaining various phonological processes, appeals to certain notions borrowed from syntax, such as the ECP, proper government, governing domains, the projection principle and so forth.

The aim of this thesis is to investigate the constraints to which the governing relations are subject. The first concept to be discussed is that of harmony processes, as defined in terms of a governing relation between two positions. Harmony is characterized as the spreading of an element present in the representation of a

triggering segment (the governor) to its governee. From such a perspective, my first objective is to demonstrate that governing relations between two adjacent positions on a given projection are subject to minimality. More precisely, the failure of long vowels to undergo local harmony processes may be accounted for in terms of a constraint on government preventing an external governor from governing within a governing domain.

The governing relations between nuclei are not restricted to positions which both have phonetic content, nor to harmony processes. It is argued that a vowel which has the special property to alternate with zero has the representation of an empty nucleus whose behaviour is determined by the general principles of phonological theory. This proposal is illustrated in the analysis of a well-known phonological process, viz. the alternation between schwa and zero in French. I aim to demonstrate that the distribution of schwa follows from general principles of the theory. More specifically its properties are determined by the constraints to which the governing relations are subject. In this respect, the analysis proposed for French is not language specific, it may be extended to other languages where similar alternations between a vowel and zero are found.

The thesis is structured as follows:

Chapter One introduces the main lines of the theory of phonological government which will be assumed in the rest of this study.

In chapter Two, I concentrate on governing relations with specific attention to the characterization of governing domains. The relations involve two adjacent nuclei which both have phonetic content. Based on the analysis of umlaut in Korean, vowel deletion in Tangale and ATR harmony in Pulaar, I demonstrate that the failure of long vowels to undergo local harmony processes and vowel deletion may be accounted for by proposing that minimality is also present in phonology. An external governor cannot govern within a governing domain, viz. branching constituent. The choice between the two formulations of the condition proposed by Chomsky (1986) is provided by the analysis of consonant assimilation in Cordoba Spanish. I claim that with respect to minimality in phonology, only the immediate projection of a head counts as a barrier to government from the outside.

The following chapters are devoted to the analysis of schwa in French. After the presentation of the facts in chapter Three, I

consider in chapter Four three previous analyses of schwa. Dell represents the SPE framework, Anderson and Selkirk represent the syllable and the metrical theories, respectively. The problems encountered with previous treatments of schwa lead me to propose an alternative analysis for the behaviour of the vowel.

In chapter Five, I examine the alternation between schwa and zero word-internally. I propose that zero is an instance of an underlying empty nucleus which is properly governed. I show that, in terms of government, the analysis of schwa can be extended to vowel alternation with zero in other languages. The only thing that varies from one language to the other is the phonetic interpretation of the empty nucleus which is not properly governed.

In chapter Six, I explore contexts in which an underlying empty nucleus must be phonetically interpreted. In proposing that a governing consonant must be licensed and that a licenser is a following nucleus with phonetic content, I account for the manifestation of schwa after a consonant cluster.

In chapter Seven, I concentrate on word-final empty nuclei. It is proposed that there is no branching rime in word-final position.

Words end with a nucleus which, subject to parametric variation, may or may not lack phonetic content. The universality of this proposal accounts for the distinction between languages where words always end with a vowel and those where words can phonetically end with a consonant. Moreover, languages which allow word-final empty nuclei differ as to whether a final empty nucleus may or may not be the licenser of a preceding governing consonant. This second parameter distinguishes languages like French and English from others like Wolof and Pulaar. While in English and French words can phonetically end with a consonant cluster, such final clusters are not allowed in Wolof and Pulaar.

In chapter Eight, it is proposed that the behaviour of the final empty nucleus of the first term of a compound is determined by stress assignment. The analysis of compounds extended to phrases accounts for the similarity between compounds and phrases in certain dialects of French.

In chapter Nine, I argue against the proposal that schwa is realized as ɛ in closed syllables. As an alternative analysis, it is proposed that ɛ is the manifestation of an ungoverned empty nucleus occurring in an accentuated syllable.

Finally in chapter Ten, different other contexts in which schwa either alternates or fails to alternate with zero are examined. While some of the facts follow from the analysis, e.g. the behaviour of schwa in sequences of clitics, a complete understanding of some other facts would required further investigation.

CHAPTER ONE

A THEORY OF GOVERNMENT IN PHONOLOGY

1.0 Introduction

Since this thesis lies within the framework of the theory of phonological government, in this first chapter I present the main lines of this theory proposed by Kaye, Lowenstamm & Vergnaud (1985, 1988). In addition to presenting the idea behind government in phonology I give a fairly detailed picture of all the aspects and properties of this theory.

1.1 The principle of prosodic government

It appears that the proposal that relations of government may also be present in phonology, was first suggested by Lowenstamm & Kaye (henceforth L&K) (1982) in their proposal of the 'Principle of Prosodic Government'.[1] As argued by L&K, processes of vowel shortening in closed syllables are found in so many languages that they

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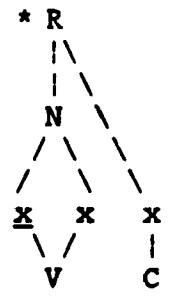
[1] See also Lowenstamm (to appear).

cannot be either accidental or language-specific. This phonological process should follow from general principles of the theory of phonology. To capture the universal property of vowel shortening in closed syllables it is proposed that within the rime, the head (defined as the leftmost nuclear skeletal point) must govern all the skeletal points within its domain, i.e. the rime. Government is based on the following notion of c-command proposed by Reinhart (1983:18).

(1) Node α c(onstituent)-commands node β iff the branching node most immediately dominating α also dominates β.

The configuration of a branching nucleus within a branching rime is excluded because in such a configuration, the branching nucleus has the effect of blocking the c-command of the rimal complement by the nuclear head.

(2)



The first branching node dominating the head is N, and N does not dominate the rimal complement. Given that the nuclear head must c-command all the skeletal points within the rime, it follows that a branching nucleus cannot occur within a rime which is also branching.[2]

The principle of Prosodic Government in addition to explaining why long vowels systematically shorten in closed syllables provides an account as to how skeletal points are organized within the rime. There is a nuclear head which must be strictly adjacent to its complement.

The principle of prosodic government is, along with a number of proposals regarding the organization of stress systems, among the first attempts at deriving phonological phenomena from universal constraints on the organization of skeletal positions. There are, however, many apparent counter-examples to the principle. For example vowel shortening seems to be systematically violated in word-final

[2]We will see that c-command is no longer needed as a condition on government. It is now replaced by the locality requirement between a constituent head and its complement. If the leftmost nuclear point must be strictly adjacent to all skeletal points within its domain, it follows that a branching nucleus cannot occur within a rime which is also branching.

position in some languages. According to the theory if a long vowel fails to shorten in what appears to be a closed syllable, it is because the following consonant is not syllabified into the rime along with the branching nucleus. Interestingly many apparent violations of vowel shortening in closed syllables are found in word-final position, exactly where it is claimed, for independent reasons, that some languages have an extrametrical position.[3] Prosodic Government was then the first step towards a theory which derives syllabification of skeletal points and segments in terms of constraints on the relations they contract with each other. It remained to discover how segments and skeletal points are syllabified into constituents and how constituents are grouped together within a domain such as the word. Providing an answer to these questions on syllabification falls within the scope of the theory of phonological government.

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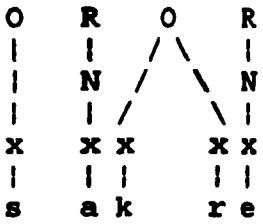
[3] Following the spirit of Halle & Vergnaud (1980), I proposed in Charette (1985) that languages in which vowel shortening is systematically violated in word-final position have a word-final appendix. With respect to word-internal positions, it appears that a long vowel always shortens in closed syllables. I will show in the thesis that what appears to be a closed syllable at the surface level should not always be analyzed as such phonologically.

1.2 Phonological government

Except in the frameworks of Dependency Phonology (cf. Anderson and Ewen (1987)) and Phonological Government (cf. Kaye, Lowenstamm & Vergnaud, (1985), (1988)), words are viewed as sequences of syllables. Such a conception of the internal structure of words raises problems. Consider for example the French word sacrer 'to swear'. If words are indeed constituted of sequences of syllables, the syllabification of sacrer should be ambiguous. Since sac 'bag', sa 'her', crée 'creates' and ré 'musical note D' are all well-formed syllables in French, sacrer should have two possible syllabifications, namely sa-kre or sak-re.

(3) a.



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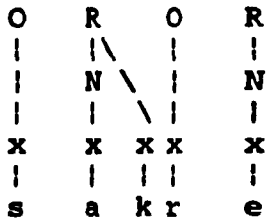

The fact is that the word sacrer has only one possible syllabification, viz. (3a).[4] That the sequence stop plus liquid does not have

[4]Aware of these problems, phonologists propose constraints on syllabification. This point will be considered shortly.

the structure given in (3b), in languages which have both branching onsets and branching rimes, can be fully justified.[5] Stress assignment, the distribution of long vowels and heavy diphthongs in Québec French are among many processes which clearly show that the sequence vowel-stop before a liquid never constitutes a closed syllable. Preceding a cluster stop plus liquid, a vowel always behaves like one in an open syllable. If the order of the two consonants is reversed, the preceding vowel now behaves like a constituent of a branching rime. As an example, let us consider stress assignment in English.

1.2.1 Stress assignment in English

Without going into a detailed analysis of stress assignment in English, it is clear that stress is sensitive to the branching of the rime. Let us take words containing three syllables. Stress falls on the penultimate syllable if it is closed. If the penultimate syllable is open, it is the initial syllable which is accentuated. The following examples show that the sequence vowel-liquid-stop counts as a closed syllable, while the sequence vowel-stop-liquid counts as an

[5] In fact we will see that government claims that (3b) is universally ill-formed. Even in languages which have branching rimes but non-branching onsets, the theory claims that the sequence stop plus liquid never constitutes a transsyllabic cluster.

open one.

(4) Vowel - stop - liquid		Vowel - liquid - stop	
álgebra	* algébra	recórder	* récorder
rétrograde	* retrógrade	resúltant	* résultant

As a second motivation for the difference in syllabification of a stop plus liquid and a liquid plus stop cluster, let us consider the distribution of long vowels in Québec French.

1.2.2 Long vowels and heavy diphthongs in Québec French

Unlike standard French, Québec French has long vowels and heavy diphthongs.[6] While a long vowel or heavy diphthong systematically shortens before a cluster liquid plus stop, it remains long before a cluster of the type stop plus liquid.[7] This is illustrated in (5).

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[6] See Dumas (1981) for an analysis of heavy diphthongs in Québec French.

[7] Shortening is systematically violated in word-final position before a single consonant. We will see later in the thesis that I consider that French has no branching rimes in word-final position.

(5) A. Before a cluster liquid plus stop

mort	[mɔ:r]	'dead'	morte	[mɔrt]	*[mɔ:rt]	'dead (fem)'
	[maᵘr]		mortuaire	[mɔrtüɛr]	*[mɔ:rtüɛr]	'mortuary'
vert	[vɛ:r]	'green'	verte	[vɛrt]	*[vɛ:rt]	'green (fem)'
	[vaⁱr]		verdure	[vɛrdür]	*[vɛ:rdür]	'greenness'
fort	[fɔ:r]	'strong'	forte	[fɔrt]	*[fɔ:rt]	'strong (fem)'
	[faᵘr]		fortement	[fɔrtamã]	*[fɔ:rtamã]	'strongly'

B. Before a cluster stop plus liquid

pauvre	[po:vr]	'poor'	pauvrement	[po:vramã]	'poorly'
maigre	[mɛ:gr]	'thin'	maigrement	[mɛ:gramã]	'meagerly'

Assuming that a branching nucleus cannot occur within a rime which is also branching, the distribution of long vowels and heavy diphthongs in Québec French motivates that a sequence stop plus liquid does not constitute a transsyllabic cluster.

Let us now consider what the theory of government proposes as principles of syllabification.

1.2.3 Government as the motor deriving syllabification

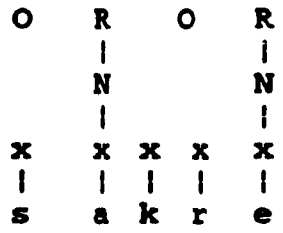
Suppose that words are not constituted of sequences of syll ables, but rather that they are formed of sequences onset-rime, those constituents being stitched together on both sides in terms of governing relations. In addition, skeletal points along with their segments are syllabified into constituents by similar governing relations they contract with each other. This means that the theory of government assumes that skeletal points are organized and associated to constituents in terms of governing relations they contract with each other.

Consequently, it is not the case that the governing relations skeletal points contract with each other are determined from their syllabification into constituents. Indeed syllabification proceeds from government, not vice versa. This raises the question as to how governing relations are defined. Let me present the theory in reconsidering the French word sacrer.

Let us suppose that the lexical representation of a word is as follows. At the segmental level the word is a linear sequence of segments. At the skeletal level it is a linear sequence of skelétal

points which are associated to the segments. Then I propose that nuclear points along with their vocalic segments are lexically associated to a constituent nucleus. Since a nucleus is always preceded by an onset, at the syllabic level there is a linear sequence of constituents onset-rime. The lexical representation I assume for the word sacrer is illustrated in (6).

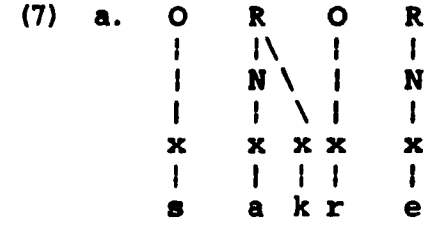
(6)



From the information present in the lexical representation, all the points along with their segments are projected to constituents which will be grouped together to form a word. What needs to be determined is how points and segments are syllabified. Concerning the first two segments or positions of the word sacrer there is no possible ambiguity in their syllabification. The non-nuclear point dominating the s may only be syllabified in the onset to the left of the nucleus. What is less transparent is how the word-internal cluster kr is syllabified. At the segmental and the skeletal levels the syllabification of the two consonants or non-nuclear points might appear

to be potentially ambiguous. Since the two members of the sequence are of the same nature, viz. non-nuclear points, both the rime and the onset are available constituents. One possibility to be considered is that the first consonant occupies the rimal position and the second one the following onset. It might also be the case that both consonants are sisters within a branching onset, and finally the two segments may be sisters within a branching coda. These alternatives are summarized in (7).

(7) a.



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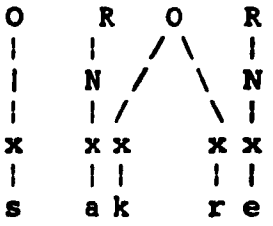
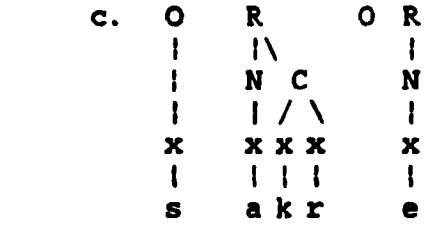


c.



The fact is, for reasons given above, that the syllabification of the sequence s.a.k.r.e is not ambiguous. The only possible syllabification is one where the two consonants are sisters within a branching

onset, namely sa-kre in (7b).

Now let us examine another French word, partir 'to leave'. Once again since we have an internal cluster of consonants their syllabification might be potentially ambiguous. Are both consonants sisters within an onset as in sacrer? Do they constitute a transsyllabic cluster where the liquid is in the rime and the stop in the following onset? The answer is that the only possible syllabification is one of a branching rime followed by an onset dominating the stop i.e., par-tir, as shown above.

Among other things the theory of government seeks to explain why in all languages which have both branching onsets and branching rimes, a consonant cluster of the type stop plus liquid always forms a branching onset and a cluster liquid plus stop a branching rime followed by an onset. These facts are well known and various proposals have been made to account for the absence of structures like (7a). These proposals either claim that when there is a choice in the syllabification of two consonants or non-nuclear points, we select a syllabification that maximizes the onset position (a sequence liquid plus stop is not considered a possible onset), or that only sonorants

can be syllabified within a rime.[8] According to the principle of Maximization of onset, a word like sacrer has the structure of an open rime followed by a branching onset (cf. (7b).

As we will see below, government is inconsistent with a maximal onset approach. This latter proposal encounters problems in languages which have branching rimes but no branching onsets. In those languages, a maximal onset approach will syllabify a sequence stop plus liquid in a rime followed by an onset. According to government such a syllabification is universally impossible as we will see below. Hence, a maximal onset approach would claim that the structure in (8) is well-formed in languages that have branching rimes but no branching onsets.[9] In the framework of the theory of government, this structure is claimed to be universally ill-formed.[10]

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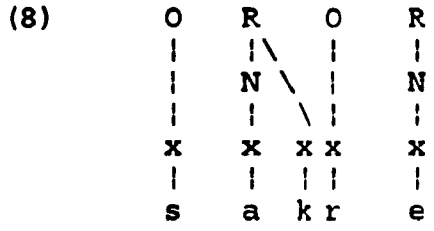
[8] See Kahn (1976), Kiparsky (1979), Steriade (1982), Angoujard (1988) to name but a few. See also Lowenstamm (1981) who argues against a Maximal Onset Approach.

[9] Kiparsky (1979) claims that structures like the one given in (8) is required in Finnish and Sanskrit. He gives no evidence or arguments.

[10] The theory of government does not claim that in languages which have branching rimes but no branching onsets sequences of the type stop plus liquid are not found. We will see later in this chapter that while nothing in the theory prevents those sequences from occurring they cannot be analyzed as underlying transsyllabic clusters. Moroccan Arabic is one language which has branching rimes but no

(8)



Let us consider what the theory of government proposes as principles of syllabification.

In terms of government the syllabification of segments and the organization of constituents within the word is derived from general principles of the phonological theory. To this end it is crucial to adopt a theory of the representation of segments which among other things attributes to all segments a charm value.[11] Very roughly

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branching onsets. In this language sequences of the type stop plus liquid can be found. That these clusters do not constitute a trans-syllabic cluster is motivated by both the appearance of a vowel between the two consonants under certain circumstances and by stress assignment. In M.A. stress is sensitive to the branching of the rimes. A vowel preceding a cluster liquid plus stop is accentuated. However, before a cluster stop plus liquid a vowel is never accentuated. It then seems clear that the members of a cluster stop plus liquid are not syllabified in a rime followed by an onset. See Elmejjad (1985) for an analysis of stress in M.A.

[11]The reader is referred to KLV (1985, 1988) and Bamba (in preparation) for a discussion on the representation of segments. A presentation of these aspects of the theory would lead me far beyond the scope of this section. In chapter two, I will briefly consider the representation of certain vowels.

speaking, charm is a property of elements which defines their combinatorial possibilities. Positive charm represents the property of 'voweliness', negative charm the one of 'consonantiness'. A segment which is characterized by neither one nor the other property is called neutral, i.e. charmless. Nuclear governors have positive charm; non-nuclear governors have negative charm and governees have neutral charm. The charm value attributed to a segment is crucial since it determines, among other things, how adjacent skeletal points are syllabified.[12] As a rough approximation, stops and non-strident fricatives are negatively charmed and all other consonants are charmless. Given this characterization of segments, the theory claims the following: charmed segments are governors and charmless segments are governees. The syllabification of adjacent segments is determined from the governing relation they contract with each other. A govern-

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[12]Given that the charm value of segments determines what is a governor and a governee, one may consider charm as being another way of expressing the sonority hierarchy. But from what I mentioned above, this conception of charm cannot be maintained. Before all, charm determines how elements, which constitute a segment, can combine with each other. Given that the charm value of elements is crucial with respect to the internal representation of segments, one cannot say that charm has as its only objective the one of capturing sonority. Note also that the charm value of a segment is determined by a calculus of the charm value of the elements which constitute this segment. Charm is then not attributed to segments in an arbitrary way. It is not sufficient to say that a liquid is neutral and a stop is negatively charmed. See KLV (1985, 1988) and Bamba (to appear).

ing relation between adjacent skeletal points is not optional. Two adjacent points always contract a governing relation. There are two principal types of governing relations: syllabic and transsyllabic (interconstituent) governing relations.

1.2.3.1 Syllabic government

Syllabic government determines what constitutes a well-formed branching constituent. To be sisters within a constituent, two adjacent skeletal points must be in a governing relation which is characterized as follows:

1. Syllabic government is directional: the head is initial
2. Syllabic government is strictly local: the governor must be strictly adjacent to the governee.

From these two conditions, it follows that a branching constituent is maximally binary and that it constitutes a governing domain where the head governs a complement from left-to-right.

That constituents are maximally binary follows from both conditions. Suppose that an onset dominates three skeletal points.

(9)

This configuration would violate either the directionality of government or the locality requirement between the head and its complement. In such a ternary branching onset if the head is initial, it would not be adjacent to both its complements, violating locality (the situation would be identical if the head were final). This is illustrated in (10). In (10a) the head of a ternary branching onset is initial and it cannot govern the rightmost point without violating strict adjacency. In (10b) the head of the onset is final, once again violating adjacency in governing the leftmost point.

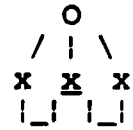
(10) a.

b.

In order to respect locality the head of a ternary branching constituent must be situated between its complements. But this would violate directionality. In medial position the head will govern from right-to-left the preceding complement and from left-to-right the

following one.

(11)



Consequently according to the two conditions just mentioned, a branching constituent is maximally binary.

Now, consider what is a governor and what is a governee. Recall that the theory claims that governors are charmed segments and that governees are charmless ones. Since a stop consonant is negatively charmed, it is a potential governor.[13] In contrast, a liquid being charmless, it is a potential governee.[14] In the French word sacrer

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[13] I use the term potential governor and governee to indicate that it is not because a segment is negatively charmed or charmless that it is necessarily a governor or a governee. We will see shortly that in a word like auto 'car' for example, even though the stop is a negatively charmed segment, it does not govern a complement.

[14] I am aware that one may find counterexamples to the claim that a charmless consonant cannot govern a negatively charmed one. For example, it has been pointed out to me that Russian, which permits initial clusters such as rt and rv, may be problematic for the theory. In such circumstances, there are two possibilities: the violation of the theory is real or apparent.The only way to find out is by careful analysis of the relevant data. Thus, it may well be the case that a given consonant cluster violates government but only at the phonetic level, since structurally the two consonants are separated from each

the internal cluster is one where the stop precedes the liquid, that is, where the governor precedes the governee. Given that two adjacent skeletal points are always in a governing relation, it follows from government that the only possible internal syllabification for the two consonants is one where the two segments are sisters within a branching onset. Syllabified in an onset, the two conditions of syllabic government are met: the two consonants are strictly adjacent and the governing consonant, the stop, precedes the governee.

Under syllabic government every branching constituent is a governing domain and in order to be a governing domain the two conditions on directionality and locality must be respected.

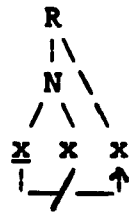
---

other by an empty nucleus. Alternatively, one may find evidence that in a word such as rta the resonant is under a preceding rime (preceded by an empty nucleus) and followed by a non-branching onset. Government requires us not to restrict our attention to the phonetic level. Only a careful analysis of the data will tell us if they do or do not constitute a violation of the theory. In this thesis I discuss the absence of governing relations between consonants. I consider cases where at the phonetic level, sequences of consonants seem to violate syllabic or transsyllabic government, and give clear evidence that the two consonants are separated from each other by an empty nucleus. Along these lines see also KLV (1988) and Kaye (1988a).

(12) Governing domains: a.  b.  c. 

(where X indicates the head)

In either a well-formed branching onset, nucleus or rime, the head is initial and adjacent to its complement. Note here that strict locality requirement captures the impossibility of having a branching nucleus within a branching rime.

(13) * 

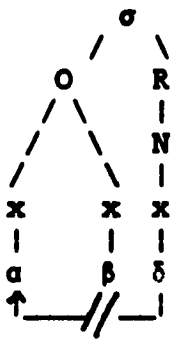
It is important to notice that the head of the rime is not the nucleus itself, but the nuclear point. In this theory a relation of government is a relation between skeletal points. In other words, heads and complements (governors and governees) are skeletal points and not constituents. Skeletal points receive their properties of governor/governee from the segments. It is not claimed that a syllabic constituent must constitute the domain of a governing

relation. A constituent can dominate a head and its governee (e.g. branching constituent), only the head (e.g. non-branching) or can even be empty.

In the theory of government the syllable is not recognized as a constituent of a word. What is generally assumed to be a syllable is a sequence of onset-rime. Note that if there were a constituent syllable, given syllabic government which says that the head is initial, the onset would be considered the head of the syllable, an undesirable result.

In order for the nucleus to be the head of the syllable, it would force relaxing directionality. This move would clearly be ad hoc as the syllable would be the only constituent within which government flows from right to left. Moreover, syllabic government also requiring strict adjacency between the head and its complement, it would also force relaxing the strict adjacency requirement between the nuclear head and its complement onset in cases where the onset branches. This is illustrated in (14).

(14)



In addition we will see in the next section that the rime is in a governing relation with a preceding onset. Grouping these two constituents in a constituent syllable would lead to a redundancy between transsyllabic government and the grouping of the two constituents in a syllable. The reader will also have noticed the absence of a constituent Coda. Given that there is no evidence for the presence of a constituent Coda, this constituent is eliminated. The rimal non-nuclear point is now considered the complement of the rime.[15]

Syllabic government determines what constitutes a well-formed branching constituent. It remains to consider the principles that determine the syllabification of adjacent skeletal points that do not

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[15] See KLV (1988) for a discussion on the absence of evidence for the presence of a Coda.

meet the conditions of syllabic government.

1.2.3.2 Transsyllabic government

The fact that two skeletal points do not meet the conditions on syllabic government, viz. when the potential governor follows the potential governee, does not mean that no governing relation exists between those two contiguous skeletal positions. The governing relation between adjacent points which cannot be analyzed as a branching constituent, may be one of a relation of interconstituent government. Hence, according to the theory, a governing relation is present between any two adjacent points. With respect to transsyllabic clusters, government flows in the opposite direction of syllabic government. A sequence of skeletal points is a well-formed transsyllabic cluster if the following conditions are met:

Transsyllabic government:

1. Strictly local: the governor and the governee must be strictly adjacent
2. Strictly directional: the head is final.

Whereas the internal consonant cluster in sacrer cannot constitute a transsyllabic cluster because the governor precedes the governee, the one in partir respects the two conditions of transsyllabic government. The two segments are adjacent and the governor follows the governee. Consequently from governing relations just defined, the only possible syllabification of sacrer and partir are respectively sa.kre and par.tir. Transsyllabic government is the mirror image of syllabic government. Reversing the order of the segments of a well-formed branching onset gives a well-formed transsyllabic cluster.[16]

It should now be clear that government differs from a maximal onset approach. In languages which have branching rimes but no branching onsets, "sequences" stop plus liquid can be found. According to a maximal onset approach, in those languages a word like sacrer would be formed of a branching rime followed by a non-branching onset.

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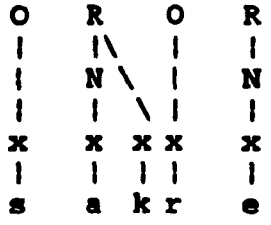
[16] As to why, on the other hand, reversing the segments of a well-formed transsyllabic cluster does not always give a well-formed branching onset, see KLV (1988) for discussion.

(15)

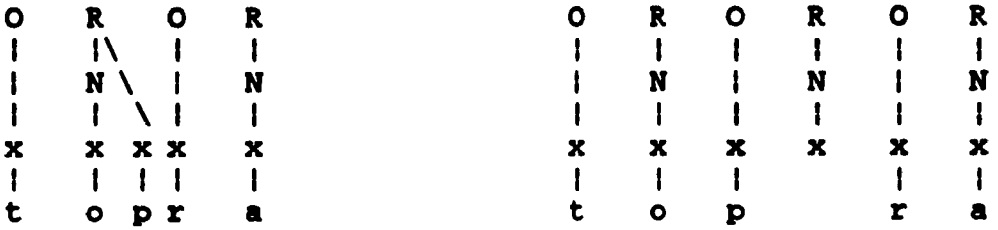


However, the theory of government claims that such a syllabification is universally ill-formed. Even in languages which do not have branching onset, a sequence stop plus liquid cannot form a transsyllabic cluster where the stop is in the rime and the liquid in the following onset. Such a syllabification violates the conditions on transsyllabic government. Since the head (the stop) precedes the complement (the liquid), the two consonants cannot be in a transsyllabic governing relation. In languages that do not have branching onsets, the two consonants must be syllabified in constituents that are not in a governing relation. The only possible syllabification is one where the two consonants belong to distinct onsets separated from each other by an empty nucleus.[17] The contrast between the two ap-

[17] Kaye (1988a) showed that in Moroccan Arabic, which has branching rimes but no branching onsets, sequences of the type stop plus liquid are found on the surface. He claims that the two consonants belong to distinct onsets and that a nucleus intervenes between them. As predicted by this proposal, under certain circumstances a vowel appears exactly in the position Kaye claims that there is a nucleus.

proaches for languages which do not have branching onset is illustrated in (16).

(16) A maximal onset approach: Government:



Under government, nothing prevents a sequence stop plus liquid from being found in languages where rimes branch and onsets do not. However, the theory claims that even though the two consonants are phonetically adjacent, they cannot be in a governing relation. In the lexical representation a nucleus intervenes between the two consonants and they can only be syllabified in distinct constituents that do not contract a governing relation. More specifically, the two segments must be syllabified in distinct onsets. The nucleus which intervenes between the two non-nuclear points prevents a relation from holding between them.[18]

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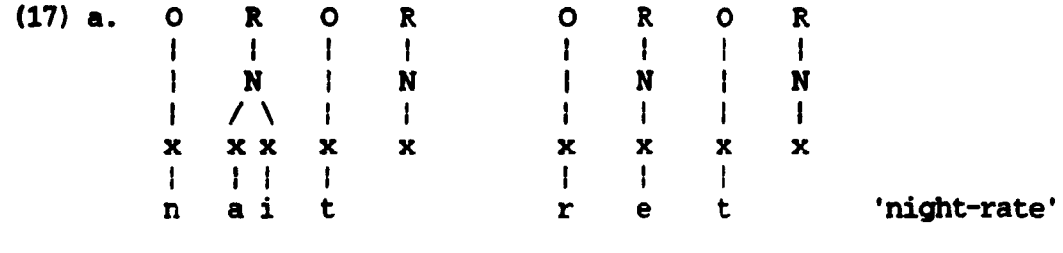
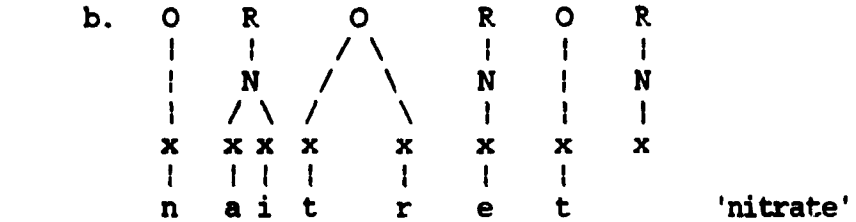
[18] Constraints on empty nuclei will be considered in detail in the analysis of schwa. It is not the case that empty nuclei are posited when governing relations are violated at the surface level. I will demonstrate that empty nuclei are subject to specific con-

Note also that in languages that have branching onsets, the members of a sequence stop plus liquid can belong to distinct constituents if they belong to different cyclic domains. This is the case for words like night-rate for example. Interestingly the two words nitrate and night-rate differ phonetically with respect to the pronunciation of the stop. It is clear that in night-rate the t of night is pronounced like a word-final segment, whereas the first t of nitrate is not.

(17) a.



b.



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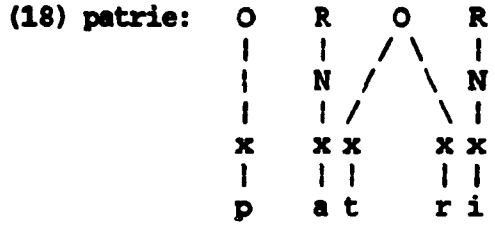
straints and that in a position where it is claimed that there is an empty nucleus, it is generally possible to find contexts where the nucleus is manifested.

Along the same lines I claim that in languages which have both branching onsets and branching rimes, nothing forces a sequence stop plus liquid, or liquid plus stop (phonetically adjacent) to be syllabified as a branching onset or a branching rime followed by an onset, respectively. Let us for example consider the words patrie [patri] 'native land' and poterie [pɔtri] 'pottery'. While these two words are phonetically identical (except for the leftmost vowel) I claim that they have a different lexical representation. In patrie the two non-nuclear points are strictly adjacent and in poterie a nuclear point (empty nucleus) intervenes between them. This is justified by the fact that it is possible to realize poterie as [potəri] while such a pronunciation is impossible for patrie *[patəri]. Consequently, I assume that some languages allow nuclei with no phonetic content in the lexical representation of particular words. That in the same language a given word contains an empty nucleus and another phonetically very similar word one does not, is lexically determined and does not follow from constraints on governing relations.[19]

[19] I will present a detailed discussion of this proposal in my analysis of schwa.

(18) patrie:



poterie:

To this point phonological government determines why adjacent skeletal points are syllabified the way they are. Government is a principle of phonological theory. The claim is that in any language which has both branching rimes and onsets, the members of a sequence of underlyingly adjacent stop plus liquid are always both projected to an onset and reversing the order of the segments always gives a governing relation driving to the structure of a rimal complement followed by an onset.

Transsyllabic or interconstituent government is not restricted to the relation a rimal complement contracts with a following onset. As mentioned earlier, a governing relation holds between any two

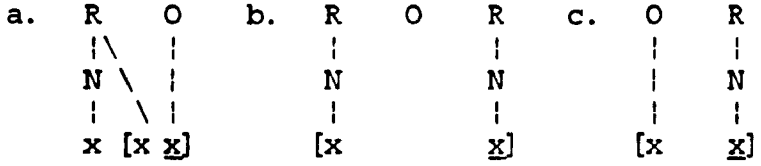
adjacent skeletal points. Here the following two principles are proposed:

(19) a. Only the head of a constituent can govern.

b. Only the nuclear head may govern a constituent head.[20]

According to the two principles given in (19), interconstituent governing relations are reduced to three configurations.

(20) Interconstituent governing domains: (the governors are underlined)



Let us first consider (20a&b). In (20a) we have a sequence of skeletal positions which are respectively associated to a rime and a following onset. According to the theory there is always a governing

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[20] This can de derived from the properties of the nucleus. It is the head of the sequence onset-rime, the only constituent that can occur as the unique member of a word, the only constituent to which a skeletal point is lexically associated, the only constituent whose head can govern regardless of its charm value.

relation between an onset and a preceding rimal complement. A negatively charmed segment in the onset transsyllabically governs a charmless complement in the preceding rime.

Let us now consider (20b). As in (20a) there is a sequence of adjacent skeletal points of the same nature. More precisely we have a sequence of two adjacent nuclear positions (the intervening onset is empty, it does not dominate any skeletal point). Since the two positions are syllabified into distinct nuclei but are adjacent at both the skeletal and segmental level there is an interconstituent governing relation holding between them. The head is final and governs the nucleus to its left. Interconstituent governing relations between adjacent nuclear points is principally designed to explain constraints on vowel sequences in some languages. Among other things, it captures the fact that when two nuclear points are adjacent, either the leftmost vowel is deleted or harmonized to its governor. These two situations are illustrated in (21). While in Vata a vowel is harmonized to an adjacent following vowel, in French the first vowel in a sequence of two adjacent vocalic segments is syncopated.

(21) Vata (Data from Kaye (1982))

là ɔ́ nɔ́	--->	[lɔ̀ ɔ́ nɔ́]	'call his mother'
call his mother			
ɔ́ pá Í	--->	[ɔ̀ pÍ Í]	'he throws them'
he throw them			
ń lɛ̃ ɔ́	--->	[ǹ lɔ̀ ɔ́]	'I eat him'

French

la ami	---> [lami]	'the friend'
la école	---> [lekɔl]	'the school'
le ours	---> [lurs]	'the bear'

Now let us consider (20c). Here we have a sequence of an onset followed by a rime. According to the theory, a transsyllabic governing relation between a nucleus an a preceding onset is always present. (Government between a nuclear head and a preceding onset always holds whatsoever the charm value of the segments). It is from this relation a nucleus contracts with a preceding onset that the two constituents are grouped together in a domain which is generally called the syllable. This means that a nucleus transsyllabically governs a preceding onset and an onset transsyllabically governs a preceding rimal complement if the preceding rime branches.[21]

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[21] Since I reject the idea that the syllable is a constituent, the term transsyllabic should be construed as a heuristic device.

1.2.3.3 Government by projection

Syllabic and transsyllabic government involve governing relations between skeletal points which are adjacent at the skeletal level. Consequently the segments and constituents involved in these relations of government are always adjacent at their respective levels. Syllabic and transsyllabic government are not, however, the only types of governing relations. Bearing in mind that the theory of government seeks to derive phonological processes from government, the theory must allow government between constituents which are not adjacent at every level. This third type of government is similar to transsyllabic government since it involves relations between constituents. Because only the nucleus can govern another constituent head, this type of government is restricted to governing relations between nuclei. In other words the theory proposes a another type of government which involves nuclei which are not adjacent at every level, but which are adjacent at a level called the level of nuclear projection. Government by projection is principally needed to account for vowel harmony and stress assignment. It allows two nuclear positions which are separated from each other by a non-nuclear point to be in a governing relation. This third type of government is the one which will be involved in various phenomena investigated in the

chapters to follow

Following is a summary of the principal characteristics and principles of governing relations.

(22) Phonological government:

Governing relations must have the following properties:

1. Syllabic government: the head is initial and government is strictly local.
2. Transsyllabic (interconstituent) government: the head is final and government is strictly local.

Government is subject to the following principles:

1. Only the head of a constituent may govern.
2. Only the nuclear head may govern a constituent head.

CHAPTER TWO

THE MINIMALITY CONDITION

2.0 Introduction

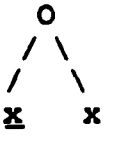
In this second chapter I consider phonological phenomena which are instances of governing relations applying at the level of nuclear projection. The relations involve nuclei both of which having a phonetic content. I show that when a potential governee is contained within a governing domain, e.g. a branching nucleus, it cannot be governed from outside its domain. I suggest that the reason why an external governor cannot govern within a governing domain is because government is subject to the Minimality Condition.

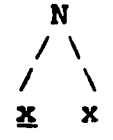
The chapter is organized as follows: After a brief review of what constitutes a governing domain in KLV's theory of phonological government, I present the Minimality Condition proposed by Chomsky (1986). Then, it is argued that the failure of long vowels to undergo umlaut in Korean, ATR harmony in Pulaar and vowel deletion in Tangale may be accounted for by proposing that phonological government is subject to the condition of Minimality. In addition to providing good

support for the Minimality Condition in phonology, the analysis of consonant assimilation in Costeño Spanish leads to the conclusion that if minimality is present in phonology, only the immediate projection of a head counts as a barrier to external government.

2.1 Governing domains

KLV claim that within a branching constituent there is a relation of government between the head and its complement. The head is initial and government is local. In a branching onset, a branching nucleus or a branching rime, the head governs its complement from left-to-right.

(1) a. 

b. 

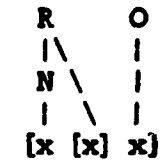
c. 

(heads are underlined)

It is also claimed that there is a transsyllabic relation of government between adjacent skeletal points which do not belong to the same constituent. Transsyllabic government is local and the head is final. It follows that in the structure given in (2) the rimal complement is

governed by the nuclear head within the rime and it is also governed from outside the rime by the following onset.

(2)



In this chapter I try to demonstrate that in opting for the narrower formulation of the Minimality Condition as proposed by Chomsky (e.g. in tems of the immediate projection of a head), we predict exactly this double government of the rimal complement. In addition, in accordance with the facts, the chosen formulation predicts that unlike the rimal complement, the other complements (within branching nuclei and onsets) can never be governed by two distinct governors. I differ from KLV and consider that the "rimal complement" is not a complement of the rime, but rather its specifier.[1]

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[1] In considering the rimal complement the Specifier of the rime we have a better understanding as why this position is in relation with both a nucleus and a following onset. While complements may only be governed by their head a specifier is, as in syntax, doubly governed.

Now that a brief review of what is a governing domain has been presented, we can concentrate on the notions of government and governing domains. Before asking the question of whether government in phonology is subject to the minimality constraints, let us first consider carefully the Minimality Condition as proposed by Chomsky (1986).

2.2 The Minimality Condition

The idea that some governing domains resist government by a remote governor was first suggested by Reuland (1983). In order to block certain undesirable relations of government, Reuland suggested that governor and governee must be in the same governing domain. Reuland's restrictions on government make some domains inaccessible to government by an external governor.

For different reasons, but along the same lines, Chomsky (1986) has proposed certain constraints on relations of government. In some cases, in spite of the fact that no barriers defined for movement intervene between a potential governor and a governee, he seeks to prevent a governing relation from holding between these two. To this end, since he cannot appeal to the notion of barrier defined for movement

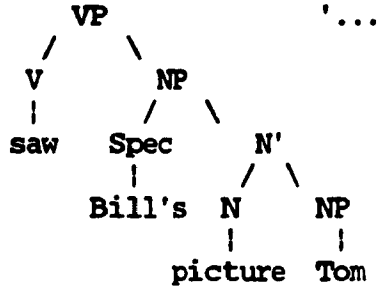
he proposes to extend the concept of barrier for the theory of government (but not for the theory of movement). Specifically, he proposes that government is subject to a specific constraint: the Minimality Condition. Under minimality, a projection which would not be considered a barrier to government, is able to block government from the outside. Roughly speaking, minimality prevents a relation of government between a governor and a governee when there is a nearer governor that intervenes between them. The relevant constructions motivating both minimality and its appropriate formulation are complex. Going into a detailed presentation of Chomsky's arguments would lead me far beyond the scope of this chapter. I have decided then, not to go into a detailed analysis of minimality in syntax.

I believe that the easiest way to introduce minimality is by considering the structure of a complex NP.[2] Let us then consider the complex NP given in (3).

---

[2] I am aware of the fact that I illustrate minimality by means of a construction which does not empirically motivate the relevance of minimality for syntactic government. This means that in considering a complex NP such as Bill's picture of Tom, the reader must understand that I am choosing this structure exclusively because it represents a perfect 'tool' for applying the condition.

(3)



'... saw Bill's picture of Tom'

Within the NP, there is a head picture which governs the Spec and the NP complement. The question is whether the verb can or cannot govern within this complex NP. Since no barriers (defined for movement) intervene between the verb and the potential governees, it should be possible for the verb to doubly govern the Spec and the complement of the NP. In order to prevent the undesirable governing relation between the verb and the NP complement, Chomsky proposes the following condition.

(4) The Minimality Condition (Barriers p.42)

In the configuration $\ldots\alpha\ldots[_{\tau}\ \ldots\delta\ldots\beta\ldots]$

A. α does not govern β in (4) if τ is a projection of δ excluding α

OR

B. α does not govern β in (4) if τ is the immediate projection of δ excluding α

The condition says that an external governor (α) does not govern a given governee (β) if β occurs within a projection of a head (δ), such a projection dominating β and excluding α. In other words, a projection of a head blocks government from the outside. Chomsky proposes two formulations of the condition. In (4A), it is said that any projection of a head acts as a barrier to government. Under definition (4B) it is claimed that only the immediate projection of a head can be a barrier to government. As we will see, the two formulations have different consequences with regard to government of the Spec of τ from outside of τ. Government (from outside) of the Spec of τ will be blocked under formulation A, but will be possible under B. Let us reconsider the complex NP given in (3) since it represents the configuration where minimality is said to apply.

The question is whether the verb can govern within the NP. We know that within the NP there is already the head picture that governs both its complement and the Spec. Can these two be doubly governed by the verb? Let us first consider government of the NP complement from outside the NP. First let us take formulation A.

Under A, τ is any projection of the head picture. That is, τ can either be NP or N'. No matter which projection one chooses, the result is that the NP complement would not be governed by the verb. Both NP and N' are projections of the head picture, they both dominate the NP complement and they also both exclude the verb. In other words they are both considered to be barriers under formulation A of minimality. Consequently, formulation A of minimality guarantees the uniqueness of government of a complement of a head. Uniqueness of government of the complement is also guaranteed under definition B. Under definition B, τ is N', the immediate projection of the head. Because N' dominates the complement and excludes the verb, it protects government of the complement from the outside.

To summarize, either formulation of minimality makes it impossible for an external governor to govern the complement of a head. Note that according to empirical facts, this is a desirable result.

Let us now turn to government of Spec of NP from outside NP. Here the two formulations make different predictions. Under A, τ can either be NP or N' (both projections of the head). If we choose N', it follows that Spec can be doubly governed by the verb. N' dominates

the head but since it does not also dominate Spec it cannot act as a barrier protecting Spec from government by the verb. On the other hand, if τ is NP, since NP dominates the head, the Spec and excludes the verb, NP will block government of Spec by the verb. Finally, under formulation B, there is no choice of projection for τ. It can only be N', the immediate projection of the head. Consequently formulation B will allow Spec of NP to be governed from the outside by the verb.

Now that we see that the two formulations make different predictions concerning government of Spec by an external governor, it remains to know which formulation of minimality is needed for the theory of syntactic government. If we need to block external government of both the Spec and the complement, definition A should be retained. Recall that uniqueness of government of complement is guaranteed under both definitions, but that uniqueness of government of Spec is only guaranteed by definition A. On the other hand, if Spec can be doubly governed, that is governed both by the nominal head and by an external governor but complement cannot, then formulation B should be retained.

I said earlier that there are no obvious empirical consequences for minimality in relevance to the structure of the complex NP. There are other constructions where minimality is relevant but I consider them too complex to be analyzed here. These other constructions motivate the choice of definition B. That is, Chomsky wants to permit Specs of τ, but not complements to be governed from outside τ by a more remote governor.

To summarize, minimality says that it is not possible for an external governor to govern within the immediate projection of a head. Thus, in the structure of the complex NP, the NP complement will not be doubly governed but the Spec will be. I propose to turn now to phonology and see if, as syntactic government, phonological government is subject to this constraint.

What I intend to do in the rest of this chapter is to show that some phonological phenomena provide clear cases which help us to choose between the two formulations of the condition for phonological government. We will see that if minimality is indeed present in phonology, only the immediate projection of a given head must count as a barrier to government from the outside. We turn now to some phonological processes.

2.3 The Minimality Condition in phonology

We have seen in the preceding section that one consequence of the Minimality Condition in syntax is that complements of heads cannot be governed by an external governor. In other words, a complement cannot be doubly governed. The prediction which can then be made is that, if the Minimality Condition is also present in phonology, we should observe a difference in the behaviour of branching and non-branching constituents. Whereas a non-branching constituent does not constitute a governing domain, a branching one does. Within a branching constituent, there is a relation of government between the head and its complement. If phonological government is subject to the Minimality Condition, it should then be impossible for a complement to be also governed by a governor outside the projection of its head. Recall that within a branching onset or a branching nucleus, the complement of the head is dominated by the immediate projection of the head, namely by the onset or the nucleus constituent. As immediate projection of their head these two projections should, according to either one of the two formulations of the condition, act as barriers to government from the outside. In order to see if this prediction is true, let us consider some cases where there seems to be an asymmetry in the behaviour of branching versus non-branching

constituents.

In carefully considering certain phonological phenomena involving assimilation, we observe that branching constituents may behave differently from non-branching ones.[3] We would like to determine if, in a theory of government, this observation follows from the fact that complements are ungovernable from outside their domain. Saying that a complement of a head cannot be governed by a more remote governor might indeed be a possible way of capturing the difference in the behaviour of branching and non-branching constituents. As a first example, let us consider umlaut in Korean.

2.3.1 Umlaut in Korean

In Korean (data from Boulie Jeong (1987)) there are different contexts where umlaut takes place. Two of them are when the causative marker /-Ci/ and the subject marker /-i/ are suffixed to a stem. As

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[3] It is important to bear in mind that all the examples that I will consider are cases where the application of a phonological process is restricted to two adjacent segments. For example, when I discuss vowel harmony, I concentrate on processes which only affect two adjacent vowels. Metrically speaking, I restrict my analysis of harmony to binary feet. For reasons that will not be mentioned here, it seems that non-local harmony processes must be treated in a different way from local ones.

the following examples show, the final back vowel of the stem is realized as [-back] when the causative or the subject marker is suffixed.

(5) A.	Radical	Causative	Gloss
	cap-ta	cæp-hi	'to take'
	mək-ta	mek-hi	'to eat'
	nok-ta	nök-hi	'to melt'
	sum-ta	süm-ki	'to hide'

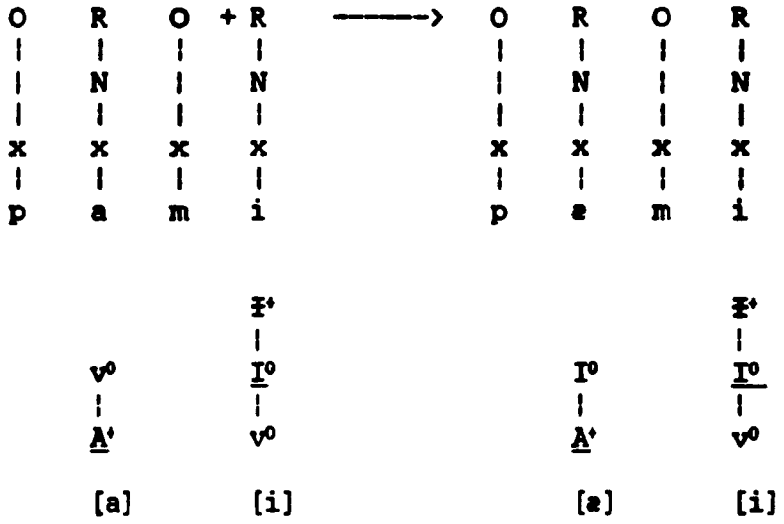
B.	Radical	Subject	Gloss
	pam	pæm-i	'night'
	cañ	cæñ-i	'fare'
	tam	tæm-i	'wall'
	səm	sæm-i	'a measure'

As Jeong has suggested, umlaut takes place under government. That is, umlaut is the manifestation of a governing relation between two nuclei at the level of nuclear projection.

As can be observed with the data given in (5), in Korean a suffixal vowel i is in a governing relation with a preceding vowel.

This relation of government is manifested by spreading the element I (the head of the suffixal vowel [i]), to the governed vowel.[4] Without going into a detailed analysis of the representation of vowels and the propagation of elements, let me just give the following example.

(6)



As we can see with the form [pæmi] 'night', the element $\underline{I^0}$,[5] contained in the representation of the suffixal vowel, spreads to the noun's final vowel /a/. This spreading results in a vowel which has in its representation the element I^0 (as operator) and the element A'

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[4]For a discussion on the representation of vowels, see KLV (1985). Note also that a similar representation is proposed in the Dependency Phonology.

[5]The superscripts refer to the charm values of the elements.

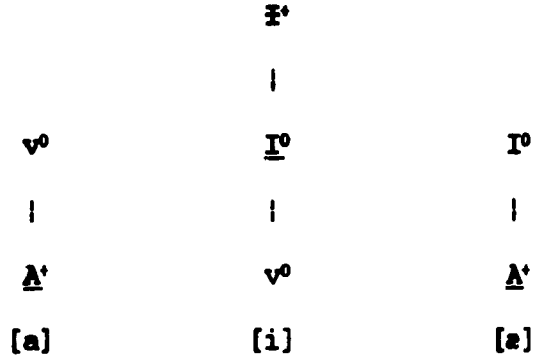
(as head). Such a vowel is phonetically realized [ə].

A word should be said about KLV's theory of representation of segments. Segments, they claim, are composed of elements. An element may be thought of as a complete matrix of features (it is phonetically interpretable) which contains at most one marked (or hot) feature specification. For example the element I^0 is marked for the feature Back, A^+ for the feature High and U^0 for the feature Round. In addition to the three proposed elements I, U and A, the theory claims that there is an ATR element (I^+) as well as an element which contains <u>no</u> marked feature specification, the so-called "cold" element. All segments are composed of an operator and a head. The resulting segment has all the feature specifications of its head except for the operator's hot feature. If we consider the vowel <u>a</u>, for example, it is composed of the element A^+ as its head. No other element counts in its representation. That is, its operator is an element which does not transmit any of its feature specification. Such an element is the cold element. The reader is referred to KLV (1985) for a detailed discussion of this matrix calculus.

Going back to Korean, we saw that the element I^0, head of the suffixal vowel, spreads to the preceding vowel. When I^0 spreads on

the vowel a, I^0 replaces the initial operator contained in the representation of a, that is, the element I^0 replaces the cold element which is the operator of a. It follows that I^0 becomes the operator of a governed vowel which has already the element A^+ as its head. When I^0 acts as the operator, it gives the specification of its hot feature. The result is then a vowel which has all the feature specifications of the element A^+, plus the one of the operator's hot feature i.e. [-back]. Consequently; (/a/ --> [æ]).

(7)

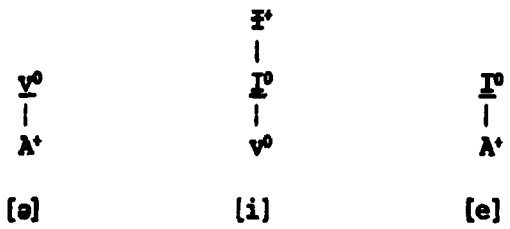


The fact that an umlauted schwa is realized as [e] is accounted for the following way. Schwa is composed of the cold element as its head and the element A^+ is its operator. When a following element I^0 spreads on schwa, I^0 replaces the cold element.[6] The result is a

[6] That in Korean the element I^0 replaces the operator and not the head is parametrically determined.

vowel which has I^0 as its head and A^+ as its operator. Such a vowel is [e].

(8)



As we just saw, the final back vowel of a stem is fronted when followed by a suffixal vowel i. The situation is different when the final vowel of the stem is long. When the stem's final vowel is long, this vowel is not subject to umlaut.[7]

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[7]As we will see, one prediction my analysis makes is that long vowels should resist umlaut. This is indeed true in Korean but does not seem to be the case in modern German. Thus it seems that my analysis encounters a problem with German. There are however some major differences between Korean and modern German. In Korean a back vowel is fronted only when a vowel -i, phonetically realized as such, follows it. Umlaut is strictly local in the sense that only the vowel (or the consonant) which immediately precedes the vowel -i is fronted. In modern German, umlaut is not as transparent as it is in Korean. It is indeed well known that in modern German it is not always the case that the triggering vowel is phonetically present. The vowel which triggers umlaut may be realized as [i], as a schwa or it can be phonetically null. That is, it seems that the conditioning environment for umlaut in modern German has now been lost. The rule has been morphologized and the umlauted vowels have become phonemic in consequence. All this proves is that modern German cannot be compared with Korean, but surely the stage of German prior to the loss of the conditioning environment would still be a counterexample

(9)	Radical	Subject		Gloss
	pa:m	pa:m-i	*pɐ:m-i	'chestnut'
	ca:ñ	ca:ñ-i	*cɐ:ñ -i	'sauce'
	sə:m	sə:m-i	*se:m-i	'island'
	ta:m	ta:m-i	*tɐ:m-i	'energy'

As the above examples show, there is a contrast, with respect to umlaut, between short and long vowels. Unlike short vowels, long ones

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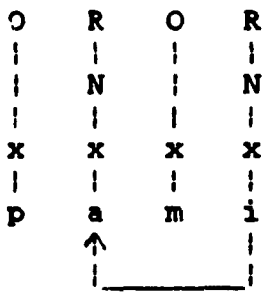
to my analysis. However, an important factor is that in Pre Old High German, i.e. before the loss of the conditioning environment for umlaut, only short [a] is said to have undergone umlaut. When long vowels became candidates for umlaut, the conditioning environment for umlaut was lost. In addition, it is not clear that German umlaut is strictly local. It seems that unlike Korean, German umlaut is not restricted to the segment which is adjacent to the triggering vowel. Because of the complexity of the analysis of umlaut in German, I have chosen to not pursue this question here. At first glance it seems to me that umlaut in German should not be analyzed in the same way as it is in Korean.

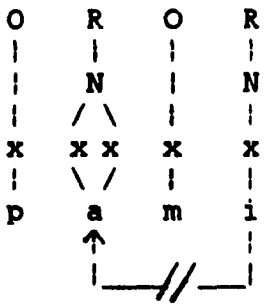
I take advantage of this note to quote what KLV (1988) say with respect to the apparent counter-example German umlaut constitutes for my analysis:

> "a. The nature of German umlaut is still a subject of debate, in particular as regards its current synchronic status. By contrast, Korean umlaut is totally productive.
>
> b. It is not clear, that the seemingly long vowels of words like, say, ro:t 'red', are not due to the kind of word final lengthening pervasive throughout Germanic. Significant in this respect is the fact that the umlauted vowels themselves are not long, regardless of whether they were pronounced with phonetic length or not prior to submitting to umlaut..."(KLV 1988)

are not fronted when followed by the vowel -i. Something blocks the propagation of the element I^0 to a preceding long vowel. One possible explanation for the absence of this spreading is to say that unlike non-branching nuclei, branching ones may not be governed. If branching nuclei may not be governed, this means that in Korean, the element I^0 contained in the representation of the suffixal vowel, may not spread to the radical's final vowel if this vowel is long. The propagation of the element I^0 being the expression of the relation of government between the two final nuclei, if for any reason the relation of government is blocked, it follows that the propagation of the element would be blocked.

(10)





The fact that branching nuclei cannot be governed from the outside (as will be discussed later) directly follows from the Minimality Condition. The suffixal vowel cannot govern the preceding branching nucleus, because this governing relation would involve

government within the immediate projection of the nuclear head. Within this immediate projection of the nuclear head, a complement is already governed by its head.

As another example of the difference between branching and non-branching nuclei, let us consider vowel deletion in Tangale.

2.3.2 Vowel deletion in Tangale

In the case under investigation, that is in the behaviour of long vowels I seek to show that in terms of Minimality the failure of long vowels to undergo vowel deletion is accounted for.

In his analyses of vowel deletion and epenthesis in Tangale, a Chadic language spoken in northen Nigeria, Nikiema (1987a,b) mentions that except in the initial syllable of a word, a vowel is deleted when it is followed by another vowel.[8] Deletion is done under government. The nucleus whose vowel is dissociated is realized as zero only if it is properly governed. What is particularly interest-

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[8] A detailed analysis of vowel deletion in Tangale is presented in chapter six. Tangale has been analyzed by Kidda (1985), Kenstowicz & Kidda (1987) and Nikiema (1987a,b) and (to appear).

ing is that as we can see in (11) below, unlike a short vowel a long vowel is never subject to deletion.

(11) tana 'cow' tana + go --> [tango] 'her cow'
taga 'shoe' taga + no --> [tagno] 'my shoe'

rubee 'brain' rubee + no --> [rubeeno] *[rubno] 'my brain'
tabee 'tobacco' tabee + go --> [tabeego] *tabgo] 'her tobacco'

If deletion is done under government and a long vowel is never deleted, this means that a branching nucleus cannot be governed. Once again, if a branching nucleus is a governing domain and as I claim if it is impossible to govern from the outside within such a domain, we have an account as to why long vowels behave differently than short ones with respect to vowel deletion.

As a last example of the difference between branching and non-branching nuclei, let us consider ATR harmony in Pulaar.

2.3.3 ATR harmony in Pulaar[9]

Dunn (1987 and to appear) proposes two ATR harmony processes in Pulaar, which he analyzes in metrical terms. He proposes to treat one of them with unbounded feet (non-local harmony) and the other with binary feet (local harmony). For the purpose of this chapter, I will only consider the local harmony which is, according to Dunn, sensitive to the branching of the nucleus.

That ATR harmony is sensitive to the branching of nuclei can be seen in the following examples.[10] As can be observed, there is a difference between short and long vowels with respect to the ATR quality.[11]

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[9] Pulaar is also known as Fula or Peul.

[10] For discussion on ATR harmony in Pulaar, see Prunet & Tellier (1984), Paradis (1986), Prunet (1986) and Dunn (1987, and to appear).

[11] I put in parenthesis what is, according to Dunn, affected by the non-local ATR harmony and not by the local one.

(12) ATR harmony in Pulaar

(o doof) ii no	'He had pulled out'
(o doof) ii nɔ bɛ	'He had pulled them out'
suud-ɛɛ-mɔ	'Hide him! (pl)'
suud-mɔ	'Hide him (sg)'
(Abou) suud-e-tɛ nɔ	'We were hiding Abou'
(Abou) suud-ɛ-tɛ nɔɔ	'It was Abou that we were hiding'
(Ali) suud-ɔɔ	'Ali must hide himself'
hinɛrɛ	'nose'

(13) Dunn's analysis:

i) Construct feet on nucleus projection,

ii) Type of feet: Binary

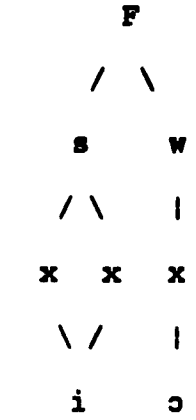
iii) Direction: From right to left

iv) Dominance: Left (s w)

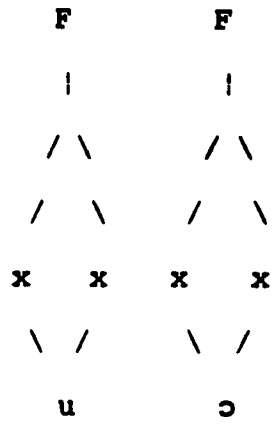
v) Domain of government: the foot

vi) Quantity sensitive: Yes

(14) a. [(o doo)fii no]



b. [suud-ɔɔ]



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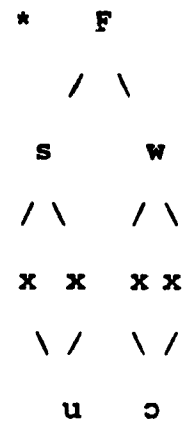
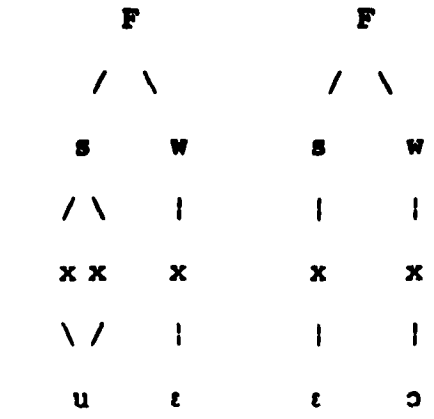
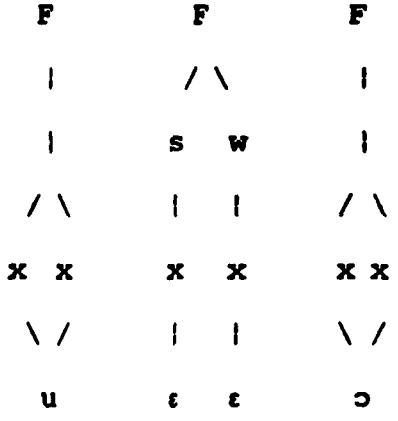


c. [ʃuudetɛ nɔ]



d. [ʃuudɛtɛnɔɔ]



2.3.3.1 Construction of metrical feet.

From right-to-left, we construct binary feet on the nuclear projection. The feet are left dominant, i.e. labelled s w. Recessive nodes cannot branch. Vowels receive their ATR quality from the vowel dominated by the strong branch of the foot. If the foot is degenera-

te, it follows that the vowel keeps its underlying ATR value, i.e. non-high vowels are realized [-ATR] and high vowels [+ATR].

The fact that recessive nodes cannot branch is relevant here. As we have seen, when the construction of a binary foot would result in the branching of the recessive node, a degenerate foot is built. Does this fact follow from anything?

2.4 Recessive nodes cannot branch

In the preceding analysis of ATR harmony in Pulaar, binary feet are constructed on nuclear projections. The construction of a binary foot is a way of expressing a relation that holds between two nuclei. One can call this relation a relation of government.[12] The well-formedness of the relation is subject to a constraint, namely that the recessive node does not branch. Saying that in binary feet recessive nodes cannot branch is similar to saying that a branching

[12]Tellier and Prunet (1984) have proposed a metrical analysis of vowel shortening and accentuation in Pulaar expressed in terms of government. In spite of the relevance of their analysis to my proposal (their analysis directly follows from the Minimality Condition) I will not present a detailed discussion of this point here. See also Prunet (1986) for a revised analysis of Tellier and Prunet (1984).

nucleus cannot be governed by another nucleus. We can then draw a perfect parallel between the fact that in Korean long vowels are not umlauted, that in Tangale that long vowels are not deleted and that in Pulaar ATR harmony is sensitive to the branching of the nuclei. It would highly illuminating if it could be shown that these facts follow from the same theoretical principle. The question then is how can we explain that recessive nodes cannot branch or in other words, that branching nuclei cannot be governed? The first thing to know is that a relation between two nodes of a foot (i.e. two nuclei) is in fact a relation between skeletal points dominated by two distinct constituents. The head of the strong node (a skeletal point) has to govern all its complements within its domain, the foot. The fact that a strong node (nucleus) cannot govern a branching weak node (a branching nucleus) may be explained by the Minimality Condition. Within a branching weak node (a branching nucleus) there is already a relation of government between the head and its complement (cf. syllabic government). The head of the strong node cannot govern inside a branching nucleus within which a relation of government already holds. It follows that the reason why a branching nucleus behaves differently from a non-branching one, is because it is impossible for an external governor to govern such a branching structure which itself constitutes a governing domain. Notice that my

explanation of Pulaar foot construction applies to all languages that manifest the restriction against the branching of recessive nodes.

The fact that a branching constituent may not be governed by an external governor is similar to the syntactic motivation for the Minimality Condition. Let us say, roughly speaking, that in phonology, a complement of a head cannot be governed by a more remote governor.

To this point, the facts of Korean, Tangale and Pulaar, have provided reasons to extend the Minimality Condition in phonology. With either version of the condition, we account for the absence of government of branching nuclei. However, what we do not know yet, is whether the complement of the rime can or cannot be doubly governed. The answer to this question will decide which one of the two formulations should be retained in phonology. If only the immediate projection of the head counts as a barrier to external government, the rimal complement would be governable from outside the rime. Within the rime, the immediate projection of the head is the nucleus, and the nucleus does not intervene between the rimal complement and an external governor. On the other hand, if any projection of the head counts as a barrier to government from the outside, the rimal

complement would not be governable by an external governor. Since the rime is a projection of the nuclear head, the rime will act as a barrier to government of the rimal complement form the outside. Let us then consider the behaviour of a branching rime with respect to government.

Let us now consider a case where both government within the nucleus and within the rime can be observed. We will see if there is a difference in the behaviour of the two branching constituents.

2.5 Branching nucleus versus branching rime

2.5.1 Gemination in Costeño Spanish

In the variety of Spanish spoken in the department of Cordoba in Colombia (data from Rocio Nieves (1987)), the first consonant of a transsyllabic cluster assimilates completely to the following consonant. Hence unlike consonant clusters in standard Spanish, all consonant clusters in Spanish Cordoba are realized as geminates.[13]

[13]A word should be said about the difference between standard and Cordoba Spanish. In Cordoba Spanish a transsyllabic relation between two non-nuclear skeletal points should be one of proper government. In order for a transsyllabic sequence to be well-formed,

Consider the following data.

(15)	Cordoba Spanish	Standard Spanish	Gloss
	[seddo]	[serdo]	'pork'
	[pwetta]	[pwerta]	'door'
	[aggo]	[algo]	'something'
	[takko]	[talko]	'talc'
	[dottor]	[doktor]	'doctor'
	[nettuno]	[neptuno]	'Neptune'
	[maddalena]	[magdalena]	'Madeleine'
	[asessia]	[asepsia]	'asepsis'
	[amma]	[arma]	'arm'
	[canne]	[carne]	'meat'

---

the governor must properly govern its complement. That is, the rimal segment is disassociated from its point and the governor spreads to the preceding free skeletal point. This relation between a governor and an empty skeletal point is one of proper government. On the other hand, standard Spanish does not require a transsyllabic relation to be one of proper government. A transsyllabic sequence is well-formed if there is a governing relation between the two consonants. It seems that Cordoba Spanish belongs to a group of languages along with Japanese, Wolof etc. where transsyllabic consonant sequences are geminates.

The fact that in standard Spanish sequences like kt, pt, gd, ps are well-formed transsyllabic sequences leads to the conclusion that some languages have two series of stops. In one series the segments are negatively charmed while in the other series they are charmless. Notice that this is also the case in Korean, French, English. See KLV (1988) for a discussion about charmless stops.

[awto]	*[atto]	[awto]	'car'
[oygo]	*[oggo]	[oygo]	'onion'
[ahno]	*[anno]	[asno]	'donkey'
[fohforo]	*[fofforo]	[fosforo]	'match'

As the above examples show, when the first consonant of a cluster is any consonant other than a glide, the sequence is realized as a geminate in Cordoba Spanish. On the other hand, when the first member of the cluster is a glide, there is no gemination. The question is what distinguishes glide-consonant clusters from the other type?

In a theory of phonological government, total assimilation is considered to be a manifestation of a proper governing relation. Transsyllabically, a consonant associated to an onset, properly governs a preceding rimal complement which dominates no segment. Following Halle and Vergnaud (1980), as well as others, I do not consider complete assimilation as changing a segment into something more like its neighbor, but rather as the spreading of the triggering segment's melody onto the target segment's skeletal point. Regressive assimilation involves dissociation of the governed segment and spreading of the governor onto the preceding empty skeletal point.

What is particularly interesting for us, is that in the variety of Spanish spoken in Cordoba, the only consonants which do not assimilate with a following consonant are the glides [y], [w] and [h]. The question to ask is what is the difference between consonant clusters where the first member is a glide and the others?

As Nieves has suggested, one difference between the two types of clusters, is that only the one with a glide followed by a consonant may be analyzed as having their first member in the nucleus. Indeed following Kaye's theory of diphthongs (cf. Kaye (1985)), a branching nucleus may dominate a single vowel (phonetically a long vowel) or two distinct vocalic segments (phonetically heavy diphthong). Following Nieves's analysis, I assume that Spanish has heavy diphthongs.[14]

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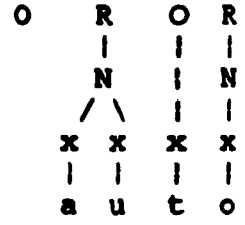
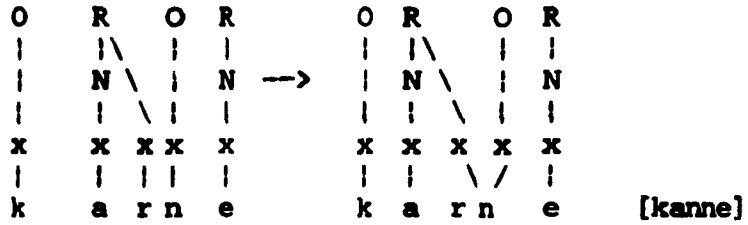
[14] Unfortunately Nieves does not motivate the presence of heavy diphthongs in her dialect of Spanish. That is, she presents no motivation for the claim that a word like ‹hoy› [oy] 'today' is a heavy diphthong. Such evidence is not essential to my argument however. Under the proper government constraint, the y of oyga may be restructured into the nucleus, escaping the effects of the following consonant.

(16)



(17)



[kanne]

In a word like [awto], the high vowel is syllabified under the nucleus. On the other hand, in a word like /karne/ the first member of the consonant cluster is syllabified under the rime. That means that in the word [kanne], there is a transsyllabic relation of government where the onset properly governs the preceding rimal skeletal point. This relation of proper government results in a complete assimilation of the first consonant to its governor.[15] In

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[15] If my analysis of complete assimilation in Cordoba Spanish is generalized to other cases, it would require that all cases of complete assimilation be regressive. However there are cases of progressive assimilation. Apparent cases of progressive assimilation occur in the following situation: -VC^{c}CV- where C^{c} represents a complex consonant (aspirated, glottalized, etc.). A complex consonant may not occur in a governed position. Either an element of the governed position is dissociated and thus, not realized phonetically, or else it may reassociate to the governor position if permitted by

the word [awto], as Nieve suggests, the high vowel (=glide cf. Kaye & Lowenstamm (1984)) is syllabified under a branching nucleus and not under the rimal complement. The absence of assimilation of the glide to the following consonant tells us that the consonant under the onset does not govern the preceding segment. This means that a transsyllabic relation of government seems to be sensitive to the syllabification of the potential governee. Following this observation, I suggest the following analysis.

Phonological government is subject to the Minimality Condition. This means that a complement of a head should resist government by an external governor. In diphthongs, the high vowel is the complement of the nuclear head; that is, this complement is already governed by its head. The reason why the following onset cannot govern this member of the diphthong, is because of the Minimality Condition. A following onset cannot govern a complement which is dominated by the immediate projection of a head. This immediate projection acts as a barrier protecting the complement from being governed from the outside. Notice that this immediate projection excludes (does not dominate), the external governor which is the head of the onset. This analysis

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the segmental constraints of the language. Apparent cases of progressive assimilation are discussed in Kaye & Lowenstamm, 1985 for Sanskrit.

accounts for the absence of assimilation of a glide to a following consonant.

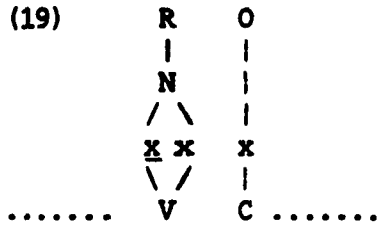
It remains, however, to explain why the rimal complement, which is also considered the complement of the nuclear head, may be governed by the following onset. How can we explain that in one case the complement of the nuclear head (the other nuclear point) may not be governed from the outside and that in a second case, another complement of the nuclear point (the rimal complement) may be governed from the outside? This apparent problem for the Minimality Condition constitutes in fact the reason for choosing the narrower version of the Minimality Condition as proposed by Chomsky. Given the following formulation, it follows that a branching nucleus behaves differently than a branching rime.

(18) α does not govern β if τ is the <u>immediate</u> projection of δ, excluding α.

This narrower formulation of the Minimality Condition, allows us to account for both the absence of external government of a complement inside a branching nucleus, and the possibility of governing a complement inside a branching rime.

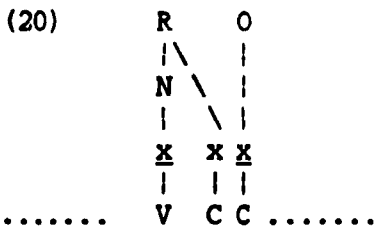
Consider a branching nucleus, where the leftmost nuclear point (the head), governs the complement to its right.

(19)



In such a configuration, the immediate projection dominating the head is the nucleus. The nucleus dominates the head and its complement, but excludes the following point dominated by the onset. This means that N is a barrier which protects the complement from government by a governor outside this domain. Consider now a branching rime.

(20)

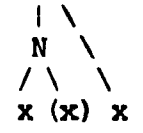


Recall that I do not consider the Coda to be a constituent and consequently I analyze the rimal point as syllabified directly under

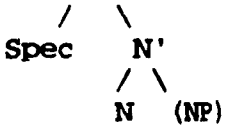
the rime. Being syllabified directly under the constituent rime, the rimal complement is not dominated by the immediate projection of the head. That is, because the rime is not the immediate projection of the head (the nuclear head), the rime is not a barrier which can protect the rimal complement from government from outside its projection. N is the immediate projection of the head and N does not intervene between the rimal complement and an external governor.

Here I would like to draw a parallel between a branching rime and the syntactic structure of a complex NP. I wish to propose, following the similarity between these two structures, that what KLV call "the rimal complement" is in fact the specifier of the rime.

(21) a.



b.



In (21a) I give the structure of a branching rime and in (21b) that of a complex NP (ex. the picture of Tom). In (21b) N', the immediate projection of the head, dominates the head and its complement. The higher NP dominates the Spec and the immediate projection of the head. Let us now look at (21a). The node N, immediate projec-

tion of the head, dominates the head (and its complement if the nucleus branches). The rime dominates the immediate projection of the head along with the so-called rimal complement. It is tempting to instead say that the rime dominates the immediate projection of the head along with the Spec of the rime. Considering the rimal complement to be the Specifier of the rime allows one to: (i) draw a perfect parallel between the phonological and syntactic structures given in (21) and (ii) to say that as in syntax, specifiers may be doubly governed and complements may not.

Palatalization in LuGanda provides additional support for the position adopted here. Skeletal points dominated by the immediate projection of a given head cannot be governed from the outside, but the specifier of the rime which is not dominated by the immediate projection of the nuclear head can itself be governed both from inside and from outside the rime.

2.5.2 Palatalization in LuGanda

According to Clements (1985), in LuGanda both non-geminate and geminate consonants can undergo palatalization.[16]

(22) LuGanda

/kiintu/ ---> [ciintu] 'thing'

/bwoogi/ ---> [bwooji] 'sharpness'

/oluggi/ ---> [olujji] 'door'

In drawing a parallel between umlaut and palatalization (in both processes an element I propagates on a given segment) the question is how can we explain that long vowels do not undergo umlaut (the palatalization of a vowel) while geminates can undergo palatalization (the umlaut of a consonant)?

One who treats long vowels and geminates in the same way, faces a problem regarding the asymmetry between long vowels and long consonants. On the other hand, this asymmetry between long vowels and geminates follows directly from the Minimality Condition. More

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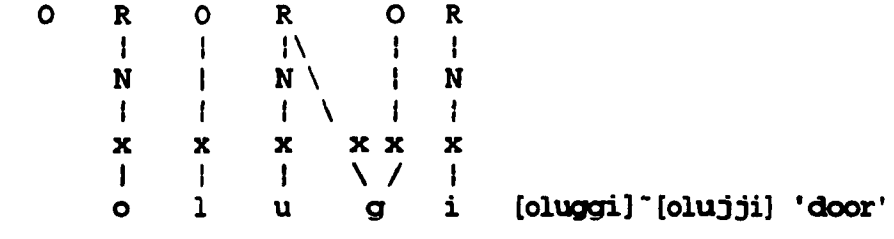
[16] J. Lee pointed out to me that Korean is identical to LuGanda regarding palatalization.

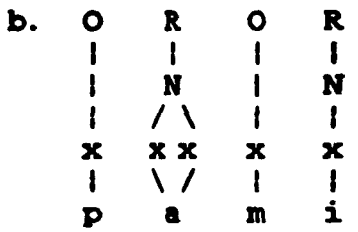
specifically, in both umlaut and palatalization, there is a specific segment which triggers the frontness of the adjacent vowel or consonant. Umlaut and palatalization may be analyzed as a manifestation of a governing relation between a governor and a governee. The manifestation of this governing relation is the transmission of one element, namely the element I, contained in the representation of the governor, onto the governee. Given this analysis, the asymmetry between long vowels and geminates follows, as I said, directly from the Minimality Condition. From the outside a governor cannot govern within the immediate projection of a given head (viz. a remote governor cannot govern within a branching nucleus). A long vowel may not be fronted under the influence of an adjacent vowel. On the other hand, it is possible for a remote governor to govern a geminate. Let us consider the following structures.

(23) a.



[oluggi]~[olujji] 'door'

b.



[pa:mi] 'chestnut'

In (23a) the final vowel is the element which triggers the palatalization of the preceding consonant. The skeletal point dominated by the onset preceding the final vowel, can be governed by the following vowel. There is nothing preventing the right member of the geminate (the head of the geminate) from being governed by a following nucleus. Because a geminate does not constitute a branching constituent, it follows that government of both members of the geminate is possible. The left member of the geminate is governed by the nuclear head within the rime as well as transsyllabically by the following point under the onset. Concerning the right member, it is governed by the nuclear head which follows it and itself governs the preceding rimal complement. (The transmission of palatalization to the left member of the geminate is provided by the transsyllabic governing relation between the two members of that geminate).[17]

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[17] It is possible that many of the "inalterability effects" noted for geminates (Hayes (1986), Schein & Steriade (1986)) may be accounted for by the Minimality Condition. More research needs to be done in this area.

The crucial point is that, following the Minimality Condition, a geminate consonant, unlike a long vowel, does not constitute an island which is opaque to government from the outside. This means that we predict that unlike a long vowel, a geminate should undergo certain phonological processes such as palatalization.

Proposing that governing domains are subject to the Minimality Condition, allows, among many other things, for an explanation of the asymmetry between branching and non-branching constituents, as well as the difference between branching onsets and nuclei on the one hand and branching rimes on the other hand.[18]

In conclusion, I have tried to show that the Minimality Condition is a principle of phonology and that its form is strikingly similar to what has been proposed for syntax. This result lends strong support to the idea that syntactic and phonological theory may be unified. I turn next to the analysis of schwa in French which treated in terms of proper government lends even stronger support to

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[18]Minimality has nothing to say with respect to the government of a head from outside its projection. Given that the condition is concerned with the double government, it does not apply to government of heads. This specification will be of importance in my analysis of licensing presented in chapter six.

the unification of the two theories.

CHAPTER THREE

THE E-MUET IN FRENCH

3.0 Introduction

Descriptions of French typically assume the existence of a vowel schwa, the so called 'e-muet' or 'unstable-e', which has the salient property of alternating with zero, thus making it phonologically different from all the other vowels of French. While in certain dialects of French schwa is phonetically similar to the vowel [oe], it is phonologically different from this phoneme.[1] In this chapter I present the properties of schwa along with some relevant data which lead to the conclusion that schwa is phonologically different from /oe/ as well as from all other vowels of the phonemic inventory. The [ə] (i.e. schwa) or [oe] which derives from schwa, has two salient properties. Under certain circumstances it alternates with zero or with [ɛ].[2] Unlike the [oe]'s which are allophones of schwa, those

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[1] According to Dell (1973) this is the case in Parisian French.

[2] Those two properties of schwa are well established. The facts I consider in this chapter are presented in traditional grammars (cf. Fouché (1959)) as well as in detailed analyses of schwa like Dell's (1973) among others.

which express the phoneme /oe/ do not alternate either with zero or with [ɛ]. The latter alternates with the vowel [ö] (e.g. ils veulent [voel] 'they want' vs il veut [vö] 'he wants').

3.1 The alternation between schwa and zero

I begin the overview of the facts by considering the property of schwa in alternation with zero. I present three types of cases where such an alternation is found.

3.1.1 Word-internal and word-final pre-pausal schwas

The alternation of schwa with zero can be observed in comparing the two groups of words I give in (1). In both groups of words schwa is preceded by two consonants. In the left column it occurs in word-final position and it is never pronounced. In the right column schwa occurs in word-internal position and it must be phonetically realized.[3]

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[3] I use ə́ to represent a schwa which is not pronounced and ə̲ to represent a phonetically realized schwa.

(1)

Without schwa		With schwa	
fortə	'strong'	fortəment	'strongly'
brusquə	'abrupt'	brusquəment	'abruptness'
fermə	'firm'	fermənent	'firmly'
fumistə	'shirker'	fumisterie	'fraud'
ébénistə	'cabinet maker'	ébénisterie	'cabinet making'
hurlə	'roar'	hurlement	'roaring'
bordə	'hem'	Bordelais	'from Bordeaux'
embarquə	'board'	embarquement	'boarding'
désistə	'withdraw'	désistement	'withdrawal'
forgə	'forges'	forgeron	'blacksmith'
pauvrə	'poor'	pauvrement	'poorly'
orgə	'barley'	orgelet	'sty'
partə	'leave'	appartement	'apartment'
gouvernə	'govern'	gouvernement	'government'
percə	'pierce'	percevoir	'to perceive'
librə	'free'	librement	'freely'
tristə	'sad'	tristement	'sadly'
calmə	'calm'	calmement	'calmly'

In another group of words shown in (2) schwa is posited in similar contexts to those cited in (1). The difference between the words given in (1) and those in (2) is that in (2) schwa is preceded by only one consonant. In all these words, both word-finally and word-internally schwa is never realized phonetically.

(2)

lentə	'slow'	lentəment	'slowly'
sagə	'sensible'	sagəment	'sensibly'
ânə	'donkey'	ânerie	'stupidity'
froidə	'cold'	froidəment	'coldly'
chaudə	'hot'	chaudəment	'warmly'
chemisə	'shirt'	chemiserie	'outfitter'
surə	'certain'	surəment	'certainly'
dupə	'dupe'	duperie	'dupery'

rondə	'round'	rondəment	'roundly'
rivə	'shore'	rivərain	'waterside'
galə	'scab'	galərie	'gallery'
brèvə	'short'	brèvəment	'shortly'
durə	'hard'	durəment	'hardly'
sottə	'stupid'	sottəment	'stupidly'
légèrə	'light'	légèrəté	'lightness'
rarə	'rare'	rarəté	'rarity'
canə	'duck (female)'	canəton	'duckling'

Based on the data presented in (1 & 2), the generalization is that a word-final schwa (at least before pause which is the only word-final context considered so far) is not realized phonetically regardless of the number of consonants that precede it. Word-internally the situation is different. Schwa is realized as zero when preceded by one consonant and as schwa when two consonants precede it. The same alternation is found in syllable initial of bisyllabic words.

3.1.2 Syllable initial of bisyllabic words.

It is almost always the case that a schwa in the initial syllable of a bisyllabic word and preceded by a single consonant is not realized phonetically.

(3)

petit gars	[ptiga]	'young boy'
reviens-ici	[rvjɛ̃isi]	'come back here'
demande moi	[dmɑ̃dmwa]	'ask me'
cheval	[ʃval]	'horse'
demain matin	[dmɛ̃matɛ̃]	'tomorrow morning'

While it is possible for a schwa to be realized as zero when it occurs in the initial syllable of a bisyllabic word whose onset contains a single consonant, it is impossible for this manifestation to occur if the onset is branching.

(4)

frelon	[frəlõ]	'hornet'	brebis	[brəbi]	'sheep'
crevasse	[krəvas]	'fissure'	grenier	[grənje]	'garret'
premier	[prəmje]	'first'	crever	[krəve]	'to blow'

With regard to the behaviour of schwa word-internally, there are certain cases where even if preceded by a single consonant, schwa is manifested phonetically. One of these cases is when schwa precedes "h-aspiré".[4] Compare the following two words.

(5) mets la déssus [mɛ ladsü] 'put it on'

va dehors [vadəər] 'go outside'

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[4]Words beginning with an "h-aspiré" have the characteristic to begin phonetically with a vowel while they behave phonologically as beginning with a consonant. (This point will be considered in chapter five).

While it is possible for a schwa to be realized as zero when it occurs in the first syllable of a word whose initial onset contains a single consonant, it is impossible for this manifestation to occur, if an "h-aspiré" follows schwa.

3.1.3 Word-internal sequences of schwas

Word-internally, we can also find sequences of adjacent schwas. Any word-internal schwa conforms to the generalization concerning the number of preceding consonants. Schwa may be realized as zero when preceded by a single consonant (cf. (2)) and must be realized as schwa after a consonant cluster (cf. (1)). Let us suppose that a word contains two adjacent schwas. The first one is preceded by two consonants and only one consonant intervenes between the two vowels. In this case the first schwa is retained and the second one is not realized phonetically.

(6) First schwa preceded by two consonants:

entretenir	'to maintain'	contrevenir	'to contravene'
contrevenant	'offending'		

In another instance of adjacent schwas, if it is the second one which is preceded by two consonants and the first one by a single one, it is the second one which is retained and the preceding one which is unrealized.

(7) Second schwa preceded by two consonants:

palɛfrenier	'ostler'	vilɛbrequin	'brace'

If both word-internal schwas are preceded by a consonant cluster, they are both realized phonetically.

(8) Both schwa preceded by two consonants:

entrepreneur	'contractor'	entreprenant	'enterprising'

But it is also possible to find adjacent schwas both preceded by a single consonant. In this case it is impossible for both schwas to be syncopated. The result is always the sequence schwa-zero.

(9) Both schwas preceded by only one consonant:

ensevelir	'to bury'
semeler	'to put a sole'
devenir	'to become'
papeterie	'stationery'

I conclude this section on word-internal schwa with the consideration of compounds. More precisely I consider the behaviour of the word-final schwa of the first term of a compound.

3.1.4 Compounds

Like the situation in pre-pausal position, the word-final schwa of the first term of a compound is never manifested when it is preceded by a single consonant.

(10)	piqué-nique	'picnic'	piqué-assiette	'scrounger'
	cassé-noix	'nutcracker'	cassé-noisettes	'nutcracker'
	passé-droit	'privilege'	passé-partout	'master'
	coupé-feu	'firebreak'	coupé-papier	'paper knife'

The situation is different, however, when in this context schwa is preceded by two consonants. In this case the manifestation of schwa varies. It seems that what determines its presence or absence is the number of phonetically expressed syllables the second member of the compound contains. The examples given in (11) are compounds in which the first members end with a consonant cluster followed by schwa. As illustrated in the right column of (11) we see that if the second word has more than one phonetically expressed syllable, schwa

is not manifested. On the other hand, as shown in the compounds given in the left column of (11), if the second word is phonetically monosyllabic, schwa must be manifested.

(11)

One syllable		Two or more syllables	
porte-clefs	'key ring'	porte-manteau	'coat rack'
garde-fou	'railing'	garde-manger	'meat safe'
garde-feu	'curfew'	garde-malade	'nurse'
couvre-lit	'coverlet'	couvre-douillette	'duvet cover'
ouvre-boîte	'can opener'	ouvre-bouteille	'bottle opener'

Notice that the number of phonetically expressed syllables the second term of the compound has only determines the presence/absence of a preceding schwa preceded by a consonant cluster. When the first term ends with a schwa preceded a single consonant, the schwa is always realized as zero (cf.(10)).

The review so far covers almost all the alternations involving schwa and zero word-internally and word-finally before pause. I now consider the behaviour of word-final schwa in phrases.

3.1.5 Word-final schwas in phrases

Similar to the situation with word-internal and word-final prepausal schwas, a word-final schwa preceded by one consonant is always unrealized phonetically. The following examples show that whatever the number of consonants at the beginning of a following word, a word-final schwa is not pronounced if it is preceded by a single consonant.

(12) Word-finally and followed by another word

longué route	'long way'	petité prairie	'small grassland'
grossé grenouille	'big frog'	bonné stratégie	'good strategy'
mangé vite	'eat fast'	robé bleue	'blue dress'
ampoulé brulée	'burned out bulb'		

Let us now consider word-final schwas preceded by two consonants that belong to the same word, and followed by another word. We have seen that before pause and preceded by two consonants a schwa is never realized phonetically. The situation is different, however, when another word follows the word-final schwa. Following the same pattern as compounds, in certain dialects of French, the manifestation of a word-final schwa preceded by two consonants varies depending of what follows. The pattern attested in compounds is also

observed in sequences such as noun-adjective and verb-adverb. Compounds show the same behaviour in all dialects of French. On the other hand, in my dialect of Québec French the pattern of alternation shown in (13) does not occur. Except in compounds, all word-final schwas preceded by a consonant cluster behave like pre-pausal schwas; they are never realized phonetically.

(13) Continental French

<u>One syllable</u>

arm<u>e</u> blanche	'a white arm'
aigl<u>e</u> noir	'a black eagle'
quatr<u>e</u> jours	'four days'
notr<u>e</u> père	'our father'
vest<u>e</u> rouge	'red jacket'
il parl<u>e</u> bas	'he speaks softly'
il parl<u>e</u> mal	'he speaks badly'

<u>Two or more syllables</u>

armé turquoise	'a turquoise arm'
(un) aiglé grisâtre	'a greyish eagle'
quatré journées	'four days'
notré papa	'our dad'
vesté rouge et blanche	'red and white jacket'
il parlé trop bas	'he speaks too softly'
il parlé mal et vite	'he speaks bad and fast'

(14) Québec French:

armə blanche	armə turquoise
aiglə noir	aiglə grisâtre
quatrə jours	quatrə journées
notrə père	notrə papa
vestə rouge	vestə rouge et blanche
il parlə bas	il parlə trop bas
il parlə mal	il parlə mal et vite

3.1.6 Schwa in monosyllabic words

Let us now consider the behaviour of schwa occurring in monosyllabic clitics. The following data show that a schwa occurring in a clitic is not manifested phonetically when it is preceded by a single consonant. This means that in such contexts the schwa is realized as zero when a preceding word ends with a vowel.

(15) Preceded by a word ending with a vowel

pas də scrupules	'no scruples'	rien də nouveau	'nothing new'
pas də lait	'no milk'	pas də crapaud	'no toads'
chien də chasse	'hunting dog'	tu nə dis rien	'you say nothing'
Marie lə dit	'Mary says it'	Marie sə coupe	'M. cuts herself'

Like schwa in word-internal position, a schwa followed by an h-aspiré must be realized as schwa.

(16) pas de haricots 'no beans'
beaucoup de haches 'many axes'
Marie le hache 'Mary chops it'

The examples given in (15) show that in clitics a schwa preceded by one consonant is not realized phonetically even if three consonants follow it (e.g. pas dé scrupules). Let us now see what happens when schwa is preceded by more than one consonant. In contrast with the examples given in (15), those in (17) show that schwa in the words de, se and le, is phonetically realized when it is preceded by a word ending with a consonant.

(17) a. bol de lait 'a bowl of milk'
bec de lièvre 'harelip'
clair de lune 'moonlight'
il le veut 'he wants it'
jour de l'an 'new year'
mal de tête 'headache'
Erik se rase 'Erik shaves himself'
Erik le dit 'Erik says it'

We may also find within a sentence sequences of clitics each containing a schwa. When these schwas are preceded by a single consonant, any of them can be realized as zero as long as two consecutive schwas are not both syncopated. In other words, the result must be a sequence of schwa-zero or zero-schwa.

(18) envie de te le demander 'desire to ask it to you'[5]

a.	e	e	e	e
b.	e	ø	e	Ø
c.	ø	e	Ø	e
d.	e	e	Ø	e
e.	Ø	e	e	Ø
f.	Ø	ə	ə	ə
g.	ə	Ø	ə	ə
h.	ə	ə	Ø	ə
i.	ə	ə	ə	Ø

Like traditional grammarians, I have considered almost all the different contexts where schwa alternates or fails to alternate with zero.[6] I now present another property of schwa, its alternation with the vowel ɛ.

3.2 Alternation between schwa/zero and ɛ

Under certain circumstances schwa alternates with ɛ. According to Dell (1973) schwa or zero are manifested as ɛ in the following contexts: (a) when schwa is the final phonetically expressed segment of a word (cf. paqu[ɛ]t) and (b) when schwa phonetically occurs in a

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[5]This example is taken from Dell (1973).

[6]With respect to the assertion that schwa alternates with zero word-internally after one consonant, there are some apparent problematic data which I will consider in a final chapter devoted to residual data.

word-internal or word-final closed syllable (cf. harc[ɛ]lément, hot[ɛ]l). As a form like harc[ɛ]lément shows, the latter context can be the result of the deletion of a second schwa in a sequence of two schwas.[7]

(19)

Zero			ɛ		
appeler	[aple]	'to call'	appel	[apɛl]	'a call'
achever	[asve]	'to finish'	achève	[asɛv]	'(he) ends'
			achèvement	[asɛvmã]	'ending'
cacheter	[kaste]	'to seal'	cachet	[kasɛ]	'a seal'
semeler	[səmle]	'to put a sole'	semelle	[səmɛl]	'sole'
paqueter	[pakte]	'to pack'	paquet	[pakɛ]	'parcel'

schwa			ɛ		
malmener	[malmane]	'to manhandle'	malmène	[malmɛn]	'manhandles'
ensorceler	[ãsɔrsəle]	'to bewitch'	ensorcelle	[ãsɔrsɛl]	'bewitches'
			ensorcellement	[ãsɔrsɛlmã]	'spell'
harceler	[arsəle]	'to harass'	harcelle	[arsɛl]	'harasses'
			harcèlement	[arsɛlmã]	'harassment'
bouquetière	[bukətjɛr]	'flower seller'	bouquet	[bukɛ]	'bouquet'
dentellière	[dãtəljɛr]	'lace maker'	dentelle	[dãtɛl]	'lace'
hotelière	[otəljɛr]	'hotel keeper'	hotel	[otɛl]	'hotel'

[7]According to Dell the first schwa of a sequence of two is not realized as ɛ if a cluster obstruent plus liquid follows it (cf. ensevelir 'to bury' [ãsəvlir], *[ãsɛvlir]). Dell's analysis will be considered in detail in the next section.

I conclude this section with the following chart which summarizes the contexts where schwa alternates and fails to alternate with zero and ɛ.

(20) A. Alternation between schwa and zero

Contexts	Schwa realized as zero		Schwa retained	
..C __ ##	maladé	'sick'		
..CC__ ##	macabré	'macabre'		
..VC__ CV..	souvénir	'remember'		
..VCC__CV..			fortement	'strongly'
..VC__CGV..			hotelière	'hotel keeper'
..#C__CV..	chéval	'horse'		
..#C__CCV..			degré	'degree'
#C__CVCVCV			chevalet	'support'
.(V) # C__hV..			va dehors	'go out'
.(V) # CC__CV..			la brebis	'the sheep'
..VC # C__ # CV..			bol de lait	'bowl of milk'
..V # C__ # CV..	pas dé lait			
..VC__ # CV(CV..)##	piqué-niqué	'picnic'		
	passé-partout	'master'		

..VCC__ # C_1V(C)] ##		porte-clef	'key ring'
		parle bas	'speaks softly'
		veste rouge	'red jacket'
..VCC__ # CVCV..	gardé-malade		'nurse'
	parlé lentement		'speaks slowly'
	veste rouge et blanche		'red and white jacket'
..C__C__CV..	enseveli 'to bury'		enseveli 'to bury'

B. Schwa realized as ɛ

..__C(C)(é) ##	app[ɛ]llé	'calls'
	cél[ɛ]bré	'celebrates'
	hot[ɛ]l	'hotel'
..__ ℓ ##	paqu[ɛ]t	'parcel'
..__Cé [-seg]	ach[ɛ]vement	'ending'

I turn next to a review of three previous analyses of schwa along with the problems raised by these earlier treatments of the vowel. Questions which remained unanswered in previous analyses lead me to consider a new account of the behaviour of schwa.

CHAPTER FOUR

EARLIER TREATMENTS OF SCHWA

4.0 Introduction

Faced with the alternation between vowel/zero one may consider that the presence/absence of the vowel is determined by phonotactic constraints. It might be argued that epenthesis applies or deletion fails to apply when a cluster of three or more consonants would be created. Such analyses of vowel alternation with zero appeal to "la loi des trois consonnes" (cf. Grammont (1914)). Either a vowel is inserted to break a sequence of consonants or a vowel is not subject to deletion if its deletion creates a sequence of three or more adjacent consonants. Treating the alternation between schwa and zero in French in terms of phonotactic constraints raises many problems. Such a possibility must be rejected in the light of the examples in (1). The data given in (1) below show that what matters with respect to a process of schwa deletion or schwa epenthesis is not the number of adjacent consonants the absence of schwa would create. The examples in (1a) show that schwa may be absent even though this results in a cluster of four consonants. These examples must be

compared with those in (1b) where in a same segmental environment the absence of schwa is not possible. It is clear that the consonantal environment cannot be what determines the presence or the absence of schwa.

(1)	a.	cassé-croute	[kaskrut]	'snack'
		porté-crayon	[pɔrtkrɛjõ]	'pencil rack'
		pas dé scrupules	[padskrüpül]	'no scruples'
	b.	casque rouge	[kaskaruz]	'red helmet'
		porte-craie	[pɔrtakrɛ]	'chalk rack'

These examples show that one cannot appeal to phonotactic constraints to account for the presence or the absence of schwa.

Phonological analyses of French schwa have served as the testing ground for a wide range of theories. Within the generative framework we may mention SPE, metrical phonology and syllable based theories. In the framework of linear phonology (i.e. the SPE), French schwa has been analyzed by Schane (1968), Dell (1973), Tranel (1974), to mention but a few. With respect to the metrical and syllable based approaches, schwa has been analyzed by Selkirk (1978) and Anderson (1982). In this section I present a fairly detailed discussion of three previous analyses of schwa. Dell represents the SPE framework,

Anderson and Selkirk represent syllable and the metrical theories, respectively. I start with Dell whose analysis of schwa has become the point of departure for the other analyses.

4.1 Dell's analysis of schwa

Dell (1973) argues that some phonological processes may be accounted for by proposing that schwa is underlyingly present in the representation of particular words. Schwa is however different from all other vowels of French principally because it has the special property of alternating with zero.

He starts his analysis by justifying the presence of underlying schwas in word-final position in certain words. His argumentation goes as follows. The presence of underlying schwa in word-final position is motivated by the behaviour of the last consonant of certain adjectives in their feminine and masculine forms. Consider the adjective petit 'small'. Now compare its masculine forms with its feminine ones.

(2) a. Masculine forms

petit clou	[pətiklu]	'small nail'
petit drapeau	[pətidrapo]	'small flag'
petit tapis	[pətitapi]	'small rug'
petit bois	[pətibwa]	'small wood'
petits abats	[pətizaba]	'small giblets'
petits amis	[pətizami]	'boy friends'

b. Feminine forms

petite cloture	[pətitklɔtür]	'small fence'
petite draperie	[pətitdrapri]	'small curtain'
petite tortue	[pətittɔrtü]	'small turtle'
petite boîte	[pətitbwat]	'small box'
petites amies	[pətitzami]	'girl friends'
petites autos	[pətitzoto]	'small cars'

We see that the final t of petit is phonetically realized in the feminine forms but not in the masculine ones. Because Dell assumes a unique underlying representation for the adjective petit, he proposes that the final consonant t is underlyingly present in both the masculine and feminine representation. This consonant is subject to deletion before a consonant as well as in word-final position. The rule of consonant deletion is given in (3).

(3) Rule of final deletion

$$[-son] \rightarrow \emptyset \; / \; \_\_\_ \; \begin{Bmatrix} + C \\ \# \\ \#\# \end{Bmatrix}$$

The rule accounts for the following pronunciations.

(4)

a.	petits amis	[pətizami]	/pətit+z # ami/	[-son] --> Ø / __ +C
b.	petit clou	[pətiklu]	/pətit # klu/	[son] --> Ø / __ #C
c.	plus petit	[plŭpəti]	/pətit##/	[-son] --> Ø / __ ##

Dell's analysis accounts for the fact that the final t in the masculine forms of petit is not realized before another consonant. Whether the following consonant belongs to another word or if it is the plural morpheme, the presence of this following consonant triggers the application of rule (3). But Dell must now account for the realization of the t of petit in the feminine forms.

(5)

petites amies	[pətitzami]	'girl friends'
petite cloture	[pətitklɔtür]	'small fence'
petite clef	[pətitkle]	'small key'
la petite	[lapətit]	'the small one'

To account for the apparent problem in the feminine forms, Dell proposes that the feminine inflexion is a final schwa. The underlying representation of petit and petite are now respectively:

(6) petit: /pətit/ petite: /pətit+ə/

The final schwa, present in the feminine form even though not realized phonetically, prevents the preceding consonant from being deleted by rule (3). In the examples given in (7), the t of petite is no longer final or adjacent to a following consonant since schwa follows it in the lexical representation. Therefore the structural condition of rule (3) is not met and no consonant deletion occurs.

(7)	petite cloture	[pətitklɔtür]	/pətit+ə # klɔtür/
	petites amies	[pətitzami]	/pətit+ə + z # ami/
	petite	[pətit]	/pətit+ə ##/

The proposal that the difference between the masculine and the feminine is the presence in the latter of an underlying final schwa, accounts for the manifestation of the consonant in the feminine forms as well as its absence in the masculine ones. In Dell's analysis there is one feminine inflexion: schwa. This schwa is present in feminine forms of all adjectives.

	Masculine		Feminine			
	petit	[pəti]	petite	[pətit]	/pətit+ə/	'small'
	rare	[rar]	rare	[rar]	/rar+ə/	'rare'
	flou	[flu]	floue	[flu]	/flu+ə/	'vague'

Given Dell's account of the phonetic manifestation of the final consonant in the feminine adjectives, he must generalize the presence of final schwa to any word which is phonetically realized with a final obstruent. The careful reader will have noticed that his rule of consonant deletion is not restricted to adjectives. The rule says that any obstruent is deleted in word-final position. Accordingly, he must analyze all words ending with an obstruent as having an underlying final schwa which prevents the consonant from being deleted. The question arises whether this strong proposal is motivated. It would be desirable to find phonetic evidence of the presence of such an abstract segment. Fortunately, the presence of final schwas can be found. Compare the following two groups of words which show that a final schwa is manifested in some contexts.

(9) Dell's facts:

a. Without schwa

quelle outre	[kɛlutr]	'what water skin'
petite auto	[pətitoto]	'small car'
porte-manteau	[pɔrtmãto]	'coat holder'
garde-malade	[gardmalad]	'nurse'

b. With schwa[1]

quelle housse	[kɛlaus]	'what dust-cover'
petite hausse	[ptitaos]	'small raise'
porte-clefs	[partakle]	'key ring'
ouvre-boîte	[uvrabwat]	'can opener'

Words given in (9b) show that a word-final schwa is phonetically manifested under certain circumstances. It is phonetically realized before words beginning with an "h-aspiré" and in compounds where the second term is phonetically monosyllabic. Comparing forms given in (9a) with those in (9b) leads to the conclusion that word-final schwas alternate with zero.

Moreover, the alternation of schwa with zero is not restricted to word-final position. It also occurs word-internally. Since schwa is sometimes manifested and sometimes not, this now raises the question as whether schwa is an epenthetic vowel or if it is subject to rules of deletion. Dell poses this question in considering the following type of examples.

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[1]The pronunciations in (9b) are those given by Dell (1973). It is not the case that before words beginning with "h-aspiré" those final schwas are manifested in all dialects of French. I will consider some differences between the dialect of French spoken in Paris and in Montréal later in the thesis.

(10) a.	cette pelouse	[sɛtpəluz]		'this lawn'
	la pelouse	[lapluz]		'the lawn
	vs			
	cette place	[sɛtplas]	*[sɛtpəlas]	'place'
	la place	[laplas]		'the place'
b.	Marie secoue	[marisku]		'Mary shakes'
	Paul secoue	[pɔlsəku]		'Paul shakes'
	vs			
	Marie skie	[mariski]		'Mary skies'
	Paul skie	[pɔlski]	*[pɔlsəki]	'Paul skies'

One who proposes that schwa is subject to epenthesis would require the following rule.

(11) Ø --> ə / CC ___ C

Proposing this rule of epenthesis would entail that a lot of words be treated as exceptions to it. For example whereas pelouse and secouer would be subject to epenthesis of schwa, words like place [plas] and skier [skije] would not. In addition to this problem, proposing epenthesis and retaining the proposal of an underlying word-final schwa (to prevent certain consonants from being deleted in final position) would have the consequence of requiring both a rule of schwa deletion and one of schwa epenthesis. Consequently, Dell proposes that schwa

is always underlyingly present and that it is subject to certain rules of deletion. To account for its deletion in the examples given in (10) he proposes the following two rules.

(12) a.	VC_1:	ə --> Ø / V #$_1$ C __	A schwa is deleted when preceded by a word ending with a vowel.
b.	E-FIN:	ə --> Ø / VC __#	A schwa preceded by one consonant is deleted in word-final position.

Rule (12b), which must be ordered before rule (12a), accounts for the deletion of the final schwa of cette and place as in cette place. Rule (12a) accounts for schwa deletion when it occurs in the first syllable of a word which is preceded by another word ending with a vowel (Marie sécoue vs Paul secoue).

In his analysis, Dell considers all the cases of alternation between schwa, zero and ɛ reviewed in chapter three and he proposes linear rules to account for these alternations. The rules governing the alternation with ɛ are expressed and ordered in such a way that they account for the alternations as well as for the failure of schwa to alternate.

Dell provides a very careful analysis of schwa. He not only considers all the contexts where schwa alternates or fails to alternate with zero and ɛ, but he also relates his analysis of schwa to other phonological phenomena present in French. We saw that proposing schwa as the feminine inflexion permits a unique representation of the feminine inflexion. In addition, it leads to an account of the behaviour of the final consonant of adjectives in their feminine and masculine forms. Dell also provides a way of distinguishing nasal vowels from sequences vowel plus nasal consonant (at the phonetic level). His proposal is that all nasal vowels in French are derived from a sequence vowel plus nasal consonant. The nasal consonant nasalizes a preceding vowel in a context where this consonant occurs before another consonant or before a word boundary. The nasal consonant is then deleted after nasalization takes place. The relevance of schwa to nasalization is that according to Dell, the presence of schwa provides an account for the absence of nasality of the vowel in certain words. In words where a nasal does not nasalize a preceding vowel, a schwa follows the nasal consonant, preventing nasality to take place. Compare the two words <u>caneton</u> [kəntõ] 'duckling' and <u>canton</u> [kãtõ] 'district'. According to Dell, a schwa is present in tne representation of the first word but not in the latter: caneton: /kanəton/ [kantõ], canton: /kanton/ [kãtõ]. Because

of a following schwa, in caneton the nasal consonant is not adjacent to a following consonant and it cannot nasalize the preceding vowel.[2]

To summarize, the main features of Dell's analysis are that it provides a comprehensive description of the facts and serves as a basis for explaining other phonological phenomena present in French. Note also that a strong claim is made. All words ending with an obstruent phonetically expressed, are analyzed as ending with a word-final schwa which is subsequently deleted. I will come back to this proposal later in my analysis of schwa.

4.1.1 Problems with Dell's analysis

With respect to the problems raised by Dell's insightful analysis, they can be traced back to the SPE framework, admittedly the only one available at the time. Linear analyses are arbitrary in the sense that while they do describe the observational facts, they do not explain why things are the way they are. Considering any rule, there is never an answer as to why things are not different, e.g. as to why a given process takes place in a given context and not in

[2] See Prunet (1986) for an analysis of nasalization in French in terms of a floating vs non-floating nasal segment.

another one. For example, a rule which says that schwa is deleted when preceded by one consonant but is not deleted when preceded by two consonants describes the facts, but does not explain them. Since the behaviour of schwa is not determined by phonotactic constraints, why is schwa not deleted after two consonants and preserved after a single one? A rule never provides an answer to such questions. In addition, it is possible to formulate rules that express attested as well as unattested processes. It would, for example, be possible to write a rule saying that schwa is deleted after a liquid, even if such a process is never attested. But these problems pertain to the framework and not to any particular analysis.

With respect to the particular analysis of Dell, his proposal to analyze words ending phonetically with an obstruent, as ending with an underlying final schwa appears to be fully justified. Unfortunately, no attempt was made to extend this proposal to words ending with any consonant. He considers that words ending phonetically with i) an obstruent, ii) a sonorant (in feminine form of adjectives), iii) a nasal when the preceding vowel is not nasal, have a final schwa in their representation. Moreover, while he claims that the feminine form of the invariable adjective <u>rare</u> [rar] 'rare' has a final schwa in its representation, Dell does not motivate why he does not

attribute a similar structure to the masculine form. More precisely, while Dell considers, in the light of feminine adjectives, that a sonorant may be followed by a schwa, he makes no attempt to generalize his proposal to any word ending phonetically with a consonant. In addition, a linear analysis of schwa does not explain why schwa is the only vowel of French that is subject to alternation with zero. What is it that differentiates schwa from all the other vowels? A rule gives also no answer as why some contexts block schwa deletion while some others do not. Finally, there is no attempt to generalize the properties of French schwa to other languages where similar alternations are found. Dell's linear analysis is language specific; it is restricted to French, and the properties of schwa are also accidental. All these unresolved problems lead linguists to consider alternative analyses of schwa. Let us consider what Selkirk (1978) proposes as a new account of the behaviour of schwa.

4.2 Selkirk's analysis of French schwa

Faced with the alternation schwa/Ø in French, Selkirk proposes an analysis of the phenomenon in metrical terms. A syllable containing schwa she claims, forms a binary foot along with a preceding syllable. Feet are left dominant (labelled strong/weak). A schwa,

which occupies the weak branch of a binary foot, is deleted. Selkirk agrees with Dell that schwa is a phonemic vowel of French which is subject to deletion. According to her, the vowel schwa is present in the lexical representation of particular words and it is subject to deletion.

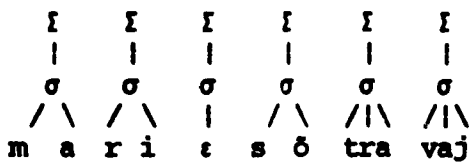
In her analysis Selkirk seeks primarily to derive, in terms of principles of metrical theory, the following three rules of schwa deletion proposed by Dell.

(13) Dell's analysis

1. ə ---> Ø / VC ___ # OBLIG
2. ə ---> Ø / VC ___ OBLIG
3. ə ---> Ø / V#$_1$ C ___ OPT

Following the work by Liberman (1975) and Liberman and Prince (1977), Selkirk postulates that syllables are grouped together into feet. The French foot she claims, generally consists of a single syllable. Let us consider the representation of the sentence Marie hait son travail 'Mary hates her work'.

(14)

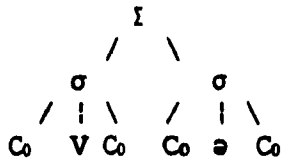


Σ=foot

σ=syllable

The structure given in (14) contains a sequence of non-branching feet, each of them consisting of a single syllable. As Selkirk claims, however, the French foot can be more complex:

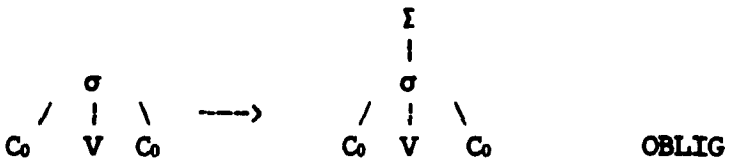
(15) "There are instances, however, where the French foot is more complex, I would claim. I submit that yet another principle is at work in the definition of the foot in French, a principle according to which a syllable containing ə may join together with a preceding syllable and with it constitute a foot." (Selkirk; 1978:143)



In addition, she argues that within a foot, the syllable containing schwa is weakened. According to the conventions of metrical theory the syllable with schwa is labelled weak (w) and its sister is strong (s). Let us now consider the foot formation rules proposed for French by Selkirk.

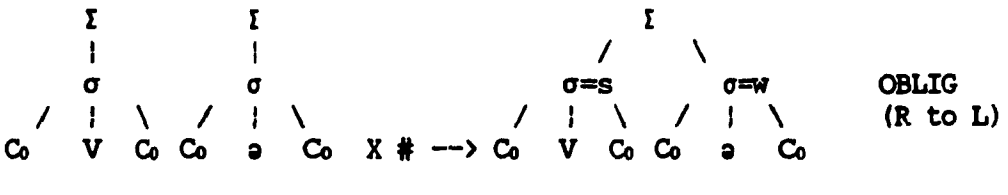
(16) French Foot Formation

I. The Simple Foot

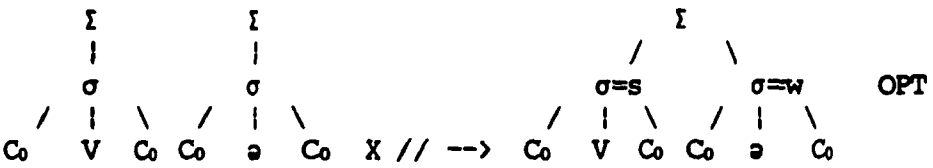


II. The Derived Foot

A.



B.

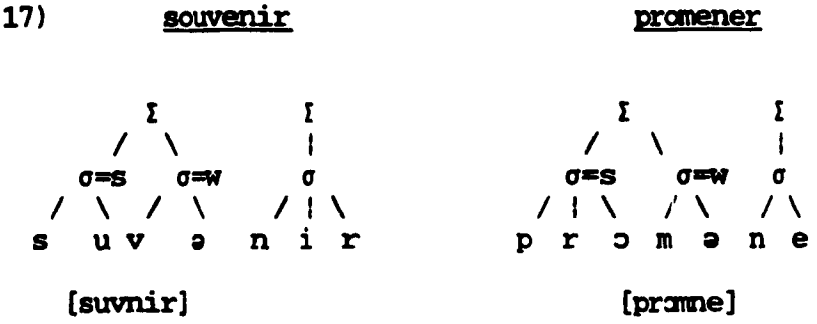


Principle I, i.e. the formation of the simple foot, says that any syllable is a foot. Principles IIA and IIB give to schwa a special treatment. IIA operates word-internally (between word boundaries), and is obligatory, while IIB has the entire utterance contained between pause boundaries as its domain and is optional. As claimed by Selkirk:

"According to IIA, no syllable with ə can constitute a foot of its own inside a word — unless of course, it's a monosyllable." (Selkirk; 1978:144)

Let us now apply these principles to some words.

(17)



In order to account for schwa deletion, Selkirk proposes the following rule:

(18) ə Syncope

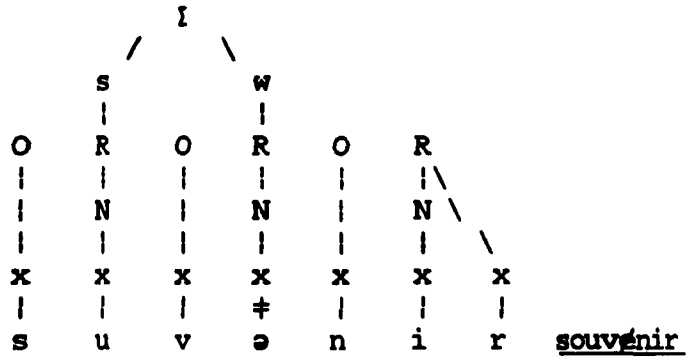
ə ---> ø / Σ[...VC ___...]Σ OBLIG

The rule says that schwa is deleted when it is the right member of a binary foot and when it is separated by only one consonant from the

preceding vowel.[3]

By proposing that a syllable containing a schwa constitutes a binary relation with another syllable, Selkirk accounts for the manifestation of zero word-internally.

(19) Selkirk's:

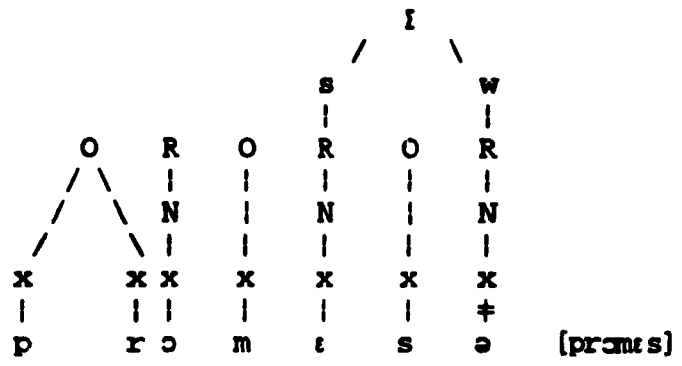


Her analysis also accounts for the deletion of schwa in word-final position of polysyllabic words. Schwa deletion in word-final position is in fact what motivates Selkirk's proposal that schwa is in a binary relation with a preceding vowel. According to her analysis the final syllable containing schwa forms a foot along with a preceding syllable. Being the weak member of the foot, schwa is

[3]Selkirk's observation that only one consonant must intervene between schwa and the preceding vowel will be consider in chapter six. I will propose a principle which accounts for this observational fact.

deleted.

(20)



In order to account for the absence of schwa deletion in words like fortement 'strongly', that is, in cases where word-internal schwa is preceded by two consonants, she adds the specification that schwa must be separated from the preceding vowel by one consonant in order to be subject to deletion. While this specification allows her to account for the failure of schwa deletion to apply word-internally, it restricts the instances of schwa deletion in word-final position to cases where the final schwa is preceded by one consonant. That is, Selkirk accounts for the pronunciation of words like bêtə 'beast', lentə 'slow', grandə 'tall' etc., but not for one of words like quatrə 'four', vertə 'green (fem)', biblə 'bible' etc. As a result of the behaviour of word-final schwas in words like vertə, Selkirk relies on the following linear rule of schwa deletion in

word-final position proposed by Dell.

(21) Dell's rule of "E-FIN$_2$" (facultative)

ə ---> Ø / CC___#

The preceding outlines the main lines of Selkirk's analysis. Let us next consider the problems with her analysis.

4.2.1 Problems with Selkirk's analysis

Although Selkirk accounts for word-internal and word-final schwa deletion when preceded by a single consonant, she has no metrical explanation as why internal schwa cannot be incorporated into a binary foot when two consonants precede it. In the absence of metrical explanation she is forced to specify the context of application of her "metrical" rule of schwa syncope. The rule affects the schwas which are preceded by a vowel unless those schwas have a consonant cluster to their left. However, while her rule of schwa syncope accounts for the behaviour of both word-internal and word-final schwas preceded by a single consonant, it does not capture both the behaviour of word-internal and word-final schwa after two consonants. On the one hand, the fact that a word-internal schwa is

not syncopated when it is preceded by a cluster is accounted for by the restrictive context of the rule (only one consonant can intervene between schwa and the preceding vowel). On the other hand such a restrictive context is not always required for word-final schwa. Because the manifestation of word-final schwas after a cluster varies, Selkirk relies on the following linear rule proposed by Dell.

(22) Dell's rule of "E-FIN$_2$" (facultative)

$$\text{ə} \longrightarrow \emptyset \;/\; CC\_\_\#$$

The optionality of this rule does not, however, solve the problem of the behaviour of schwa in compounds. In compounds, the final schwa of the first member is sometimes realized and sometimes it is not. This behaviour does not follow from the optional application of rule (22). Preceded by a consonant cluster, the final schwa of the first term is always absent before a word which has more than one phonetically expressed syllable, and is attested when the second term is phonetically monosyllabic.

(23)

With schwa		Without schwa	
porte-clés	'key ring'	porté-manteau	'coat rack'
porte-plume	'penholder'	porté-crayon	'pencil holder'
porte-carte	'card holder'	porté-cigare	'cigar case'
porte-voix	'megaphone'	porté-parole	'spokesman'
couvre-livre	'book cover'	porté-avion	'aircraft carrier'
tourne-disque	'turntable'	porté-bonheur	'lucky charm'
tourne-vis	'screwdriver'	porté-monnaie	'wallet'
ouvre-boite	'can opener'	ouvré-bouteille	'bottle opener'
garde-robe	'wardrobe'	gardé-manger	'meat safe'
garde-fou	'railing'	gardé-malade	'home nurse'
garde-pêche	'water bailiff'	gardé-champêtre	'rural policeman'

In addition, Selkirk's metrical analysis does not account for the fact that schwa can be realized as zero in the initial syllable of bisyllabic words. It is impossible, in a bisyllabic word where schwa is initial, to create a binary foot where schwa is the right branch of the foot.[4]

(24)

chémin	'road'	chéval	'horse'
sémaine	'week'	léver	'to stand up'
méner	'to lead'	chémise	'blouse'
jéter	'to throw'	rédonne	'give again'
chénil	'kennels'	vénir	'to come'
démande	'ask'	ténir	'to hold'
séringue	'syringe'	démain	'tomorrow'
cérise	'cherry'	pétit	'small'

[4] Selkirk could argue that the words in (24) must be preceded by a clitic, e.g. determiner of pronominal. The imperative forms of verbs clearly show that this claim cannot be maintained.

rəviens ici	'come back here'
dəmandé les	'ask for them'
rətourné les	'return them'
rəgarde moi	'look at me'

And finally, there is no explanation as why schwa and no other vowel is incorporated into a metrical binary foot.

Those unanswered questions lead Anderson (1982) to propose an alternative analysis of schwa. Let us next consider what he proposes to account for the special properties of schwa in French.

4.3 Anderson's analysis

In his analysis of schwa, Anderson seeks to provide an answer to the following questions: (1) Why is schwa the only vowel of French subject to alternation with zero? (2) Why are internal schwas always realized as zero after one consonant and always realized as schwa after a consonant cluster? To account for these, he proposes that schwa is the phonetic interpretation of an empty nucleus present in the lexical representation of particular words. The main aspects of his analysis can be summarized as follows.

4.3.1 Zero as an alternant of schwa; a case of resyllabification

In French we are faced with an alternation involving schwa, zero and ɛ. Anderson agrees with Dell that schwa is not an epenthetic vowel. If schwa is not an epenthetic vowel, what must first be determined is the underlying value of the segment. There seem to be three possibilities; the underlying value may be schwa, zero or ɛ. Let us consider what leads Anderson to propose that zero must be chosen for the underlying representation of schwa.

Following Dell, Anderson considers schwa as phonetically identical to the vowel [oe]. What this means is that one who chooses /oe/ as the underlying value of schwa faces a major problem, namely to distinguish stable from unstable oe's. Even if schwa is phonetically identical to [oe] the two segments do not show the same behaviour. As the examples given below show, there are properties that differentiate stable from unstable oe's.

(25) A. Stable oe

i) Stable oe does not alternate with zero.

la jeunesse	[la žoenɛs]	*[laž̌nɛs]	'the youth'
le jeunet	[loežoenɛ]	*[loež̌nɛ]	'the youngster'

ii) Stable oe alternates with ö.

veulent	[voel]	'want pl.'	veut	[vö]	'want sg.'
malheur	[maloer]	'misfortune'	malheureux	[malörö]	'unfortunate'

B. Unstable oe (i.e. schwa)

i) Unstable oe alternates with zero.

forte	[fœrt]	'strong'	fortement	[fœrtoemã]	'strongly'
un cheval	[oe̯šval]	'horse'	un chevalier	[oe̯šoevalje]	'horseman'
tu demandes	[tüdmãd]	'you ask'	il demande	[ildoemãd]	'he asks'

ii) Unstable oe alternates with ɛ

appeler	[aple]	'to call'	(il) appelle	[apɛl]	'he calls'
harceler	[arsoele]	'to harass'	harcèlement	[arsɛlmã]	'harassment'
hotelier	[otoelje]	'hotel-keeper'	hotel	[otɛl]	'hotel'

The preceding data show that there are two kinds of oe. A stable and an unstable one, the so-called schwa. Whereas stable oe cannot be manifested as null, the unstable one can be. Whereas stable oe alternates with ö in open syllable, the unstable one alternates with ɛ in what seems to be a closed syllable. And finally, whereas stable oe occurring in word-final position can be accentuated, stress falls on the penultimate syllable of a word containing an unstable oe in this position. Thus, one who proposes /oe/ as the underlying representation of schwa is forced to find a way of distinguishing the two

vowels. This lead some authors (cf. Morin (1978)) to the proposal of marking unstable oe with a diacritic.

Since the vowel ɛ is also a manifestation of schwa or zero, a second possibility is to choose /ɛ/ as the underlying representation of schwa. Once again this option faces problems. The vowel /ɛ/ as in rêver 'to dream' and allaiter 'to nurse', neither alternates with zero nor with schwa.

(26)					
	rêver	[rɛve]	*[rəve]	*[rve]	'to dream'
	tu rêves	[rɛv]	*[rəv]		'you call'
	allaiter	[alɛte]	*[aləte]	*[alte]	'to nurse'
	tu allaites	[alɛt]	*[aləte]		'you nurse'

On the other hand the ɛ found in the second person singular forms of the verbs appeler 'to call', haleter 'to gasp' and harceler 'to harass' does alternate both with zero and schwa.

(27)					
	appeler	[aple]	*[apɛle]	*[apəle]	'to call'
	tu appelles	[apɛl]	*[apəl]		'you call'
	haleter	[alte]	*[alɛte]	*[aləte]	'to gasp'
	tu haletes	[alɛt]	*[aləte]		'you gasp'
	harceler	[arsəle]	*[arsɛle]	*[arsle]	'to harass'
	tu harceles	[arsɛl]	*[arsəl]		'you harass'

There remains a third possibility. Namely to propose that the underlying representation of schwa is zero and that under certain circumstances zero is realized as schwa or as ɛ. This third option is chosen by Anderson. He analyses schwa as an empty nuclear position present in the lexical representation. As he mentions:

> "Such a representation relies on the fact that a structurally present syllable must ... contain a nuclear position. Syllables with "schwa" in French are then treated as analogous to "empty nodes" in syntactic representation: elements which are structurally present, but to which no designated content is assigned in underlying form." (Anderson p.551)[5]

There are many advantages of this representation. By assuming that French has a rule of schwa-spelling which realizes an unfilled empty nucleus as schwa, it is possible to explain why it is this segment and no other vowel that alternates with zero. According to Anderson, the alternation between zero and schwa is not accounted for

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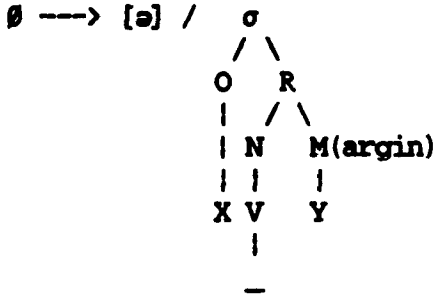
[5] Kaye and Lowenstamm (1980) in their article "De la syllabicité" which appeared in (1984), had independently the same conception of the underlying representation of a vowel which alternates with zero.

by a rule of epenthesis or deletion, but by the following rule of schwa-spelling.

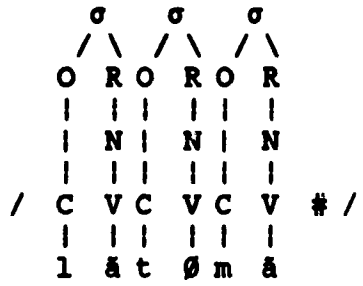
(28) Anderson's rule of schwa-spelling:



> "...(regardless of the content of the rest of the syllable), if its nucleus is unfilled, this segment (nuclear point [MC]) is assigned the features of [oe]." (Anderson p.552)

Now that it is clear what motivates Anderson to propose zero as the underlying value of schwa, let us consider the main lines of his analysis. Anderson does not fully motivate the presence of syllables with empty nuclei in certain words. He adopts the underlying representations that Dell has postulated. He proposes, for example, the following representation for a word such as lentement 'slowly'.

(29)



Consider, first, word-internal positions. We know that schwa is not manifested phonetically when it is separated from the preceding vowel by one consonant. In Anderson's terms, an empty nucleus receives no phonetic content when one consonant intervenes between this nucleus and the preceding vowel. He proposes that this fact follows from principles of resyllabification. A consonant occurring in the onset position of a syllable containing an empty nucleus is resyllabified into a preceding open rime. The resyllabification of the onset consonant results in a syllable which has an empty onset and an empty nucleus. If this syllable has also no coda, it is deleted by the following rule of syllable deletion.

(30) [$_{\sigma}$ Ø] ---> Ø In French: Delete a syllable which contains no specified material.

If we reconsider the word lentement 'slowly' the proposed lexical representation for such a word is three open syllables with the second one containing an empty nucleus. Since the rime preceding the second syllable with an empty nucleus is open, the onset of this second syllable is resyllabified into the preceding open rime. As a result, the second syllable now has an empty onset, an empty nucleus and no coda; it constitutes an "empty syllable" which is deleted by the rule of syllable deletion given in (30). Anderson, therefore, accounts for the absence of word-internal schwa preceded by one consonant by both a process of resyllabification and a rule of empty syllable deletion. In (31,32) I present these two rules and derive the pronunciation of the word lentement.

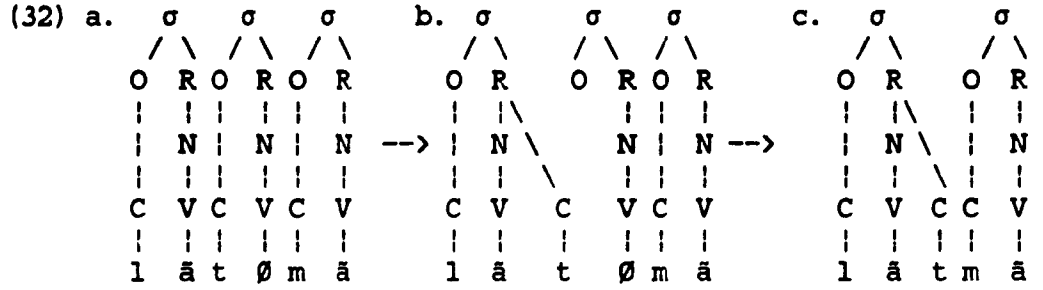
(31) Word-internal resyllabification: $V\ ]_{\sigma}\ \ [_{\sigma}\ C_0\ \emptyset\ ]$

$1 \qquad 2\ \ 3$

$1 + 2\ ]_{\sigma}\ [_{\sigma}\ 3\ ] \longrightarrow V\ C_0\ ]_{\sigma}\ [_{\sigma}\ \emptyset\ ]$

Rule of syllable deletion: $[_{\sigma}\ \emptyset\ ] \longrightarrow \emptyset$

(32)



The fact that zero is not possible when preceded by two consonants (cf. fortement [fɔrtəmã] *[fɔrtmã] 'strongly') follows from the fact that a coda cannot branch, thus making it impossible for the onset to be resyllabified into the preceding rime (N.B. the coda is already filled). In the case of a liquid plus obstruent cluster preceding a schwa for example, the coda of the preceding rime is already filled and there is no room for another segment (cf. 33b). Because the consonant remains in the onset position of the syllable containing the empty nucleus, this syllable is not subject to deletion and consequently the rule of "schwa-spelling" applies (cf. 33c).[6]

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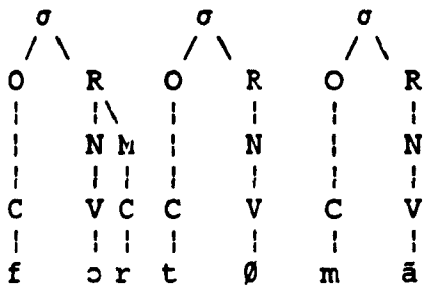
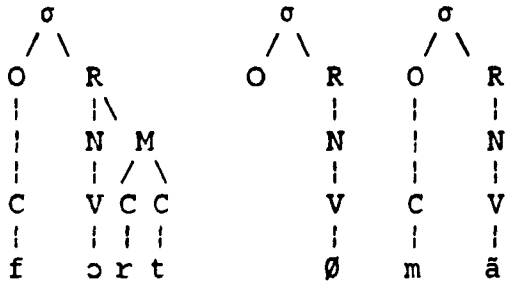
[6] We will see, however, that Anderson claims that a word-final coda can branch. I suppose that he has a principle preventing a branching coda followed by an empty onset, i.e. a principle preventing a word-internal coda to branch. See also Kahn (1976), Kiparsky (1979) among others, for precedence of filling onsets.

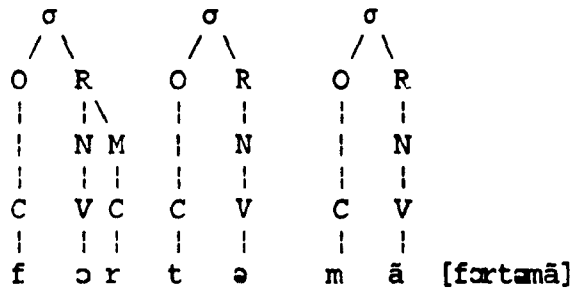
(33) a.



b. *



c.



[fɔrtəmã]

The rule of empty syllable deletion along with the resyllabification of the onset into a preceding open rime accounts for the alternation between schwa and zero word-internally.

Considering next the behaviour of word-final schwa, Anderson adopts Dell's proposals that French has a process of word-final consonant deletion and that the presence of a final schwa (i.e. a final empty nucleus) prevents a preceding consonant from being deleted. In contrast with the situation word-internally, the empty nucleus in word-final pre-pausal position is never interpreted phonetically (ex. petitɇ 'small', fortɇ 'strong'). This fact is accounted for by the resyllabification of the consonant in the onset of the word-final syllable containing the empty nucleus, into a preceding coda. Note here that Anderson is forced to say that unlike a word-internal coda, a phonetically word-final one can branch.[7]

(34) Word-final resyllabification:

$$\begin{array}{llllllllll} [_\sigma & C_0 & V & C_0 &] & [_\sigma & C_0 & \emptyset &] & \# \\ & 1 & 2 & 3 & & & 4 & 5 & & 6 \end{array}$$

$$[_\sigma\ 1\ \ 2\ 3 + 4\ ]\ [_\sigma\ \ 5\ ]\ 6 \ \longrightarrow\ [_\sigma\ C_0\ V\ C_0\ \ C_0\ ]\ \ [_\sigma\ \emptyset\ ]\ \#$$

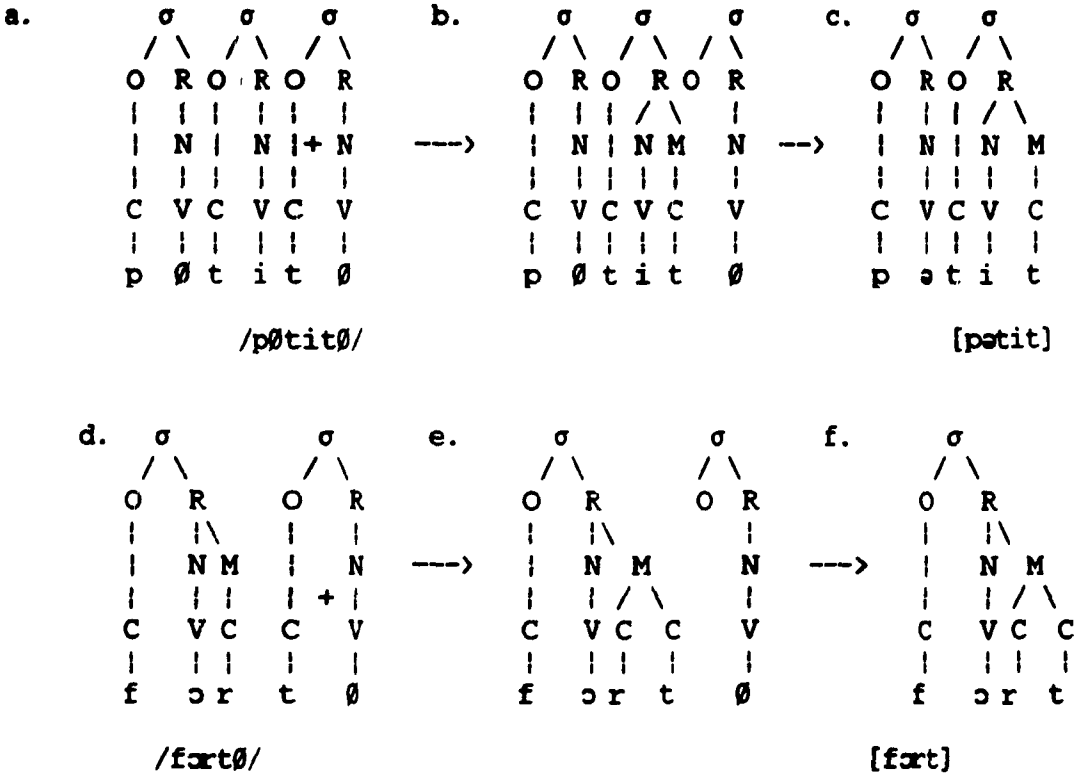
---

[7] After the resyllabification of the onset and the application of the rule of empty syllable deletion, the coda finds itself in word-final position.

The rule of word-final resyllabification is different from the one of word-internal resyllabification. In the latter rule, the rime preceding the syllable containing the empty nucleus cannot be branching (cf. word-internal schwa must be manifested after two consonants). This restriction is not needed for the rule of word-final resyllabification. Unlike word-internally, a word-final schwa is manifested as zero following a single consonant or a consonant cluster.

The rule of word-final resyllabification accounts for the absence of schwa in the final syllable of words such as petite /pØtit+Ø/ [pətit] 'small (fem)' and forte /fɔrt+Ø/ [fɔrt] 'strong'. The onset of the syllable containing the empty nucleus is resyllabified into the preceding rime regardless of the fact that this preceding rime is already branching. After resyllabification, a final empty syllable remains and is deleted by the rule of empty syllable deletion.

(35)



The absence of schwa in the initial syllable of a word preceded by another word ending with a vowel is accounted for by the rule of resyllabification between words.

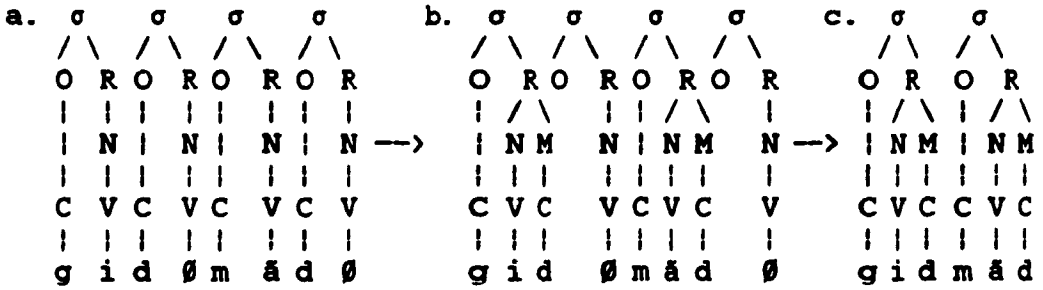
(36) resyllabification between words:

V]$_\sigma$ # [$_\sigma$ C Ø]
1 2 3 4

1 2 3]$_\sigma$ [$_\sigma$ 4] ---> V # C]$_\sigma$ [$_\sigma$ Ø]

The rule of resyllabification between words accounts for the absence of schwa in the initial syllable of a word like the verb demander 'to ask' for example, when it is preceded by another word ending with a vowel as in Guy dømande 'Guy asks'. In spite of an intervening boundary, the onset of a syllable containing an empty nucleus is resyllabified into a preceding open rime.

(37)



/ gidØmădØ/ [gidmăd]

The preceding discussion summarizes how Anderson accounts for the regular fact that a word-internal schwa can be unrealized phonetically after one consonant, that it must be realized after a consonant cluster, and that word-final schwa can be unrealized regardless of the number of consonants to its left. His analysis is based on principles of resyllabification. A syllable is deleted if its nucleus is empty and its onset has been resyllabified into a preceding rime. If resyllabification of the onset is not possible, the syllable is not deleted and the empty nucleus is spelled-out as schwa.

4.3.2 Alternation with ɛ

Concerning the alternation with [ɛ], Anderson proposes that an empty nuclear position occurring in a closed syllable ("where there is at least one consonant in the coda" [SA]) is spelled out as [ɛ]. Recall that a syllable containing a coda is not subject to deletion, because if there is a coda, the syllable contains specified material. The rule is formulated as follows:[8]

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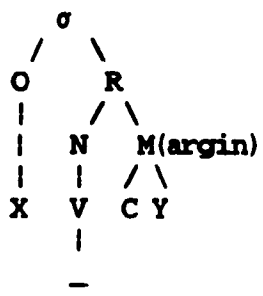
[8] The rule is said to apply both to an empty nucleus and to the vowel e.

(38) [Ø —> [ɛ] /
e]



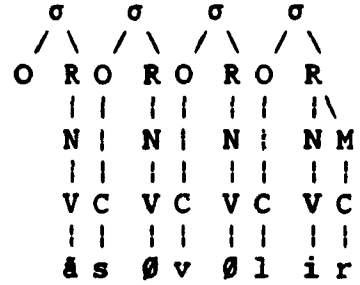
Let us first consider the difference between rule (38) and rule of schwa-spelling. What distinguishes the contexts of the two rules is that while the rule of schwa-spelling applies whether or not the margin of the syllable is filled, rule (38) only applies when the margin is filled. More precisely, an empty nucleus is spelled-out as schwa whether or not its syllable has a filled margin. On the other hand, rule (38) only applies when an empty nucleus occurs in a closed syllable.

According to schwa-spelling an empty nucleus occurring in a closed syllable is manifested as schwa. According to rule (38) an empty nucleus occurring in a closed syllable is manifested as ɛ. The question arises as to what determines the application of these rules when either may apply in a particular context. In order to resolve the conflict, Anderson proposes an order of application of those rules. He proposes that rule (38) applies first, followed by rules of

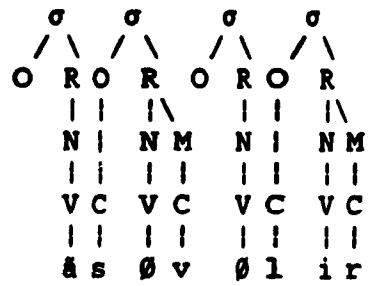
resyllabification, syllable deletion and schwa-spelling. Finally, rule (38) applies a second time. Note that if the first application of rule (38) is not possible (if the empty nucleus occurs in an open syllable for example) but that the rule of resyllabification creates a situation where the empty nucleus now occurs in a closed syllable, this empty nucleus will be realized as schwa and not as ɛ. On the second application of rule (38), it has been bled by the earlier application of the rule of schwa-spelling. Given that rule (38) applies to e and zero, but not to schwa, an empty nucleus which underwent the rule of schwa-spelling cannot be manifested as ɛ, since schwa is not one of the segment which is subject to rule (38). Thus, the application of the rule of schwa-spelling bleeds the reapplication of rule (38). This is illustrated in the following derivation of the word ensevelir [ãsəvlir] * [ãsɛvlir] 'to bury'.

(39) ensevelir 'to bury' /ãsØvØlir/ [ãsəvlir]

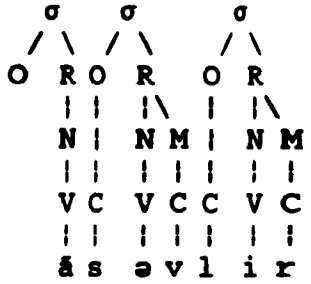
a. Non-application of rule (38)



b. Resyllabification



c. Syllables deletion
Schwa-spelling



In this word the leftmost word-internal empty nucleus is not realized as ɛ because underlyingly it does not occur in a closed syllable. The derivation goes as follows: as shown in (39a) the first application of rule (38) is impossible because the two empty nuclei do not occur in a closed syllable. We see in (39b) that resyllabification applies creating a context for both the application of the rule of schwa-spelling (cf. 39c) which manifests as schwa the empty nucleus in the second syllable, and the rule of syllable deletion which deletes the following syllable containing an empty nucleus. The application of the rule of schwa-spelling bleeds the reapplication of rule (38).

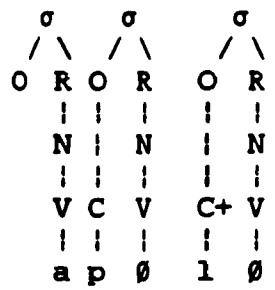
To account for the fact that word-internal empty nuclei are manifested as schwa and not as ɛ, Anderson claims that a consonant preceding an empty nucleus is syllabified in the onset of a syllable along with the empty nucleus, and that the rule of alternation of e and zero with ɛ precedes resyllabification. But he must now account for the fact that the alternation between zero and ɛ is possible. Let us consider the two words appelle [apɛl] and paquet [pakɛ]. We know that these ɛ are derived from empty nuclei since they alternate with zero as in appeler [aple] 'to call', paqueter [pakte] 'to parcel'. How Anderson proposes to account for the realization of ɛ is as follows. Assuming Dell's proposal, he considers a nucleus to be in a closed syllable if it is followed by at least one consonant which is either: a) final in word; b) part of a cluster, except when that cluster consists of an obstruent followed by a liquid; or c) followed by a schwa which is itself followed by a boundary. More precisely, he claims the following:

> "I assume (though I do not go into it further here) that a separate rule, similar to rule (34) in its effects, assigns a consonant to a preceding syllable if it forms the onset of a syllable whose nucleus is such a thematic schwa (i.e., /...V] [σ C+ë+.../ is resyllabified as /...VC] [σ +ë+ .../). This will, of course,

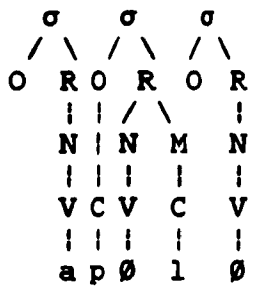
convert the syllable preceding a thematic schwa to a closed one." (555 fnt.5)

Accordingly, he derives a word like <u>appelle</u> [apɛl] the in following way. The word-final empty nucleus is what he calls a "thematic" empty nucleus which triggers the application of the special early rule of resyllabification of the onset of its syllable into a preceding rime. As a result, the penultimate syllable is closed and contains an empty nucleus. The resyllabification of the onset feeds the first application of rule (38); the underlying empty nucleus is manifested as <u>ɛ</u>.

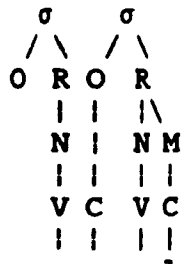
(40) a.



b.



c.



/ apØl+Ø # / [apɛl] 'he/she calls'

Anderson then distinguishes two kinds of schwas (or empty nuclei) and two processes of resyllabification. There are the "thematic" empty nuclei in front of which a consonant is resyllabified into a preceding rime by a very early rule of resyllabification. These "thematic" empty nuclei trigger the alternation with ɛ of a preceding empty nucleus. There are also the other empty nuclei in front of which the consonant is resyllabified into the preceding rime by the general rule of resyllabification. Those do not trigger the manifestation of a preceding empty nucleus as ɛ.

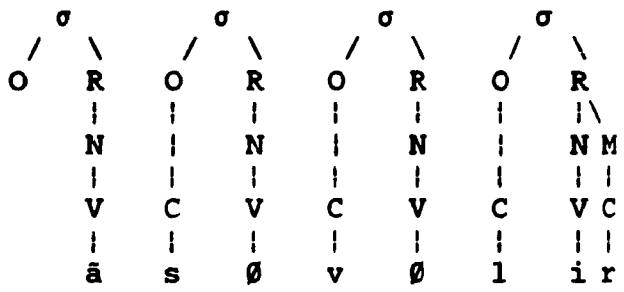
4.3.3 Sequences of empty nuclei

Let us now consider how Anderson proposes to account for the behaviour of sequences of empty nuclei.

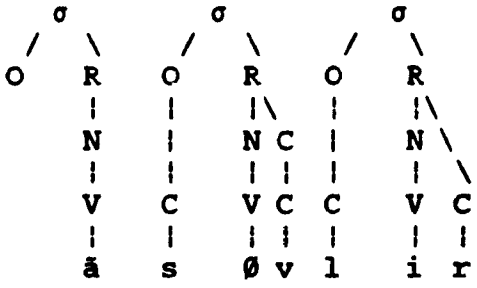
In Anderson's analysis, the fact that two successive empty nuclei cannot be both realized as zeros (ex. ensevelir [åsəvlir] *[åsvlir] 'to bury'), follows directly from his rules of resyllabification.

"Suppose we have an instance of two adjacent syllables containing schwa, subject to VCE (deletion [MC]). If we do not re-syllabify the (single) consonant which separates the two nuclei in question, the second syllable will of course be preserved, since its onset will not be empty. In order to delete it, we must re-syllabify this consonant with the preceding vowel by one of the VCE rules; but once we do this, the preceding syllable is no longer subject to deletion, since its margin is now non-null." (Anderson 1982;557)

(41) a.

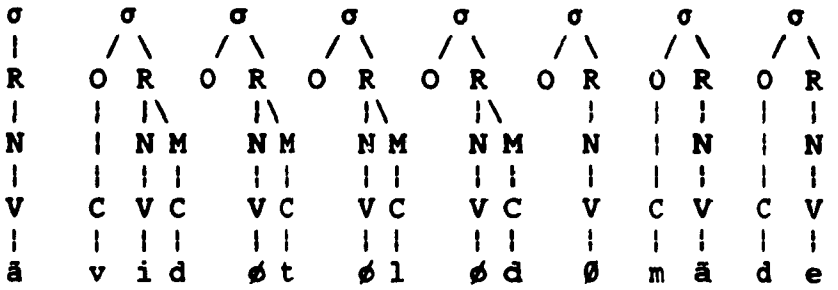


b.



Now let us consider a sequence of more than two empty nuclei as in <u>envie de te le demander</u> 'desire to ask you'. If we resyllabify into a preceding rime each onset of syllables containing an empty nucleus, we will obtain the following results.

(42)



We can see that by resyllabifying the onset of the first syllable of the verb <u>demander</u> into the preceding rime, only the first empty nucleus of <u>demander</u> (more precisely the syllable) will be deleted. While the derivation of zero in the first syllable of <u>demander</u> is appropriate, resyllabification raises a problem. Each onset of the syllables containing an empty nucleus may move to the preceding rime. That means that except for the initial syllable of the verb <u>demander</u>, all syllables that contain an empty nucleus in the above example, will have a consonant in their coda and consequently will not be subject to deletion. The reality is that in the preceding example, more than one of the empty nuclei can be realized as zero.

For example, the phonetic form [ãvidətladmãde] is one possible realization.

What Anderson suggests in order to solve the problem raised by resyllabification is that a consonant cannot move into a preceding open rime, if the onset of this preceding syllable has been resyllabified into the preceding rime. The constraint is formulated as follows.

(43) (i.e. * [$_{\sigma}$ [$_{N}$ Ø] X] (where X ≠ Ø).

The constraint says that a syllable cannot contain an empty onset, an empty nucleus and a filled coda. Consequently, a syllable will always be subject to deletion if its initial onset has been resyllabified, its nucleus is empty and it has no coda. Along with principles of resyllabification, this constraint will allow only for an alternating sequence of zero and schwa, which is in accordance with the facts. Applying resyllabification from right-to-left, in the form envie de te le demander, gives [ãvidətladmãde]. From left-to-right gives [ãvidtaldəmãde]. Whatever the direction of application, the result will always be a sequence of zero alternating with schwa or the converse.

Now that the main lines of Anderson's analysis of French schwa have been presented, let me explain why I do not adopt it and why I consider an analysis based on government more illuminating than one based on principles of resyllabification.

4.3.4 Problems with Anderson's analysis

One reason why I would reject Anderson's analysis is because it cannot account for the possible absence of schwa in initial syllable of bisyllabic words, that is, it offers no account of the fact that when a word like <u>cheval</u> 'horse' is not preceded by an article or any other words the first syllable can nevertheless be realized without a schwa.[9] The only way a syllable containing an empty nucleus can be deleted is when its onset is resyllabified into a preceding rime. In the examples I give below nothing precedes the syllable containing an empty nucleus. It should then be impossible for the onset to be resyllabified into a preceding rime. Nevertheless the empty nucleus can have no phonetic manifestation.

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[9] Even though it is not always the case that a schwa occurring in the initial syllable is manifested as zero, it remains that such a situation is possible. The clearest cases are the imperative form of verbs containing an empty nucleus in their initial syllable.

(44)	cheval de course	[ʃvaldəkurs]	'racing horse'
	petit rat	[ptira]	'small rat'
	demande-la	[dmɑ̃dla]	'ask for it'
	reprends-la	[rprɑ̃la]	'take it back'
	retourne là-bas	[rturnlaba]	'go back there'

Secondly, while Anderson can account for the absence of final schwa in words such as porté 'door', ouvré 'open' etc., he gives no explanation for the realization of these words when they are the first term of a compound.

(45) a. porte-clef 'key ring'
ouvre-boîte 'can opener'

b. porté-manteau 'coat holder'
ouvré-bouteille 'bottle opener'

The first thing that must be determined is where the word-final position must be defined in compounds. Let us suppose that each term of a compound constitutes a domain. Consequently, the final syllable of the first term is a word-final syllable. If, according to Anderson, a word-final coda can branch, it is then possible for the onset of the last syllable of the word porte to be resyllabified into the preceding rime. This leads to a final syllable which has no segmental content and is consequently subject to deletion. This would account for the pronunciation of compounds which have as a second term a word with more than one phonetically expressed syllable (cf. 45b). But if

the prediction is that zero must be the realization of schwa word-finally, how can one explain that schwa must be manifested in compounds where the second term is phonetically monosyllabic and that it must be absent when the second term has phonetically more than one syllable? In order to prevent the final onset of the word porte in porte-clef from being resyllabified into the preceding branching rime, it might be proposed that in compounds the word-final position is at the end of the compound. If this is the case, it is word-internal resyllabification which operates and not word-final resyllabification. Since a word-internal coda cannot branch, the final t of porte will not be resyllabified. But this would not solve the problem. The question would still remain as to why is the t resyllabified in compounds which have as a second term with more than one syllable.

Finally Anderson's analysis cannot account for the fact that there are certain constructions where two consecutive empty nuclei can be both realized as zero.[10]

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[10]Given that he agrees with Dell that words ending phonetically with a stop have a final empty nucleus in their representation.

(46) mange de la soupe [mãzdlasup] 'eat some soup'
le chef de la gare [lɛʃfdlagar] 'the guard of the station'
l'oeuf de la poule [loefdlapul] 'the egg of the hen'

To summarize so far, I think that the principal idea behind Anderson's analysis is excellent, namely the proposal to analyze schwa as an empty nucleus present in the lexical representation. I think, however, that to base an analysis on resyllabification raises many problems. Consequently, while I agree with Anderson regarding the underlying representation of schwa, I consider that an analysis based on government of these empty positions is more illuminating. In fact, Anderson himself compared empty nuclei with syntactic empty nodes. If it is reasonable for Anderson to compare phonological and syntactic empty categories, it is as reasonable to try to analyze these two types of empty categories in terms of similar conceptual frameworks. In order to see the superiority of government over resyllabification, let us next consider the analysis of schwa in the framework of a theory of government.

CHAPTER FIVE

AN ANALYSIS OF SCHWA IN TERMS OF GOVERNMENT

5.0 Introduction

In this chapter I propose a new account of the behaviour of schwa, aiming to demonstrate that the properties of schwa follow from general principles of phonological theory. From such a perspective, the behaviour of schwa is neither accidental nor is it specific to French. My analysis of French schwa can be extended to other languages where similar phenomena are found. It will be argued that in languages where a vowel alternates with zero, the properties of this segment always follow from principles of the theory. What distinguishes a language from another is the nature of the segment which alternates with zero. Therefore, the alternation between schwa and zero in French, between u̲ and zero in Tangale and between ɨ̲ and zero in Moroccan Arabic are accounted for in terms of the same set of principles and parameters. My analysis of schwa will also lead to a better understanding (and to a sharpening) of the theory of government.

Interestingly, my analysis embodies proposals that have been made by Selkirk (1978) and Anderson (1982) in their respective analyses of schwa. Like Anderson I analyze schwa as the phonetic interpretation of an underlying empty nucleus, and like Selkirk I consider that a given nucleus is in a binary relation with another nucleus. However, while Selkirk claims that schwa is deleted when it is the weak member of a left dominant binary foot, and Anderson proposes that an empty syllable is deleted after the resyllabification of its onset, my view is that an empty nucleus may receive no phonetic interpretation when it is governed by a following nucleus with phonetic content.

I take as my point of departure for the analysis of schwa, the work of Kaye (1987, 1988a). Kaye analyzed the alternation between ɨ/Ø in Moroccan Arabic in terms of government. I present the main lines of his analysis which will lead to a better understanding of the behaviour of schwa in French.[1]

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[1] For reason of clarity I present Kaye's first analysis of Morrocan Arabic (cf.Kaye (1987)). As I proceed in the analysis of schwa I will consider his last proposals.

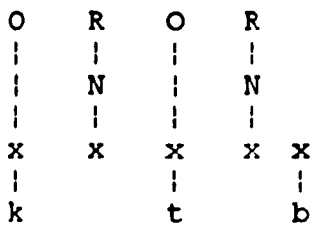
5.1 ɨ/Ø alternation in Moroccan Arabic

In Moroccan Arabic (henceforth M.A.) a vowel [ɨ] alternates with zero in some contexts. For example the verb √ktb 'to write' is pronounced [ktɨb] in the singular imperfective form and [kɨtbu] in the plural imperfective form. Kaye accounts for this alternation between ɨ/zero in terms of a theory of government. He makes the following proposal:

> (1) "Such alternations involve empty nuclear positions, i.e. nuclei dominating a point which has no segmental content. At times these positions are expressed phonetically and at times not. The point is that all such positions are present at the level of lexical representation. We must then define under what conditions such positions are or are not expressed phonetically. Suppose that one nucleus may govern another (projection government) in M.A. and further that the direction of this government is from right to left. It is now possible to characterize the contexts in which an empty nucleus is/is not realized phonetically.
>
> i) A properly governed empty position is not realized phonetically
>
> It remains to define proper government. Proper government is considered to be a stronger form of government. That is all the conditions necessary for a governing relation are still required. Further, some additional conditions are added. Two such conditions are ...
>
> i) The governor must have phonetic content
> ii) The governor cannot govern across another governing domain." (Kaye;1987:10-11)

This means that in the lexical representation of the verb √ktb 'to write' there is an empty nuclear position between the first two consonants as well as between the t and the b.[2] Since proper governors must have phonetic content and that, as Kaye claims, governing relations apply from right-to-left in M.A., an empty nucleus should only be realized as zero when followed by a vowel. In other words, the vowel [ɨ] should appear only when it is not followed by a vowel. Let us first consider the form [ktɨb] '(he/she) writes'.

(1) √ktb: 'to write'

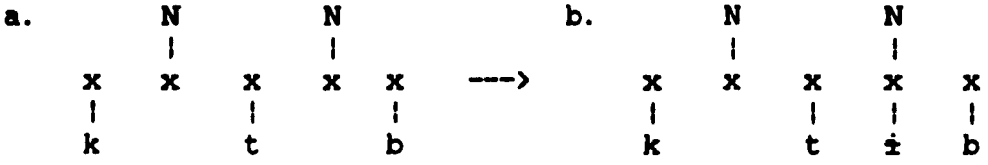


This verbal form has two syllables. Each syllable contains an empty nucleus which is adjacent at the level of nuclear projec-

[2] Alternation of a vowel with zero is not the only evidence motivating the presence of an empty nucleus in the lexical representation of particular words. According to the charm values of the two stops t and b for example, there cannot be a transsyllabic governing relation between those two segments. Both consonants must be syllabified in distinct onsets separated from each other by a nucleus.

tions.[3] At this level, from right-to-left, relations of proper government are determined.[4] In the lexical representation of the singular imperfective form, the final nucleus is empty. Because no vowel follows it, this final empty nucleus is not properly governed and so must have a phonetic interpretation. The vowel [ɨ] is realized.

(2) [ktɨb] 'he/she writes'



Because it is not properly governed, the word-final nucleus receives a phonetic interpretation. But how about the first empty nucleus? Can it be properly governed by the final nucleus? The answer is yes. The realization of the vowel ɨ in the final syllable of the

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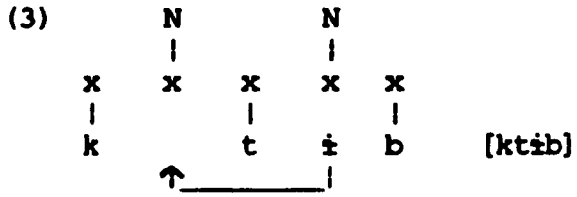
[3]The level of nuclear projection is determined by projecting the heads of rimes contained in a given domain such as the word. This point will become clearer as I proceed in my analysis of schwa.

[4]The directionality may well be parameterized. It happens that the cases studied to this point all operate from right-to-left.

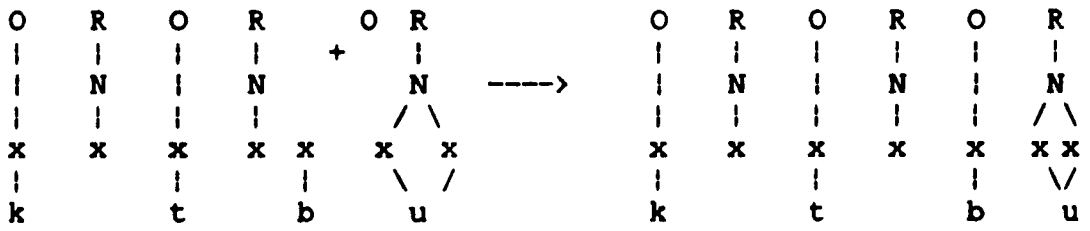
verb makes this final nucleus a potential proper governor. Now having a phonetic content this nucleus may properly govern a complement. It can then properly govern the preceding empty nucleus. It follows that the first nucleus is properly governed by the following vowel and consequently no segment has to be manifested phonetically.

(3)



Let us now consider the plural form [kɨtbu].

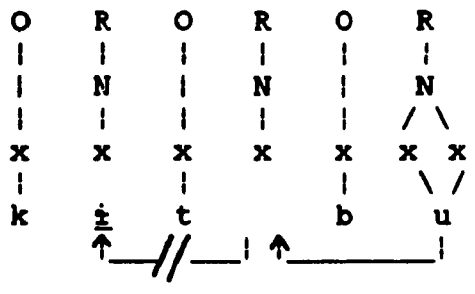
(4) √ktb: 'to write' [kɨtbu] '(they) write'



The plural form of the verb is formed by the suffixation of the plural morpheme -u. The suffixal vowel -u being syllabified in the word-final nucleus, it properly governs the preceding empty nucleus.

Now that the stem-final nucleus is properly governed, it has no phonetic content. Being empty, it cannot itself properly govern the empty nucleus to its left. Consequently, a vowel must be realized in the first syllable. The form [kɨtbu] is thus derived.

(5)



[kɨtbu] 'they write'

The analysis accounts for all the alternations between ɨ/Ø in M.A.[5] The vowel [ɨ] is only realized when an underlying empty nucleus is not immediately followed, at the level of nuclear projection, by a nucleus with phonetic content. In contrast, when an empty nuclear position is directly followed by a vowel, it is properly governed and it is not realized phonetically.

The alternation between ɨ/Ø in M.A. shows that a proper governor is a nucleus with phonetic content and that at the level of nuclear

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[5] There are some aspects of Kaye's analysis that I have not considered. The reader is referred to Kaye (1987,1988a) for a detailed discussion.

projection, governing relations are strictly local. In order to be in a governing relation, the governor and the governee must be strictly adjacent. Interpreting projection government metrically, we can say that a governing relation is defined in terms of binary structures. There is a binary relation between two nuclei. The adjacency requirement between the proper governor and the governee can be observed in the plural form [kɨtbu]. In this form, the suffix -u properly governs the immediately preceding nucleus but not the one in the first syllable ([ɨ] is present in the first syllable).

If government did not require strict adjacency, the result could be [ktbu] where the suffixal vowel would be regarded as properly governing the two preceding empty nuclei. While the form [ktbu] is not attested in the dialect of M.A. studied by Kaye, he mentions another dialect of Arabic where this pronunciation is possible. In this latter dialect the imperfective plural of the verb √ktb is pronounced [ktbu], a pronunciation where both empty nuclei are unrealized phonetically. In the light of this difference between the two dialects, Kaye proposes that at the level of projection, the adjacency requirement between a governor and a governee is subject to

parametrical variations.[6] Kaye's proposals are quoted below.

> "Following the formalism proposed in Halle and Vergnaud, 1987 two possible governing configurations are possible. Expressed in metrical terms we may find either binary or unbounded structures. Recall that this is precisely the case for accentual and harmonic structures. If strict locality is required the result is a binary domain. If not, we get unbounded effects. Translating this to the case at hand, two configurations are possible.
>
> A. Ø Ø Ø Ø Ø Ø Ø V B. Ø V Ø V Ø V Ø V
>
> A. represents the unbounded case. This structure leads to the pronunciation [ktbu] ... The structure in B. is the binary case and represents the pronunciation ...[kɨtbu]." (Kaye:1987;12)

Now that we have seen that alternations between ɨ/Ø in M.A. may be accounted for in terms of a theory of proper government, let us suppose that the analysis of French schwa is similar to the one of [ɨ] in M.A., that is, let us suppose that the distribution of the French schwa is subject to the same principles that govern the distribution of the Arabic ɨ. Schwa would then be the phonetic

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[6] I will show later in this chapter that in French a proper governor can only properly govern one empty governee. Consequently, it may be the case that languages do not vary as whether strict adjacency is required between a proper governor and an empty governee but with respect to whether a proper governor properly governs one or more than one empty governee.

interpretation of an underlying empty nucleus which is not properly governed by a following nucleus with phonetic content. One immediate difference is of course that the empty nucleus is "spelled out" as [ɨ] in M.A., but as [ə] in French.

5.2 An analysis of schwa in terms of government

5.2.1 The underlying representation of schwa

I agree with Dell (1973) that particular words contain underlying schwas. In my terms, some words contain underlying empty nuclei which are/are not manifested phonetically. We both consider these words as having a nuclear position in their lexical representation. In this approach, schwa is not treated as resulting from epenthesis. Its position is not created from nothing; it is present underlyingly.

However, even though I agree that the presence of schwa does not result from a process of epenthesis, my conception of schwa differs from Dell's, Selkirk's and Anderson's. Unlike Dell and Selkirk I do not consider schwa as an underlying vowel and I do not attribute its absence as resulting from a process of deletion. In a word like lentement [lātmā] 'slowly' for example, I, like Anderson, propose

that the second syllable contains an empty nucleus, e.g. a nucleus with no segment attached to it. But I differ from Anderson and claim that the empty nucleus is present in the lexical representation of the word and even if it has no phonetic manifestation, the position is never deleted.[7] Consequently, I do not assume that the alternation between schwa and zero results from a process of vowel or syllable deletion. Zero represents the lack of phonetic content in an underlying empty nucleus. It does not represent the absence of a syllabic position.

Concerning the vowel schwa itself, for Dell and Selkirk it is an underlying segment. For me the nuclear position dominates a skeletal point which lacks specification on the segmental tier. In fact the representation of an empty nucleus is a bit sharper in the sense that an empty position is not absolutely devoid of phonetic information. Along the same lines, Anderson (1982), Kaye & Lowenstamm (1984) have

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[7] Rialland (1985) also claims that the absence of manifestation of a word-internal schwa does not result in the deletion of its nucleus. She also provides phonetic evidence that the consonant preceding a schwa (not manifested) is not resyllabified into the preceding rime. That is, she argues against Anderson's analysis based on resyllabification.

proposed that empty nuclei dominate a null element.[8] These positions, even though they are not manifested phonetically, dominate a segment which is, according to Anderson, Kaye & Lowenstamm and Piggott & Singh, represented as the null element. The question arises as to what is the nature of such a null segment. Based on the theory of representation of segments proposed by KLV (1985) I consider a null segment in a nuclear position to be an element, i.e. a fully specified feature matrix, with no marked value for any of the features. Such a matrix represents what is called the cold element.

> "Recall that this vowel (the cold vowel [MC]) has no hot features. Accordingly, the cold vowel must be a high, back, unrounded, lax vowel: high, since [-HI] is the marked specification for the feature HI (cf. A), back, since [-BACK] is a marked specification for the feature BACK (cf. I), unrounded, since [+ROUND] is a marked specification for the feature ROUND (cf. U) and lax, since [+ATR] is a marked specification for this feature." (KLV 1985:309)

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[8] Piggott and Singh (1985) have proposed that one type of empty onset (cf. h-aspiré) dominates a null element. For them an empty onset is not always devoid of phonetic information.

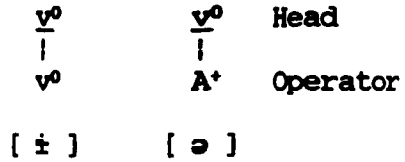
(6) Cold element:
+ back
+ high
- round
- ATR

The phonetic interpretation of this matrix of features is the vowel [ɨ]. The cold element is not phonetically interpretable in every language. Its phonetic realization is subject to parametric variation. In French for example, the cold element cannot be realized phonetically. In contrast with French the cold element is manifested in Moroccan Arabic. But in every language a nucleus dominating the cold element is different from a nucleus dominating any other segment.[9] It is sometimes manifested phonetically and sometimes not. To be realized as zero a nucleus dominating the cold element must satisfy certain conditions; it must be properly governed. When such a nucleus does not satisfy the conditions for being properly governed, it must receive a phonetic interpretation. In Moroccan Arabic, given that the cold element may be expressed phonetically, a vowel [ɨ] is realized. In French where the cold element cannot be expressed phonetically, the strategy is to add the element A* to the internal

[9]This difference follows from the fact that unlike any other internal representation, the one of an empty nucleus contains no element which is marked for a feature. The presence of the cold element in an internal representation represents the absence of a real element, viz. an element marked for a given feature.

representation of the empty nucleus.[10] This results in a segment composed of the cold element as its head and the element A⁺ as its operator. Such a representation corresponds to the vocalic segment schwa.

(7)



I am therefore considering an empty nucleus as a nuclear position dominating a nuclear skeletal point to which the cold element is attached. But in the rest of this discussion I will simplify the configuration of the empty nuclei. While I understand an empty nucleus as having the representation (8a) I will simplify it as in (8b).

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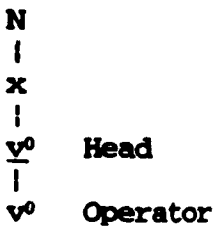
[10] Adding an element to the internal representation of an empty nucleus which must be manifested phonetically, should not be compared with a process of epenthesis. While traditional analyses claim that epenthesis adds a position along with a segment in the representation of a given word, in my analysis nothing is added in the lexical representation. It is only the case that something is added in the internal representation of a null segment which is already present underlyingly.

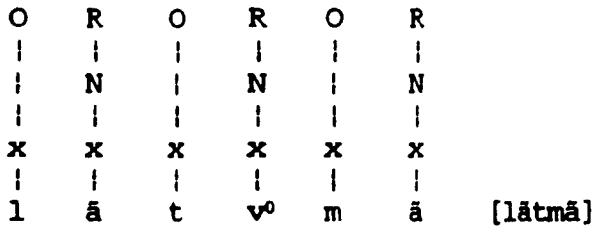
(8) a. Empty nucleus:



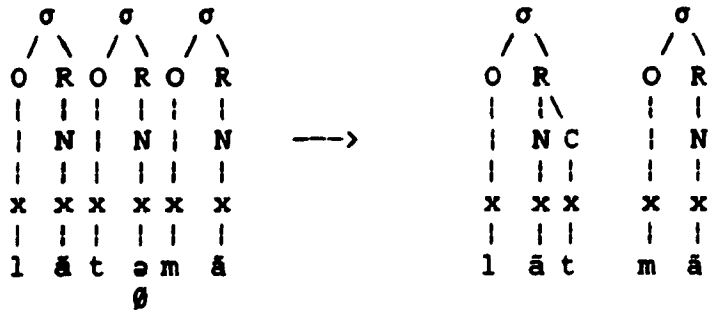
b. Simplification:

In (9) below I give two derivations of the word lentement [lãtmã] 'slowly'. (9a) reflects my view of the lexical representation of the word. This underlying structure remains unchanged at all the levels of the derivation. Even though the two consonants t and m are phonetically adjacent, I claim that a nucleus intervenes between them. This nucleus is not manifested but it is nevertheless always present in the representation. By comparison, the structures given in (9b) could represent the position of one who treats schwa as underlyingly present but subject to deletion.

(9) a. My analysis:



b. Schwa subject to deletion:



Let us next consider how I propose to account for the alternation between schwa and zero.

5.2.2 Motivation for the presence of empty nuclei

For the purpose of this discussion, I consider separately word-final and non-word-final schwa. I start with the analysis of word-internal schwas, which I claim are present in the lexical representation of the words in (10).

(10) Consonant - zero - nasal:

lentəment	'slowly'	sottəment	'stupidly'
entendəment	'understanding'	battəment	'beat'
rapidəment	'quickly'	centənaire	'centenary'
cadənas	'pad lock'	maintənir	'to maintain'
froidəment	'coldly'	maintənant	'now'
lendəmain	'the day after'	soutənir	'to support'

publiquement	'publicly'	enjambement	'enjambment'
vaguement	'vaguely'	bravement	'bravely'
sagement	'wisely'	effectivement	'really'
avenant	'pleasant'	mouvement	'movement'
achèvement	'completion'	souvenir	'memory'
gisement	'deposit'	gauchement	'clumsily'
cauchemar	'nightmare'		

Liquid - zero - nasal:

actuellement	'now'	surement	'certainly'
littéralement	'literally'	allemand	'german'
follement	'madly'	finalement	'finally'
harcèlement	'harassment'	seulement	'only'

Nasal - zero - nasal:

promenade	'walk'	extrêmement	'extremely'
amener	'to bring'	ennemi	'enemy'

Consonant - zero - liquid:

matelot	'sailor'	appeler	'to call'
attelage	'harness'	gobelet	'goblet'
envelopper	'to wrap'	matelas	'mattress'
peluche	'wig'	chapelet	'rosary'
rondelet	'plumpish'	pelotte	'ball'
geler	'to freeze'	bracelet	'bracelet'
ciseler	'chisel'	developper	'to develop'
engelure	'chilblain'	déceler	'to detect'
moquerie	'mockery'	maquereau	'mackerel'
coupéret	'chopper'	lapereau	'young rabbit'
sautérelle	'grasshopper'	cerise	'cherry'
banqueroute	'bankrupt'	casserole	'pot'
gâterie	'little treat'	riverain	'waterside'
minerai	'ore'	chaperon	'chaperon'
Catherine	'Cathy'	duperie	'dupery'
baucéron	'from Bauce'	puceron	'greenfly'
papeterie	'stationery'	sécheresse	'draught'
menterie	'lie'	charcuterie	'delicatessen'
brasserie	'brewery'	tapisserie	'wall paper'

Liquid - zero - liquid:

serrurørie	'lock smith store'	bourrølet	'roll of fat'
hôtellørie	'hostelry'	galørie	'gallery'

Liquid - zero - consonant:

durøté	'hardness'	røpas	'meal'
feuilløter	'leaf through'	légèrøté	'lightness'
furøter	'to nose'	carrøfour	'cross road'
rarøté	'rarity'	souløver	'lift up'
løver	'raise'	sûrøté	'safety'
røbours	'wrong way'		

Consonant - zero - consonant:

cachøter	'to seal'	déchiquøter	'to tear'
pøtit	'small'	aquøduc	'aqueduct'
faussøté	'falsehood'	honnêtøté	'honesty'
saintøté	'sainthood'	brèvøté	'brevity'
søcours	'help'	tafføtas	'taffeta'
achøver	'to finish'	achøter	'to buy'
médøcin	'doctor'	chøval	'horse'
chøveux	'hair'		

Nasal - zero - consonant:

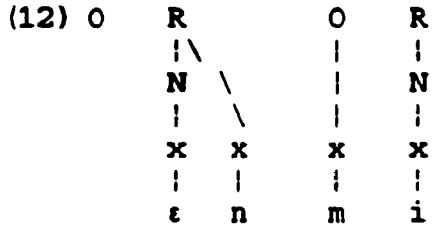
samødi	'saturday'	ânørie	'stupidity'
manøquin	'fashion model'	cannøvas	'framework'
hamøcon	'hook'	hannøton	'may-bug'
omølette	'omelette'		

All the words in (10) are realized without a schwa. In spite of their pronunciation, I propose that they contain an empty nucleus in their lexical representation.[11] I attribute to a word like ennemi for

[11] In the syllables which contain an empty nucleus, this segment is represented by an 'ø'.

example, the following structure.

But of course, a logical alternative to (11) would be to attribute to ennemi a structure with an initial closed syllable.



Indeed, word-internally in many words an empty nucleus is never phonetically manifested. Superficially then, the structure in (12), i.e. a branching rime followed by a non-branching onset, seems appropriate for many of the words I gave in (10). To justify a structure like that in (11) I give the following three arguments:

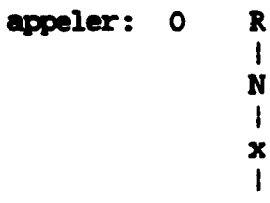
Some evidence for the presence of an empty nucleus in the words given in (10) is that it is always possible to pronounce these words with a schwa. In poetry and careful speech words like ennemi, appeler, soulever, pelouse, etc. can always be realized with a schwa in the syllable identified as having one. In contrast, in words like aplanir, calvaire, place a schwa cannot appear between the consonants of the clusters. Compare the following pronunciations.

(13)

appeler:	[aple]	[apəle]	aplanir:	[aplanir]	*[apəlanir]
soulever:	[sulve]	[suləve]	calvaire:	[kalvɛr]	*[kaləvɛr]
pelouse:	[pluz]	[paluz]	place:	[plas]	*[palas]

It therefore seems clear that one must distinguish words like appeler from those like aplanir. I propose that the distinction lies in the lexical representation of these two types of words. Words which can be realized with a schwa contain an empty nucleus. On the other hand those that cannot be realized with schwa do not contain such an empty nucleus.

(14) appeler: 0



[aple] / [apəle]

aplanir: 0

[aplanir] *[apəlanir]

A second source of evidence for the presence of an empty nucleus in the lexical representation of the words given in (10) may be found in considering the contrast between the infinitive and the imperative forms of verbs. Starting with regular cases, i.e. with verbs that can never be realized with a schwa, the infinitive is formed by adding the morpheme [e] (-er) to a verbal stem. For those regular cases, the imperative is phonetically identical to the stem of the verb.

[1 2] In this chapter I decide not to syllabify the word-final consonants. The syllabification I assume for these segments is presented in chapter seven.

(15)

Infinitive		Imperative		Gloss
parl-er	[parle]	parle!	[parl]	'to talk'
pelt--er	[pɛlte]	pelte!	[pɛlt]	'to shovel'
racl-er	[rakle]	rakle!	[rakl]	'to scrape'

Now consider the infinitive form of the following verbs.

(16)

achet-er	[aʃte]	'to buy'	halet-er	[alte]	'to gasp'
appel-er	[aple]	'to call'	soulev-er	[sulve]	'to lift'
achev-er	[aʃve]	'to finish'			

In infinitive form, the verbs in (16) may be realized without a schwa in the second syllable. This means that there is no phonetic evidence for the presence of a nucleus in the second syllable of the infinitive form appeler, for example. However when we consider the imperative form of the verbs in (16), the result is not a form identical to the stem. That is, the imperative form of regular verbs is different from the imperative form of the verbs in (16). In their imperative form the verbs in (16) are realized with a vowel ɛ exactly in the position where an empty nucleus is posited.

(17)

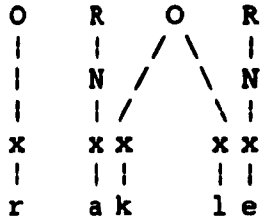
achète!	[aš̌ɛt]	*[aš̌t]	'buy!'	halète!	[alɛt]	*[alt]	'gasp!'
appelle!	[apɛl]	*[apl]	'call!'	soulève!	[sulɛv]	*[sulv]	'lift!'
achève!	[aš̌ɛv]	*[aš̌v]	'finish!'				

If the verbs in (16) are analyzed as having an empty nucleus in their second syllable, it would not be surprising to find contexts where this nucleus receives a phonetic interpretation. On the other hand one who posits for those verbs the structure of a branching rime in the first syllable, must propose that the vowel ɛ is epenthetic in the imperative forms given in (17). The question would then arise as to why there is no similar epenthesis in the imperative form of the verbs in (18).

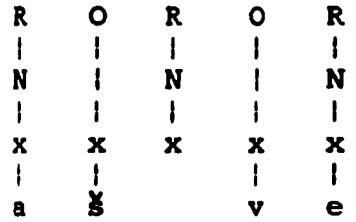
(18)	parle!	[parl]	*[parɛl]	'talk!'
	pelte!	[pɛlɛ]	*[pɛlɛt]	'shovel!'
	rakle!	[rakl]	*[rakɛl]	'scrape!'

Faced with this difference between the imperative forms of the two types of verbs, I propose the following representation for the verbs racler and achever, respectively.

(19) **racler:**



achever:



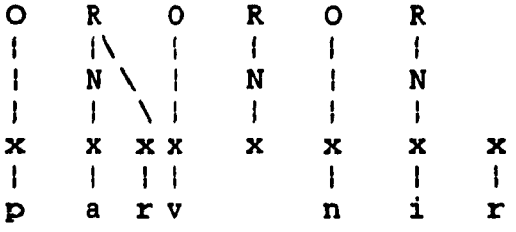
As a third justification for the presence of an empty nucleus in the words given in (10), let us consider a word like souvenir 'remember'. It is not unrealistic to propose that this word is morphologically complex. A morpheme is prefixed to the stem venir. Accordingly, the following words are morphologically related. A given morpheme is prefixed to the stem venir.

(20) a.	souvenir	[suvnir]	'to remember'
	prévenir	[prevnir]	'to advise'
	devenir	[dəvnir]	'to become'
	convenir	[kõvnir]	'to suit'
b.	parvenir	[parvənir]	'to achieve'
	subvenir	[sübvənir]	'to provide'
	advenir	[advənir]	'to happen'
	survenir	[sürvənir]	'to occur'

There is a difference between the verbs in (20a) and those in (20b). The first group of verbs, the ones in (20a), are phonetically bisyllabic. Words in (20b) are phonetically trisyllabic. Each is pronounced with a schwa in the second syllable. Assuming that we do not want to treat schwa as an epenthetic vowel, it seems reasonable to propose that <u>venir</u> has a unique lexical representation in spite of the variation in pronunciation. Let suppose that it is represented with an initial open syllable. The nucleus of this syllable is sometimes phonetically realized and sometimes it is not. The point is that while <u>souvenir</u> is almost never realized with a schwa, the presence of a nucleus in the first syllable of <u>venir</u> is phonetically manifested in words like 'parvenir'.

(21) a. souvenir

b. parvenir



The arguments and evidence presented above clearly show that words in (10) contain a word-internal empty nucleus and that this nucleus receives no phonetic interpretation after a single consonant.[13] I now have to account for the absence of manifestation of the empty nucleus.

5.2.3 Zero as the realization of a properly governed empty nucleus

5.2.3.1 Word-internally and preceded by one consonant

We generally observe relations between nuclei in processes such as vowel harmony and stress assignment. This means that nuclei can contract relations with each other in spite of the fact that the two positions are not adjacent at all levels. In the metrical theory, feet are constructed on nuclear or rimal projections and an intervening onset is not considered in the foot formation. In terms of government, nuclei are projected at a level called the level of nuclear projection. It is at this level of nuclear projection that

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[13] One who would claim that the evidence and arguments presented apply only to the words discussed and not to all the words in (10) should note that the first argument holds for all the data. More evidence for my proposal will be provided in the rest of thesis.

relations between nuclei apply. An intervening non-nuclear point cannot block the adjacency between two nuclear positions since government between nuclei is a case of government at the level of nuclear projection.

My analysis of schwa involves government by projection where the nuclear governee is empty. For a governee to remain empty, it must not only be governed, it must be properly governed. While zero is an instance of an empty nucleus, properly governed, schwa represents the manifestation of an empty nucleus which is not properly governed. Governing and proper governing relations which apply at the level of nuclear projection are characterized as follows.

Government: A nucleus α is in a governing relation with a nucleus β iff

i. α and β are strictly adjacent at this level of nuclear projection and

ii. the relation is directional (from right-to-left or left-to-right)

Proper government: A nucleus α properly governs a nucleus β iff

i. α governs β

ii. α has phonetic content.

In French, schwa should be the phonetic interpretation of an ungoverned empty nucleus. In addition, if schwa is subject to exactly the same principles that govern the distribution of the Arabic [ɨ], the prediction is that zero should only be found when the empty nucleus is directly followed at the level of nuclear projection by a nucleus with phonetic content. In the words presented in (10), schwas are not realized phonetically. In those words, the empty nucleus is directly followed by a nucleus with phonetic content. This nucleus, since it has a phonetic content, properly governs the preceding empty nucleus. Consequently, the empty nucleus does not need to be manifested phonetically.[14] Following the spirit of Chomsky (1981) who proposed the Avoid Pronoun Principle, I propose a principle which imposes a choice of zero over a schwa for a properly governed empty nucleus.[15]

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[14]I will consider word-final position later in the analysis.

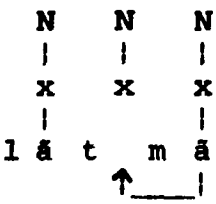
[15]The Avoid Pronoun Principle says that when a pronoun is coreferent with its antecedent, we chose PRO instead of an overt pronoun.

(22) The Avoid Schwa Principle:

An empty nucleus remains uninterpreted whenever possible.

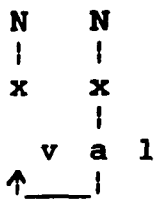
Thus in (23), where an empty nucleus is properly governed by a following nucleus with phonetic content, it is not phonetically realized.

(23) lentement:



[lătmă]

chéval:



[šval]

To this point, we have seen that, at least word-internally, French schwa seems to be subject to the same principles that govern the distribution of the Moroccan [ɨ]. Both in M.A. and French an empty nucleus is realized as zero when immediately followed at the level of nuclear projection by a nucleus with phonetic content which properly governs it.

The M.A. data show that a proper governor must have a phonetic content and that government requires strict adjacency between the

governor and the governee. In French, we can also demonstrate that a proper governor must have phonetic content. In the data presented in (24) below, words contain a sequence of empty nuclei. The fact that only the rightmost empty nucleus may be without phonetic interpretation shows that: i) a proper governor must have phonetic content and ii) that the governor and the governee must be strictly adjacent at the level of nuclear projection. Recall now that in some languages proper governing relations require strict adjacency whereas in other languages they do not. In one dialect of M.A. we saw that a sequence of consecutive empty nuclei is not possible, while in another dialect the same sequence is allowed. Faced with this difference, it is proposed that strict adjacency requirement between a proper governor and its governee is subject to parametric variation.[16] The behaviour of sequences of empty nuclei in French shows that government is strictly local. Consider the following data.

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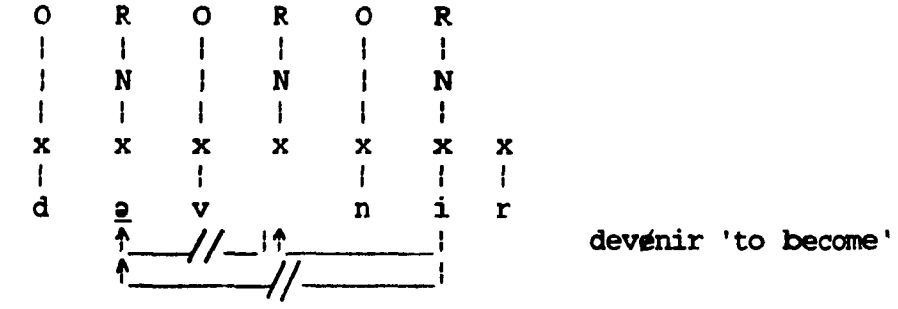
[16] That the parameter refers to adjacency rather than to the requirement that a proper governor must have phonetic content is justified by the phonetic realization of the singular form of the verb √ktb in the two dialects. We have seen that the plural form is manifested as [kɨtbu] in one dialect (dialect 1) and as [ktbu] in the other dialect (dialect 2). But the singular form of the verb is in both dialects realized as [ktɨb]. If the parameter referred to the content of the governor we would expect the following two realizations in dialects 1 and 2 respectively: [ktɨb], [ktb].

(24)

a.	ensevélir	'to bury'	b.	papetérie	'stationery'
c.	briquetérie	'brickyard'	d.	semèler	'to sole'
e.	devénir	'to become'	f.	redevance	'dues'
g.	relever	'to stand'	h.	rejéter	'to throw back'

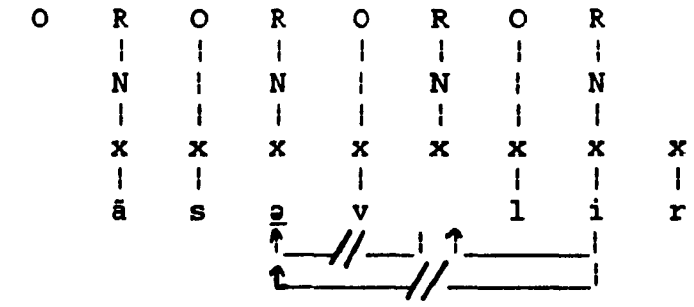
The forms given in (24) have sequences of two consecutive empty nuclei. From right-to-left, a vowel properly governs the immediately preceding empty nucleus. The properly governed nucleus, because it does not have a phonetic content, cannot itself properly govern the empty nucleus to its left.

(25) a.



devénir 'to become'

b.



ensevélir

To this point a theory of proper government accounts for the fact that word-internal empty nuclei are realized as zero and that in a sequence of consecutive empty nuclei, only the one which is adjacent to a following nucleus with phonetic content is not manifested. The preceding examples showed that in French proper government relations require strict adjacency between the governor and the governee. The adjacency requirement accounts for the impossibility of having a sequence of empty nuclei where both nuclei are unrealized phonetically.

I would like to digress here to motivate the directionality I assume for governing relations between nuclei. Recall that while I claim that an empty nucleus is in a governing relation with a following nucleus, Selkirk (1978) claims that it is a preceding vowel which determines the behaviour of schwa. In the light of the words presented in (10) above, given that almost all the empty nuclei occur in word-internal position, it is not clear if an empty nucleus is in relation with a preceding or with a following nucleus with phonetic content. The question arises then as whether in French, like in M.A., an empty nucleus is properly governed by a following nucleus or, as claimed by Selkirk if it is the nucleus to its left that determines its behaviour. Let us consider what motivates my proposal that an

empty nucleus receives no phonetic content when it is properly governed by a following nucleus.

5.2.3.2 Are empty nuclei governed by a preceding or by a following vowel?

Starting with compounds, I present three types of data which show some cases where it cannot be a preceding vowel that determines the behaviour of schwa.

The main factor which leads Selkirk to say that it is a preceding and not a following vowel which manifests a binary relation with schwa is the fact that schwa is subject to deletion word-finally. While Selkirk's characterization of the binary feet seems to be motivated by many instances of schwa deletion word-finally, it encounters problems with the behaviour of final schwa in the first term of compounds.

According to Selkirk, schwa is incorporated into a binary foot along with a preceding vowel. She accounts for the absence of schwa in words like souvénir and malé. Because a word-internal schwa is never syncopated when preceded by a consonant cluster, she proposes

that a binary relation is impossible between two vowels when a cluster intervenes between them (cf. fortement). But word-finally, schwa is always realized as zero regardless of the number of preceding consonants (cf. verté, carté). In the light of these two preceding words, she relies on a linear rule of word-final schwa deletion. However, while she predicts that a consonant cluster prevents schwa from being deleted word-internally but not word-finally, she has no explanation for the behaviour of final schwa in the first term of compounds. In this context schwa is sometimes manifested and sometimes not. Its presence or absence is not, however, optional. Schwa is always realized as zero when preceded by a single consonant. On the other hand after two consonants schwa must be realized as zero when the second term has more than one phonetically expressed syllable (cf. 26 B) and it must be manifested when the second term is phonetically monosyllabic (cf.26 A).

(26) A. With schwa

porte-clés	'key ring'
porte-plume	'penholder'
porte-carte	'card holder'
porte-voix	'megaphone
porte-scies	'saw holder'
porte-jupe	'skirt hanger'
couvre-feu	'curfew'
couvre-lit	'coverlet'
couvre-livre	'book cover'

B. Without schwa

porté-manteau	'coat rack'
porté-crayon	'pencil holder'
porté-cigare	'cigar case'
porté-parole	'spokesman'
porté-drapeau	'standard bearer'
porté-fenêtre	'French window'
porté-bagages	'luggage rack'
porté-couteau	'knife rest'
porté-avion	'aircraft carrier'

tourne-disque	'turntable'	porté-bonheur	'lucky charm'
tourne-vis	'screwdriver'	porté-monnaie	'wallet'
ouvre-boîte	'can opener'	ouvré-bouteille	'bottle opener'
garde-robe	'wardrobe'	gardé-manger	'meat safe'
garde-côte	'coast-guard'	gardé-barrière	'level crossing keeper'
garde-fou	'railing'	gardé-malade	'home nurse'
garde-pêche	'water bailiff'	gardé-champêtre	'rural policeman'

What is relevant here is that for a given word, (e.g. the word porte), there are two possible pronunciations: one where schwa is realized and one where it is not. If, as claimed by Selkirk, it is the preceding vowel which determines the presence or the absence of schwa, we would not predict two different pronunciations for a given word. Neither the rule of word-final schwa deletion nor the status of the cluster can account for the behaviour of the final schwas in the first terms of compounds. It seems clear that in the preceding compounds it is the right constituent of the compound which determines if schwa is or is not realized.

Secondly, Selkirk's claim that schwa is in a relation with a preceding vowel gives rise to another problem with words that contain a schwa in their initial syllable. In certain dialects of French, in the initial syllable of bisyllabic words, schwa is not realized phonetically.

(27)

chémin	'road'	chéval	'horse'
sémaine	'week'	léver	'to stan up'
méner	'to lead'	chémise	'blouse'
jéter	'to throw'	rédonne	'give again'
chénil	'kennels'	vénir	'to come'
démande	'ask'	ténir	'to hold'
séringue	'syringe'	démain	'tomorrow'
cérise	'cherry'	pétit	'small'

réviens ici	'come back here'
démandé les	'ask for them'
rétourné les	'return them'
démain matin	'tomorrow morning'

This fact is accounted for by an analysis which claims that it is a following vowel that determines the behaviour of schwa. According to my analysis, in the initial syllable of a bisyllabic word the empty nucleus is properly governed by the following nucleus with phonetic content. Being properly governed, the empty nucleus can be unrealized phonetically. On the other hand, according to Selkirk's analysis, it should never be the case that the first schwa is subject to deletion. Because in such a position schwa cannot form a binary foot along with a preceding nucleus, it should be impossible for schwa to delete. Recall that schwa is subject to deletion only when it is the weak branch of a binary foot. The data in (27) indicate that it is not what precedes but what follows that determines the absence or the presence of schwa.

Finally, in analyses of French schwa where it is claimed that the presence of a preceding vowel is what determines if schwa is or is not phonetically realized, it is mentioned that a consonant cluster cannot intervene between the two vowels. While this account for the presence of word-internal schwa preceded by two consonants, it gives no explanation as why a cluster prevents a schwa to be realized as zero wether or not there is a vowel to the left of the consonant cluster. The point is that it is not only the case that a cluster blocks a relation between schwa and a preceding vowel. A cluster prevents schwa from being realized as zero even if no vowel precedes. As the following data show, in the first syllable of a bisyllabic word, schwa is unrealized only if it is preceded by <u>one</u> consonant. If two consonants precede the empty nucleus, it must receive a phonetic interpretation.

(28)

a. Without schwa		b. With schwa	
chémin	'road'	brebis	'sheep'
chéval	'horse'	breloque	'bracelet'
sémaine	'week'	bretelle	'suspenders'
séringue	'syringe'	breton	'Breton'
cérise	'cherry'	brevet	'diploma'
chénil	'kennel'	crevasse	'fissure'
pétit	'small'	crever	'to blow'
chémise	'blouse'	frelon	'hornet'
démander	'to ask'	fredonne	'hum'
démain	'tomorrow'	grenade	'grenade'

Considering the preceding facts, it seems reasonable to propose that it is what follows that determines the behaviour of an empty nucleus.

5.2.3.3 Empty nuclei before h-aspiré

A prediction which my analysis makes is that it should always be possible to find zero when an empty nucleus is immediately followed by a vowel (nuclei are adjacent at the projection level). There are, however, exceptions to the absence of manifestation of word-internal empty nuclei in this context. For example, a word-internal empty nucleus preceded by a single consonant is always realized as schwa when an empty onset follows it (cf. (29a)).

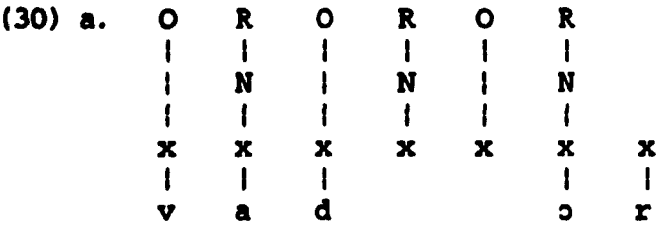
(29) a.	va dehors	[vadəɔr]	*[vadɔr]	'go outside'
	rehausser	[rəose]	*[rose]	'to raise again'
b.	la déssus	[ladəsü]	[ladsü]	'on it'
	retourne	[rəturn]	[rturn]	'go back'

Let us consider next how my analysis accounts for this fact. Each of the above forms contains an empty nucleus in the first syllable. In both cases, the second syllable contains a nucleus with

phonetic content. This following nucleus with phonetic content should, in principle, properly govern the empty nucleus to its left, allowing for the manifestation of the latter as zero. While this is what happens in the forms in (29b), a schwa must be realized in the first syllable of (29a). The difference between these two groups of forms is that in (29a) an empty onset intervenes between the two nuclei, whereas in (29b) the intervening onset dominates a phonetically expressed consonant. The question arises as to why an empty onset (i.e. "h-aspiré") determines the manifestation of a preceding empty nucleus.

Assuming the representation of h-aspiré proposed by Vergnaud (1982), the difference between an onset dominating an "h-aspiré" and one dominating any other consonant is the following one. "H-aspiré" is represented as a constituent dominating a skeletal point but no segment; this is the representation of an empty constituent. Thus, the forms given in (29) have the following representations, respectively.

(30) a.



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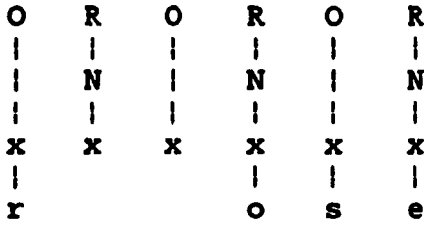
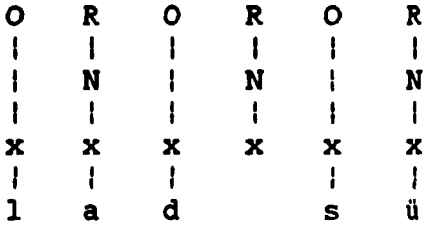
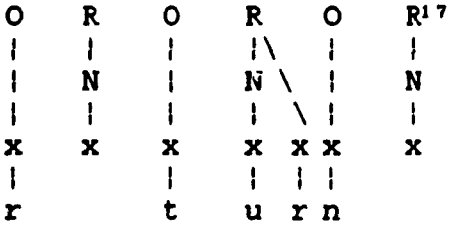


c.



d.



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[17] I will justify, in chapter 7, the proposal of a final open syllable containing an empty nucleus.

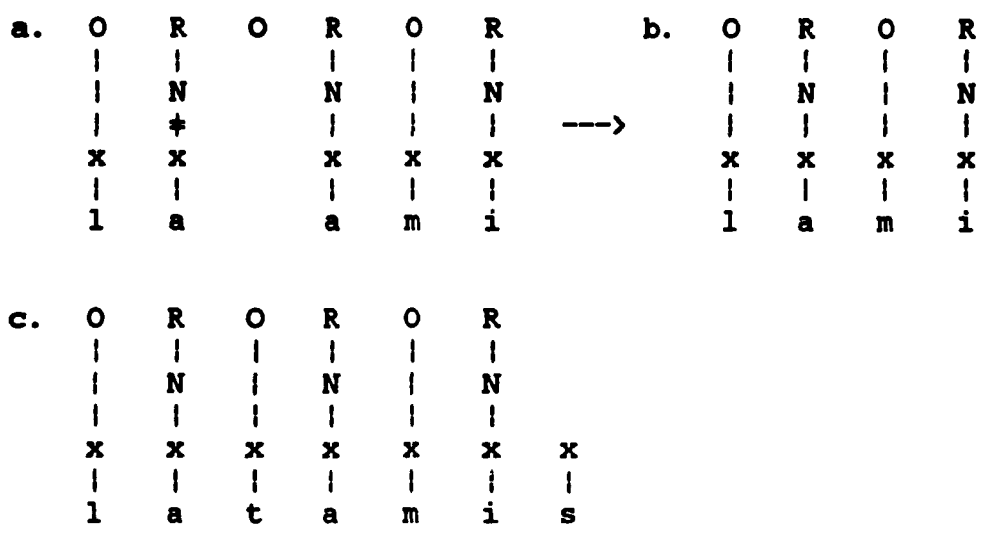
The representation I assume for "h-aspiré" can be justified. It is a well-known fact that in French a vowel deletes before another vowel and stays before a consonant. This can be seen in (31).

(31) a. la amie --> [lami] 'the girl friend'
la école --> [lekɔl] 'the school'
le épi --> [lepi] 'the ear'

b. la Tamise ---> [latamiz] 'the Thames'
le pétrole ---> [lapetrɔl] 'the petrol'
le képi ---> [lakepi] 'the kepi'

The deletion of the vowel of the article preceding a noun beginning with a vowel can be accounted for by proposing that in a sequence of two adjacent nuclear points, the first one is deleted as a result of OCP (Obligatory Contour Principle). In words beginning with a vowel, the word-initial onset has no segment and no skeletal point. Consequently, two nuclear points are adjacent and the first one is deleted. Deletion does not take place when the noun following the article begins with a consonant, since in this case the word-initial onset or non-nuclear point prevents the two nuclear points from being adjacent.

(32)



When an article precedes a word beginning with an "h-aspiré", even though such a word begins phonetically with a vowel, the article behaves as before a word beginning with a consonant. The vowel is not subject to deletion.

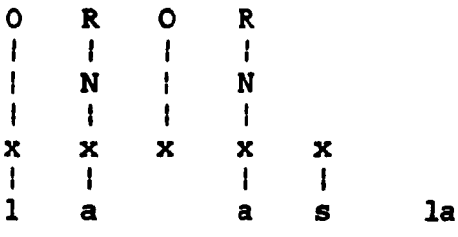
(33)

h-aspiré		consonant		vowel	
la housse	'the dust-cover'	la soupe	'the soup'	lé ours	'the bear'
la hache	' " axe'	le tapis	' " carpet'	lá ami	' " friend'
le héros	' " hero'	le bébé	' " baby'	lá épée	' " sword'

That words beginning with "h-aspiré" begin phonetically with a vowel means that at the segmental level these words have as word-

initial onsets, a constituent that dominates no overt segment. On the other hand the fact that these words behave phonologically like words beginning with a consonant means that at the skeletal level the word-initial onset must dominate a skeletal point which prevents the two nuclear points from being adjacent. I then assume the following representation for words beginning with "h-aspiré".[18]

(34) a.



la hache [la as] 'the axe'

Let us now return to the question of why before "h-aspiré" an empty nucleus must receive a phonetic interpretation. Consider the data in (35a) and the representations in (35b & c).

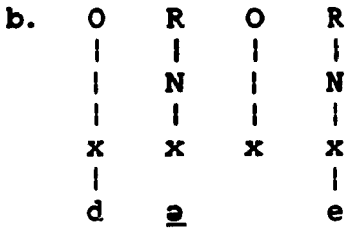
(35) a.

pas dé ami	'no friend'	pas de hache	'no axe'
pas dé ours	'no bear'	pas de housse	'no dust-cover'
pas dé école	'no school'	pas de héros	'no hero'

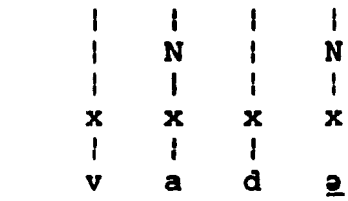
[18] Piggott and Singh (1985) propose a different representation of the two types of empty onsets. While an empty onset always dominates a skeletal point, the onset of "h-aspiré" words has a null segment attached to the skeletal point. Their analysis provides an account for both liaison and elision effects.

la déssus	'on it'	va dəhors	'go outside'
rétourne	'go back'	rəhausser	'to raise again'

b.



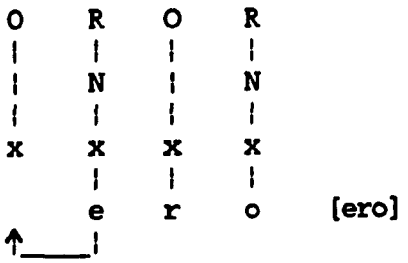
c.



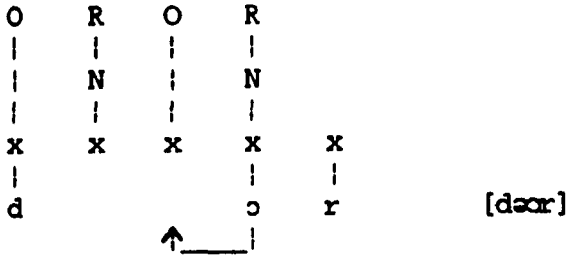
Words containing an "h-aspiré" contain an onset which is present in the lexical representation but has no phonetic content. Such an onset is an empty position. Because it is empty this onset, unlike onsets dominating an overt segment, must not only be governed, it must be properly governed. The first question is what is a proper governor for an empty onset. According to the theory, the only governor for an onset is the following nucleus. Indeed, given transsyllabic government, a nucleus always governs a preceding onset. Recall that there is no governing relation between onsets since only a nuclear head has the property to govern another constituent head.

Consequently, the only possible governor for any onset is a following nucleus. In the three words dehors, rehausser and héros the empty onset is followed by a nucleus with phonetic content which has the required property to properly govern the empty onset to its left. Being properly governed, the onset may remain empty.

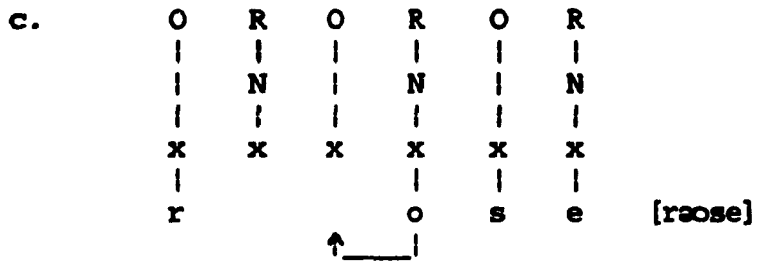
(36) a.



b.



c.

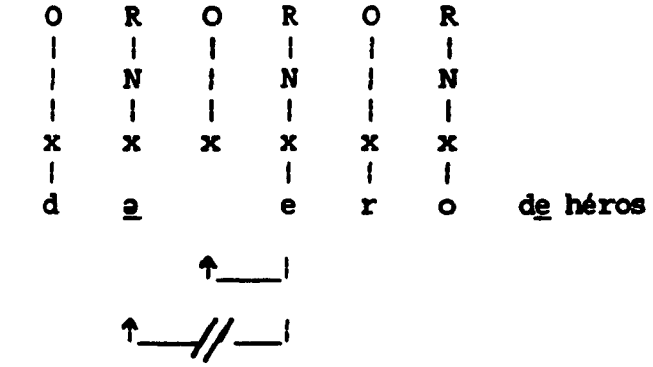


In words like dehors and rehausser the empty onset is itself preceded by an empty nucleus. There is then a situation where both an empty onset and an empty nucleus would have to be properly governed by a following nucleus with phonetic content. I propose the following principle according to which a proper governor can properly govern one and only one empty governee.

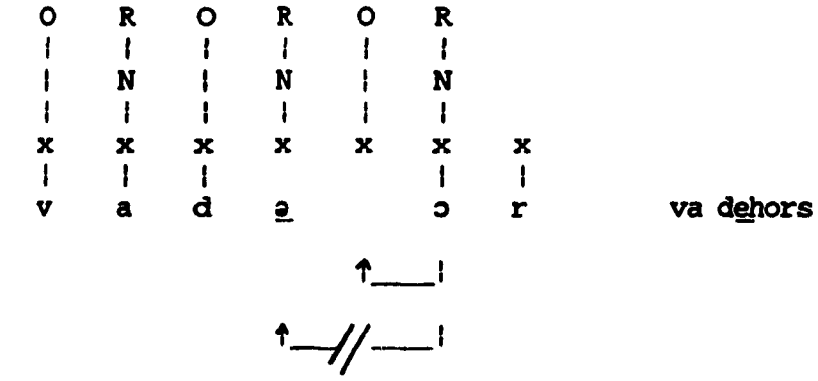
(37) A proper governor can only properly govern one and only one empty position.

I can now account for the manifestation of the empty nucleus preceding the empty onset. Since the empty onset is properly governed by the following nucleus and a proper governor can only properly govern one governee, the empty nucleus to the left lacks proper government and must then be manifested.

(38) a.



b.



One may wonder why the transsyllabic governing relation between the nuclear point and the preceding non-nuclear one, i.e. the governing relation between the nucleus and the empty onset to its left, has precedence over the governing relation between the two nuclei applying at the level of nuclear projection. One may also wonder why empty onsets do not alternate with consonants under certain circumstances and finally why is schwa never found after h-aspiré. The difference in the nature of the two types of governing

relation (applying at the level of nuclear projection and at the skeletal level) provides the answer.

Let us first consider why is schwa never found after h-aspiré and why h-aspiré never alternates with a phonetic entity (as an empty nucleus does with schwa). In the lexical representation, skeletal positions along with the segments they dominate are organized into constituents according to the governing relation they contract with each other. Recall that nuclear heads are lexically associated to a constituent nucleus but that all the other points are projected to a constituent following the governing relations that operate between them. Let us suppose that a nuclear point has no segment attached to it. If the preceding non-nuclear point has also no phonetic content, a governing relation between those two points is absolutely impossible. The empty non-nuclear point needs to be properly governed and the following empty nucleus cannot assume this role of proper governor. Given that there must be a governing relation between a nuclear head and the preceding non-nuclear point, a configuration where both positions have no phonetic content is impossible. For the governing relation to apply, either the nucleus has phonetic content and the preceding onset can then be empty or the nucleus is empty and the preceding non-nuclear point has phonetic content. In the former

situation the nucleus can properly govern the preceding onset while in the latter the onset only requires to be governed and an empty nucleus is a governor. From this proposal it also follows that schwa never occurs after h-aspiré. Given that schwa is the manifestation of an empty nucleus and that an empty nucleus never occurs after an empty onset, it follows that schwa is never found in this position.

With regard to why governing relations applying at the skeletal level have precedence over those applying at the level of nuclear projection, this follows from the fact that it is only when points are organized into governing relations that constituents are projected. The difference in the nature of the two types of government should make clear why proper government of an empty onset has precedence over proper government of an empty nucleus.

To summarize, an empty nucleus occurring before an h-aspiré must receive a phonetic content. The empty nucleus is always realized as schwa in this position (cf. dehors, rehausser). I propose that this follows from the impossibility for a proper governor to properly govern two empty governees. "H-aspiré" having the representation of an empty onset, it must be properly governed by the following nucleus. It follows that the nucleus properly governs the empty

onset, but it cannot also properly govern the empty nucleus. Since it is not properly governed, the empty nucleus must be realized as schwa.

To this point, I have considered the behaviour of word-internal empty nuclei preceded by a single consonant. In this context, the empty nucleus is properly governed by a following nucleus with phonetic content and it is realized as zero, except if an h-aspiré intervenes between the two nuclei. There are, however, cases where even if immediately followed by a vowel, an empty nucleus must receive a phonetic interpretation, viz. when preceded by more than one consonant. In the next chapter, I propose a principle to account for these facts.

CHAPTER SIX

LICENSING

6.0 Introduction

In this chapter I consider word-internal empty nuclei preceded by a consonant cluster. I introduce a new notion: licensing.[1] It is argued that a non-nuclear head can govern a complement only if i) it has the required charm value and ii) if it is licensed by a following nuclear head. Among other things licensing accounts for the phonetic realization of an empty nucleus following a governing onset (i.e. a non-nuclear skeletal point which governs a complement). Given that a licenser must have a phonetic content, an empty nucleus which has the status of licenser is manifested as schwa.

In order to understand licensing the reader must recall the following two types of governing relations, syllabic and transsyllabic (or interconstituent) government.

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[1] I use the term 'licensing' in an entirely different sense from Ito (1986). For her prosodic licensing is a requirement to the effect that all phonological units belong to higher prosodic structure.

6.1 A summary of governing relations

As mentioned in Chapter 1, the syllabification of skeletal points into constituents is derived from the governing relations they contract with each other. As a reminder of the two types of governing relations, let us re-examine the French words sacrer [sakre] 'to swear' and partir [partir] 'to leave'. At the segmental level these words are a sequence of segments. At the skeletal one they are a sequence of skeletal points. Only the nuclear points are lexically associated to a constituent nucleus. Now let us consider the word-internal clusters kr and rt in sacrer and partir respectively, and let us determine how these two consonants are syllabified. With respect to the sequence kr, the only possible syllabification is one where the two consonants are sisters within a branching onset, namely the syllabification sa-kre. The absence of ambiguity in the syllabification follows directly from syllabic government. In a sequence of consonants where a negatively charmed segment precedes a charmless one, government applies from left-to-right. The stop governs the liquid and the two segments can only be sisters within a branching onset. In partir, on the other hand, the internal cluster is one where the charmless segment precedes the negatively charmed one. Consequently the two consonants cannot be sisters within an onset

where government goes from left-to-right. In partir the governor stop follows the charmless liquid, resulting in a governing relation applying from right-to-left. According to the theory, in a sequence where a governor immediately follows the governee, the two segments can only be syllabified in a rime followed by an onset. In that case the stop transsyllabically governs the preceding charmless liquid.

In Chapter 1 I have also asserted that a transsyllabic governing relation is always present between a nucleus and a preceding onset. That an onset cannot itself govern a preceding nucleus is accounted for by the principle that only a nucleus, i.e. a nuclear head, can govern another constituent head. I also claimed in Chapter 5 that an onset which dominates an overt segment is governed by a following nucleus even if this nucleus is empty (e.g. lentement). Moreover, I argued that empty positions, onsets or nuclei, are required to be governed by a nucleus with phonetic content. I then differentiate government of a position which has phonetic content from government of an empty governee. While the former can be governed by a position which has no phonetic content, this is not the case for an empty governee. That is, while an empty governee must be properly governed (cf. my analysis of schwa and "h-aspiré"), no such condition is required for a governee with phonetic content. An essential dif-

ference between government and proper government is that the latter, but not the former, requires the governor to have phonetic content. Proper government is then a stronger case of government. This being said, let us next turn to the behaviour of word-internal empty nuclei preceded by a consonant cluster.

6.2 Licensing as a condition on government

At the end of the preceding chapter we left the discussion at the point of considering why a word-internal empty nucleus is always realized as schwa after two consonants. Let us consider the following data.

(1)

fermeté	'firmness'	fourberie	'treachery'
marguerite	'daisy'	hurlement	'roaring'
bordelais	'from Bordeau'	orphelin	'orphan'
embarquement	'boarding'	surmener	'to overwork'
forteresse	'fortress'	parsemer	'to sprinkle'
forgeron	'blacksmith'	morceler	'to parcel out'
fermeture	'closing'	fermement	'firmly'
harceler	'to harass'	orgelet	'sty'
ensorceler	'to bewitch'	appartement	'apartment'
marteler	'to hammer'	gouvernement	'government'
percevoir	'to perceive'	versement	'payment'
parchemin	'parchment'	bordereau	'note'
gendarmerie	'police station'	tourterelle	'turtledove'
infirmerie	'infirmary'	garderie	'day nursery'
intervenir	'to intervene'	bergerie	'sheepfold'

porcherie	'pigsty'	fortement	'strongly'
parlement	'parliament'	département	'department'
gouvernement	'government'	corselet	'corselet'
porcelaine	'porcelain'	porcelet	'piglet'
surmenage	'overwork'	ouvertement	'openly'
mercerie	'haberdasher's shop'		

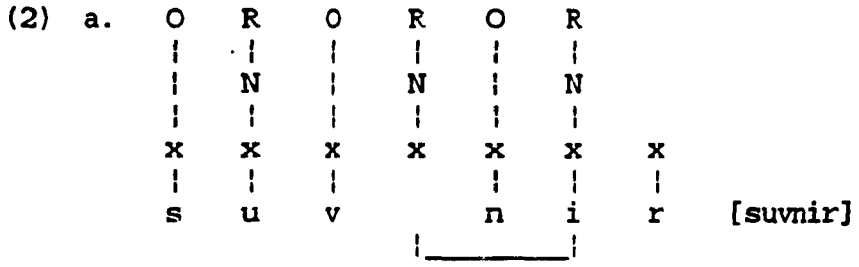
In (1) a word-internal empty nucleus is preceded by a consonant cluster of the type liquid plus obstruent and it must be realized phonetically. However, in all the examples the word-internal empty nucleus is followed by a nucleus with phonetic content. According to the analysis, the empty nucleus is properly governed by the following nucleus and zero should be a possible manifestation of the empty nucleus. In this chapter I propose an explanation for the absence of schwa in words like souvénir [suvnir] 'remember', while allowing for its presence in words like parvenir [parvənir] 'to reach.

6.2.1 Governing vs non-governing non-nuclear heads

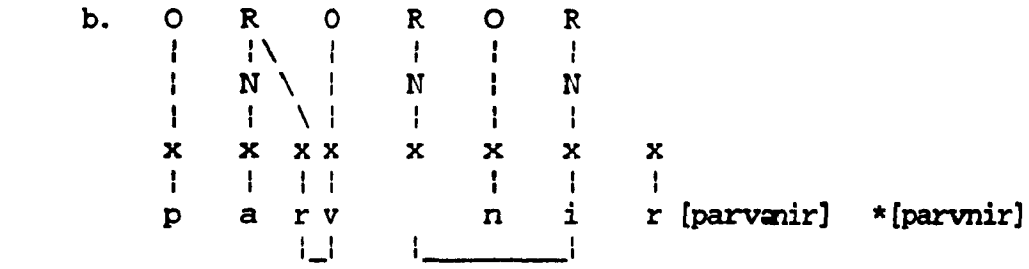
Considering first the case of souvenir, the empty nucleus is followed by a nucleus with phonetic content which properly governs it, and it is manifested as zero. What is of importance is that the empty nucleus is preceded by a single consonant, i.e. by a non-nuclear point which has no complement to govern. With regard to the

word parvenir, as in souvenir, the empty nucleus is followed by a proper governor. What distinguishes the two forms is that in parvenir the empty nucleus is preceded by a non-nuclear point which governs a rimal complement. The difference between those two words then, lies in the status of the consonant preceding the empty nucleus. The structure of the two words is given in (2).

(2) a.



b.



In (2b) the properly governed empty nucleus is preceded by an obstruent which transsyllabically governs the preceding liquid. It is then the case that in a word like parvenir the onset of the sequence O-R containing the empty nucleus is a governor which governs a preceding

rimal complement. The situation is different in souvenir. In the latter form, the empty nucleus is preceded by a consonant which does not govern a complement. I claim that the manifestation of the empty nucleus is determined by the status of the preceding consonant. A properly governed empty nucleus must be manifested when it is preceded by a consonant which governs a complement. Otherwise it can always be realized as zero. I propose the following constraint on government:

(3) Licensing: For a governing relation to hold between a non-nuclear head α and its complement β, α must be licensed, i.e. properly governed.

According to principle (3), for a non-nuclear point to govern a complement, two properties are needed; charm and licensing. We know that according to the theory of charm and government a negatively charmed segment has the required charm value to be a governor, while this is not the case for a charmless consonant.[2] But it appears that

[2] KLV (1988) mention that a charmless segment may govern if it has a complexity greater than its governee. (Complexity is measured in terms of the number of elements that constitute a segment). For example the liquid l and the nasals being more complex than r may govern this latter segment. However, being less complex r cannot govern any segment (ex. hurlement 'roaring', surmener 'to overwork').

charm is not a sufficient property to allow a non-nuclear point to govern. While in words like parvenir, fortement and the like, the consonant in the onset position has the required charm value to be a governor, this is not sufficient. It also needs to be licensed to assume its role of governor. This means that whereas charm gives to a non-nuclear segment the potential to govern, licensing allows the segment to realize this potential.[3]

Licensing is a required property for a governing relation to hold between a non-nuclear head and its complement. The fact that a stop is licensed when it is followed by a nucleus with phonetic content points to drawing a relationship between licensing and proper government. In both cases the proper governor or the licenser must have phonetic content. Proposing that licensing is proper government would capture the similarity between proper governors and licensers. Like empty governees, governing non-nuclear heads would be required

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[3] It seems that there are only the nuclear heads which can govern without being licensed. Nuclear heads have intrinsic properties which give them the possibility to govern spontaneously. This might follow from the fact that i) nuclear heads are themselves licensers, ii) are heads of the sequence Onset-Rime, iii) are the only lexically associated positions and iv) that they are the only positions which always govern a complement and this regardless of their charm value. Moreover we saw that even empty, a nucleus governs a preceding non-nuclear point in the onset position. In contrast with nuclear heads, non-nuclear heads cannot spontaneously govern a complement.

to be properly governed.

6.2.1.1 Licensers

Let us determine what is the licenser for a non-nuclear governor. From what we have observed, a governing relation between a governing consonant and its governee seems to be possible only if the nucleus which governs the non-nuclear head has phonetic content. Notice that an empty nucleus cannot be manifested as zero after a consonant cluster. This leads to the conclusion that the licenser is the nucleus of the sequence O-R which contains the governing consonant. In addition, since I have already asserted that an onset is governed by the nucleus to its right and that there is no governing relation between onsets, this also leads to the conclusion that the licenser for a governing onset is the adjacent nuclear head. In other words, the head of the sequence O-R, the nucleus, is the governor as well as the licenser of the preceding onset.

To summarize so far, to govern its complement a consonant needs two properties: the appropriate charm value and licensing. A stop consonant has the required charm value to govern a preceding liquid, but if it is not licensed it cannot govern. There are then two

possibilities. The governor has the required charm value and it is licensed. In this case it can govern the complement. Or it has the required charm value but it is not licensed. In that case the governing relation between the two consonants is impossible.[4]
Needless to say, if a consonant does not have the required charm value, the intrinsic property required for governors, licensing cannot help it to govern. Which means that even though it may be followed by a nucleus with phonetic content, a charmless liquid could never govern a complement with greater complexity.

As we saw, schwa must be manifested after a transsyllabic cluster in order to license the preceding governing onset. Transsyllabic clusters are not, however, the only consonant clusters where a governor must govern a complement. Recall that within a branching constituent there is also a governing relation between the two skeletal points. Consequently, a nucleus which is preceded by a branching onset, is preceded by a governing domain, even though the nuclear point is not adjacent to the governing non-nuclear head. If it is indeed the case that a governing consonant must be licensed by a following nucleus, schwa should always be present after a branching

[4]Transsyllabic government is not optional. We will see, later in this chapter, what happens when a governing consonant is not licensed.

onset. The following words show that it is indeed always the case that after a branching onset an empty nucleus is realized as schwa.

(4)

maigrement	'poorly'	crever	'to blow'
lisiblement	'legibly'	brebis	'sheep'
librement	'freely'	sifflement	'whistle'
encerclement	'surrounding'	tendrement	'tenderly'
probablement	'certainly'	mercredi	'wednesday'
vendredi	'friday'	Angleterre	'England'
grelotter	'to shiver'	acreté	'acridity'
tendreté	'tenderness'	diablerie	'devilment'
sucrerie	'sweat things'	crevasse	'crack'
engrenage	'gears'	simplement	'simply'
effondrement	'collapse'	entretien	'discussion'
écrevisse	'crayfish'	encombrement	'congestion'
ameublement	'furniture'	entrevue	'meeting'
durablement	'long lasting'	épouvantablement	'dreadfully'
entrelacer	'to interlace'	entretenir	'to maintain'
contremaître	'foreman'	première	'first'
entreprise	'firm'	brevet	'diploma'
Bretagne	'Brittany'	frelon	'hornet'
crevaison	'flat'	crevasse	'fissure'
crevette	'shrimp'	grenouille	'frog'
sacrement	'sacrament'	édredon	'eiderdown'
bretelle	'suspenders'	entrepôt	'warehouse'

In the above examples the empty nuclei are properly governed by a following vowel, but they are nevertheless phonetically realized. The presence of schwa after a branching onset follows from licensing. The non-nuclear head of a branching onset must syllabically govern its complement. In order to govern its complement this governing

consonant must have the required charm value and it must be licensed by the following nuclear head. Consequently, the empty nucleus to the right of the branching onset receives a phonetic content and licenses the preceding governing consonant.

Licensing is a relation of proper government between a nucleus and a preceding governing consonantal position. When a nucleus licenses an onset which governs a rimal complement, the licenser and the licensee are strictly adjacent. However, the fact that a nucleus licenses the head of a preceding branching onset leads to the conclusion that government of a head is possible even though a complement intervenes between the 'head-governor' and this 'head-governee'. We must then claim that while a head must be strictly adjacent to its complement, strict adjacency is not required between a head and another constituent head. In terms of minimality, while a remote governor cannot govern a complement occurring within a branching constituent, nothing prevents a head from being governed from the outside. Government of a head from the outside is not a case of double government. Nothing within a governing domain already

governs the head.[5]

6.2.2 Principles in conflict

To this point of the analysis I have suggested two principles:

(5) 1. an empty nucleus can always be realized as zero when it is properly governed

2. a governing consonant must be licensed (properly governed).

We saw that in French an underlying empty nucleus may be realized as zero when it is properly governed. But in cases where a properly governed empty nucleus is in the position of licenser, it should produce the following paradoxical situation. On one hand this empty position should be realized as zero, since it is properly governed and on the other hand because it is a licenser it should receive a phonetic interpretation. The question is what happens in a situation where the two principles are in conflict. There are two

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[5] Or, it would be possible, in order to preserve strict adjacency, to propose that it is the onset constituent which is licensed by a following nucleus. If syllabic constituents are projections of their head, an onset will be licensed by a following nucleus and the licensing property will percolate to the head. Licensing applying between constituents remains strictly local.

possibilities; either principle (5:1) or principle (5:2) is retained but not both.[6] Let us first consider a situation where principle 2 is maintained, i.e. a situation where what is preserved is the requirement that a governing consonantal position must be licensed. Opting for principle 2 means that even if properly governed, an empty nucleus which is a licenser would be manifested phonetically. Having phonetic content, it would license the preceding governor. A language which retains principle 2 over principle 1 would be exactly like French. The presence of schwa in parvenir shows that French chooses to preserve licensing and not the realization as zero of a properly governed empty nucleus. The empty nucleus is properly governed, it nevertheless receives a phonetic interpretation in order to license the preceding onset.

Let us now consider what the situation would be if, in cases where proper government of an empty position and licensing are in conflict, a language chooses to preserve the absence of manifestation of a properly governed empty position instead of licensing. In such a language, in a situation where an empty nucleus is preceded by a governing onset, the empty nucleus would remain without phonetic

[6] The choice of dominance, i.e. whether principle (1) takes precedence over (2) or vice-versa is determined parametrically.

content. If empty, this nucleus cannot be the licenser of the preceding governor. We would then predict that something would happen to the governing relation between the two consonants, since the onset is not licensed and cannot govern its complement. In such a language we predict that, in a word like parvenir for example, the empty nucleus would be realized as zero, but we also predict that one consonant of the sequence will be dissociated from its point because the governing relation between the two consonants is no longer possible. Recall that if empty, a nucleus cannot license the preceding governor. This means that parvenir would be realized as [parnir] or [pavnir]. While neither of those realizations conform to the fact in French, one of them reflects the situation in one dialect of Tangale, a Chadic language spoken in Northern Nigeria, that I next consider.

6.2.2.1 Licensing in Tangale

In this section I draw heavily from Nikiema's (1987a,b) analysis of Tangale, a language where some phenomena may find an explanation in terms of licensing. In addition, I show that the choice between the absence of manifestation of a properly governed nucleus and licensing is subject to parametric variation. While French and the

Kaltungo dialect of Tangale opt to preserve licensing, another dialect of Tangale called Billiri opts for the absence of manifestation of properly governed empty positions. Let us consider Tangale which has been studied by Kidda (1985), Kidda and Kenstowicz (1987) and Nikiema (1987a,b), (1988).

Tangale is very interesting in the context of the present discussion. Like French, Tangale shows an alternation between V/zero. Unlike French however, the alternation between V/Ø may result from a process of vowel deletion.[7] Without going into the detail, the facts are that except in the initial syllable of a word, a vowel is deleted when followed by another vowel.[8]

(6)	sana + do	---->	san-do	'her food'
	tana + go	---->	tan-go	'your (masc) cow'
	dume + go	---->	dum-go	'hurt'
	sumo + zi	---->	sum-zi	'your (fem) name'
	pido + no	---->	pid-no	'my tree'

In (6) we see that a stem-final vowel deletes when followed by a suffix. Nikiema (1987) argues that in (6), a vowel is dissociated

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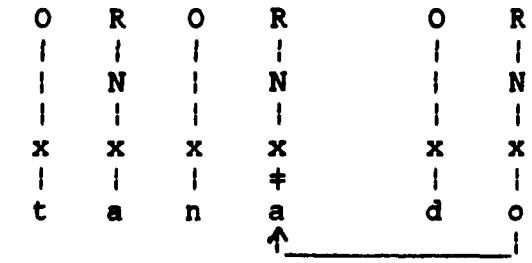
[7] Unlike in French, in Tangale any vowel can alternate with zero.

[8] We saw in chapter two that in addition to the initial syllable, a long vowel is never deleted when followed by another vowel.

from its nucleus but that the position remains. The resulting empty nucleus has no phonetic interpretation if it is properly governed by a following nucleus with phonetic content. Proper government requires strict adjacency at the relevant level between the proper governor and the governee and it applies from right-to-left.

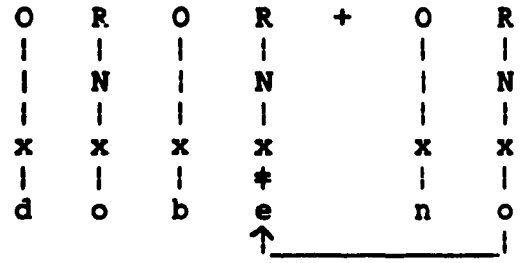
(7)



[tando] 'her cow'

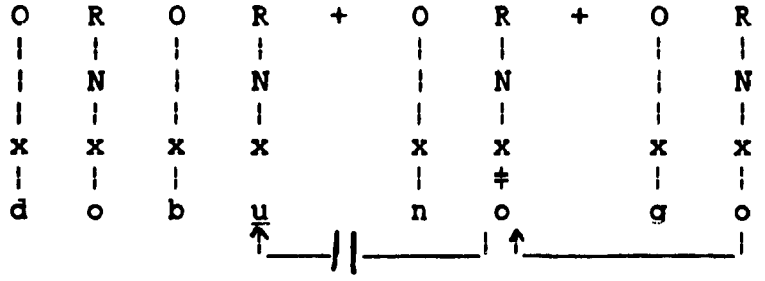
That deletion creates an empty nucleus (a nucleus with no segment) and not the deletion of the entire position is motivated by the manifestation of a so-called epenthetic vowel when a resulting empty nucleus is no longer adjacent to a proper governor (no longer properly governed). Consider the following:

(8) dobe + no ---> [dobno] 'call me'



The preceding example shows that in a form like dobe+no the stem-final vowel is deleted when a suffix is attached ([dobno]). The question is whether it is the entire nucleus that is deleted or if only the vowel is dissociated from its position. The answer to this question is provided when two suffixes are attached to a stem.

(9) dobe+no+go --> [dobungo] *[dobngo] 'called me'



As examples (8 & 9) show, while the stem final vowel is deleted when one suffix is attached, the situation is different when two

suffixes are attached. In this latter case, the rightmost suffix triggers the deletion of the vowel to its left (the preceding suffix). The stem-final vowel no longer adjacent to a proper governor receives a phonetic interpretation; a vowel u is manifested (dobe+-no+go --> [dobungo]). If vowel deletion does not result in the deletion of the nuclear position, but only in the deletion of the segment, it is not surprising that a vowel may reappear in this position under certain circumstances.[9]

What is particularly interesting for us are the forms given in (10) below. I present two dialects of Tangale. One called Billiri and another named Kaltungo. The forms given in (6) are the same for both dialects; except in syllable initial, a vowel preceded by one consonant deletes when followed by another vowel. The two dialects are however different with respect to the following forms in (10). In (10) I give some words where the stem-final vowel is preceded by two consonants. It can be observed that unlike in (6), the deletion of the stem-final vowel triggers some other processes.

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[9]Following KLV (1988) Nikiema assumes that the Projection Principle is present in phonology. According to this principle, governing relations are defined in the lexical representation and remain constant throughout a phonological derivation. According to the Projection Principle, a governing relation holding between two nuclei remains throughout the derivation.

(10) a. Billiri

landa + zi	---> lan-zi	'your (fem) dress'
kambo + go	---> kam-go	'your (masc) growth'
monde + go	---> mon-go	'forgot'
simbe + go	---> sim-go	'met'

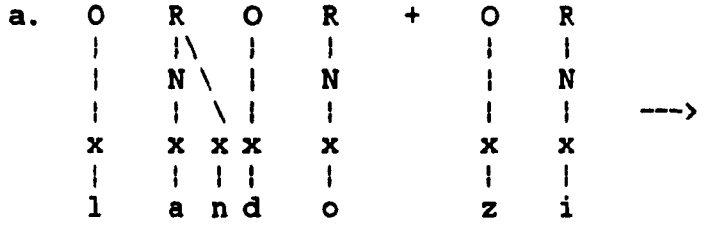
b. Kaltungo

landa + zi	---> landu-zi
kambo + go	---> kambu-go
monde + go	---> mondu-go
simbe + go	---> simbu-go

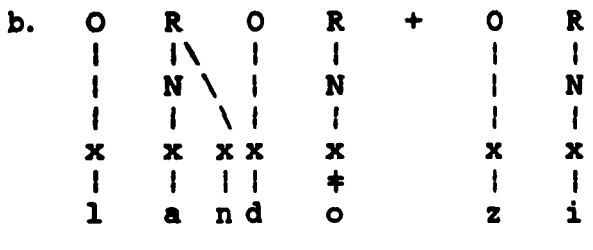
Let us first consider the Billiri dialect of Tangale. Under the general process of vowel deletion the stem-final vowel deletes when a suffix follows. In addition we can observe that one consonant of the cluster disappears (cf. /landa-zi/ --> *[land-zi], [lan-zi]). What is particularly interesting with those forms is that, unlike the situation in words given in (6), the stem-final vowel of the words given in (10) is preceded by a consonant cluster. As I have already proposed, a governing consonant must be licensed, (i.e. properly governed) by a following nucleus. A nucleus preceded by a consonant cluster is then the licenser of the governing consonant to its left and since licensing is proper government this licenser must have a phonetic content. We are then facing a situation where an empty nucleus is properly governed but is also a potential licenser. We saw that in this situation French opts for licensing; schwa is realized

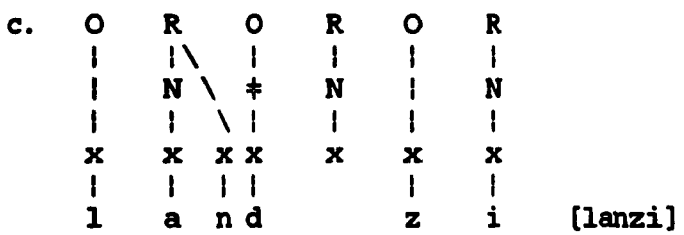
after a consonant cluster. In the dialect of Billiri, unlike in French, the dominant principle is the one requiring absence of manifestation of a properly governed empty position. An empty nucleus which is a potential licenser but which is properly governed remains without phonetic content. Being empty it lacks the required property to license the preceding governor. Because the governor is not licensed, a governing relation between the two consonants is impossible. What happens is that because it lacks the required properties to govern a complement the governing non-nuclear point along with its segment is dissociated.[10]

(11) Billiri



[10] It seems that the dissociation of the onset is not predicted. The dissociation of the complement of the preceding rime is an equally likely possibility.





In dissociating the non-nuclear point from its constituent onset it follows that the onset has no skeletal point attached to it. I propose that the rimal complement (the n) is reassociated to the onset of the second syllable since a rimal complement must be governed by a non-nuclear point in an onset position.[11] When there is no onset following a rimal complement, the consonant cannot occupy a position within a rime. The reassociation of the n to the onset of the second syllable is illustrated in (12).[12]

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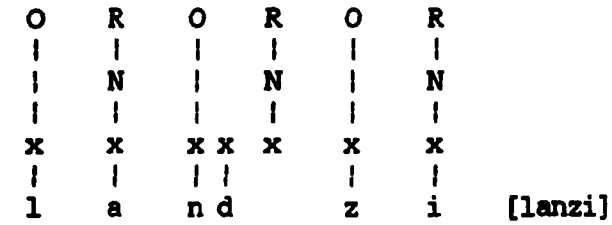
[11]The requirement that a rimal complement must be followed by an onset will be considered in detail in the following chapter.

[12]We can also see that I assume that the consonant d along with its skeletal point are still present in the structure but that the position is not associated to a constituent. The d cannot join the n within the onset since this would violate syllabic government. My

(12)



We saw earlier that when two suffixes are added to a stem, the rightmost nucleus properly governs the empty nucleus to its left and, the stem-final empty nucleus (no longer adjacent to a proper governor) must be realized phonetically (dobe+no [dobno], dobe+no+go [dobungo]). Interestingly, when two suffixes are added to a stem of the type of landa, the stem-final nucleus is manifested allowing for the appearance of the preceding governing consonant. The nucleus to its right having a phonetic content the consonant in the onset position is now licensed and can govern the rimal complement to its left.

(13) tunde 'delay'

tunde + go	[tungo]	*[tundgo]	'delayed'
tunde + no + go	[tundungo]	*[tunungo]	'delayed me'

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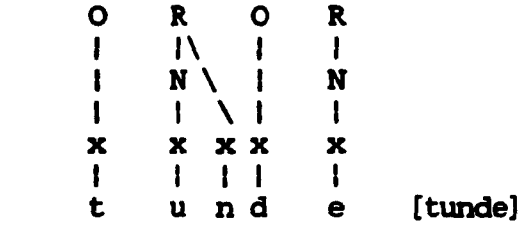
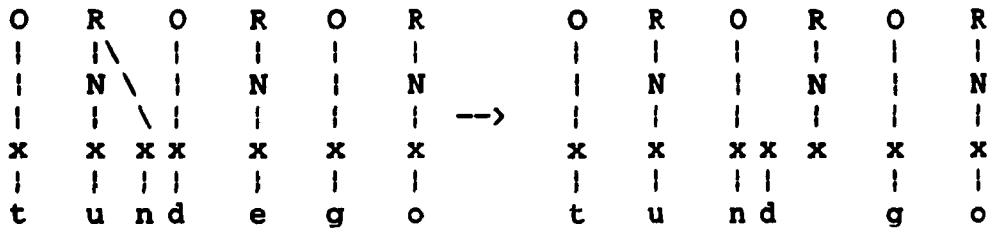
proposal that the d remains will be motivated shortly.

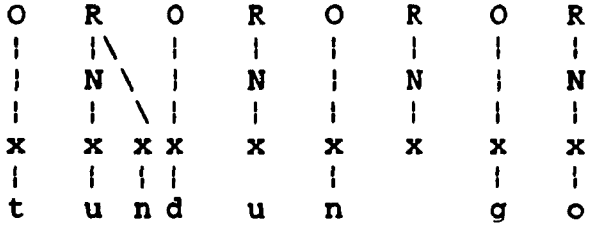
a. tunde [tunde]



b. tunde + go [tungo]



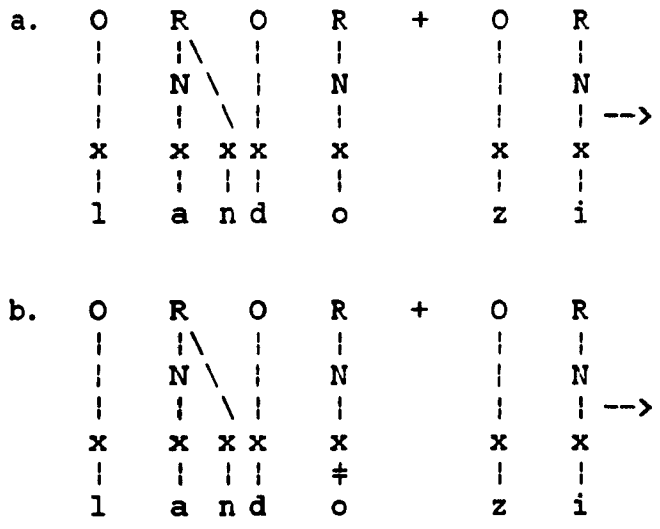
c. tunde + no + go [tundungo]



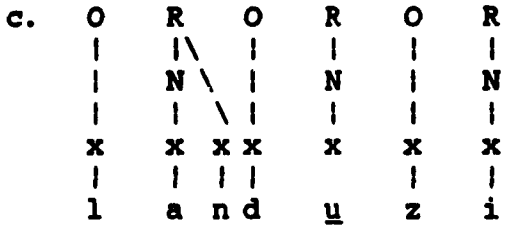
Let us now consider the dialect of Kaltungo. As in the dialect of Billiri, in Kaltungo a vowel deletes when followed by another vowel (see (6)). When the resulting empty nucleus is preceded by one consonant, this nucleus remains phonetically empty. However, when

vowel deletion takes place and the empty nucleus is preceded by two consonants, it results in a situation where a properly governed empty nucleus is also the potential licenser of a preceding governing consonant. The data given in (10) show that Kaltungo is like French. When government of empty positions is in conflict with the principle which says that a governing consonant must be licensed, Kaltungo retains licensing. Because it must properly govern the onset, the empty nucleus receives phonetic content: in Tangale, its realization is u.

(14) Kaltungo



c.



[landuzi]

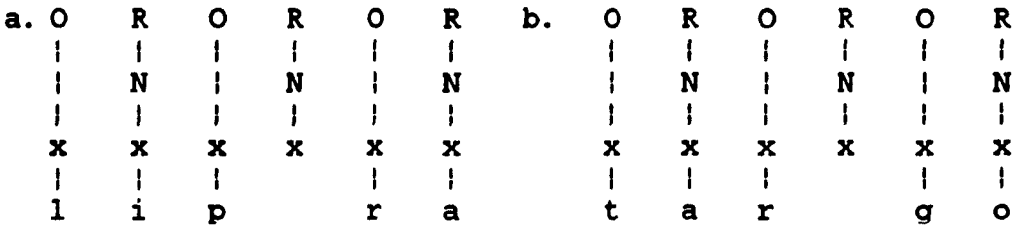
A comparison between the Kaltungo and the Billiri dialects of Tangale shows that when proper government of empty nuclei is in conflict with licensing of a governing consonant, the choice of which principle has precedence is determined parametrically. While Kaltungo and French opt for licensing, Billiri opts for the absence of manifestation of a properly governed empty position.

6.2.3 Government vs. syllable well-formedness

One may wonder how this analysis of Tangale compares with one that appeals to syllable well-formedness in these two dialects. In his paper Nikiema shows that government is an improvement over the syllable-based analysis. Let me give an example. As mentioned, Nikiema assumes that the projection principle is present in phonology. A governing relation remains throughout the phonological derivation. It follows for example, that a relation between a nucleus and an onset established in the lexical representation, remains at

every level of the derivation. He also proposes that Tangale has branching nuclei and rimes, but not branching onsets. In addition, the right branch of a branching rime dominates only the first member of a geminate or the nasal in a sequence nasal plus stop. According to his view, words like lipra 'needle' and targo 'trap' have the representation of three syllables, the second one containing an empty nucleus.[13] Note that he does not syllabify the r of targo in the rime, since according to him only the right member of a geminate or an homorganic nasal can occupy this position.

(15)



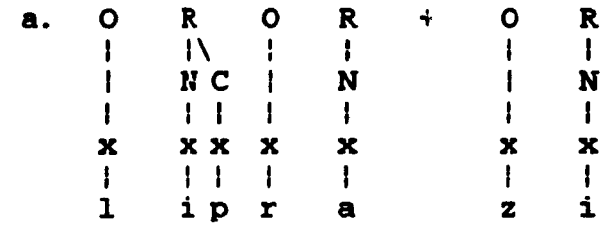
[13]Nikiema argues that the sequence stop plus liquid does not constitute a branching onset. His evidence are that: i) under certain circumstances a vowel intervenes between the two consonants and he assumes that no positions can be inserted in a structure. ii) in the initial syllable, no words contain an initial sequence stop plus liquid. Since in the initial syllable a vowel is never deleted, if onset would branch, nothing would prevent a cluster stop plus liquid to occur in word-initial position.

We can see that it is proposed that words may contain in their lexical representation empty nuclei which are realized as zero if properly governed.

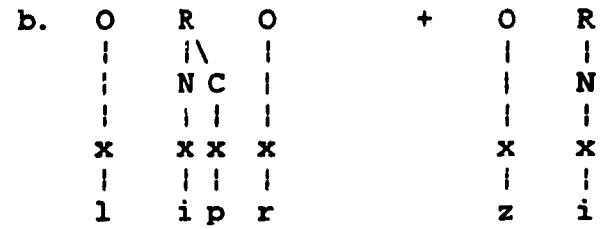
Nikiema says that Kidda (1985) who analyses Tangale in terms of a syllable-based approach, also claims that Tangale has no branching onsets but does have branching rimes and nuclei. However, she considers the words lipra and ṭargo as having a branching rime followed by a non-branching onset. When a suffix is added to these two forms and the stem-final vowel deletes, the result is [lipur-zi], [tarug-mu]. Kidda then assumes both a process of vowel deletion and epenthesis along with a syllabic reorganization of the segments; the Coda of the first syllable is re-syllabified into a following onset along with the epenthetic vowel in the nucleus and the onset of the stem-final syllable is resyllabified into a preceding rime. These mechanisms are illustrated in (16).

(16) 1. Kidda's analysis: lipra + zi ---> li-pur-zi

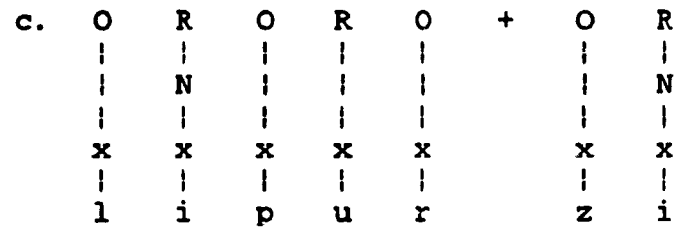
a.



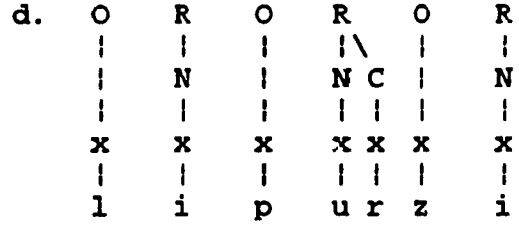
b.



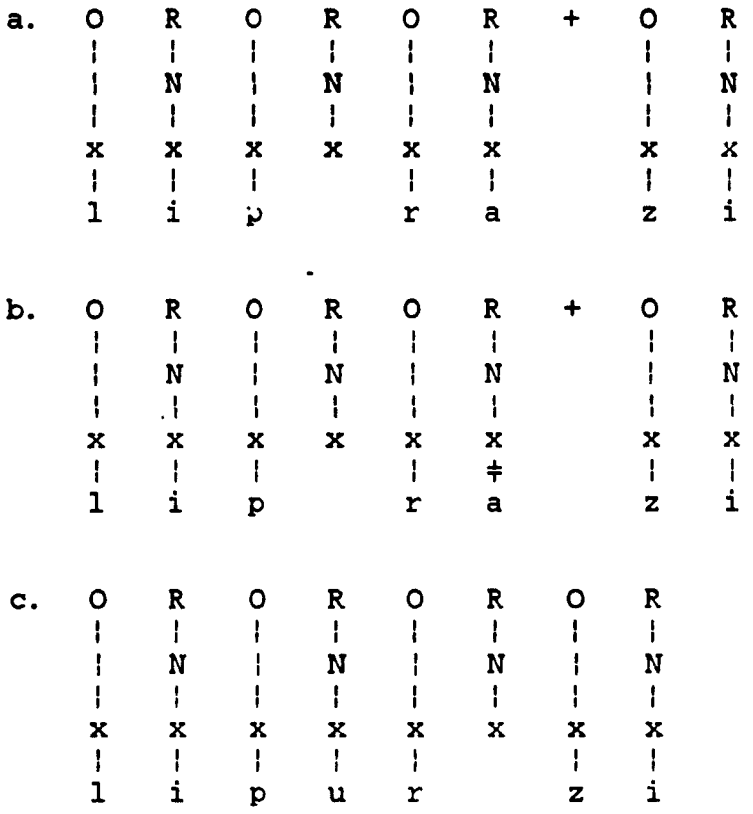
c.



d.



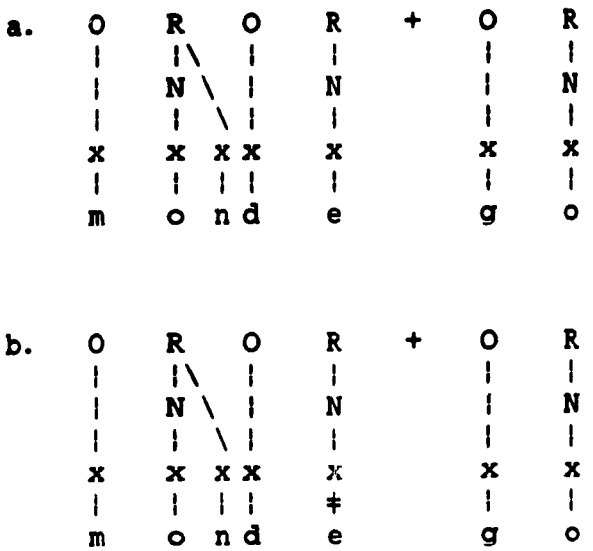
2. Nikiema's analysis



The question arises as to why a form such as monde 'to forget' which should according to Kidda, have the same syllabic structure as targo and lipra, is not realized as [monudgo] when a suffix is added. In fact the result is [mongo]. For Nikiema, the only transsyllabic clusters found in Tangale are geminates and homorganic nasal plus stop. Therefore, targo, lipra and monde do not have the same

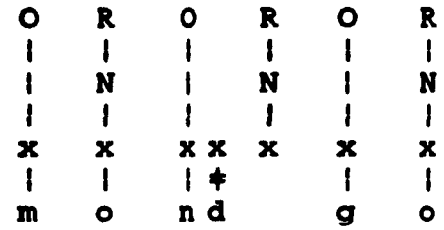
structure.[14] Only monde is analyzed as having a branching rime in its first syllable. Accordingly, the two words behave differently with respect to "deletion" and "epenthesis".

(17) Nikiema's: Billiri monde+go --> mongo *monudgo



[14] See Nikiema (1987) for motivation.

c.



[mongo][15]

In addition, an analysis based on resyllabification, gives rise to the problem of explaining why we find nasal plus stop clusters where the nasal is not homorganic to the following consonant. While there are forms like monde, kamba where the nasal is homorganic to the following stop, there are, also forms like dume + go [dumgo] where the nasal is not homorganic to the following stop. According to Kidda's analysis, in the latter form, resyllabification results in a nasal syllabified into a rime followed by an onset. The problem (for an analysis where the first member of a consonant cluster is always (re)syllabified into a rime) is to explain why it is not always the case that a nasal is homorganic to a following consonant. According to Nikiema on the other hand, while monde has an underlying transsyllabic cluster, in dumgo both the nasal and the stop are syllabified in distinct onsets separated from each other by a nucleus. He then

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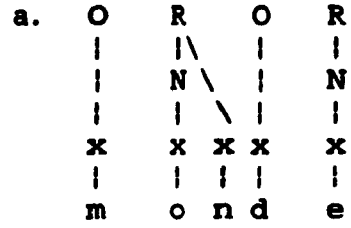
[15]The reassociation of the n to the onset of the second syllable and the floating status of the d and its skeletal point is not proposed in Nikiema's analysis.

accounts for both the homorganic nasal in monde and the non-homorganic nasal in dumgo.

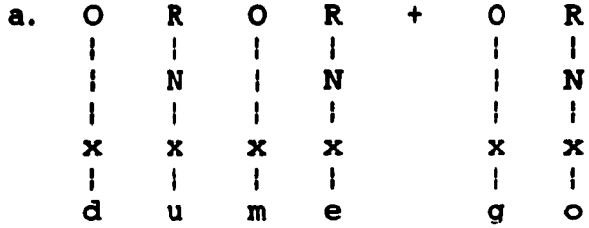
(18) A. Nikiema: monde

a.

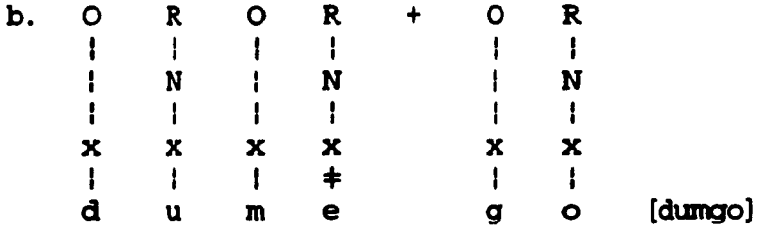


B. dume + go [dumgo]

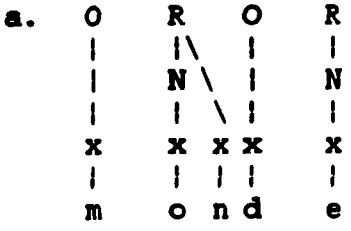
a.



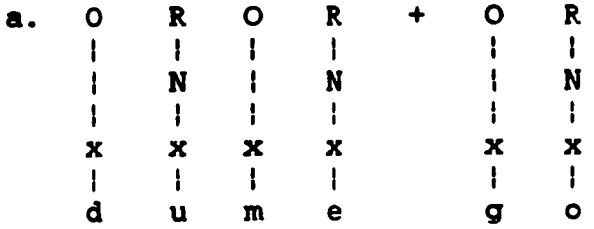
b.

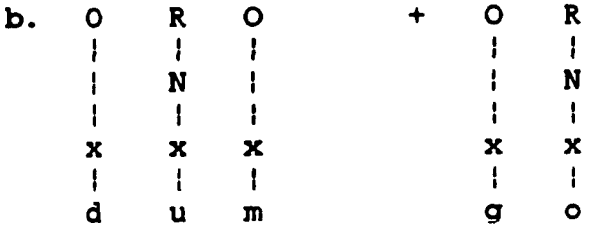


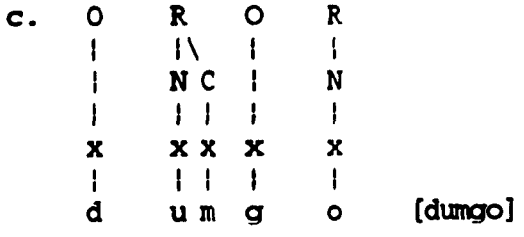
C. Kidda: monde



D. dume + go [dumgo]







To summarize, the facts observed in Tangale find a simple explanation if one assumes empty positions, proper government of

these empty positions and licensing. We can see that my analysis of schwa is not only motivated by the facts of French. A similar analysis has also been applied to Tangale.[16]

Returning to French, we have seen that the notion of licensing allows us to explain the well known observational fact that in French schwa must be phonetically realized when preceded by more than one consonant. In this analysis, this fact follows from a principle of licensing, and not from a stipulation. Because licensers are proper governors, an empty nucleus must receive a phonetic interpretation if it is the licenser of a preceding governing consonant. That is, schwa must be realized when preceded by a branching onset (cf. crever 'to blow', encombrement 'congestion') as well as preceded by a branching rime (cf. fortement 'strongly').

It should be clear that I understand licensing as the possibility for particular positions to have a particular status. While

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[16] An alternative analysis to my proposal that languages differ with respect to what principle has precedence over the other one, would be to say that languages vary according to whether a properly governed empty nucleus can or cannot be realized phonetically. The situation would be that in Billiri a properly governed empty nucleus cannot be realized phonetically, while in Kaltungo and French it can be.

I proposed in this chapter that a governing onset must be licensed in order to have the status of governor I will next extend licensing to other positions which have a special status.

I turn next to chapter 7 where I consider an aspect that has been postponed since the beginning of the analysis: the presence of empty nuclei in word-final position. Word-finally, schwas are not pronounced. How can this fact be explained under my analysis of proper government and licensing?

CHAPTER SEVEN

WORD-FINAL EMPTY NUCLEI

7.0 Introduction

In this chapter devoted to word-final empty nuclei, I argue in favour of a proposal made by Kaye (1988c), according to which a consonant occurs within a rime if it is followed by a segment in the onset position. It follows from this proposal that every word, or more precisely every cyclic domain, contains a final nucleus in its representation.[1] Moreover, it is claimed that this proposal is universal and that subject to parametric variation, those ungoverned word-final nuclei may or may not be uninterpreted. From this parametric choice, languages like Southern French, Portuguese, Italian and the so called "CV languages" are distinguished from others like English, French, Wolof, Pulaar and the like.[2] While in the latter

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[1] The notion of cyclic domain will become important in my analysis of schwa/zero alternation with ɛ presented in chapter 9.

[2] By "CV languages" I understand languages like Dida, Vata, Bété (African languages) where words always end phonetically with a vowel. I am not claiming that there are no CV languages with final empty nuclei.

group of languages a word-final nucleus can be realized as zero, this is not the case in languages of the former group. In addition, in languages in which a word-final nucleus can have no phonetic content, those languages vary as to whether the empty nucleus may or may not be the licenser of a preceding governing consonant. This second parameter distinguishes languages like French and English from others like Wolof and Pulaar. While in English and French words can phonetically end with a consonant cluster, such final clusters are not allowed in Wolof and Pulaar.

7.1 Licensing of the Rimal Complement

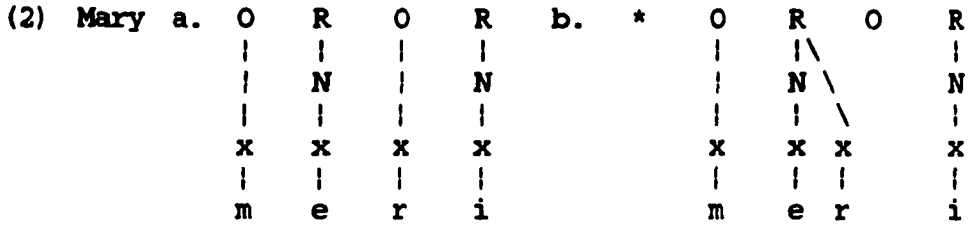
In order to explain why an intervocalic consonant is always syllabified within an onset and not within a rime followed by an empty onset (cf. Mary [me-ri], *[mer-i]), and to account for the behaviour of elements that are analyzed as being in an extrametrical position, Kaye (1988c) proposes the following principle.

(1) The "Coda" Licensing Principle

A non-nuclear point is syllabified within the rime iff there is a governor in the following onset.

According to the principle a word-internal or word-final branching rime is only possible when there is a following consonant in the onset position. This explains why a word like Mary has the structure in (2a) and not the one in (2b).

(2) Mary



The principle also provides an account for the behaviour of elements that were analyzed as being in an extrametrical position. In this sense, the absence of vowel shortening in word-final "closed" syllable, stress assignment sensitive to the branching of the rime except for a word-final "branching rime", do now directly follow from the fact that a word-final consonant cannot be syllabified within a branching rime. What is proposed is that a word-final consonant occurs within an onset which is followed by a nucleus which has or has not phonetic content.[3] Consequently, words ending phonetically

[3]There are languages in which it seems that the liquids may occur within the nucleus. Portuguese is such a language. A word-final liquid is realized as a glide as this is also the case in Old French and Polish. Notice that the fact that in certain languages a liquid

with a consonant contain a final nucleus in their lexical representation. Let us consider how this proposal is justified in French.

7.1.1 Word-final nuclei in French

Following a proposal made by Dell (1973), almost all analyses of French schwa assume the presence of a final schwa (or empty nucleus) in particular words. The reader would recall that Dell claims that words which end phonetically with an obstruent as well as all feminine adjectives have a word-final schwa in their representation. Those word-final schwas are not manifested when they occur in word-final position, regardless of the number of consonants that precede them.[4] This is illustrated in the data given in (3) and (4) below.

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may occur within a nucleus does not contradict the claim that words end with a nucleus.

[4] When I say that final empty nuclei are not manifested in word-final position, I understand in a context where what follows does not determine the behaviour of the preceding nucleus (e.g. in pre-pausal position and anywhere except in compounds in Québec French). Contexts where a word-final empty nucleus is realized depending of what follows are considered in the next chapter.

(3) Feminine forms — Ending with an obstruent

petite	[ptit]	'small'	site	[sit]	'site'
lente	[lãt]	'slow'	tante	[tãt]	'aunt'
bête	[bɛt]	'dumb'	fête	[fɛt]	'birthday'
grande	[grãd]	'tall'	viande	[vjãd]	'meat'
blonde	[blõd]	'blond'	monde	[mõd]	'world'
malade	[malad]	'sick'	promenade	[prɔmnad]	'walk'
sadique	[sadik]	'sadistic'	cantique	[kãtik]	'song'
publique	[püblik]	'public'	colique	[kɔlik]	'colic'
magique	[maǯik]	'magical'	brique	[brik]	'brick'
longue	[lõg]	'long'	bague	[bag]	'ring'
sage	[saǯ]	'well-behaved'	rage	[raǯ]	'rabies'
rousse	[rus]	'red (hair)'	mousse	[mus]	'moss'
grasse	[gras]	'fat'	tasse	[tas]	'cup'
grise	[griz]	'grey'	brise	[briz]	'breeze'
mauvaise	[mɔvɛz]	'wrong'	chaise	[sɛz]	'chair'
suave	[süav]	'sweet'	rivage	[rivaǯ]	'shore'
blanche	[blãš]	'white'	manche	[mãš]	'sleeve'
sale	[sal]	'dirty'			
belle	[bɛl]	'beautiful'			
chère	[ʃɛr]	'dear'			
sure	[sür]	'sour'			

As illustrated in (3) following one consonant a word-final schwa is not expressed phonetically. As we can see in (4), this is also the case when a word-final schwa is preceded by a consonant cluster.

(4) **Feminine forms** **Others**

A. Liquid plus consonant

forte	[fɔrt]	'strong'	porte	[pɔrt]	'door'
ouverte	[uvɛrt]	'open'	couverte	[kuvɛrt]	'blanket'
verte	[vɛrt]	'green'	alerte	[alɛrt]	'alert'
lourde	[lurd]	'heavy'	gourde	[gurd]	'flask'
acerbe	[asɛrb]	'sour'	barbe	[barb]	'beard'
vierge	[vjɛrž]	'virgin'	verge	[vɛrž]	'yard'
infirme	[ɛ̃firm]	'disabled'	ferme	[fɛrm]	'farm'

B. Consonant plus liquid

souple	[supl]	'supple'	peuple	[poepl]	'people'
lisible	[lizibl]	'legible'	bible	[bibl]	'bible'
tendre	[tãdr]	'tender'	vendre	[vãdr]	'to sell'
autre	[otr]	'other'	montre	[mõtr]	'watch'
maigre	[mɛgr]	'slim'	pègre	[pɛgr]	'underworld'
pauvre	[povr]	'poor'	orfèvre	[ɔrfɛvr]	'goldsmith'

All the words given in the left column of (3&4) are feminine forms which according to Dell have a final feminine inflexion (i.e. schwa) in their representation. With respect to the forms in the right column of (3&4) Dell also proposes that they end with a schwa. While in those latter forms the final schwa is not the feminine desinence its presence is either motivated by the fact that the "final" stop does not undergo the rule of word-final obstruent deletion (cf. 3&4A) or because this final schwa can optionally be manifested (cf. [poepl], [poeplə]). This means that according to Dell and many others, a final schwa or empty nucleus is underlyingly

present in words ending phonetically with: i) a consonant cluster, ii) a single obstruent, iii) any consonant if it is a feminine adjective, iv) a nasal when the preceding vowel is not nasalized. Thus, the only words which are not analyzed as ending with a final empty nucleus (or schwa) are words (except for feminine adjectives) ending phonetically with a sonorant. Some of those words are given in (5).

(5)	bol	[bɔl]	'bowl'	colle	[kɔl]	'glue'
	mer	[mɛr]	'sea'	lire	[lir]	'to read'
	travail	[travaj]	'work'	fille	[fij]	'girl'

While Dell's proposal that words may contain a final empty nucleus (i.e. schwa), is fully consistent with the ""Coda" Licensing Principle", the claim is that it should not be restricted to particular classes of words. In the following discussion I motivate the idea that words do not differ with regard to the syllabification of their final consonant. For example, it is argued that a word like colle [kɔl] 'glue' ends with an empty nucleus as does the feminine adjective folle [fɔl] 'crazy'. While the empty nucleus belongs to the feminine morpheme in folle, the empty nucleus is present because of governing constraints in colle. Let us consider how this claim is justified starting with words ending phonetically with a single

consonant.

7.1.1.1 Word-final nucleus preceded by a single consonant

7.1.1.1.1 Long vowels in Québec French

That a word-final consonant is not syllabified within a branching rime is motivated by the behaviour of long vowels and heavy diphthongs in Québec French.[5] A comparison between the data given in (6a,b) with those in (6c) shows that while a long vowel may occur before a word-internal single consonant or a cluster of the type obstruent plus liquid, a branching nucleus is never found before a sequence liquid plus obstruent.

(6)	a.	rêver	[rɛ:ve]	[raⁱ ve]	'to dream'
		pâlir	[pa:lir]	[paᵘ lir]	'to become pale'
		empêcher	[ãpɛ:se]	[ãpaⁱ se]	'to prevent'
		poelon	[pwa:lõ]	[pweⁱ lõ]	'saucepan'
	b.	sabler	[sa:ble]	[saᵘ ble]	'to sand'
		pauvrement	[po:vramã]		'poorly'
		prêtrise	[prɛ:triz]	[praⁱ triz]	'priesthood'
		encadrer	[ãka:dre]	[ãkaᵘ dre]	'to frame'

[5] See Dumas (1981) for an analysis of heavy diphthongs in Québec French.

c.	porter	[pɔrte]	*[pɔ:rte]	'to bring'
	partir	[partir]	*[pa:rtir]	'to leave'
	merci	[mɛrsi]	*[mɛ:rsi]	'thank you'
	poltron	[pɔltrõ]	*[pɔ:ltrõ]	'easily frightened'

The examples in (6) show that a nucleus can only branch when it occurs within a rime which is not also branching. Interestingly, long vowels have the same distribution in word-final position. While a vowel may be long before a single word-final consonant (cf. (7a) or a cluster of the type obstruent plus liquid (cf. (7b), no such long vowel is possible when the preceding cluster is one of the type liquid plus obstruent (cf. (7c).

(7)

a.	bête	[bɛ:t]	[baⁱt]	'stupid'	rêve	[rɛ:v]	[raⁱv]	'dream'
	rage	[ra:z]	[raᵘz]	'madness'	crabe	[kra:b]	[kraᵘb]	'prawn'
	rare	[ra:r]	[raᵘr]	'rare'	tasse	[ta:s]	[taᵘs]	'cup'

b.	sable	[sa:bl]	[saᵘbl]	'sand'
	pauvre	[po:vr]		'poor'
	maigre	[mɛ:gr]	[maⁱgr]	'thin'
	prêtre	[prɛ:tr]	[praⁱtr]	'priest'
	cable	[ka:bl]	[kaᵘbl]	'cable'
	libre	[li:br]		'free'

c.	forte	[fɔrt]	*[fɔ:rt]	'strong'
	morte	[mɔrt]	*[mɔ:rt]	'dead'
	palpe	[palp]	*[pa:lp]	'to feel'
	parc	[park]	*[pa:rk]	'park'

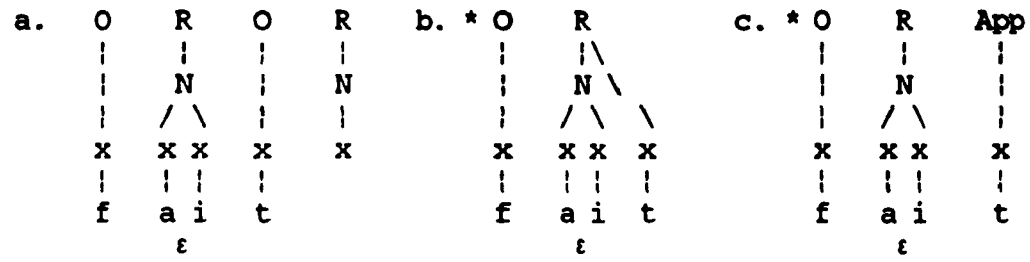
What is crucial here is that before a word-final single consonant a vowel may be long or diphthonguized as this is also the case word-internally. Moreover, the impossibility to have a long vowel before a (word-final) cluster liquid plus obstruent leads to the conclusion that the word-final consonants in (7a) are not syllabified within a branching rime. If the final consonant is not a rimal complement, we have an account for the possibility of occurrence of a long vowel before a single word-final consonant. Not being within the rime, the consonant is not governed by the preceding nuclear head. Then the nuclear head does not need to be adjacent to the non-nuclear point. One who argues that the structure in (9b) (i.e. a final branching rime) is appropriate for the words given in (7a) has to explain why a long vowel systematically shortens before a cluster of the type liquid plus obstruent while it does not shorten before a (word-final) single consonant.

(8)

fort [fɔ:r]	'strong'	fortement	[fɔrtəmã]	*[fɔ:rtəmã]	'strongly'
		forte	[fɔrt]	*[fɔ:rt]	'strong'
vert [vɛ:r]	'green'	verdure	[vɛrdür]	*[vɛ:rdür]	'greenness'
		verte	[vɛrt]	*[vɛ:rt]	'green'
mort [mɔ:r]	'death'	mortuaire	[mɔrtüɛr]	*[mɔ:rtüɛr]	'mortuary'
		morte	[mɔrt]	*[mɔ:rt]	'dead'

The occurrence of long vowels and heavy diphthongs before a word-final single consonant forces one to conclude that a single final consonant belongs to a constituent which is not a word-final branching rime. In Charette (1985), following the spirit of Halle & Vergnaud (1982) I proposed that after a long vowel a word-final single consonant was syllabified within an Appendix. In the framework of government, it is impossible for a constituent whose skeletal point does not belong to a governing domain to be present in a structure. If a consonant that I syllabified within an Appendix is in fact syllabified within a constituent onset, then a word-internal or word-final long vowel or heavy diphthong is in both cases followed by a consonant syllabified within an onset. Since an onset is always followed by its governor the nucleus, the structure of the words given in (7a) would be similar to that in (9a). The final consonant is syllabified within an onset which is followed by a final nucleus which is not expressed phonetically.

(9) fête [fɛ:t], [fa^{i}t] 'birthday'



Thus I propose that words ending with a single consonant preceded by a branching nucleus have their final consonant in an onset which is followed by an empty nucleus. With respect to words ending with a single consonant preceded by a short vowel, the questions arises how the consonant is syllabified. According to the "Coda" Licensing Principle any word-final consonant is syllabified in an onset followed by an empty nucleus, regardless of the structure of the preceding nucleus and regardless of the nature of the consonant. Considering first words ending with a short vowel followed by a final consonant which is an obstruent, proposing that the consonant is syllabified within an onset would be in accordance with the fact that an obstruent is never syllabified within a rime word-internally. Moreover, as we will see in the following section, one who agrees with the proposal that the feminine desinence contains an empty

nucleus (or schwa)[6] and with Vergnaud's analysis of floating consonant and representation of adjectives, would syllabify the final stop of the feminine adjective petite [ptit] 'small' within an onset. Since I see nothing which would prevent attributing the same structure to any word ending with an obstruent, I assume the "Coda" Licensing Principle and turn next to its justification in adjectives.

7.1.1.1.2 Adjectives

Following the spirit of Vergnaud (1982) I consider that the feminine desinence has the representation of an empty nucleus preceded, as in any well-formed sequence of constituents, by an onset. While both constituents dominate no segment, unlike the onset the nucleus has a skeletal point attached to it.[7]

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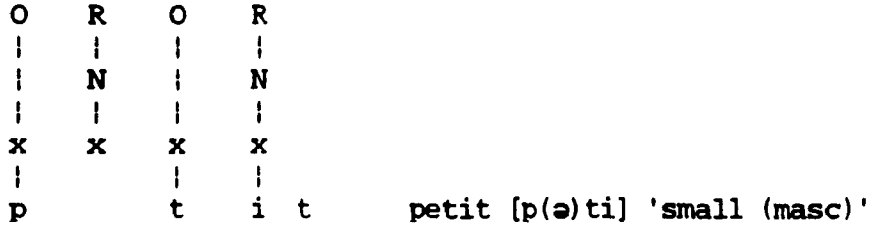
[6]This has been proposed by Dell (1973) among others.

[7]Notice that the representation I assume for the feminine desinence does not contradict my account as to why no words have an "h-aspiré" followed by an empty nucleus. While the onset of an "h-aspiré" dominates a skeletal point the onset of the feminine morpheme does not dominate anything. If governing relations apply between skeletal points, only does the former type of empty onset need to be properly governed. See Piggott & Singh (1985) for an alternative representation of the two types of empty onsets.

(10) **Feminine desinence:**

Following up Vergnaud's suggestion the alternation between the masculine and the feminine form of adjectives of the type petit [p(ə)ti], petite [p(ə)tit] is accounted for the following way. In the lexical representation of the masculine form, there is a final floating consonant, i.e. a segment which is neither associated to a skeletal point nor to a constituent. Not associated to a position, this final segment is not manifested. This is illustrated in (11).[8]

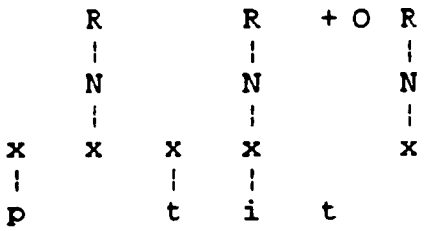
(11)



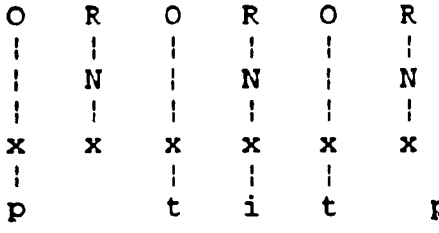
[8] See Piggott & Singh (1985), Prunet (1986), Encrevé (1988) among others for an analysis of floating segments and liaison in French. Whatever the representation one assumes for the feminine desinence, what is of importance in the present discussion is that the feminine morpheme contains an empty nucleus.

In the lexical representation of the feminine form of the adjective there is an additional sequence O-R (e.g. the feminine morpheme). The floating segment associates to the available onset constituent, this association triggering (as proposed by Vergnaud) the creation of a skeletal point. The representation I assume for the adjective <u>petite</u> is given in (12).

(12) a. Before governing relations apply



b. After governing relations applied



petite [p(ə)tit] 'small (fem)'

I then assume that adjectives ending phonetically with a vowel in their masculine form and with a consonant in their feminine form

have in both forms a word-final nucleus. While the nucleus has phonetic content in the masculine form, it is realized as zero in the feminine one.

Let us next consider adjectives ending with a single consonant in both their masculine and feminine forms.

(13)	A. Masculine	B. Feminine	Gloss
	rare [ra:r]	rare [ra:r]	'rare'
	sale [sa:l]	sale [sa:l]	'dirty'
	bête [bɛ:t]	bête [bɛ:t]	'stupid'
	brave [bra:v]	brave [bra:v]	'brave'

Each one of the forms in (13A) is phonetically identical to its feminine counterpart in (B). Those adjectives are said to be invariable. There are two possibilities. They are either not marked for gender or each adjective of the duo has the same structure but its word-final empty nucleus has a different status. That is, each form has a final nucleus in its representation and while in the masculine form the final empty nucleus is present because of constraints on governing relations, it is part of the feminine desinence in the feminine form. Whether they are or are not marked for gender, my claim is that each form has the same structure. Each form ends with a

final empty nucleus. Let us suppose that invariable adjectives are, as the other adjectives, marked for gender.[9] I give in (14) the representation I propose for the masculine adjective rare.

(14) rare (masc)

a. Before governing relations apply b. After

I claim that the final liquid of the adjective rare (masc) cannot be syllabified either within the rime (because it would not be licensed by a following onset) or within the nucleus. Its skeletal point can only be projected to a constituent onset. This onset is followed by a nucleus which is its governor.[10]

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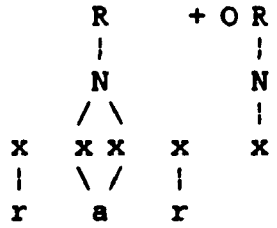
[9] If it happens that invariable adjectives are not marked for gender, this would not contradict my claim that the adjectives end with a final nucleus.

[10] Notice that the final liquid is not a floating segment. It is attached to a skeletal point and this point must link to a constituent as is always the case for skeletal positions.

In its feminine form (as shown in (15)) the adjective has now the non-cyclic feminine morpheme in its representation. The liquid associates to the onset of the feminine desinence and the onset now being followed by the nucleus of the morpheme, its government is satisfied.[11]

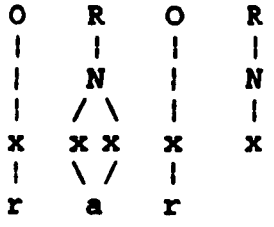
(15) rare (fem)

a. Before G.R. a.



[11] We will see in chapter nine that a final empty nucleus is required at the end of a cycle. Consequently, when a cyclic suffix is attached to a stem on a second cycle, the final empty nucleus of the first cycle remains (cf. enterrement: ătɛ:rØ]mă]). However, a non-cyclic syffix is not added to a word, it is part of the word. More precisely, a non-cyclic suffix is present on the innermost cycle where the points are syllabified in terms of the governing relations they contract with each other. More concretely, this means that while a cyclic suffix does not modify the governing relations contracted on an earlier cycle, a non cyclic suffix is part of the representation when the points are syllabified. This is why the final empty nucleus present at the end of the masculine form is not present in the feminine form. See Prunet (1986), Halle (1986) and Kaye (1988b) for motivation that the notion of cycle and strict cyclicity are crucial parts of the Universal Grammar.

b. After G.R. b.



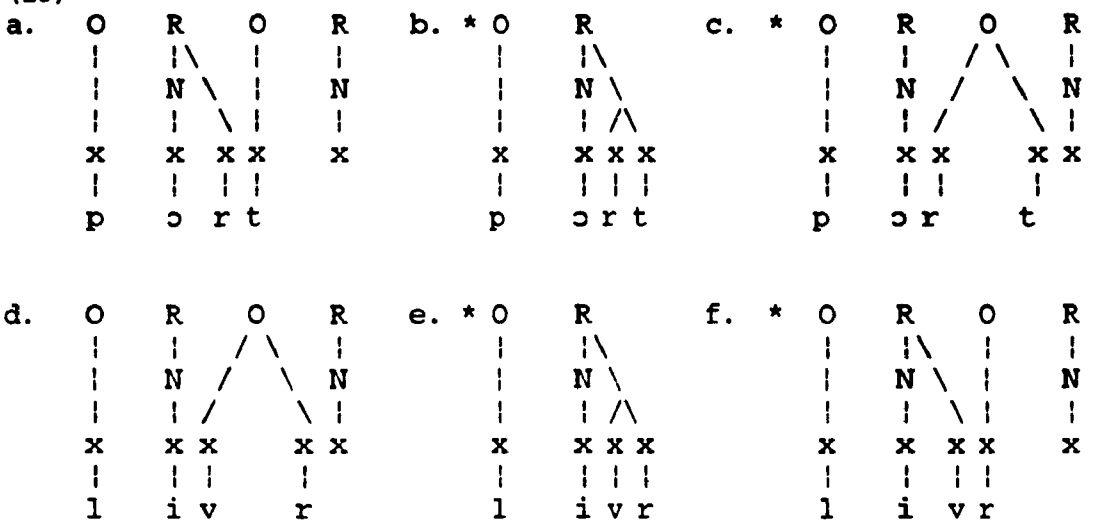
To summarize, I claim that every word ending phonetically with a single consonant ends with an empty nucleus. As we saw this proposal is motivated by the presence of long vowels and heavy diphthongs before a word-final single consonant and by the feminine forms of adjectives. Let us next turn to the data I gave in (4), i.e. words ending with a consonant cluster.

7.1.1.2 Word-final nucleus preceded by a consonant cluster

Considering two nouns of the type of porte [pɔrt] 'door' and livre [livr] 'book' the theory attributes to them a structure containing a final nucleus. Since in both words the final consonant can only be syllabified within an onset, a nucleus must follow this onset to satisfy governing constraints. Recall that a "syllable" is a sequence onset-rime and that an onset must always be governed by the head of this sequence of constituents: the nucleus. Consequently, a constituent onset can never appear without being followed by a

nucleus.

(16)

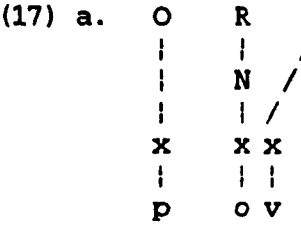


The lexical representations of porte and livre are the ones in (16a,d) respectively. While (16c) is excluded by syllabic government, (16f) is excluded by transsyllabic government. Within a constituent government applies from left-to-right. It is impossible for a charmless liquid to govern a following negatively charmed obstruent (cf. 16c). Along the same lines transsyllabic government excludes a structure as in (16f) where a liquid would transsyllabically govern a preceding obstruent. Finally, a syllabification where the two final consonants are both syllabified within the rime (cf. 16b&e), is excluded by syllabic government according to which within the rime,

(or any constituent) the head must be strictly adjacent to its complement. Consequently, it follows from government that words ending phonetically with a consonant cluster have a final nucleus in their representation.[12] Even though this final nucleus has no phonetic content, a point that I will consider shortly, the position is nevertheless underlyingly present.

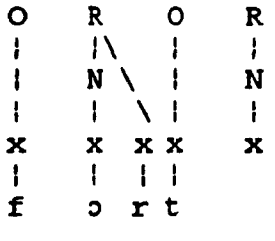
For their part adjectives ending phonetically with a consonant cluster such as forte [fɔrt] 'strong fem.', pauvre [povr] 'poor', have obviously (except for their segments) the same structure as porte and livre respectively.

(17) a.



pauvre (masc) [povr]

b.

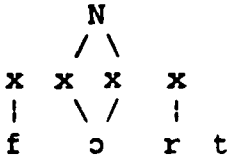


forte [fɔrt]

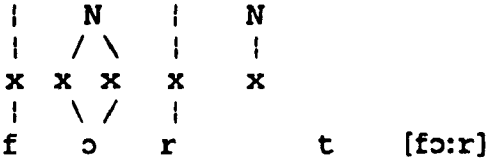
[12] The prediction here is that the set of word-final clusters should be the same as the combined set of onset clusters and trans-syllabic clusters, which is according to facts.

The lexical representation of an adjective in its masculine form is a linear sequence of skeletal points to which segments are associated. With respect to constituents, only the nuclear points are lexically associated to a constituent nucleus. The skeletal points are projected to constituents in terms of the governing relations they contract with each other. This is illustrated in (18) where I give the representation of the adjective fort [fɔ:r] 'strong (masc)'.

(18) a.



b.



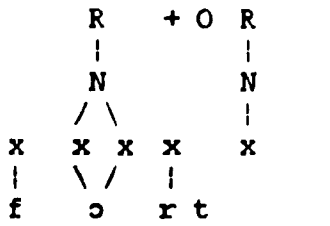
There is a sequence of four skeletal points to which are associated the segments (the final segment is floating). These points are projected to constituents. I claim that the final liquid can only be projected to a constituent onset.[13] An onset always being governed by a following nucleus, a word-final nucleus is present in the represen-

[13] Note that the floating stop cannot join the liquid within the onset since this would violate syllabic government. Neither can the floating consonant be projected to a constituent which is not available in the representation, since the segment is not associated to a skeletal position. Only skeletal positions are projected to constituents that are not already present in the representation.

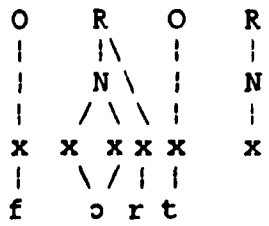
tation. The masculine form of the adjective fort surfaces as [fɔ:r].

Consider now the feminine form of this adjective. The lexical representation now contains five skeletal points, the rightmost one being dominated by the nucleus of the feminine desinence. The points are now projected to constituents in terms of the governing relations they contract with each other. Since the feminine desinence is part of the representation, there are two additional constituents: the empty nucleus along with its skeletal point preceded by a constituent onset. The floating segment may now associate to the available onset and the preceding liquid into the rime (it is now licensed by an onset). When the liquid finds itself syllabified within the branching rime, the preceding vowel can no longer be long. This is illustrated in (19).

(19) a.



b.



c.

Both <u>fort</u> and <u>forte</u> have a final nucleus in their representation. There is however a difference between the two adjectives with respect to the final nucleus. In <u>fort</u> the final nucleus is present because of governing constraints. The final skeletal point to which the liquid is attached being syllabified (i.e. projected) in an onset, a nucleus must follow in order to govern the onset to its left. With respect to the feminine form of the adjective, the empty nucleus is part of the representation as the feminine morpheme.

I have showed that it follows from the theory of government that words ending phonetically with a consonant have a final nucleus in their lexical representation.[14] Even though those final nuclei are not manifested in pre-pausal position (a property which I next consider), they are nevertheless underlyingly present.

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[14] As we will see, languages do not vary according to whether they have/have not a nucleus in word-final position. They only vary as whether a word-final nucleus may/may not be empty.

7.1.2 Word-final empty nucleus

While I showed that the "Coda" Licensing Principle is motivated in French, it remains to explain why a final nucleus is realized as zero. Indeed in French words either end with a nucleus which has phonetic content or which is realized as zero. However, I clearly demonstrated that word-internally zero is only possible when an empty nucleus is followed by a proper governor. Given that nothing follows a word-final empty nucleus we would predict zero to be an impossible manifestation. To account for the manifestation of zero in word-final position I propose that in this position an underlying empty nucleus can be realized as zero in French because this language selects a parameter according to which a word-final empty nucleus is licensed. This means that along with the "Coda" Licensing Principle, there is the following parameter.

(20) **Licensing of word-final empty nuclei:**[15]

A word-final <u>empty</u> nucleus is licensed: YES / NO

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[15] In the preceding chapter I claimed that licensing is an instance of proper government. The requirement that a governing consonant must be licensed, means that it must be properly governed. From this it follows that a nucleus which licenses a consonant must have phonetic content (a proper governor is a governor with phonetic content). If licensing is indeed an instance of proper government, saying that a word-final empty nucleus is licensed means that it is properly governed. While it is true that there is no proper governor, or licenser, for a word-final empty nucleus, what is interesting is that licensing means that it can be realized as zero exactly as it is the case for properly governed empty nuclei. The only problem with the conception of licensing as proper government is to explain why while in French and Moroccan Arabic a word-final empty nucleus is a licenser for a preceding consonant, it is not a proper governor for a preceding empty nucleus. Recall that both in French and Moroccan Arabic an empty nucleus followed by a word-final empty nucleus is manifested (cf. [ktɨb] /kØtØbØ/, [lɛv] /lØvØ/, [smɛl] /sØmØlØ /). The claim that licensing is proper government is then difficult to maintain, given that while a final empty nucleus would properly govern a preceding governing consonant, it would not properly govern a preceding empty nucleus. As the following data showed, it really seems to be the case that a word-final empty nucleus is not a proper governor for an empty nucleus to its left while it is the licenser of a preceding governing consonant (cf. [aklu] /akØlu/ 'they eat', [akɨl] *[akl] /akØlØ/ 'he eats', [kɨlba] /kØlba/ 'bitch (fem), [kɨlb] /kØlbØ/ 'bitch (masc)' [sɛvr] *[svr] /sØvrØ / 'weans'). As I claimed earlier a proper govenor cannot properly govern two governees. This may explain why a word-final empty nucleus which licenses a preceding consonant does not also govern an empty nucleus. But it still remains that this final empty nucleus does not either properly govern an empty nucleus when a single consonant intervenes between them. However, whether licensing is or is not an instance of proper government, it has no implication for my analysis. If it happens that licensing is different than proper government, I clearly showed that both notions are needed in the theory. Licensing remains what provides to something the possibility, the authorization to occur or to have a special status.

According to the parameter given in (20), we should find two types of languages. Languages which choose the NO option and languages which choose the YES option. Languages which choose the NO option of the parameter would obligatory give phonetic content to word-final nuclei. Such languages are Portuguese, Southern French, Italian and the like where words always end phonetically with a vowel. Southern French for example is one dialect of French which chooses the NO option. Southern French does not allow a word-final nucleus to be phonetically empty (i.e. to be realized as zero). Consequently, no words may phonetically end with a consonant. A vowel schwa is always realized in final of words ending phonetically with a consonant in other dialects of French. Words like [ami], [brikə], [portə] and [folə] are well-formed, but ones like [kart] and [brik] are impossible. The second type of languages are those which select the YES option. They allow a word-final nucleus to be realized as zero, that is, they allow words to end phonetically with a consonant. More precisely, all words have a final nucleus in their representation, but this final nucleus can have no phonetic content. This means that in my dialect of French for example, a word-final nucleus may or may not have phonetic content. That is, words may end phonetically with a vowel or with a consonant (cf. auto [oto] 'car', lame [lam] 'blade', carte [kart] 'card').

The proposal that a nucleus is always present at the end of words, along with the parameter according to which this final nucleus may or may not be empty, provide a way to differentiate languages in which words must end with a vowel from those which allow words to end phonetically with a consonant. But within this latter type of languages (in which a final empty nucleus is licensed, i.e. can be realized as zero) an additional distinction must be made. One the one hand there are languages like French and English where words can either phonetically end with a single consonant or a consonant cluster. On the other hand there are languages like Wolof and Pulaar where interestingly words can phonetically end with a vowel, a single consonant but never with a consonant cluster. In the light of these two latter types of languages, I propose the following parameter.

(21) A licensed empty nucleus may be a licenser. YES / NO

While Wolof and Pulaar select the NO option of the above parameter, French and English select the YES one. Let us consider the following data from Wolof.

7.1.2.1 Licensing in Wolof

(22)

a.			b.			c.		
	musa	'Moussa'		lɛm	'to fold'		muus	'cat'
	loxo	'hand'		ᵑdox	'water'		cɛɛb	'rice'
	tɛ:rɛ	'book'		lal	'make the bed'		ŋiis	'to sit'
	xale	'child'		nag	'cow'		suub	'to dye'
	pa:ka	'knife'		xarit	'friend'		rɔɔf	'to put'
	ᵐburu	'bread'		dɛf	'to do'		gɛɛw	'to meet'

Wolof is an african language which like Pulaar belongs to the West-Atlantic linguistic family. With respect to the syllabic structure, the rime and nucleus can branch but the onset cannot. What is relevant in our discussion is that, as shown in (22), Wolof like French has words ending phonetically with a vowel or a single consonant. Also like French words in Wolof can end with a consonant preceded by a long vowel. This means that in Wolof a word-final empty nucleus is licensed. While in (22a) the final nucleus has phonetic content, it is realized as zero in (22b&c).

Let me digress here to justify the claim that the Wolof words in (22c) end with a nucleus. As I claimed earlier a word-final consonant preceded by a long vowel is syllabified in an onset which is followed by an empty nucleus. Moreover, Wolof has a process of vowel shortening in closed syllables which is systematically violated in word-

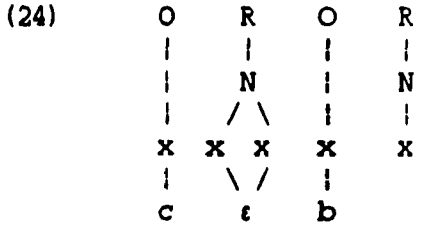
final position.[16] That is, a long vowel shortens before a geminate consonant (which is the only possible consonant cluster). Let us consider the following examples where, in order for the nuclear head to be adjacent to the rimal complement, a long vowel shortens when a following consonant must be syllabified within the rime.

(23)

a. Verbs	b. Inceptive (-i)	c. Inversive (-i)
rɔɔf 'to put into'	rɔɔfi 'to go...'	rɑppi 'to take off'
naaw 'to sew'	naawi 'to go...'	nawwi 'to un-sew'

The data given in (23) show that word-internally, a long vowel shortens before a geminate consonant. Given that there is no vowel shortening in the words given in (22c), the only possible structure for those words is one where the final consonant is not syllabified into the rime but in an onset followed by a nucleus which has no phonetic content. This is illustrated in (24).

(24)



cɛɛb 'rice'

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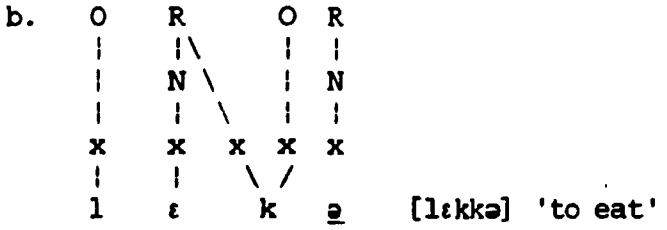
[16] See Charette (1985) for an analysis of vowel shortening in Wolof.

In the final syllable of the word cɛɛb a single consonant is present. This final consonant is syllabified in an onset which is followed and governed by an empty nucleus which is not manifested. Concerning words in (22b) according to the "Coda" Licensing Principle, those words also end with a nucleus along with the preceding consonant syllabified within an onset.

To this point what I argue for French applies in Wolof. Words end with a nucleus which can be realized as zero. But there is a difference between French and Wolof. In French an empty nucleus occurs following either a single consonant or a consonant cluster. In Wolof however, while an empty nucleus is possible after a single consonant, this is not the case when a consonant cluster precedes it. As illustrated in (25), following a cluster a word-final empty nucleus must be manifested.[17]

(25) a. lɛkkə 'to eat'
dakkə 'village'
nakkə 'older sister'
gejjə 'fish'
rabbə 'to weave'

b.



[lɛkkə] 'to eat'

[17]In Pulaar a word-final empty nucleus occurring after a consonant cluster is manifested as u (ex. [raddu] *[radd] 'to hunt').

In the latter examples a vowel schwa occurs in word-final position, that is, the final onset must be followed by a nucleus with phonetic content. We have seen that this is not always the case. In words like cɛɛb 'rice', the final onset is followed by a nucleus with no phonetic content. Why is it that after a geminate consonant the final empty nucleus must receive a phonetic interpretation? Let us observe carefully the two groups of examples. In one case all final consonants are preceded by a long vowel. I claim that these consonants are not in the same syllable as the preceding vowel. Being preceded by an open syllable, the final onset has nothing to govern. Let us now consider the data where words end with a geminate consonant that is, in a syllable where the final onset must transsyllabically govern the preceding rimal complement (the left member of the geminate). Since the final onset must govern the preceding rimal complement, it must then be licensed. The only possible licenser for this onset is the nucleus occurring to its right. If the word-final nucleus must license the preceding stop and in this language a word-final empty nucleus is licensed but is not a licenser, it must then be realized phonetically. This explains why an epenthetic vowel occurs in word-final position after a geminate consonant but not after a single consonant. In the former case but not in the latter, a governing consonant governs a rimal complement and must then be licensed. In order to license the preceding governing segment a word-final empty nucleus which is not a licenser is manifested.[18]

Unlike Wolof French allows words to end phonetically with both a single consonant or a consonant cluster. I propose that in French a

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[18]The same analysis applies in Pulaar.

final empty nucleus can be the licenser of a preceding governing consonant. We can see this status of licenser as a way for the empty nucleus to show that it is present in the lexical representation. It has no phonetic content but its presence is captured by its property of being a licenser. In French then, there are three types of words. Words that end either with a vowel, or a single consonant or with a consonant cluster. In the lexical representation of words of each type, a final nucleus is present.

Languages do not vary parametrically according to whether they are or are not governed by the "Coda" Licensing Principle. However, languages do vary parametrically according to whether i) they do/do not allow the final nucleus to be phonetically empty, and ii) if a word-final empty nucleus has/does not have the property to license a preceding governing consonant. This is illustrated in the following chart.

(26)	YES	NO	
Final nucleus can be empty:		X	Italian "CV languages" Southern French Portuguese ...
	X		French English Wolof, Pulaar
Final empty nucleus is licenser:		X	Wolof, Pulaar
	X		French, English

7.2 Conclusion

The parameters according to which a word-final empty nucleus to be empty and to be a licenser allows one to distinguish three types of languages; i) those whose words always end with a vowel, ii) those whose words end with a vowel or a single consonant iii) and those whose words end with a vowel, a single consonant or a consonant cluster. Notice that a prediction is made. No languages should have words ending phonetically with a vowel and a consonant cluster but not a single consonant. If a language allows a word-final nucleus to be empty and to be a licenser, absolutely nothing would prevent this empty nucleus from occurring after a single consonant. To my knowledge the different types of languages with respect to what may occur in word-final position are restricted to the above three types.

I turn next to the following chapter where I consider empty nuclei which even though occurring in word-final position, have their realization determined by a following word.

CHAPTER EIGHT

COMPOUNDS AND PHRASES

8.0 Introduction

To this point of the analysis of schwa I claim that a word-internal empty nucleus is realized as zero if it is properly governed and it is not a licenser. Moreover, in the preceding chapter I argued that a word, or more precisely a cyclic domain, ends with a nucleus which, in French, can be realized as zero and may license a consonant even though it has no phonetic content. Those proposals seem, however, to encounter a problem with compounds. While in certain types of compounds the final nucleus of the first term is never manifested, it must be phonetically expressed in others. The question now is why is it that in one type of compound the final nucleus of the first term behaves as in word-final position (e.g. it is never manifested) while in another type of compound it behaves as word-internally (e.g. it is realized as zero unless it is preceded by a consonant cluster). To account for those facts it will be argued that, while the final nucleus of the first term of a compound occurs in word-final position, its behaviour is determined by stress

assignment. Let us first consider the facts.

8.1 Compounds

8.1.1 The facts

One type of compound has as its first term a word whose final nucleus is preceded by a single consonant. The second term can either be phonetically monosyllabic or polysyllabic. What is of importance in the present discussion is that whatsoever the syllabic structure of the second term, the final nucleus of the first member is never manifested when it is preceded by a single consonant. This is illustrated in (1).

(1) A. Second term phonetically monosyllabic

coupé-feu	[kupfö]	'firebreak'
casse-tête	[kastɛt]	'puzzle'
casse-noix	[kasnwa]	'nutcracker'
passe-droit	[pasdrwa]	'privilege'
casse-croute	[kaskrut]	'snack'
piqué-nique	[piknik]	'picnic'

B. Second term phonetically bisyllabic

coupé-papier	[kuppapje]	'paper knife'
coupé-circuit	[kupsirkɥi]	'cutout'
cassé-noisettes	[kasnwazɛt]	'nutcracker'
passé-partout	[paspartu]	'master key'
passé-montagne	[pasmõtaɲ]	'balaclava'
piqué-assiette	[pikasjɛt]	'scrounger'

While the final nucleus of the first term of a compound is never manifested when it occurs after a single consonant, the situation is different when it is preceded by a consonant cluster. In the latter case, the behaviour of the final nucleus depends on the number of phonetically expressed syllables in the second term. As shown in (2a) when the second term is phonetically monosyllabic the empty nucleus must be manifested. On the other hand as shown in (2b) when the second term has more than one phonetically expressed syllable, the empty nucleus has no phonetic content.

(2) A. Second term phonetically monosyllabic

porte-clés	[pɔrtəkle]	'key ring'
porte-plume	[pɔrtəplüm]	'penholder'
porte-cartes	[pɔrtəkart]	'card holder'
porte-voix	[pɔrtəvwa]	'megaphone'
porte-scies	[pɔrtəsi]	'saw holder'
couvre-feu	[kuvrəfö]	'curfew'
couvre-lit	[kuvrəli]	'coverlet'
tourne-disque	[turnədisk]	'turntable'
tourne-vis	[turnəvis]	'screwdriver'
ouvre-boîte	[uvrəbwat]	'can opener'

garde-robe	[gardərɔb]	'wardrobe'
garde-côte	[gardəkot]	'coast-guard'
garde-fou	[gardəfu]	'railing'

B. Second term phonetically bisyllabic

porte-manteau	[pɔrtmãto]	'coat rack'
porte-crayon	[pɔrtkrɛjõ]	'pencil holder'
porte-cigare	[pɔrtsigar]	'cigar case'
porte-parole	[pɔrtparɔl]	'spokesman'
porte-drapeau	[pɔrtdrapo]	'standard bearer'
porte-couteau	[pɔrtkuto]	'knife rest'
porte-camion	[pɔrtkamjõ]	'truck carrier'
ouvre-bouteille	[uvrbutɛj]	'bottle opener'
garde-manger	[gardmãže]	'meat safe'
garde-barrière	[gardbarjɛr]	'level crossing keeper'
garde-malade	[gardmalad]	'nurse'
garde-champêtre	[gardšãpɛtr]	'rural policeman'

As mentioned, the pattern of all the compounds may be accounted for in terms of stress assignment. The final nucleus of the first term loses its property of licenser and is realized as schwa when it finds itself incorporated within a binary foot. Otherwise, the final empty nucleus of the first term keeps its property of licenser and is never manifested. Let us first consider how stress is assigned in French.

8.1.2 Stress assignment in French

In French stress falls on the rightmost expressed vowel of a word. To account for the pattern of accentuation, I propose, following the spirit of Hayes (1981), that in French stress is assigned the following way:

(3) Foot construction: At the right edge of a cycle construct a maximally binary right dominant foot.[1]

According to the definition of foot construction, a maximally binary right dominant foot is built on the rimal projection at the right edge of a word or more precisely of a cyclic domain. The foot is built starting from the rightmost nucleus with phonetic content. In saying that the strong node dominates the rightmost nucleus with phonetic content, I prevent the metrical foot from being built starting from the final empty nucleus. To this end I propose the following universal principle of metrical phonology.

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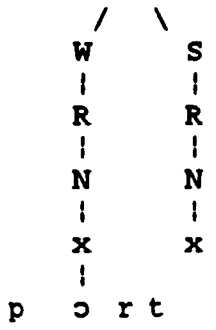
[1]That the binary foot is built at the right edge of a cyclic domain will be of importance in the following chapter devoted to the alternation between schwa/zero with ə.

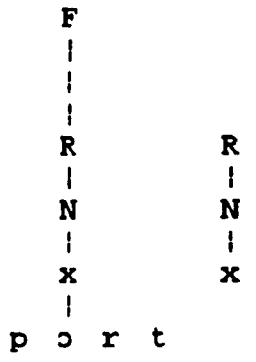
(4) A nucleus with no phonetic content cannot be the head of a metrical foot.

According to the principle in (4), a word like <u>porte</u> has its first vowel accentuated. Even though such a word has a lexical representation of two syllables, a binary foot cannot be built starting from the word-final empty nucleus. A non-branching foot is then built on the unique nucleus with phonetic content.

(5) a.



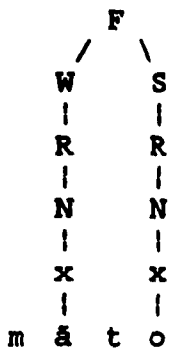
b.



[pɔ́rt]

With respect to another word like <u>manteau</u> since it contains two nuclei with phonetic content, the rightmost vowel occupies the head position of the binary foot and the preceding vowel is incorporated into the foot as the weak node.

(6) a.

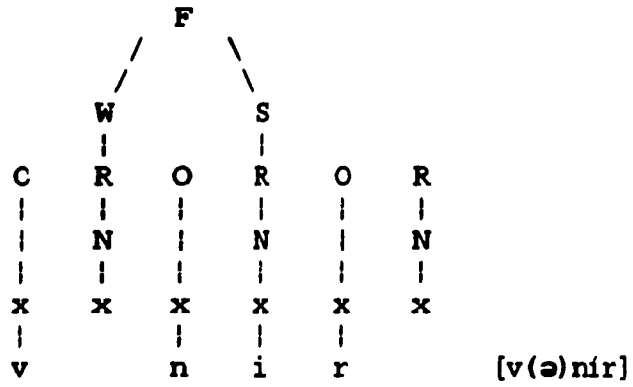


[mãtó]

Let us now consider what metrical pattern my analysis would attribute to a word like venir 'to come', which contains only one underlying nucleus with phonetic content. According to principle (4), a nucleus with no phonetic content cannot be the head of a metrical foot. One thing is then certain; the foot cannot be built starting from the word-final empty nucleus which is always realized as zero. Recall that at the end of a domain an underlying empty nucleus has the special property to remain with no phonetic content. Having no phonetic content, a word-final empty nucleus would never be the strong member of a binary foot. In venir then, the foot is built on the vowel i. The vowel i is preceded by an empty nucleus which is properly governed and receives no phonetic content. But nothing prevents an empty nucleus from being incorporated within a binary foot as the weak member. Recall that while principle (4) says that a nucleus with no phonetic content cannot be the head of a foot, it

says nothing about the recessive position. The metrical structure I propose for the word <u>venir</u> is given in (7).

(7)

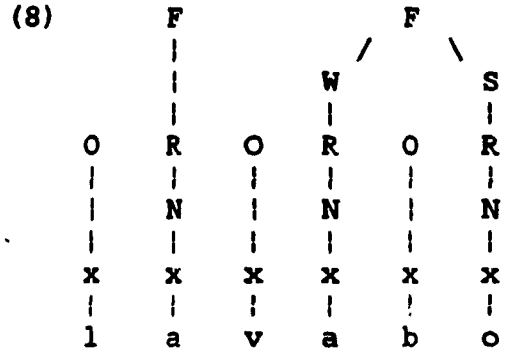


To this point I have proposed that the accentuation of the final vowel of a word in French is accounted for by the proposal that a right dominant binary foot is built at the right edge of a word. It remains to consider what metrical pattern I attribute to polysyllabic words.

Considering a word like <u>lavabo</u> 'sink' for example, stress falls on the final vowel <u>o</u> [lavabó]. With regard to the vowels in the initial and second syllables, they are unstressed or at least they both have a less degree of accentuation than the final vowel. Adapting a proposal made by Selkirk (1978) I propose that the vowel

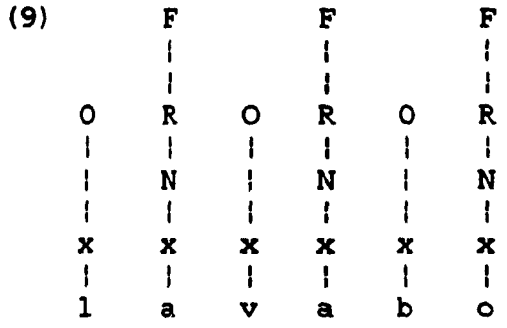
in the initial syllable is projected to a non-branching foot. This is illustrated in (8).

(8)



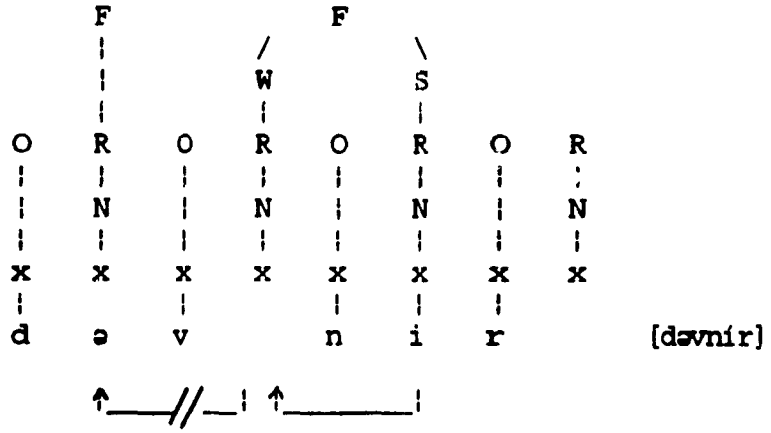
In fact, Selkirk's proposal is that except for schwa, every vowel is projected into a non-branching foot. The metrical pattern she attributes to lavabo is given in (9).

(9)



While I agree with Selkirk that a vowel may be projected as a non-branching foot, I differ from her in two important ways. First, I consider that an empty nucleus which is not properly governed and is consequently realized as schwa may be projected into a non-branching foot as does any other vowel. Secondly, while she claims that except in cases where schwa is incorporated as the left (weak) branch of a foot, the French foot is non-branching, I claim that this is true except for the two rightmost vowels of a word which belong to a binary foot. The metrical pattern I attribute to a word like devenir is given in (10).

(10)



My proposal that at the right edge of a word the foot is branching is motivated by the analysis of compounds which I now consider.

8.1.3 Stress assignment in compounds

In the cases under investigation, that is in compounds, each term is a word which is joined to another word on a second cycle to form a complex NP. In saying that each term is a word, I assume that the final nucleus of each term occurs in word-final position and has the special properties attributed to this position. More precisely I claim that at the level of nuclear projection, there is no governing relation between the final nucleus of the first term and the first nucleus of the second term. This proposal is justified by the compounds given in (11) below. In those compounds the second term has as initial onset an empty constituent (i.e. an "h-aspiré"). We saw earlier in my analysis of words like dehors 'outside' and rehausser 'to raise again', that a nucleus with phonetic content following an "h-aspiré" properly governs the empty onset to its left, but that it does not also properly govern the empty nucleus preceding the empty onset. If in compounds there is a governing relation between the final empty nucleus of the first term and the first nucleus of the second term, the empty nucleus in final of the first term should always be manifested in compounds of the type given in (11). Given that the empty nucleus cannot be properly governed when an empty onset intervenes between this empty nucleus and its potential proper

governor, zero should be an impossible manifestation. In the following compounds, the empty nucleus is realized as zero showing that each term must be analyzed as an autonomous word. Each word has a final nucleus which has the special properties attributed to word-final nuclei.[2]

(11)

serré-hanches	'hips-squeezer'	coupé-haricot	'beans-cutter'
coupé-haie	'hedge-cutter'	passé-hoquet	'hiccup-stopper'
repassé-housse	'iron-cover'	coupé-houx	'holly-cutter'
lavé-hotte	'hood-cleaner'	attrappé-hérisson	'porcupine-catcher'

These compounds show that if there was a governing relation between the nucleus in the initial syllable of the second term and the empty nucleus to its left, the empty nucleus would not be governed in the compounds in (11) and would consequently always be manifested as schwa. My proposal that the final nucleus of the first term is not in a governing relation with the nucleus of the second term is then justified. To summarize, the final empty nucleus of the first term of a compound can be realized as zero even if not governed

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[2] The following compounds are hypothetical words but are nevertheless semantically plausible. The pronunciation I give reflects the intuition of French speakers about how they would be pronounced if they were produced.

because it occurs in final position of a word.

Let us next consider how stress is assigned in compounds, starting with those which have as their first term a final nucleus preceded by one consonant.

8.1.3.1 Second term of compounds phonetically monosyllabic

8.1.3.1.1 First term preceded by a single consonant

Let us start with compounds in which the final nucleus of the first term is preceded by a single consonant and the second term is phonetically monosyllabic.

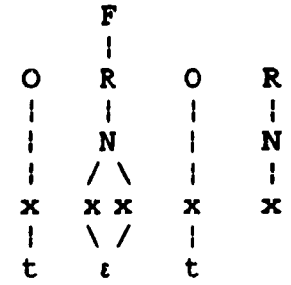
(12) cassé-tête 'puzzle' coupé-feu 'firebreak'
attrappé-mouche 'a fly catcher'

In (12) the compounds are formed of a verb which is joined to a noun to form a complex NP. Each member is a lexical category which bears a stress (ex. [kás] 'to break', [tɛ́t] 'head', [atráp] 'to catch').

(13) a.

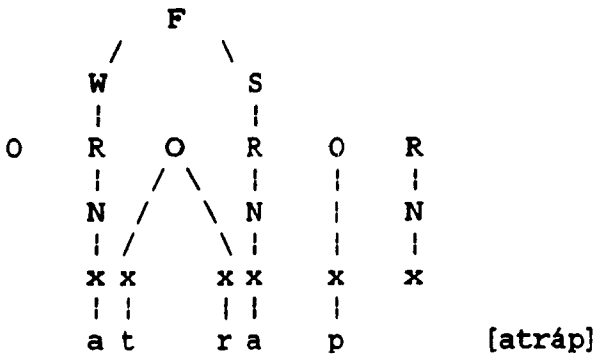
[kás]

b.



[tɛ́:t]

c.



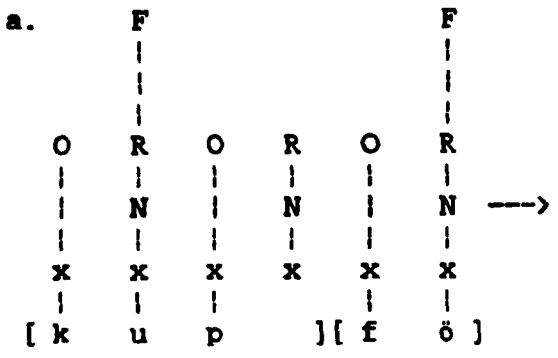
[atráp]

I propose that the formation of a compound is done in the following way. A compound has the structure of two words which are joined together to form a complex NP. On a first cycle there is the leftmost term which comes with its accentual pattern. If the term is phonetically monosyllabic, it contains a non-branching foot and if it is bisyllabic there is a branching foot dominating its two rightmost vowels. If empty, the final nucleus of the first term is not incorporated within the metrical structure on this first cycle. On the second cycle, the right term is adjoined to the preceding word. This

second term also comes with its accentual pattern. In the compounds given in (12) since the second terms are phonetically monosyllabic, their unique expressed vowel is projected into a non-branching foot. When the compound is formed, the morphologically complex word undergoes the rule of stress assignment which re-applies at the second cycle. Starting from the right edge of the word a binary foot labelled weak/strong is built. In compounds where the second term is phonetically monosyllabic, it is now possible, since the right term is now preceded by another word, to incorporate a preceding nucleus as the weak member of the foot. The final nucleus of the first term is then incorporated into a binary foot at the second cycle. The fact that it is the rightmost vowel of the compound which bears the main stress even though the phonetically expressed vowel of the first term is also accentuated is accounted for in proposing that in French an accentual unbounded, right dominant foot is built on the foot projection. The derivation of compounding is illustrated in (14).

(14) A. coupe-feu [kùpfǒ] 'firebreak'

a.



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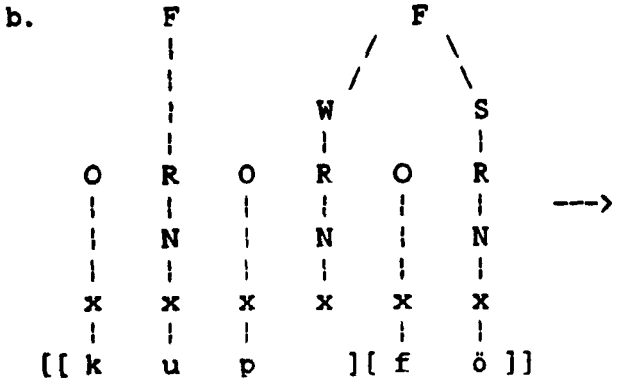

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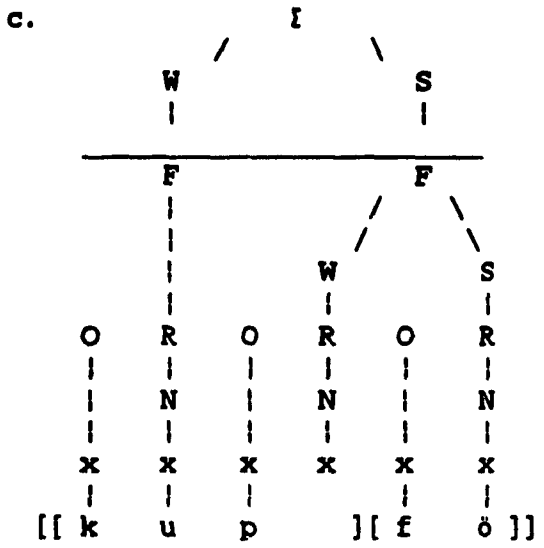
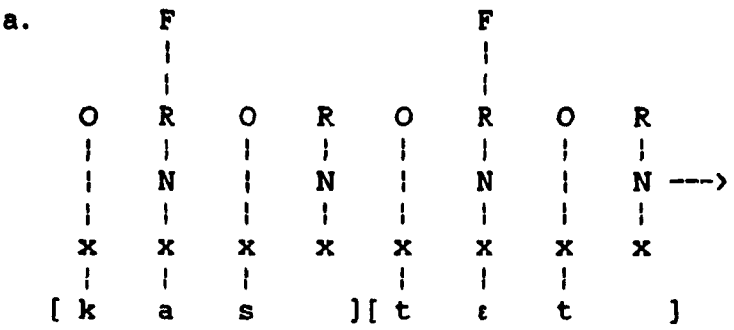
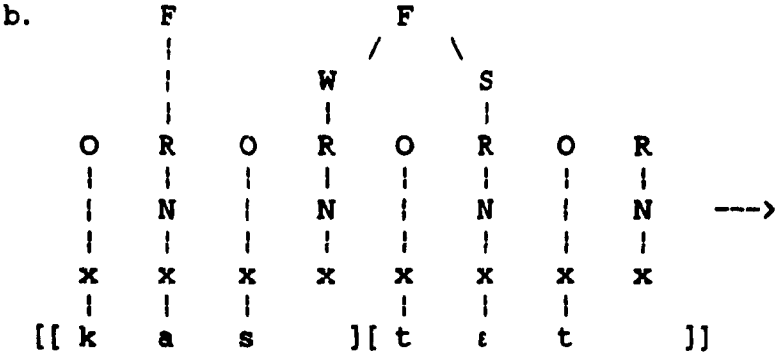


B. casse-tête [kàstɛ́:t] 'puzzle'

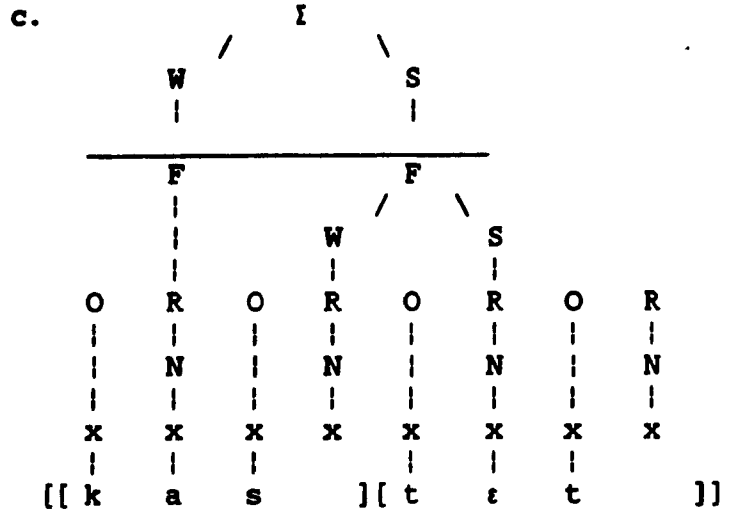
a.



b.

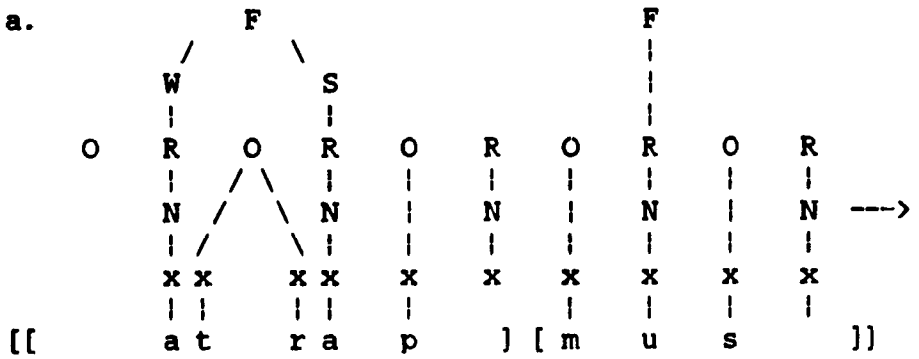


c.

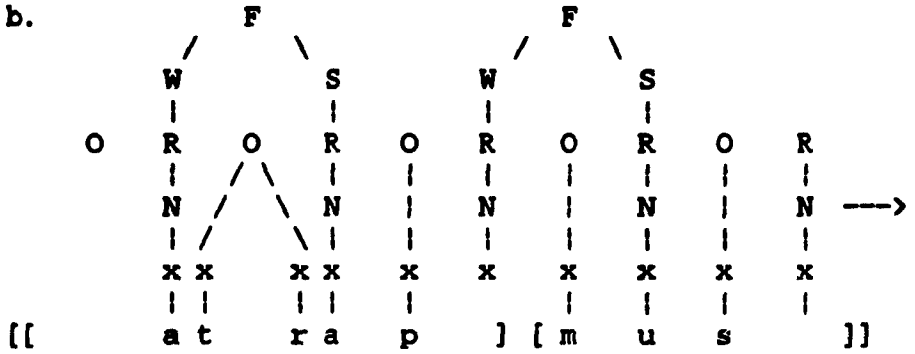


C. attrappe-mouche [atràpmús]

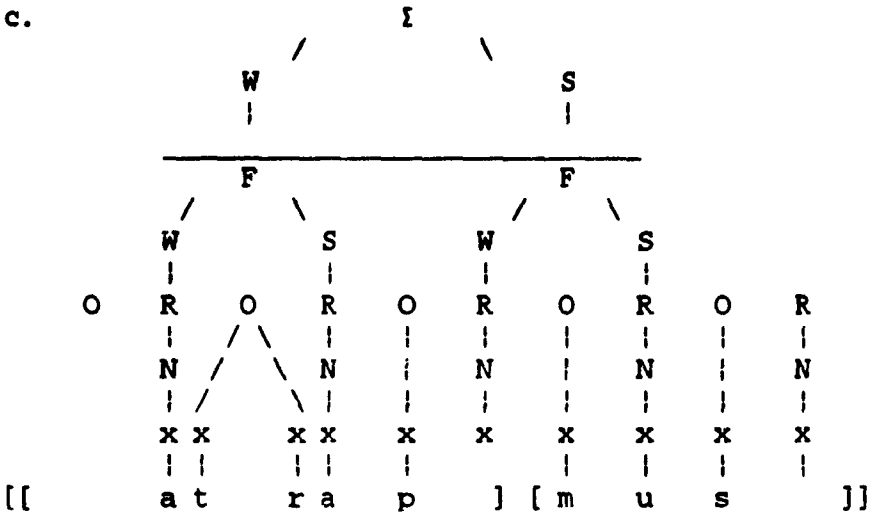
a.



b.



c.



In the structures given in (14) the final empty nucleus of the first term is incorporated into the metrical foot on the second cycle. While this final empty nucleus is not contained in a metrical foot in the first cycle it finds itself incorporated into the rightmost binary foot when the compound is formed and that stress is assigned to the compound. Given that the final nucleus of the first

term occupies the governed position of the binary foot I propose that it loses its domain-final special property; it can no longer license a consonant in remaining empty. I then claim that an empty nucleus cannot govern from within a metrical domain, something that is outside that domain.

This proposal will be supported by cases of compounds where the second term is phonetically monosyllabic, and the final empty nucleus of the first term is realized as zero when preceded by one consonant but as schwa after a consonant cluster. Recall that except in word-final position, French opts to give phonetic content to an empty nucleus which licenses a governing consonant. Knowing that the empty nucleus has indeed no phonetic content after a single consonant (i.e. when it has nothing to license) let us turn to compounds where the first term ends with a cluster followed by an empty nucleus.

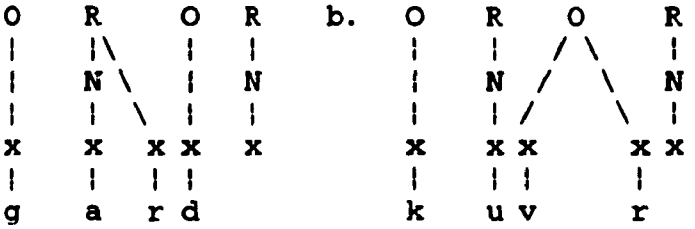
8.1.3.1.2 Final nucleus preceded by a consonant cluster

(15)	tourne-disque	[turnədisk]	'turntable'
	tourne-vis	[turnəvis]	'screwdriver'
	ouvre-boîte	[uvrəbwat]	'can opener'
	couvre-tout	[kuvrətu]	'smock'
	timbre-poste	[tɛ̃brəpɔst]	'stamp'
	garde-robe	[gardərɔb]	'wardrobe'
	garde-côte	[gardəkot]	'coast-guard'

garde-fou	[gardəfu]	'railing'
garde-pêche	[gardəpɛš]	'water bailiff'

The first member of these compounds must be analyzed either like (16a) or (16b).

(16) a.

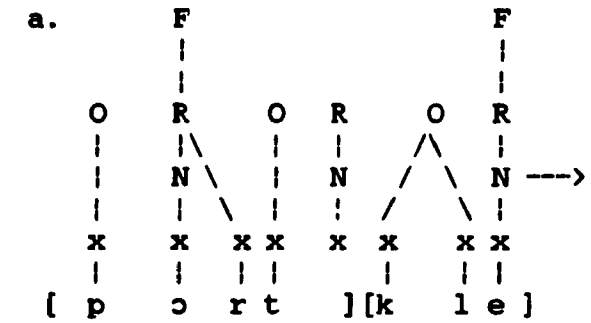


b.

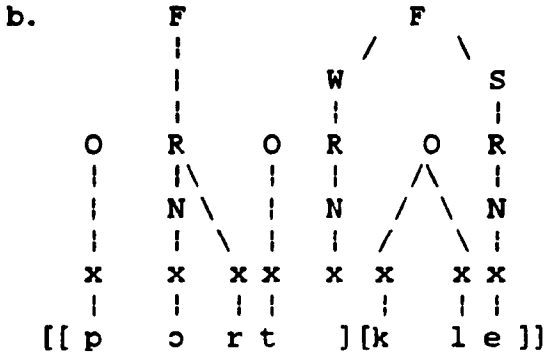
When those words are first terms of compounds of the type given in (15) it results in the following situation. In these compounds the second terms are phonetically monosyllabic words. Their final nuclei if empty are not metrically organized. The foot dominates the rime which has a nucleus with phonetic content. When the compound is formed and that stress is re-assigned, it becomes possible for the foot built on the second term to be branching. The final nucleus of the first term is incorporated into this foot as the recessive position. Being part of the metrical structure, the final nucleus of the first term loses its property of being a "licenser empty nucleus". Because it is preceded by a consonant cluster and it must

govern (i.e. license) the preceding governing consonant, it is realized as schwa. The situation is illustrated as follows.

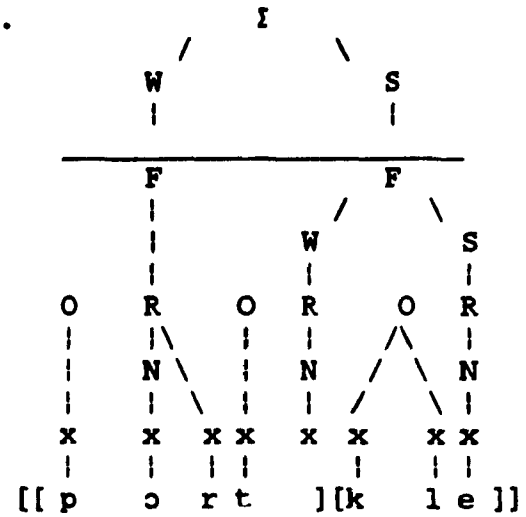
(17) a.



b.



c.



[pɔ̀rtəklé]

The proposal that the behaviour of the final empty nucleus of the first term of compounds is determined by the fact that in compound-final position a binary foot is built if possible, captures the similarity between word-internal empty nuclei and the final empty nuclei of first term of compounds which have as their second term a phonetically monosyllabic word. Being contained within the metrical domain, even though these empty nuclei are at the end of a cycle (the first term) they lose their property of being licensers even though they have no phonetic content. The loss of the status of "empty" licenser follows from the fact that a word-final empty nucleus becomes metrically governed. As this is the case word-internally when an empty nucleus is governed by a following vowel, an empty nucleus

which finds itself governed by its sister of the foot cannot either be a licenser if it has no phonetic content. Both word and foot-internally a properly governed empty nucleus must be manifested if it must license a preceding governing consonant. In other words, a nucleus with no phonetic content is not a licenser when it is contained within a governing domain.

The next question is why are the final empty nuclei of the first terms of compounds never phonetically realized when the second terms have phonetically more than one syllable, regardless of the number of consonants that precede the final nucleus of the first term.

8.1.3.2 Compounds whose second term are polysyllabic

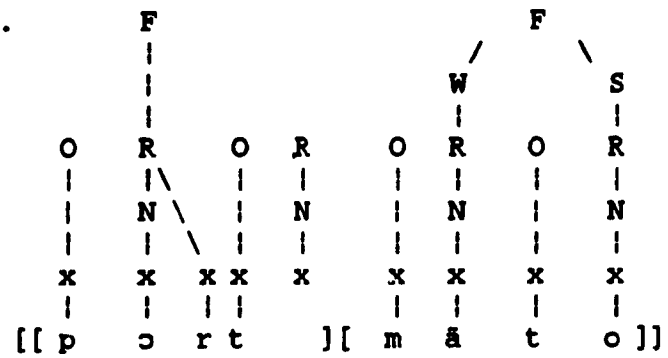
(18) a.	coupé-papier	[kuppapje]	'paper knife'
	coupé-circuit	[kupsirkYi]	'cutout'
	cassé-noisettes	[kasnwazɛt]	'nutcracker'
	passé-partout	[paspartu]	'master'
	passé-montagne	[pasmõtaɲ]	'balaclava'
	piqué-assiette	[pikasjɛt]	'scrounger'
b.	porté-manteau	[pɔrtmãto]	'coat rack'
	porté-crayon	[pɔrtkrɛyõ]	'pencil holder'
	porté-cigare	[pɔrtsigar]	'cigar case'
	porté-parole	[pɔrtparɔl]	'spokesman'
	porté-drapeau	[pɔrtdrapo]	'standard bearer'
	porté-couteau	[pɔrtkuto]	'knife rest'
	porté-camion	[pɔrtkamjõ]	'truck carrier'

ouvre-bouteille	[uvrbutɛj]	'bottle opener'
garde-manger	[gardmãʒe]	'meat safe'
garde-barrière	[gardbarjɛr]	'level crossing keeper'
garde-malade	[gardmalad]	'nurse'
garde-champêtre	[gardʃãpɛtr]	'rural policeman'

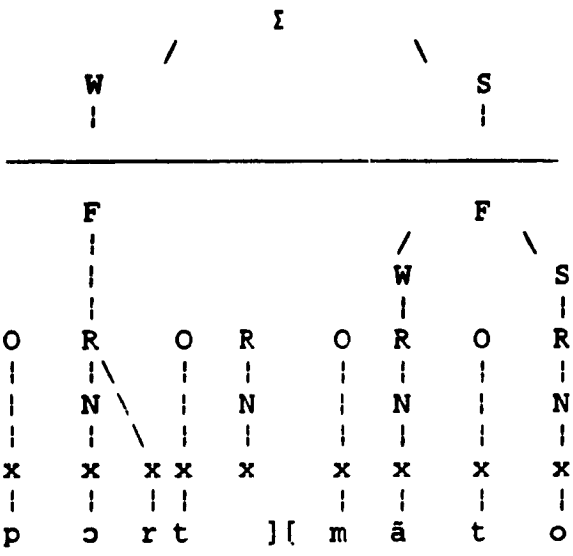
What is interesting with this type of compounds is that when the second member is phonetically polysyllabic, the empty nuclei of the first term is not realized phonetically even if preceded by two consonants. This behaviour is identical to the one of empty nuclei occurring in word-final pre-pausal position. This is accounted for the following way. At the right edge of a word, a binary foot is constructed if this is possible. When the second term of a compound has two phonetically expressed vowels or more, the binary foot is built on its two rightmost vowels. This means that the final empty nucleus of the first term is not incorporated into the foot which is already branching. Consequently, the final empty nucleus of the first term does not find itself contained within a foot and can then retain the special property attributed to domain-final empty nucleus.[3]

[3] The final empty nucleus of the first term is not projected into a non-branching foot since it has no phonetic content.

(19) a.



b.



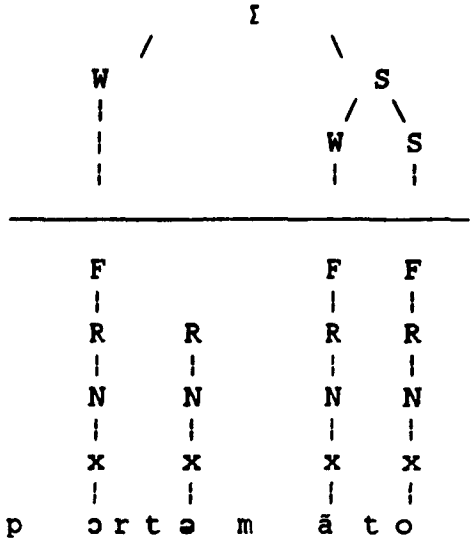
As in pre-pausal position, the final empty nucleus of the first term can be realized as zero and license the preceding consonant. This follows from the fact that it does not find itself governed within a foot. It is not incorporated into a foot, it occurs in final of a word and it can then be unrealized phonetically and license the

preceding consonant even though it has no phonetic content. Note that the situation is similar in compounds where the second terms have more than one syllable and the final empty nuclei of the first terms are not licensers.[4]

From my perspective, Selkirk's proposal that a vowel always forms a non-branching foot has to be rejected. Let us apply her analysis to the compounds porte-clef and porte-manteau. In compounds of the type of porte-manteau, the metrical pattern is as in (20).

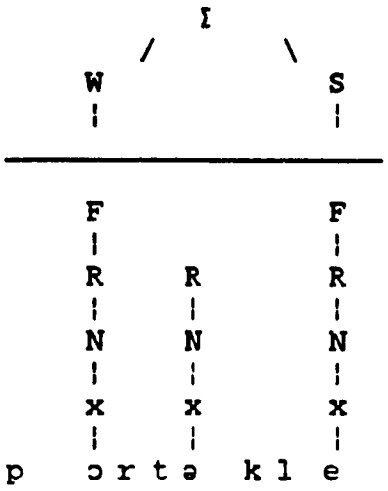
[4] Under my analysis of compounds, the final schwa in porte-clef has the same degree of accentuation than the vowel ã in porte-manteau. While one may disagree, it remains that the difference in the accentuation of the two vowels may be related to the nature of the segment schwa.

(20)



In (20) each syllable of the second term is projected into a non-branching foot. With regard to the first term, given that Selkirk claims that a vowel does not govern a following schwa when two consonants intervene between them, the final schwa (empty nucleus) of the word porte is not incorporated within the preceding foot. But what is relevant here is that the first term has a foot. Now the accentual foot, which must be right dominant, will accentuate the rightmost expressed vowel of the compound. Let us now consider the form porte-clef.

(21)



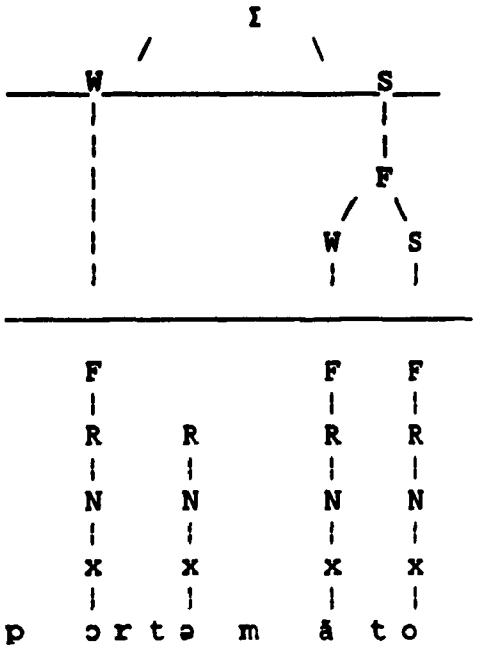
Here is the flaw in Selkirk's proposal. How can she explain that the final empty nucleus of porte is manifested in porte-clef but not in porte-manteau? If both the syllable man of manteau and kle are non-branching feet, they should behave the same way. More precisely neither of them or both of them should incorporate or not incorporate the preceding nucleus. The first syllable of manteau and the syllable kle being metrically identical, they cannot be what determines the behaviour of the preceding empty nucleus. Maybe the behaviour of the empty nucleus of the first term is determined by the accentual foot. But this cannot be maintained since in both compounds the accentual foot incorporates the foot on the first term as a weak branch, resulting in both compounds being in a situation where the final empty nucleus of the first term is contained within the accentual

foot.

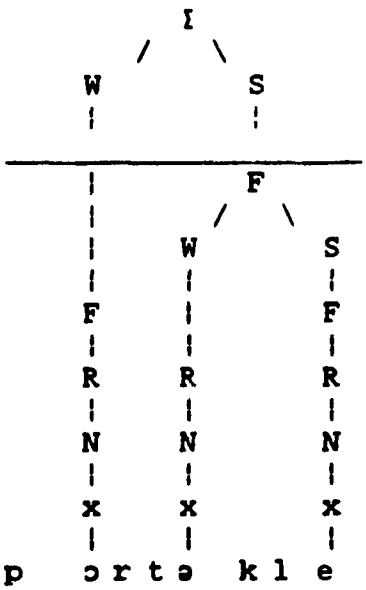
To summarize, according to Selkirk's analysis, the prediction is that porte-clef and porte-manteau are identical with respect to the behaviour of the final empty nucleus of the first term. On the other hand, if, at the right edge of a word, a foot branches, we then predict that it is only in compounds where the second term is phonetically monosyllabic that the empty nucleus of the first term is manifested if it is a licenser. The latter prediction is according to the facts.

In Selkirk's analysis, the only possible account of the behaviour of the empty nucleus of the first term in the two types of compounds would be to propose that there is an intermediate level between the foot level and the word tree. It would be at this intermediate level where the branching would be defined as significant. When the final empty nucleus of the first terms would be incorporated within the branching intermediate foot, it would be governed and realized as schwa if it is a licenser. This is illustrated in (22).

(22) a. portø-manteau



b. porte-clef



As I pursue my analysis of schwa it will become clear why I consider that my analysis is superior to Selkirk's. Many facts will find an explanation in considering that a domain-final foot branches if possible.

In this section I have proposed that the difference in the behaviour of a final empty nucleus of the first term of a compound and in word-final pre-pausal position is not that in one case the empty nucleus occurs in word-final position while in compounds it does not. In both contexts the final nucleus occurs in final position of a word. The difference in their behaviour is determined from whether or not a word-final empty nucleus finds itself incorporated within a metrical binary foot. While this may happen with the final nucleus of the first term of a compound, it will never happen to a word-final empty nucleus occurring in pre-pausal position.

I now propose that my analysis of compounds, extended to phrases, accounts for the pattern of phrases in certain dialects of French.

8.2 Phrases

That the manifestation of a word-final empty nucleus is determined by the number of phonetically expressed syllables the following word contains is not, in certain dialects of French, restricted to compounds. In the dialect of French spoken in Paris, the pattern of compounds is also found in phrases of the type noun-adjective, verb-adverb, verb-complement and so forth. Then, while in my dialect of Québec French the following pairs of forms are not ambiguous, since they are not phonetically identical, they are phonetically identical in the dialect spoken in Paris.

(23) Québec French:

garde-fou	[gardəfu]	'parapet'
Garde Fou!	[gardfu]	'keep Fou'[5]
couvre-pierre	[kuvrəpjɛr]	'stone-cover'
couvre Pierre!	[kuvrpjɛr]	'cover Peter'

Parisian French:

garde-fou / Garde Fou!	[gardəfu]	'parapet / keep Fou'
couvre-pierre / couvre Pierre!	[kuvrəpjɛr]	'stone-cover / cover Peter'

[5] In the sense that there is a dog called Fou and one tells to keep or baby-sit it.

In addition, in Parisian French, the word-final schwas in the following forms are or are not realized as zero depending on what follows. As in compounds a word-final schwa preceded by two consonants is realized as zero if the following word has more than one phonetically expressed syllable. If the following word is phonetically monosyllabic, schwa must be realized.

(24)

veste rouge	'red jacket'	vesté rouge et blanche	'red and white jacket'
veste bleue	'blue jacket'	vesté turquoise	'turquoise jacket'
parle bas	'speaks softly'	parlé trop bas	'speaks to softly'
parle fort	'speaks loudly'	parlé pas fort	'does not speak softly'

Interestingly Dell mentions:

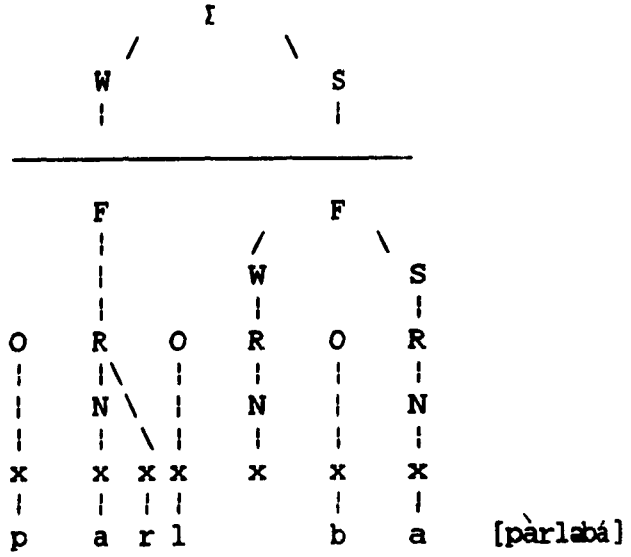
"Les schwas immédiatement précédés de deux consonnes appartenant au même mot ne tombent donc ni lorsque la syllabe suivante porte l'accent principal du mot composé, ni lorsqu'elle porte l'accent principal d'un groupe de mots situé devant une pause." (Dell, 1973:226-227)

While Dell does attribute this behaviour of schwa to stress assignment, he does not provide a metrical analysis of the phenomenon. Saying that after two consonants that belong to the same word, schwa is manifested when the following syllable bears the main accent, is exactly what I propose for the analysis of empty nuclei in compounds.

In my dialect of Québec French, however, the pattern of empty nuclei in compounds is restricted to compounds. Except in compounds a word-final schwa is never phonetically realized after two consonants whatsoever the number of phonetically expressed syllables the following word contains. This means that for me, it is only in compounds that a following word determines the behaviour of a preceding schwa itself preceded by two consonants. Accordingly, this suggests that stress is assigned differently in Québec than in some dialects of continental French. This is not surprising. This fact has indeed been observed by everyone who compared the two dialects. It seems that in my dialect, except in morphologically complex nouns, any word constitutes a domain for stress assignment. In continental French stress is assigned in a larger domain. In this latter dialect, the behaviour of schwa in forms of the type given in (24) is accounted for simply by extending my analysis of compounds to phrases. In my dialect, however, stress assignment has for domain the im-

mediate projection of a given word. Let me take an example. In Parisian French the sequences <u>parle bas</u> and <u>parle trop bas</u> constitute a domain for stress assignment. The two forms have the following representation.

(25) a.



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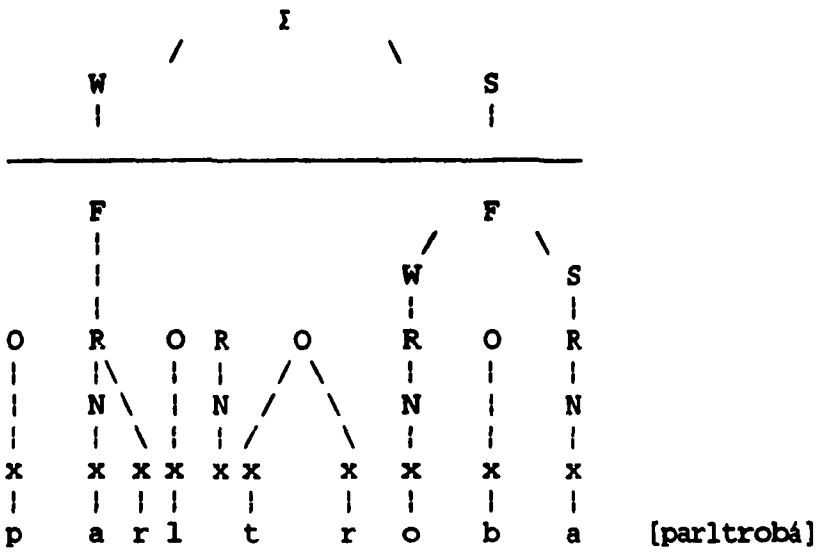
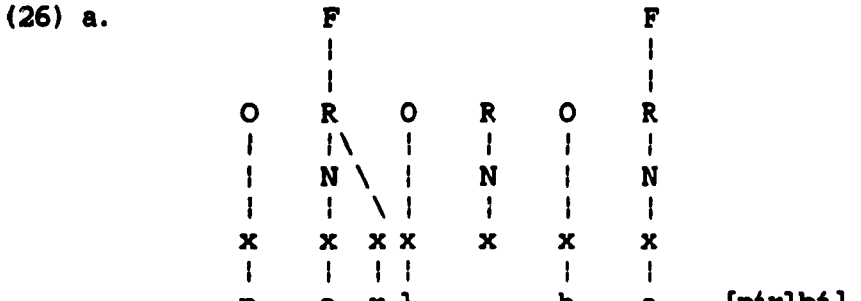


In (25a) the final empty nucleus of parle is contained within the metrical structure. It results that it loses its property of being an "empty" licenser and must then receive a phonetic content in order to license the preceding governing consonant. It must be realized as schwa. In (25b) the final empty nucleus is not incorporated in the foot (there is already a binary foot built on trop and bas). Consequently, as in pre-pausal position, it can be realized as zero even if it is a licenser.

In my dialect of French, things are different. The sequences of words in (24a,b) do not constitute domains for stress assignment. Each word is a domain which means that each word is independently

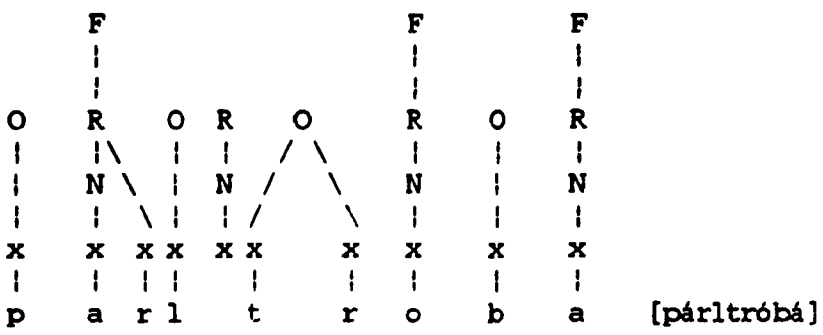
accentuated. As a result the final empty nucleus is always in pre-pausal position and is never realized phonetically.

(26) a.



[párlbá]

b.



[párltróbá]

My analysis accounts for the pattern of compounds, and phrases in certain dialects of continental French.

I turn now to the following chapter where it is proposed that the alternation of zero or schwa with the vowel ɛ may also be accounted for in terms of stress assignment.

CHAPTER NINE

THE ALTERNATION BETWEEN SCHWA/ZERO AND ɛ

9.0 Introduction

In chapter 8 I showed that when stress is assigned to a compound or a phrase, the final empty nucleus of the first term may find itself incorporated within a metrical domain, resulting in the loss of its status of "empty licenser". In terms of stress assignment, we capture the behaviour of the final nucleus of the first member of a compound and, the difference between certain dialects of French with respect to phrases. I turn next to the alternation between schwa or zero with the vowel ɛ which I claim is also a consequence of stress assignment.

9.1 The alternation between schwa/zero and ɛ

To this point in the analysis we have considered cases where an underlying empty nucleus is either realized as zero or as schwa. We will now consider another manifestation of an underlying empty nucleus, its alternation with the mid vowel [ɛ]. Consider a verb like

harceler 'to harass' for example. In its infinitive form this verb is pronounced with a schwa in its second syllable [arsəle]. Under certain circumstances this schwa is realized as [ɛ] as in harcèle [arsɛl] 'he/she harasses' or harcèlement [arsɛlmã] 'harassment'. Similarly, the absence of a vowel in the second syllable of a verb like appéler [aple] 'to call' becomes [ɛ] in a form like (il) appelle [apɛl] 'he/she calls', un appel [apɛl] 'a call'. The same alternation is found in the following examples.

(1) Zero			ɛ		
lever	[lve]	'to stand up'	lève	[lɛv]	'stand up!'
jeter	[ʃte]	'to throw'	jète	[zɛt]	'throw!'
appeler	[aple]	'to call'	appel	[apɛl]	'a call'
étinceler	[etɛ̃sle]	'to sparkle'	étincelle	[etɛ̃sɛl]	'spark'
déceler	[desle]	'to detect'	décelle	[desɛl]	'detect!'
ciseler	[sizle]	'to chisel'	ciselle	[sizɛl]	'chisel!'
atteler	[atle]	'to harness'	attelle	[atɛl]	'harness!'
amener	[amne]	'to bring'	amène	[amɛn]	'bring!'
fureter	[fürte]	'to nose'	furète	[furɛt]	'nose!'
cacheter	[kaʃte]	'to seal'	cachète	[kaʃɛt]	'seal!'
étiqueter	[etikte]	'to label'	étiquette	[etikɛt]	'label'
acheter	[aʃte]	'to buy'	achète	[aʃɛt]	'buy!'
renouveler	[rənuvle]	'to renew'	renouvelle	[rənuvɛl]	'renew!'
crocheter	[krɔʃte]	'to hook out'	crochète	[krɔʃɛt]	'hook out!'
mener	[mne]	'to lead'	mène	[mɛn]	'lead!'
échelon	[eʃlõ]	'rung'	échelle	[eʃɛl]	'ladder'
mamelon	[mamlõ]	'nipple'	mamelle	[mamɛl]	'breast'

Schwa			ɛ		
peser	[pəze]	'to weigh'	pèse	[pɛz]	'weigh!'
harceler	[arsəle]	'to harass'	harcèle	[arsɛl]	'harass!'
ensorceler	[ãsɔrsəle]	'to bewitch'	ensorcelle	[ãsɔrsɛl]	'bewitch!'
parsemer	[parsəme]	'to sprinkle'	parsème	[parsɛm]	'sprinkle!'
morceler	[mɔrsəle]	'to parcel'	morcelle	[mɔrsɛl]	'parcel!'
marteler	[martəle]	'to hammer'	martèle	[martɛl]	'hammer!'
surmener	[sürməne]	'to overwork'	surmène	[sürmɛn]	'overwork!'
crever	[krəve]	'to blow'	crève	[krɛv]	'blow!'
sevrer	[səvre]	'to wean'	sèvre	[sɛvr]	'wean!'

harcèlement	[arsɛlmã]	'harassment'
renouvellement	[rənuvɛlmã]	'renewal'
morcellement	[mɔrsɛlmã]	'parcelling'
étincellement	[etɛ̃sɛlmã]	'sparkling'
ensorcellement	[ãsɔrsɛlmã]	'bewitching'
martèlement	[martɛlmã]	'hammering'

As claimed by Dell the underlying segment which undergoes the alternation between schwa/zero and ɛ must be schwa and not ɛ. If ɛ was the underlying vowel, there would be no explanation for the fact that there are words with underlying ɛ which do not alternate with schwa nor with zero.

(2)

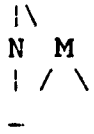
rêver	[rɛve]	*[rəve]	*[rve]	'to dream'	rêve	[rɛv]	'dream!'
allaiter	[alɛte]	*[aləte]	*[alte]	'to nurse'	allaite	[alɛt]	'nurse!'
serrer	[sɛre]	*[səre]	*[sre]	'to tight'	serre	[sɛr]	'tight!'

I agree with Dell that the underlying representation of [ɛ] in the examples given in (1) cannot be the vowel /ɛ/. In my terms a nuclear position where schwa or zero alternates with [ɛ] is underlyingly empty.

9.1.1 Is ɛ the realization of an empty nucleus in closed syllable?

According to Dell (1973), Selkirk (1978) and Anderson (1982), the realization of schwa as [ɛ] is accounted for by a rule of "Closed Syllable Adjustment".[1] They proposed that an underlying schwa/empty nucleus becomes [ɛ] in closed syllables. The rule is expressed as follows:[2]

(3) Dell's rule: $\begin{Bmatrix} ə \\ e \end{Bmatrix} \longrightarrow [ɛ] \;/\; \underline{\quad\quad} \; C \begin{Bmatrix} \# \\ C \end{Bmatrix}$

Anderson's rule: $\begin{Bmatrix} Ø \\ e \end{Bmatrix} \longrightarrow [ɛ] \;/\;$ 

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[1] Selkirk (1978) proposed that "schwas change to ɛ if followed by something else inside the foot. And that something else may be simply a consonant or an entire syllable with ə."

[2] They say that the vowel e also undergoes the rule.

The rules account for all the alternations between zero/schwa/ɛ for one who considers that all instances of [ɛ] in words given in the right column of (1) occur in a closed syllable. It is clear that under my analysis such a syllabification is not possible.[3] According to my view a word like achète [asɛt] 'he/she buys' for example, has a final empty nucleus in its lexical representation. Even though achète [asɛt] ends phonetically with an obstruent, this consonant is not syllabified into a branching rime. Along the same lines, a word like sèvre [sɛvr] 'he/she weans' cannot be analyzed neither as ending with a branching coda nor as having the v in the rime and the liquid in a following onset. While the first syllabification would violate, among other things, the adjacency requirement between the nuclear head and its complement, the latter syllabification would for its part violate transsyllabic government. Recall that a charmless liquid cannot govern a preceding negatively charmed segment. In my analysis the only possible underlying structure for the two words [apɛl] and [sɛvr] are the following ones, respectively.[4]

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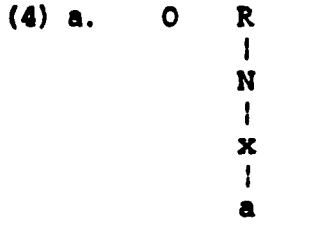
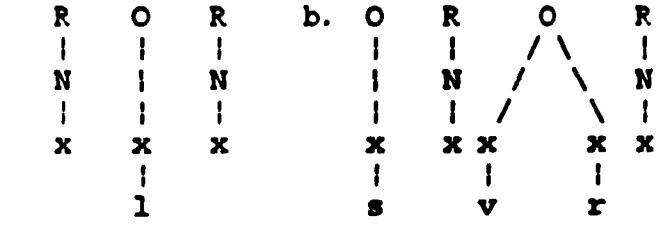
[3] See Picard (1983) who also argues against the proposal that schwa is realized as ɛ in closed syllable.

[4] Under my analysis ɛ is not the manifestation of a schwa/empty nucleus occurring in a closed syllable. In fact I claim that an empty nucleus never occurs within a branching rime. This follows from the fact that I consider that the head of a branching constituent can never be empty. (See Kaye & Lowenstamm (1984) who discussed the

(4) a.



b.



In the two structures given in (4) an empty nucleus occurs in final position, and as we know is not realized phonetically. This word-final nucleus is licensed and has itself the property to license a preceding governing consonant. This nucleus cannot, however, properly govern the empty nucleus to its left, resulting in the phonetic manifestation of this latter nucleus. The question to be addressed later is why is the penultimate empty nucleus realized as ɛ and not as schwa?[5]

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distribution of empty skeletal points). If the head of a branching rime, the nucleus, cannot be empty, we understand why no words in French have the sequence schwa-charmless consonant-negatively charmed consonant-(charmless consonant). In other words, no words have a schwa followed by a consonant in the rimal position which is followed by an onset (branching or not).

[5]Recall also that in a preceding section I mentioned that if schwa is realized as ɛ in closed syllable, it follows that according to Anderson the pronunciation of a word like ensevelir should be *[ãsɛvlir] and not [ãsəvlir]. One may argue that Anderson would syllabify the v and the l in a branching onset. If so the empty nucleus preceding this onset would not occur in a branching rime. The problem with this proposal is that Anderson accounts for the absence of manifestation of the empty nucleus between the v and the l by re-syllabifying the v in the preceding rime. Consequently this consonant

9.2 ɛ as the realization of a schwa occurring in an accentuated nucleus

I propose the following alternative analysis for the alternation between schwa-zero/ɛ. An empty nucleus which must be manifested because it is not properly governed, is realized as ɛ when it is accentuated. In other words, an underlying empty nucleus occurring in a position where it is not properly governed is realized as [ɛ] when it is the head of a foot which is dominated by the strong position of the accentual foot.

My analysis relies on the assumption that stress is assigned cyclically. At each cycle, from right-to-left one maximally binary foot labelled weak-strong is built starting from the rightmost nucleus with phonetic content. The preceding nuclei with phonetic content are projected into non-branching feet. The feet are, on each cycle, organized in a right dominant unbounded accentual foot. Let us first consider the following data where I give some words which contain a single cyclic domain, i.e. which are not morphologically

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cannot be in the onset. It must be resyllabified in the preceding rime resulting in the deletion of the syllable which now contains only an empty nucleus.

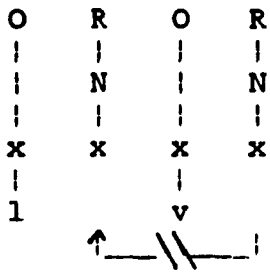
complex. In all the forms an underlying empty nucleus is manifested as ɛ.

(5)	harcèle	[arsɛl]	'he/she harasses'
	étincelle	[etɛ̃sɛl]	'spark'
	décelle	[desɛl]	'he/she detects'
	ciselle	[sizɛl]	'he/she chisels'
	attele	[atɛl]	'he/she harnesses'
	amène	[amɛn]	'he/she brings'
	furète	[fürɛt]	'he/she noses'
	cachète	[kasɛt]	'he/she seals'
	étiquette	[etikɛt]	'label'
	achète	[asɛt]	'he/she buys'
	renouvelle	[rənuvɛl]	'he/she renews'
	crochète	[krɔsɛt]	'he/she hooks out'
	ensorcelle	[ɑ̃sɔrsɛl]	'he/she bewitches'
	depèce	[depɛs]	'he/she cuts up'
	parsème	[parsɛm]	'he/she sprinkles'
	morcelle	[mɔrsɛl]	'he/she parcels'
	martèle	[martɛl]	'he/she hammers'
	surmène	[sürmɛn]	'he/she overworks'
	lève	[lɛv]	'he/she stands up'
	pèse	[pɛz]	'he/she weighs'
	jète	[zɛt]	'he/she throws'
	appelle	[apɛl]	'he/she calls'
	appel	[apɛl]	'call'
	feuillette	[foejɛt]	'he/she leafs'
	crève	[krɛv]	'he/she blows'
	mène	[mɛn]	'he/she leads'
	sèvre	[sɛvr]	'he/she weans'
	échelle	[esɛl]	'ladder'
	mamelle	[mamɛl]	'breast'

All the preceding words have a sequence of two adjacent empty nuclei in their lexical representation. More precisely they all have

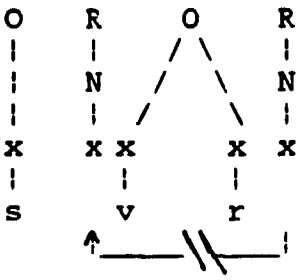
a word-final empty nucleus which is preceded by another empty nucleus.

(6) a.



lève [lɛv]

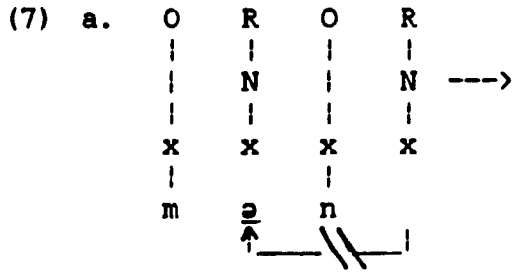
b.



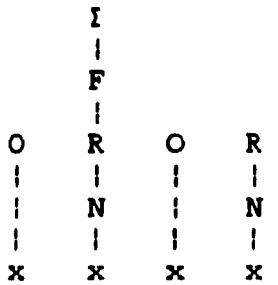
sèvre [sɛvr]

In the two forms I gave in (6), the word-final empty nuclei are realized as zero. As we now know this is possible because French allows word-final nuclei to be empty even if not properly governed. With respect to the empty nuclei occurring in the first syllable of these words, they are not properly governed. Consequently, the leftmost empty nucleus in each word must receive a phonetic interpretation. To account for the realization of ɛ, and not of schwa, in this position I propose that this ungoverned empty nucleus occurs in the accentuated rime of the word and that an accentuated schwa is realized as ɛ.

(7) a.

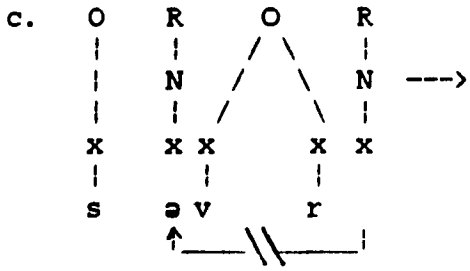


b.

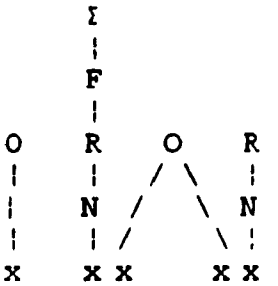


mène [mɛn]

c.



d.



[sɛvr]

At the right edge of a word we build a right dominant binary foot if this is possible. In the two forms given in (7), the head of the foot cannot dominate the final nucleus because it has no phonetic content. But given that the empty nucleus occurring in the first syllable is not properly governed and is consequently manifested phonetically, the foot can be built on this position. However, the foot cannot branch since there is nothing occurring to the left. The non-branching foot is then organized in an accentual structure.

non-branching foot is then organized in an accentual structure. Occurring in an accentual position this nucleus is manifested as [ɛ].

Let me now consider the infinitive forms of the verbs given in (5).

(8) Zero

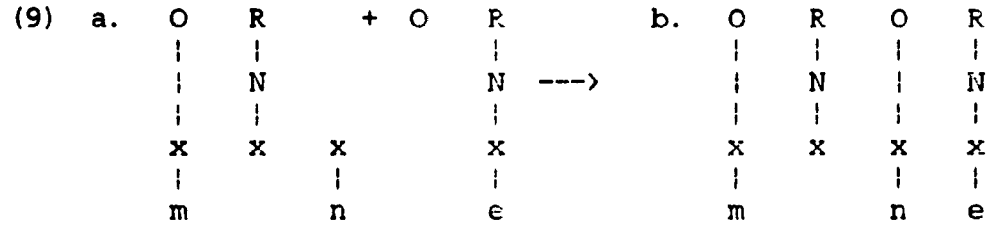
lever	[lve]	'to stand up'
jeter	[ʃte]	'to throw'
appeler	[aple]	'to call'
feuilleter	[foejte]	'to leaf'
étinceler	[etɛ̃sle]	'to sparkle'
déceler	[desle]	'to detect'
ciseler	[sizle]	'to chisel'
atteler	[atle]	'to harness
amener	[amne]	'to bring'
mener	[mne]	'to lead'
fureter	[fürte]	'to nose'
cacheter	[kaʃte]	'to seal'
étiqueter	[etikte]	'to label'
acheter	[aʃte]	'to buy'
renouveler	[rənuvle]	'to renew'
crocheter	[krɔʃte]	'to hook out'

Schwa

ensorceler	[ãsɔrsəle]	'to bewitch'
harceler	[arsəle]	'to harass'
parsemer	[parsəme]	'to sprinkle'
morceler	[mɔrsəle]	'to parcel'
marteler	[martəle]	'to hammer'
surmener	[sürməne]	'to overwork'
crever	[krəve]	'to blow'
sevrer	[səvre]	'to wean'

In contrast with words given in (5), those in (8) are not realized with a ɛ. This follows from the fact that in these infinitive forms, the penultimate empty nucleus is not the accentuated syllable of the word. Indeed, from right-to-left the construction of a binary foot labelled weak-strong is now possible from the word-final nucleus which now has phonetic content, viz the vowel e.[6] The latter can be the head of the binary foot. With respect to the penultimate nucleus it is properly governed, it would not be manifested unless it must license a governing consonant, and it is incorporated within the foot as the weak position.

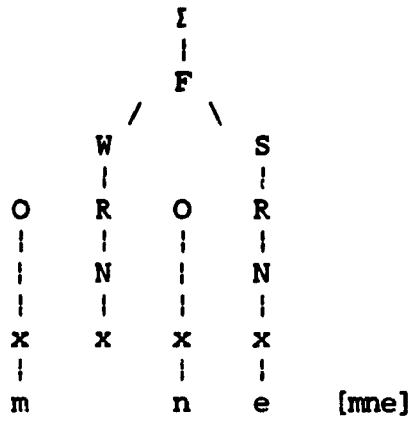
(9) a.



b.

[6] The infinitive morpheme is non-cyclic. It is present in the innermost cycle.

c.



[mne]

Saying that [ɛ] is the manifestation of an accentuated schwa accounts for Dell's, Selkirk's and Anderson's observation that a schwa in never accentuated. No matter if the syllable is open or closed, an interpreted empty nucleus (schwa) will be realized as [ɛ] if its syllable bears the accent.

9.2.1 [ɛ] as the realization of an accentuated ungoverned empty nucleus

I repeat here the examples I gave in (1) and (5). I now divide them in four groups. In group A we have principally the infinitive forms of some verbs. In those words we find either schwa and zero but not ɛ (amẽner, martəler). In group B we have morphologically derived words where a suffix -ment is attached to some stems. In those

examples the underlying empty nucleus is preceded by a consonant cluster and it is phonetically realized as schwa. In group C we have mainly verbs at the third person singular (app[ɛ]lle, ach[ɛ]te). In those examples the empty nucleus is realized as ɛ. Finally in group D I give morphologically derived words where ɔ suffix -ment is attached to some stems. In this last group of words the empty nuclei are once again preceded by a consonant cluster but unlike in B they are realized as ɛ and not as either schwa nor zero.

(10)

(ə)

Group A:

échelon	[ešlõ]	'rung'
mamelon	[mamlõ]	'nipple'
déceler	[desle]	'to detect'
ciseler	[sizle]	'to chisel'
atteler	[atle]	'to harness'
amener	[amne]	'to bring'
fureter	[fürte]	'to nose'
cacheter	[kašte]	'to seal'
étiqueter	[etikte]	'to label'
acheter	[ašte]	'to buy'
renouveler	[r(ə)nuvle]	'to renew'
crocheter	[krɔšte]	'to hook out'
étinceler	[etẽsle]	'to sparkle'
lever	[lve]	'to stand up'
jeter	[šte]	'to throw'
mener	[mne]	'to lead'
appeler	[aple]	'to call'
feuilleter	[foejte]	'to leaf'

peser	[p(ə)ze]	'to weigh'
dépecer	[dep(ə)se]	'to cut up'
harceler	[arsəle]	'to harass'
ensorceler	[ãsɔrsəle]	'to bewitch'
parsemer	[parsəme]	'to sprinkle'
morceler	[mɔrsəle]	'to parcel'
marteler	[martəle]	'to hammer'
surmener	[sürmane]	'to overwork'
crever	[krəve]	'to blow'
sevrer	[səvre]	'to wean'

Group B:

encombrement	[ãkõbrəmã]	'congestion'
justement	[žüstəmã]	'precisely'
fortement	[fɔrtəmã]	'strongly'
lisiblement	[liziblәmã]	'legibly'
plausiblement	[ploziblәmã]	'plausibly'
tristement	[tristəmã]	'sadly'
durablement	[dürablәmã]	'long lasting'
maigrement	[mɛgrəmã]	'poorly'
souplement	[suplәmã]	'supply'
largement	[laržəmã]	'widely'
lourdement	[lurdəmã]	'heavily'
ouvertement	[uvɛrtəmã]	'openly'

Group C:

harcèle	[arsɛl]	'he/she harasses'
étincelle	[etɛ̃sɛl]	'spark'
décelle	[desɛl]	'he/she detects'
ciselle	[sizɛl]	'he/she chisels'
attele	[atɛl]	'he/she harnesses'
amène	[amɛn]	'he/she brings'
furète	[fürɛt]	'he/she noses'
cachète	[kašɛt]	'he/she seals'
étiquette	[etikɛt]	'label'
achète	[ašɛt]	'he/she buys'
renouvelle	[r(ə)nuvɛl]	'he/she renews'
crochète	[krɔšɛt]	'he/she hooks out'
ensorcelle	[ãsɔrsɛl]	'he/she bewitches'

depèce	[depɛs]	'he/she cuts up'
parsème	[parsɛm]	'he/she sprinkles'
morcelle	[mɔrsɛl]	'he/she parcels'
martèle	[martɛl]	'he/she hammers'
surmène	[sürmɛn]	'he/she overworks'
lève	[lɛv]	'he/she stands up'
pèse	[pɛz]	'he/she weighs'
jète	[ǯɛt]	'he/she throws'
appelle	[apɛl]	'he/she calls'
feuillette	[foejɛt]	'he/she leafs'
crève	[krɛv]	'he/she blows'
mène	[mɛn]	'he/she leads'
sèvre	[sɛvr]	'he/she weans'
échelle	[eʃɛl]	'ladder'
mamelle	[mamɛl]	'breast'

Group D:

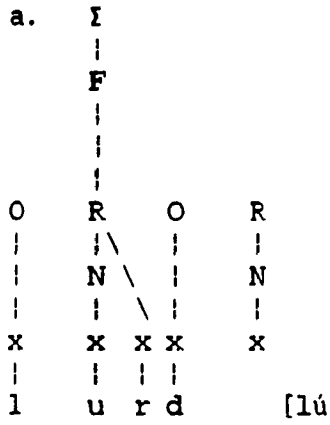
harcèlement	[martɛlmã]	'harassment'
renouvellement	[r(ə)nuvɛlmã]	'renewal'
morcellement	[mɔrsɛlmã]	'parcelling'
étincellement	[etɛ̃sɛlmã]	'sparkling'
ensorcellement	[ãsɔrsɛlmã]	'bewitching'
martèlement	[martɛlmã]	'hammering'

Let us first consider words of the groups B and D given in (10). In both groups we have morphologically derived words. A cyclic morpheme -ment is suffixed to a given stem. While words of group B are realized with a schwa, those in D are realized with a ɛ.

Starting with words of group B, we have stems that end with an empty nucleus (fɔrtə) and a cyclic suffix is attached to these stems (fɔrtement). Words of group B are then composed of two cycles. In a

first cycle we have the stem and in a second cycle the stem plus a suffix.[7] The situation is then that on the first cycle, viz. in the underived forms, words of group B end with an empty nucleus which is preceded by a consonant cluster. Let us now suppose that stress is assigned at each cycle. In the first cycle, the final empty nucleus is not incorporated in the foot. Recall that a final empty nucleus cannot be the head of a foot. This leads to the situation where it is the penultimate nucleus which occupies the stressed position.

(11) a.



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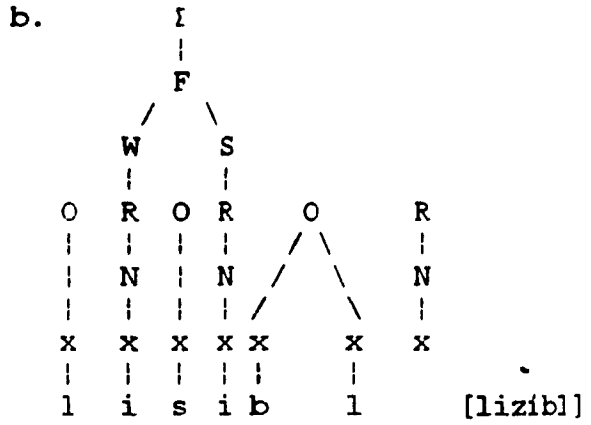
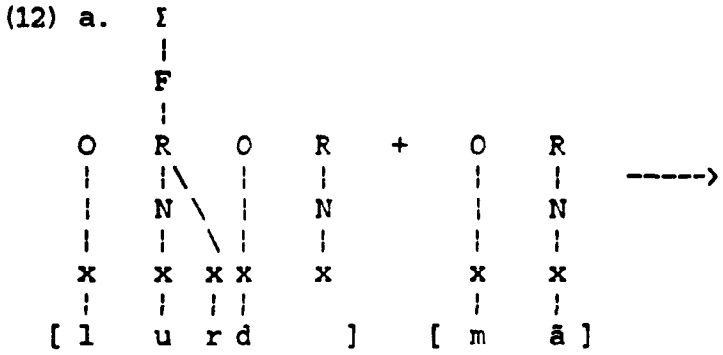
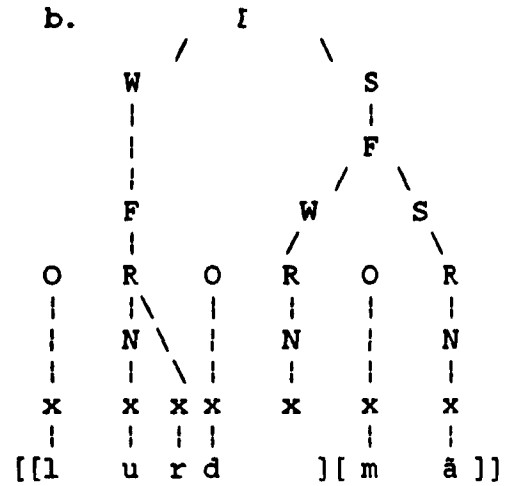


[7] That -ment is a cyclic suffix is motivated from the absence of vowel shortening. A word like enterrement 'burial' for example, is pronounced [ãtɛ:rmã]. The fact that the vowel ɛ is long shows that the vowel occurs in a non-branching rime. This is only possible if -ment is cyclic [[ãtɛ:rØ] mã]]. If -ment was non-cyclic the final empty nucleus of the stem would not be present in enterrement since it would not be in final of a domain, or cycle. If -ment was a non-cyclic suffix we would predict the pronunciation *[ãtɛrmã] that is with a short vowel ɛ.

Thus, on the first cycle, the final empty nucleus of the words of group B is not incorporated into a metrical structure. This nucleus is word-final, it can be realized as zero and it is the licenser of the preceding consonant. Turn now to the second cycle on which the morpheme -ment is added. If stress is assigned on each cycle, stress is again assigned on the second cycle. Now the suffixal vowel becomes the head of the binary foot and the preceding nucleus is incorporated in the structure as the weak node (as it is the case with certain classes of compounds).

(12) a.





As we saw in the analysis of compounds, an empty nucleus which is incorporated within a foot structure as the weak position loses its property of "empty licenser". If it is preceded by a consonant cluster, it is manifested.

To summarize the situation, in words of group B a domain-final empty nucleus is incorporated within a binary foot on the second cycle. This explains why this empty nucleus is not manifested on the first cycle but that it must be manifested on the second cycle. Given that neither on the first cycle nor on the second one is the word-final nucleus of the first term dominated by the strong position of the foot, it is never realized as ε. Let us now consider words of

group D where once again a cyclic suffix -ment is attached to some stems.

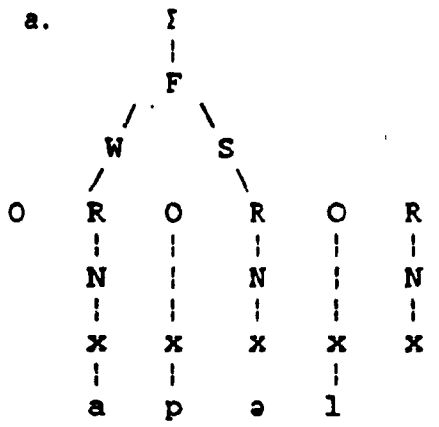
(13)	harcèlement	[martɛlmã]	'harassment'
	renouvellement	[r(ə)nuvɛlmã]	'renewal'
	morcellement	[mɔrsɛlmã]	'parcelling'
	étincellement	[etɛ̃sɛlmã]	'sparkling'
	ensorcellement	[ãsɔrsɛlmã]	'bewitching'
	martèlement	[martɛlmã]	'hammering'

As the examples show, unlike in words of group B, we find ɛ in words of group D. What is different between these two groups of words is the position where the empty nuclei occur. In words of groups B, the empty nuclei occur in the final syllable of the stems. In words of group D on the other hand, there are two consecutive empty nuclei. One empty nucleus occurs in the stem-final syllable and it is preceded by another empty nucleus. Note that it is not the stem-final nucleus which is realized as ɛ; it is the empty nucleus occurring in the penultimate syllable of the stem. Words like harcèlement [arsɛlmã] have a stem-final empty nucleus which is not manifested, and it is the penultimate one which is realized as ɛ. Let us investigate the derivation by first considering the bare stems, viz. the first cycle. Note here that in considering the first cycle of

words like harcèlement we are illustrating at the same time the words of group C.

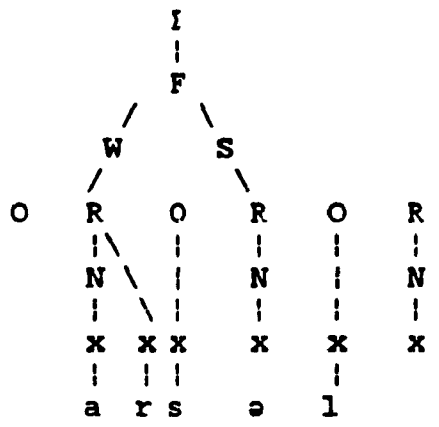
On the first cycle we have the stem which is identical to what we have in group C. Let us then assign the stress to these stems.

(14) a.



[apɛl]

b.

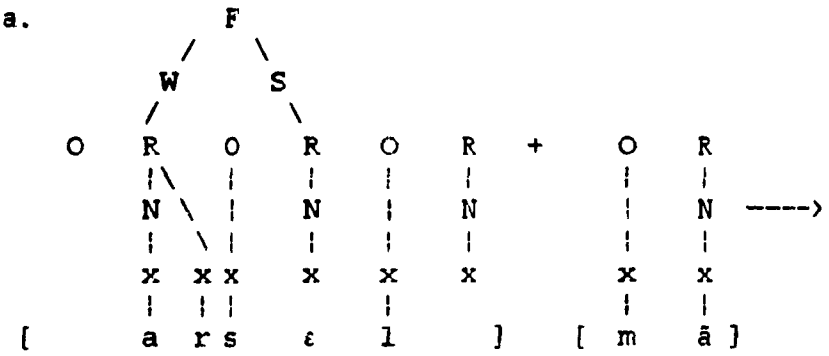


[arsɛl]

In both forms the word-final empty nucleus is not considered in the foot construction. This final empty nucleus cannot properly govern the preceding empty nucleus. This means that the empty nucleus occurring in the penultimate syllable is not properly governed and must be realized phonetically. It is not realized as schwa because it occupies the strong position of the binary foot which is also the accentuated syllable of the word. Now comes the second cycle for words of

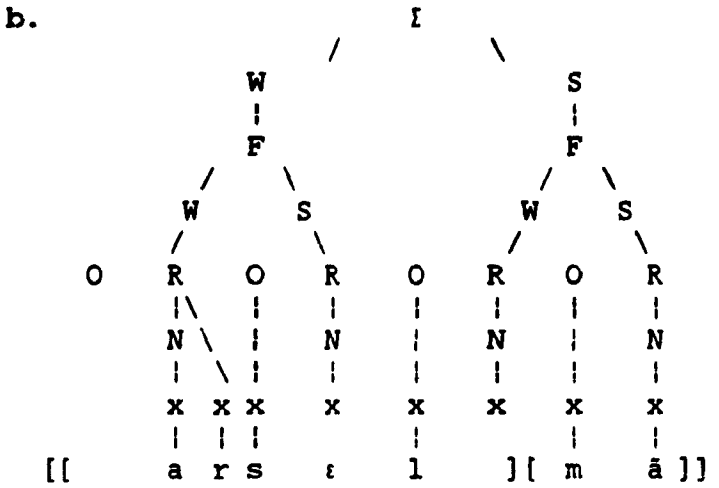
group D. A cyclic suffix is added and the construction of a binary foot applies. The suffixal vowel is the head of the binary foot which incorporates as its sister the preceding nucleus. This preceding nucleus is the final empty nucleus of the innermost cycle. This nucleus is now incorporated in the metrical structure but does not have to be manifested since it has nothing to license. ɛ remains as the manifestation of the preceding nucleus which was accentuated on the first cycle. This follows from the Strict Cyclicity Principle which prevents tampering with the internal cycle.[8]

(15) a.



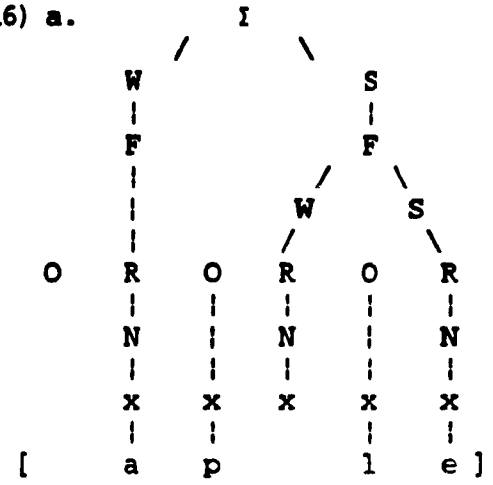
[8] See Chomsky (1973), Kean (1974), Mascaró (1976), Prunet (1986) and Kaye (1988b) for a discussion on the Principle of Strict Cyclicity.

b.



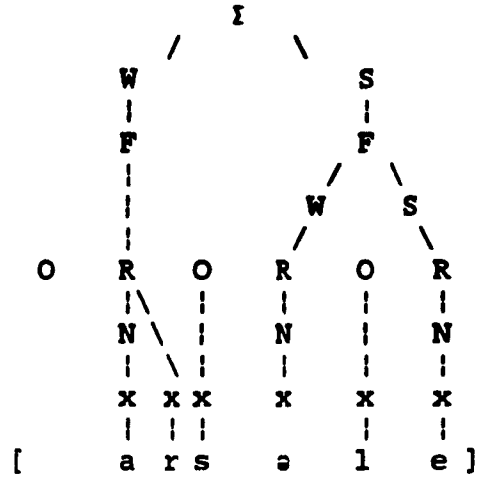
The last group of words are those in A. In those words we do not find ɛ. The empty nuclei are realized as zero when preceded by a single consonant (cf. appéler) and as schwa when they follow a consonant cluster (cf. martəler). The reason why the empty nuclei are not realized as ɛ is because these words contain only one cycle. Since the empty nuclei are always followed by a nucleus with phonetic content, they never find themselves in the accentuated syllable. They are incorporated within the binary foot as the weak member and if they are the licenser of a preceding consonant they are manifested. Otherwise, they remain with no phonetic content. The point is that they never occur in the head position of the binary foot and are consequently never realized as ɛ.

(16) a.



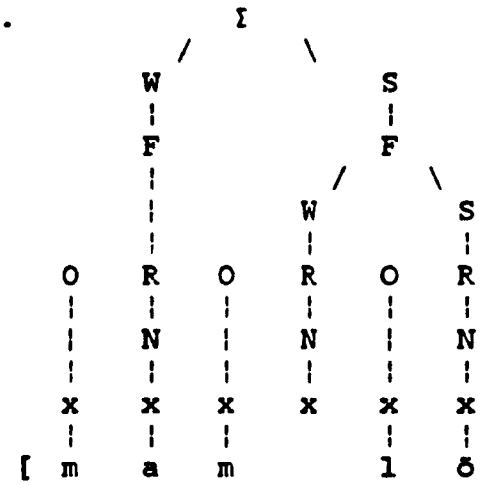
appeler [aple]

b.



harceler [arsəle]

c.



mamelon [maml̃]

Proposing that the alternation between schwa/zero with ɛ is determined by stress assignment provides an account for almost all the alternations. There remain, however, cases where an underlying

empty nucleus is manifested as ɛ while under my analysis it should not occupy the head position of the binary foot. I given in (17) some examples of this type of words.

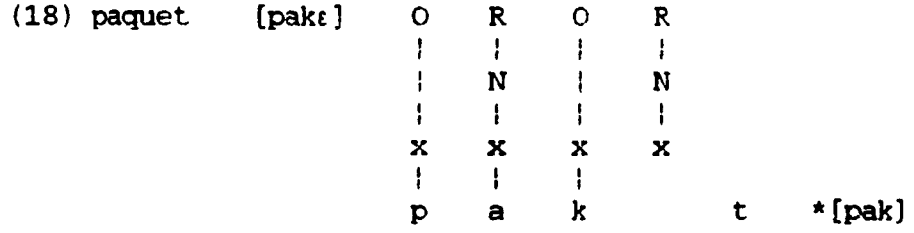
9.2.2 Apparent counter-examples

(17)

ɛ			schwa/zero		
paquet	[pakɛ]	'parcel'	paqueter	[pakte]	'to parcel'
crochet	[krɔšɛ]	'hook'	crocheter	[krɔšte]	'to hook in'
cachet	[kašɛ]	'seal'	cacheter	[kašte]	'to seal'
corset	[kɔrsɛ]	'corset'	corsetière	[kɔrsətjɛr]	'corset-maker'
bouquet	[bukɛ]	'bouquet'	bouquetière	[bukətjɛr]	'flower-seller'

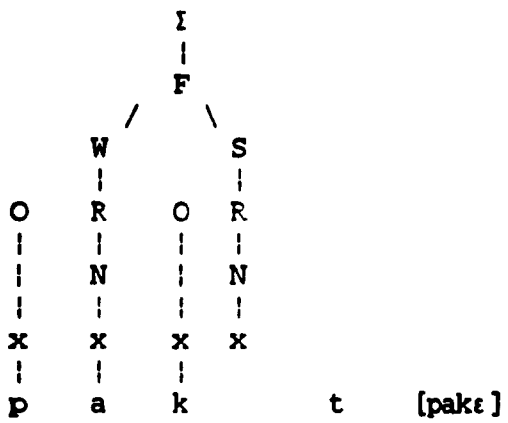
Under my analysis the words in the left column of (17) have a final empty nucleus and a floating final consonant in their representation The lexical representation I propose for the word paquet is illustrated in (18).

(18) paquet [pakɛ]



While in all the data considered so far a word-final empty nucleus is never incorporated within a binary foot as the strong node, it seems that this is what is happening in the words given in (17).

(19)



It is tempting to say that the manifestation of ɛ in the words given in (17) is not a manifestation of an underlying empty nucleus, but that it is a morpheme of nominalization. One particular process of nominalization would be to add a vowel ɛ in final of some forms. Along the same lines, a is also a morpheme of nominalization as the noun corresponding to a verb like acheter is achat [asa]. This means that while the words in (17) appear problematic for my analysis, it seems that nouns which have a floating consonant are special. As I just mentioned the form of the noun corresponding to

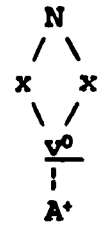
the verb acheter is achat and this form is unpredictable. It might then be the case that in (17) the ɛ's are not empty nuclei in an accentuated position but a morpheme of nominalization. This explanation can see a justification by considering other nouns which have a final empty nucleus followed by a floating consonant and are not realized with a vowel ɛ.

(20)	brique	[brik]	'brick'	briqueter	[brikte]	'to brick'
	mouche	[mus]	'stain'	moucheter	[muste]	'to spot'
	bec	[bɛk]	'beak'	becqueter	[bɛkte]	'to kiss'
	craque	[krak]	'crack'	craqueler	[krakle]	'to crackle'

9.3 Why is an accentuated schwa manifested as ɛ

The question remains why an accentuated schwa is manifested as ɛ. Or more precisely the question should be what prevents the segment schwa from being the head of a binary foot. Interestingly, Lowenstamm (1986), in order to explain why the vowel schwa is never long, proposes "la contrainte de cryocéphalie" according to which a segment which has the cold element as its head cannot occupy two contiguous positions.

(21)



As a branching nucleus, a branching foot is also a domain where a head position governs a complement. Consequently, extending Lowenstamm's proposal to any branching structure would account for the fact that schwa cannot be the head of a binary foot. Because schwa has the cold element as its head, it cannot govern an adjacent position within a governing domain.[9]

9.4 Conclusion

I have showed that treating the alternation between schwa/zero and ɛ in terms of stress assignment, has many advantages over an analysis based on the structure of the rime. First, my analysis accounts for the observational fact that schwa is never accentuated. This follows directly from the fact that in an accentuated syllable,

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[9]The only problem with this proposal is that it is clear that the segment schwa and the vowel i have the capacity to properly govern a preceding empty nucleus.

an underlying not properly governed empty nucleus is realized as ɛ. Secondly, problems raised by the rule of closed syllable adjustment do no longer exist. Forms like ensevelir [ãsəvlir], semeler [səmle] cannot be realized as ɛ since the empty nuclei never occur in the head position of a foot which occupies the strong position of the accentual foot. Dell's observation that schwa is realized as ɛ when followed by another schwa that does not belong to the stem, directly follows from the fact that stress is assigned at each cycle.

CHAPTER TEN

MISCELLANEOUS ISSUES

10.0 Introduction

I conclude the analysis of schwa by considering some additional contexts where schwa alternates with zero. While some of the facts that I consider directly follow from my analysis, some others do not. With respect to the data which appear problematic for my treatment of schwa, while I do not always have a clear understanding of their behaviour, I nevertheless suggest a direction of research which might be worth exploring. I start with sequences of clitics, one of the classical problems with respect to the behaviour of adjacent schwas.

10.1 Sequences of clitics

Without going into a detailed syntactic analysis of clitics, we may roughly say that syntactically the object clitics are always attached to a verb. As shown in (1a), when a verb moves from the head of VP to the head position of IP, the object clitic appears to the left of the verb under INFL. In (1b) we can observe that when the

verb remains in the head position of VP, the object clitic appears attached to the verb under V.[1]

(1) a. Marie ne le fait pas ne le+fait]$_{INFL}$ [$_{VP}$pas

b. Il ne faut pas le faire .... [pas le+faire]$_{VP}$

While object clitics are syntactically always "bound" to a verb, syntacticians assume that whether a clitic subject is a clitic in the syntax or not, it is clear that it is a clitic at PF. Notice that while it is possible to put something between an NP subject and a verb, it is impossible to do so when the subject is a clitic pronoun.

(2) Marie gentiment demande .... 'Mary nicely asks...'

* Je gentiment demande ..... 'I nicely ask...'

Phonologically, it is a well-know fact that in a sequence of clitics, all of them containing the vowel schwa, it is always possible to realize those schwas as zero as long as two adjacent

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[1] In his analysis of finite verb raising, Emonds (1978) says that ne is under INFL and pas at the beginning of VP. (1a) then shows that the clitic and the verb are both dominated by INFL. With respect to (1b) since a verb [-tense] remains in its position within the VP we can see that the clitic is attached to it under V.

schwas are not both syncopated. Let us first consider a sequence of two clitics.

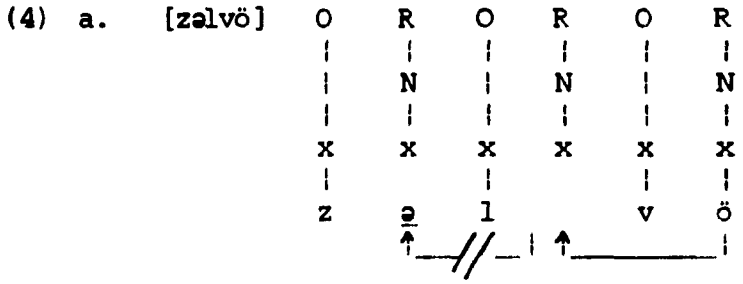
(3) Je le veux 'I want it'

a. [zəlvö]
b. [zləvö]
c. *[zlvö]

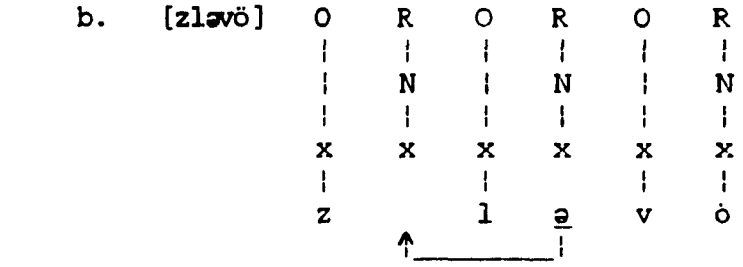
My claim is that clitics behave phonologically like non-autonomous words. This means that a clitic differs from an autonomous word with regard to the licensing of its (final) empty nucleus. While in French a word-final empty nucleus is licensed; realized as zero even though it is not properly governed, the empty nucleus of a clitic is not licensed. A subject or object pronoun, given its status in clitic and its behaviour in dependant word, has its empty nucleus subject to the same constraints word-internal empty nuclei are subject. In order to be realized as zero the empty nucleus of a clitic must be properly governed by a following nucleus with phonetic content. From this, it follows that in a sequence of two adjacent clitics one of them but not both can have its empty nucleus realized as zero. In (3) we can see that from right-to-left governing relations between nuclei apply. If the empty nucleus of the clitic immediately preceding the verb is realized as zero, (the nucleus is properly governed by the vowel in the initial syllable of the verb), then the leftmost empty nucleus is

manifested (cf.3a). But in a sequence of clitics it is always possible to give phonetic content to a properly governed nucleus. In this case, having phonetic content, this nucleus is a proper governor for the empty nucleus occurring to its left (cf.3b).[2] Those two patterns are illustrated in (4a&b), respectively.

(4) a. [zəlvö]



b. [zləvö]



[2]These two patterns are not restricted to adjacent clitics. In a sequence of two adjacent word-internal empty nuclei the variation is also sometimes possible: revenir [rəvnir], [rvənir], devenir [dəvnir], [dvənir].

In (5) below I give a different sequence of two adjacent empty nuclei. The rightmost one occurs in the initial syllable of a verb and is preceded by a clitic.

(5) a) Jean te demandé 'John asks you'
b) Jean te démandé
c) Jean té demandé
d) * Jean té démandé

The form in (5b) shows that when the empty nucleus in the initial syllable of the verb demander is realized as zero (it is word-internally properly governed) the clitic to its left must be realized with a schwa. With respect to the form in (5c) it shows that it is possible to give phonetic content to the properly governed empty nucleus in the initial syllable of the verb. In that case, the empty nucleus of the clitic occurring to the left of the verb can be realized as zero.[3] It remains a fact that if one empty nucleus of the sequence receives no interpretation, the other one must be realized phonetically. Needless to say that this follows directly from the analysis. A "word-internal" nucleus has no phonetic content only if it is properly governed by a following nucleus with phonetic content.

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[3] While this pronunciation is possible, it is not as natural as the one in (5b).

If two adjacent empty nuclei were both realized as zero, the leftmost one would lack proper government.

No more has to be said. Clitics are dependant entities and their empty nucleus behave as in word-internal position. For the empty nucleus of a clitic to be realized as zero, it must be properly governed. As it is the case word-internally, government between nuclei applies from right-to-left. Moreover, it is possible (even though this is marked) to give phonetic content to a properly governed empty nucleus. In this case the manifested nucleus can be the proper governor for an empty nucleus to its left. From this follows the different realizations of sequences of empty nuclei.

(6) envie de te le demander 'desire to ask you this'

...	ã	v	i	#	d	ə	#	t	ə	#	l	ə	#	d	ə	m	ã	d	e	...
a.			Ø			ə			Ø			ə									
b.			Ø			ə			ə			Ø								
c.			ə			Ø			ə			Ø								
d.			Ø			ə			ə			ə								
e.			ə			Ø			ə			ə								
f.			ə			ə			Ø			ə								
g.			ə			ə			ə			Ø								
h.			ə			ə			ə			ə								

While the fact that two adjacent schwas or empty nuclei cannot be both realized as zero is always mentioned in analyses of French, there are particular constructions which show that this observation is not always according to the facts.

10.2 Sequences of zeros

The observation that adjacent empty nuclei cannot be both realized as zero is true for sequences of word-internal empty nuclei and in sequences of clitics.

(7)	devenir	[dəvnir]	[dvənir]	*[dvnir]
	je le veux	[zləvo]	[zəlvò]	*[zlvo]

There are, however, some cases where two adjacent empty nuclei can both be realized as zero. That these facts exist is in accordance with my claims that word-internal empty nuclei which are properly governed can be realized as zero and that in French word-final empty nuclei are licensed. Let us consider the following data.

(8)

a.	mange de la soupe	[mäždlasup]	'eat some soup'
b.	apporte de la lecture	[apɔrtdlalɛktür]	'bring some reading'
c.	l'ogre de la forêt	[lɔgrdlafɔrɛ]	'the ogre of the forest'
d.	quatre fenêtres	[katrfnɛtr]	'four windows'
e.	douze chemises	[duzšmiz]	'twelve blouses'

In (8) the final empty nucleus of the first words (cf. mange, apporte, ogre, quatre and douze) are realized as zero. With respect to the empty nucleus of de and the ones in the initial syllable of fenêtre and chemise they are also realized as zero. It is then the case that there are sequences of two adjacent empty nuclei where both nuclei have no phonetic content. Let us first consider the forms in (8d,e). That in these forms two adjacent empty nuclei have no phonetic content follows from the analysis. The final nuclei of the words quatre and douze are licensed. They are then realized as zero even though they are not properly governed. With respect to the empty nuclei in the initial syllable of the words fenêtre and chemise they are word-internally properly governed by the nucleus to their right. Consequently, it follows from the analysis that if two adjacent empty nuclei belong to distinct autonomous words they could be both unrealized phonetically.

Let us now examine the forms in (8a,b,c). With respect to the realization as zero of the final nuclei of the first words, we just saw that this manifestation is accounted for by licensing. The question is how does the empty nucleus of de also remain unrealized. To account for this fact, it could be possible to propose that the empty nucleus of de is realized as zero because de la forms a word and the empty nucleus in the initial syllable of de la is word-internally properly governed.[4] Thus, a sequence of adjacent empty nuclei both realized as zero is possible when the rightmost empty nucleus is word-internally properly governed and it is preceded by a licensed word-final empty nucleus.

The forms in (8) where de is part of the word de la can be compared with those in (9) which show that when the preposition de is not word-internally properly governed (not followed by la), the manifestation of the empty nucleus of de is determined by the preceding word. As shown in (9a) if de is preceded by a word ending with a nucleus with phonetic content, de has its empty nucleus realized as zero. On the other hand the forms in (9b) show that when

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[4] The proposal that de la constitutes a word might be justified by the definite articles du and des which are the contracted forms of de le and de les, respectively.

de is preceded by a word ending with a licensed word-final empty nucleus, the empty nucleus of de must be manifested as schwa. Notice that comparing the forms in (9a) with those in (9b) shows that it is the preceding word which determines the behaviour of the empty nucleus of de and not the word which follows it.

(9) A. Without schwa

a.	un peu dé lait	[oẽpódlɛ]	'a little bit of milk'
b.	pas dé crapaud	[padkrapo]	'no toad'
c.	des oeufs dé poule	[dezödpul]	'hen's eggs'
d.	un vent dé mer	[oẽvãdmɛr]	'a sea wind'
e.	pas dé lune	[padlün]	'moonless'
f.	un mois dé fête	[oẽmwadfɛt]	'a month of birthday'
g.	un fond dé litre	[oẽfõdlɪtr]	'the bottom of a litre'
h.	un bout dé cigare	[oẽbudsigar]	'a piece of cigar'
i.	un bout dé bois	[oẽbudbwa]	'a piece of wood'
j.	un garcon dé ferme	[oẽgarsõdfɛrm]	'a lad'
k.	un chien dé chasse	[oẽsjɛ̃dsas]	'a hunting dog'
l.	un jet dé gaz	[oẽžɛdgaz]	'a jet of gaz'
m.	un coup dé tête	[oẽkudtɛt]	'an impulse'
n.	un bonnet dé nuit	[oẽbɔnɛdnɥi]	'nightcap'

B. With schwa

a.	un bol de lait	[oẽbɔldəlɛ]	'a bol of milk'
b.	un bac de crapauds	[oẽbakdəkrapo]	'a tub of toads'
c.	un oeuf de poule	[oẽoefdəpul]	'one hen's egg'
d.	un port de mer	[oẽpɔrdəmɛr]	'seaport'
e.	clair de lune	[klɛrdəlun]	'moonlight'
f.	un jour de fête	[oẽžurdəfɛt]	'a birthday day'
g.	un quart de litre	[oẽkardəlitr]	'a quart of litre'
h.	une boite de cigare	[unbwatdəsigar]	'a box of cigars'
i.	une chaise de bois	[ünšɛzdəbwa]	'a wooden chair'
j.	une cour de ferme	[ünkurdəfɛrm]	'a farm's backyard'
k.	un cor de chasse	[oẽkɔrdəšas]	'hunting horn'

l.	un bec de gaz	[oɛ̃bɛkdəgaz]	'gas burner'
m.	un mal de tête	[oɛ̃maldətɛt]	'a headache'
n.	ma chemise de nuit	[maʃmizdənɥi]	'my night-dress'

The behaviour of the empty nucleus of de in the forms given in (9a&b) seems problematic for my analysis. On the one hand it follows from my proposal that in French a word-final empty nucleus is licensed, that words end with a nucleus with no phonetic content. However, it does not follows from my analysis that the empty nucleus of de is manifested depending of what precedes it. More precisely, a comparison of the data in (9a&b) shows that the word following de does not determine if the empty nucleus of de is or is not realized phonetically. The manifestation of the empty nucleus of de depends of the ending of the word preceding de. It might be the case that what is special with the forms in (9) is their syntactic structure. For example, the pair of forms I give in (10) show that the pattern in (9) does no longer exist when de is followed by la.

(10)

(le)	chef de gare	[sɛfdəgar]	(le)	chef de la gare	[ʃɛfdlagar]
(une)	cour de ferme	[kurdəfɛrm]	(la)	cour de la ferme	[kurdlafɛrm]
(le)	bord de mer	[bɔrdəmɛr]	(le)	bord de la mer	[bɔrdlamɛr]
(un)	oeuf de poule	[oefdəpul]	(l')	oeuf de la poule	[oefdlapul]

Let us now turn to something different; the behaviour of empty nuclei determined by something which follows them.

10.3 Following an empty nucleus

In the analysis of the alternation schwa/zero word-internally, we should now consider whether what intervenes between the empty nucleus and the proper governor affects the relation between the two nuclei.

According to all the data presented so far, a relation of proper government always applies between two nuclei when one consonant intervenes between the proper governor and the empty governee. The question is whether more than one consonant, e.g. a governing domain, can also intervene between the two members without blocking the relation. The reader would recall that in his analysis of ɨ in Moroccan Arabic, Kaye (1988a) argues that proper government is subject to the following constraint: a relation of proper government cannot apply when a governing domain intervenes between the two nuclei. The relevant data are of the following type.

(11) Moroccan Arabic

A. Transsyllabic clusters:

a. /kØlbØ/ [kɨlb] 'bitch (masc)' /kØlba/ [kɨlba] *[klba] '(fem)'
b. /gØltØ/ [gɨlt] 'puddle (masc)' /gØlta/ [gɨlta] *[glta] '(fem)'
c. /kØttØbØ [kɨttɨb] 'to make someone write'

vs

B. Absence of underlying cluster:

a. /akØlØ/ [akɨl] '(he) eats' /akØlu/ [aklu] '(they) eat'
b. /kØtØbØ/ [ktɨb] '(he) writes' /kØtØbu/ [kɨtbu] '(they) write'

In (11A) the sequence liquid plus stop is a transsyllabic cluster. No underlying empty nucleus intervenes between the two consonants.[5] A form like kɨlba shows that the final a does not properly govern the empty nucleus to its left. A ɨ must be realized in the initial syllable (cf. *[klba]). That a nucleus governs a preceding empty nucleus when a single consonant intervenes between the two nuclei can be seen in considering the behaviour of the vowel ɨ in the forms given in (11B) (cf. [aklu] *[akɨlu]).

That proper government does not apply when a governing domain (a transsyllabic cluster or a branching onset) intervenes between the

[5]This is motivated by stress assignment. In M.A. a vowel followed by a cluster liquid plus stop behaves as occurring in a closed syllable.

empty governee and the proper governor is also motivated in French.[6] Let us consider the following examples.

(12) A. Empty nucleus followed by a cluster stop plus liquid:

un chevreau	[oə̃šəvro]	'one kid'
un chevreuil	[oə̃šəvroej]	'one roe deer'
un secret	[oə̃səkrɛt]	'one secret'

vs

un chemin	[oə̃šmɛ̃]	'one road'
au secours	[oskur]	'help'

B. Empty nucleus followed by a cluster consonant plus glide:

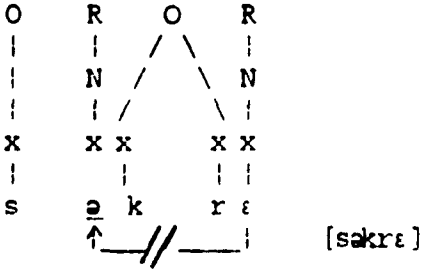
bouquetière	[bukətjɛr]	'flower seller'
chapelier	[šapəlje]	'hatter'
cimetière	[simətjɛr]	'cemetery'
dentelière	[dãtəljɛr]	'lace-maker'
atelier	[atəlje]	'workshop'
cafetière	[kafətjɛr]	'coffee maker'
hôtelière	[otəljɛr]	'hotel-keeper'
noisetier	[nwazətje]	'hazel tree'
levier	[ləvje]	'lever'
concevoir	[kõsəvwar]	'to conceive'
devoir	[dəvwar]	'to owe'
depuis	[dəpYi]	'since'
besoin	[bəzwɛ̃]	'need'

---

[6] Under the consideration that licensing is an instance of proper government, the restriction on the number of consonants intervening between an empty nucleus and its proper governor would be accounted for by the restriction that a proper governor may only properly govern one governee. Because it properly governs (licenses) the consonant to its left, a nucleus cannot also properly govern the empty nucleus.

In my dialect of French a schwa is always realized when a consonant cluster intervenes between the empty nucleus and a vowel to its right. In (12A) a cluster stop plus liquid, i.e. a branching onset intervenes between the two nuclei. That in this configuration the empty nucleus cannot be realized as zero shows that it should be the case that the empty nucleus is not properly governed. If a relation of government cannot apply across a governing domain, or if licensing is indeed an instance of proper government and there is a restriction according to which a proper governor can only properly govern one governee, this behaviour is accounted for.

(13)

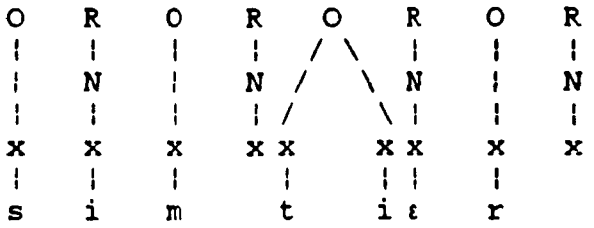


[səkrɛ]

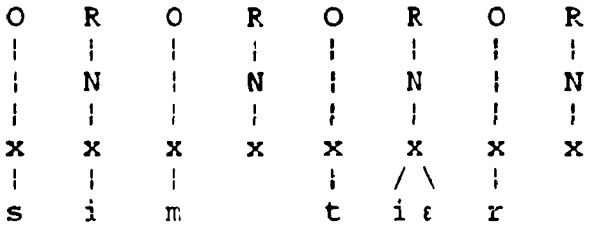
Let us now consider the data given in (12B). In those examples the empty nuclei are followed by a cluster of the type consonant plus glide. Phonetically it is impossible to know whether the high vowel, i.e. the glide, is syllabified within the onset along with the consonant or within the nucleus along with the following vowel. In

other words, it is phonetically impossible to know if the high vowel is part of a branching onset or of a light diphthong.[7] The two possible structures are given in (14).

(14) Branching onset:



Light diphthong:



While it is phonetically impossible to distinguish the structure in (14a) from the one in (14b), I propose that the appropriate structure for the words given in (12B) is the one in (14A). The high vowel belongs to a branching onset. If the structure in (14a) is indeed the appropriate one we have an account for the similar behaviour of an empty nucleus preceding a cluster of the type consonant plus consonant and one of the type consonant plus glide.

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[7] See Kaye & Lowenstamm (1984) for an analysis of light diphthongs.

Proper government would not apply across a governing domain.

Interestingly Kaye & Lowenstamm (1984) say that one property of light diphthongs is to alternate with a vowel. They claim that given that the glides in the forms given in (15) alternate with a vowel in some contexts, they belong to a nucleus.

(15) a.	verra	[vɛra]	voit	[vwa]	'to see'
b.	devons	[dəvõ]	doivent	[dwav]	'to owe'
c.	peut	[pö]	puisse	[pɣis]	'to be able'
d.	tenir	[tənir]	tienne	[tjɛn]	'to hold'

If the forms in (15) are light diphthongs, we predict that a schwa to the left of these diphthongs will be realized as zero. As shown in (16), this is according to the facts.

(16)	retiens-moi	[rtjɛ̃mwa] 'hold me'
	reviens ici	[rvjɛ̃isi] 'come back here'
	je lui redois ...	[rdwa] 'I again owe him...'

I digress here to mention that for some speakers of French the word <u>cimetière</u> is realized without a schwa in the second syllable. To account for this difference of pronunciation I propose that some people analyze the glide within a branching onset, and others within

a nucleus as a member of a light diphthong. More precisely, people who pronounce [simtjɛr] would analyze the glide and the vowel as forming a light diphthong, whereas people who pronounce [simətjɛr] would syllabify the glide within a branching onset. This difference in syllabification is not surprising. As claimed by Kaye & Lowenstamm (1984) the word ouate [wat] 'wadding' has also two possible structures. For certain speakers the u belongs to the onset (those speakers say la ouate, i.e. without liaison) and for other speakers it belongs to the nucleus (those speakers pronounce l'ouate). Along the same lines, while the word oiseau [wazo] 'bird' has the u in the nucleus, wisky has the u in the onset (cf. l'oiseau vs le wisky).

I conclude my analysis of schwa by considering its behaviour in the initial syllable of a polysyllabic word.

10.4 Empty nuclei in the initial syllable of polysyllabic words

A careful examination of words having underlying empty nuclei leads to the following observation. When nothing prevents a governing relation to hold, a properly governed empty nucleus occurring in a penultimate syllable is not manifested (except if it is a licenser). This is illustrated in (17).

(17) Empty nuclei in penultimate syllables

A.			B.		
	chéval	'horse'		matélas	'mattress'
	sémainé	'week'		cadénas	'padlock'
	chénil	'kennel'		manéquin	'model'
	démandé	'ask'		cauchémar	'nightmare'
	chénillé	'tracked vehicle'		michéliné	'rail-car'
	chémin	'path'		mainténant	'now'
	chéveux	'hair'		matélot	'sailor'
	pétit	'small'		lapéreau	'young rabbit'

However, the behaviour of empty nuclei which do not occur in a penultimate syllable is subject to variation. As shown in (18) a properly governed empty nucleus which is not in the penultimate syllable is not manifested (cf. 18B) except if it occurs in the initial syllable of a polysyllabic word (cf. 18A). Consider the following forms.

(18)

A. Syllable-initial		B. Not syllable-initial	
la petitessé	'smallness'	rapétisser	'to shorten'
le chevalier	'knight'	madémoiselle	'Miss'
chevaléresqué	'chivalrous'	matélassier	'mattress maker'
la chevalérie	'chivalry'	matélasser	'to pad'
un chevalet	'easel'	cadénasser	'to padlock'
la chemisérie	'shirt department'	madélinot	'inhabitant'
un chemisier	'blouse'	cauchémardesque	'nightmarish'
la chemisette	'short-sleeved'	cauchémardeux	'night full of ...'
la chenilette	'tracker vehicle'	clavécinisté	'harpsichordist'
le cheminément	'progress'	vaudévillisté	'writer of ...'
la cheminée	'chimney'	vaudévillesqué	'vaudeville'
un cheminot	'railwayman'	sauvégarder	'to safeguard'
chevaucher	'astride'	déconténancer	'to disconcert'
le chevauchément	'overlapping'	agénouiller	'to kneel'
cependant	'however'	agénouillément	'kneeling'
secondairé	'secondary'	pélérinagé	'pilgrimage'
seconder	'to assist'	camérounais	'Cameroonian'
secourir	'to help'	ensémencément	'sowing'

le s̲ecourisme	'first aid'	ens̲emencer	'to sow'
un s̲emestre	'semester'		
s̲emestriel	'semestral'		

Comparison of the forms given in (17A) with those in (18A) shows that in the initial syllable of a word, an empty nucleus has no phonetic content when it occurs in a bisyllabic word and must be manifested when it occurs in the initial syllable of a polysyllabic word. On the other hand, regardless of the number of syllables a given word contains, an empty nucleus in non-initial syllable has no phonetic content if it is properly governed, it is not a licenser and there is no cluster intervening between the governee and its proper governor.

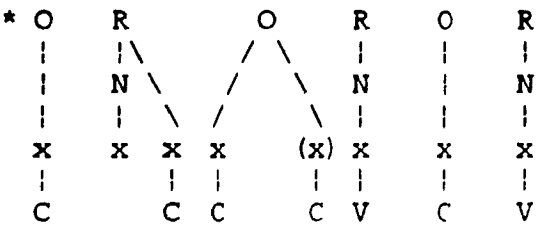
One possible account for these observations would be to propose that in French the initial nucleus of a word must constitutes a non-branching foot except when it is incorporated within the binary foot built at the right edge of a word. This means that it might be the case that the initial syllable always forms a non-branching foot except in bisyllabic words. Saying that the first syllable of a polysyllabic word constitutes a foot would provide an account of the need to give an interpretation to an empty nucleus occurring in the initial syllable of a word having more than two syllables. Recall

that a foot may only be projected on a nucleus which has phonetic content.[8]

10.5 Why does schwa never occurs within a branching rime

An additional fact of French is that an underlying empty nucleus never occurs within a branching rime. More specifically, no structures like the one given in (19) are found.

(19) a. *



That the head of a branching constituent cannot be empty is not restricted to branching rimes. It is true for any branching constituent. Might it be the case that one difference between syllabic and transsyllabic government is that the former but not the latter is always an instance of proper government? Not in the sense that a

[8] One cannot appeal to the nature of the consonant cluster the absence of schwa would create (cf. la chémise vs le chemisier, la pétite vs la petitesse).

complement is always empty, but in the sense that within a constituent a complement requires to be governed by a head with phonetic content.

CONCLUSION

In this thesis I have tried to show that analyzed in terms of a theory of government, certain phonological processes which were mainly viewed as accidental, unprincipled and language specific, follow from general principles of the theory. Considering for example the vowel schwa in French we saw that its behaviour is in many respects similar the the one of the vowel i in Morroccan Arabic which also has the property to alternate with zero. The similarity in the behaviour of the two vowels is not surprizing if a vowel which alternates with zero has the representation of an empty nucleus which requires to be properly governed in order to receive no phonetic content.

The fact that phonological government along with the constraints to which it is subject are strikingly similar to what has been proposed for syntax lends strong support to the idea that syntactic and phonological theory may be unified.

REFERENCES

Anderson, J. & C. Jones, (1974). "Three Theses Concerning Phonological Representations". Journal of Linguistics 10:1-26.

Anderson, J. & C. Ewen (1987). Principles of Dependency Phonology. Cambridge: Cambridge University Press.

Anderson, S. (1982). "The analysis of French schwa: or, how to get something from nothing". Lg 58.3.

Angoujard, J.P. (1988). "La place de la syllabe dans une phonologie pluri-linéaire". Recherches Linguistiques. Université de Vincennes. Vol. 17;7-27.

Bamba, M. (en preparation). "Etudes prosodiques du mandingue", Ph.D. dissertation, UQAM.

Booij, G.E. (1983). "French C/Ø Alternations, Extrasyllabicity and Lexical Phonology". The Linguistic Review vol 3.2.

Bouchard, D. (1980), "A voice for "E muet". ms. MIT.

Charette, M. (1985). "The Appendix in Parametric Phonology". Studies in African Linguistics. supp. 9. UCLA, R. Schuh ed.

Charette, M. (1986). "On leveling asymmetry in the consonantal system of Wolof". ms. McGill University.

Chomsky, N. (1973). "Conditions on Transformations". In S. Anderson and P. Kiparsky (eds), A Festschrift for Morris Halle, (Holt, Reinhart and Winston, New-York).

Chomsky, N. (1981). Lectures on Government and Binding. Foris, Dordrecht.

Chomsky, N. (1986). Barriers. Cambridge, Mass: MIT Press.

Clements, G. N. (1982). "Compensatory lengthening and consonant gemination in Luganda". paper presented at the "Minifestival on compensatory lengthening, Harvard University.

Clements, G. N. (1985). "Compensatory lengthening and consonant gemination in Luganda". in L. Wetzels & E. Sezer (eds).

Dell, F. (1973). Les règles et les sons: introduction à la phonologie générative. Hermann. Paris.

Dell, F. (1978). "Epenthèse et effacement de schwa dans des syllabes contigues en français". in Etudes de phonologie française, C.N.R.S.

Dell, F. (1979). "On French Phonology and Morphology and Some Vowel Alternations in French". in Studies in French Linguistics, vol.1.3.

Dell, F. (1984). "L'accentuation dans les phrases en français". Forme sonore du langage. Dell, F., Hirst D. & J.R. Vergnaud (eds). Hermann.

Dell, F. (198?). "Consonant clusters and syllable structure in French". ms. C.N.R.S.

Dumas, D. (1981). "Structure de la diphtongaison québécoise" Revue Canadienne de Linguistique. 26.1.

Dunn, C. (1987). "Processus harmoniques en pulaar". Mémoire de maitrise,UQAM.

Dunn, C. (to appear). "Gouvernement harmonique en Pulaar". Langues Orientales Anciennes Philologie et Linguistique. Peeters (éd), Louvain-Paris.

Elmejjad, K. (1985). "Le parler de Marrakech, quelques aspects prosodiques". thèse de troisième cycle, Paris VII.

Emonds, J. (1978). "The Verbal Complex V'-V in French". L.I. 9:151-175.

Encrevé, P. (1988). La liaison avec et sans enchainement: Phonologie tridimensionnelle et usages du français. Ed. du Seuil, Paris.

Fouché, P. (1956). Traité de prononciation française, Paris: Klincksieck.

Goldsmith, J. (1976). "Autosegmental Phonology", Ph.D. dissertation, Indiana University Linguistic Club, Bloomington.

Grammont, M. (1914). Traité pratique de prononciation française. Paris. Delagrave.

Grevisse, M. (1959). Le bon usage, Gembloux: Duculot, 7e éd. revue.

Guerssel, M. & J. Lowenstamm. (1988). "Classical Arabic 'Metathesis'", paper presented at the 19 Conference on African Linguistics, Boston University.

Halle, M. (1986). "On the Phonology-Morphology Interface". ms. MIT.

Halle, M. & J.R. Vergnaud. (1978). "Metrical Structures in Phonology", ms. MIT.

Halle, M. & J.R. Vergnaud. (1980). "Three-dimensional phonology". Journal of Linguistic Research. 1.83-105.

Halle, M. & J.R. Vergnaud. (1987). "Stress and the Cycle". LI 18.1:45-84.

Hayes, B. (1981). "A metrical theory of stress rules". Ph.D. dissertation, MIT.

Hayes, B. (1986). "Inalterability in CV phonology". Lg. 62.2.

Ito, J. (1986). "Syllable Theory in Prosodic Phonology" Ph.D. dissertation, University of Massachusets, Amherst.

Jeong, B. (1987). "Umlaut en Coréen". ms. Paris 7.

Kahn, D. (1976). "Syllable-based Generalizations in English Phonology". Ph.D. dissertation, MIT

Kaisse, E.M. (1985). Connected speech: the interaction of syntax and phonology. New-York: Academic Press.

Kaye, J. (1982). "Harmony Processes in Vata". in The Structure of Phonological Representations (part II). H. van der Hulst & N. Smith (eds). Foris.

Kaye, J.D. (1985). "On the syllable structure of certain West African languages". in D. Goyvaerts, (ed.), African Linguistics: Essays in Memory of M.W.K. Semikenke, Amsterdam, J. Benjamins.

Kaye, J. (1987). "Government in Phonology: The Case of Morroccan Arabic". ms. UQAM.

Kaye, J. (1988a). "Government in Phonology: The Case of Moroccan Arabic" to appear in The Linguistic Review.

Kaye, J. (1988b). "On the Interaction of Theories of Lexical Phonology and Theories of Phonological Phenomena", to appear in the Proceedings of Krems Phonology Conference, Krems, Austria.

Kaye, J. (1988c). ""Coda" licensing", ms. SOAS.

Kaye, J. & Y.C. Morin. (1977). "Il n'y a pas de règles de troncation voyons!". ms. UQAM.

Kaye, J. & J. Lowenstamm. (1982). "On the Internal Structure of the Rime". Paper presented at the 1982 GLOW Colloquium, Paris.

Kaye, J.D. & J. Lowenstamm. (1984). "De la syllabicité". in Forme sonore du language. F. Dell, D. Hirst et J.-R. Vergnaud (eds). Paris, Hermann.

Kaye, J.D. & J. Lowenstamm. (1985). "A metrical treatment of Grassmann's Law". in Proceedings of the 15th NELS Conference, University of Massachusetts.

Kaye, J.D., Echchadli, M. & S. El Ayachi. (1986). "Les formes verbales de l'arabe marocain" in Revue Québécoise de Linguistique 16.

Kaye, J.D. Lowenstamm, J. and J.-R. Vergnaud. (1985). "The internal structure of phonological elements: A theory of Charm and Government". Phonology Yearbook 2:305-328.

Kaye, J.D. Lowenstamm, J. and J.-R. Vergnaud. (1988). "Constituent Structure and Government in Phonology". to appear in Linguistische Berichte.

Kean, M.L. (1974). "The Strict Cycle in Phonology'. Linguistic Inquiry 5:179-204.

Kenstowicz, M. & M. Kidda (1987). "OCP and Tangale Phonology". in Current Approaches to African Linguistics. vol. 4, Foris, Dordrecht.

Kidda, M. (1985). "Tangale Phonology: A Descriptive Analysis". Ph.D. dissertation, University of Illinois, Urbana.

King, R.D. (1969). Historical linguistics and generative grammar. New York: Prentice Hall.

Kiparsky, P. (1965). "Phonological change". Ph.D. dissertation, MIT.

Kiparsky, P. (1968). "Linguistic universals and linguistic change". in Universals in Linguistic Theory, E. Bach & R.T. Harms eds., Holt, Reinhart, Winston.

Kiparsky, P. (1979). "Metrical Structure Assignment is Cyclic". Linguistic Iquiry 10.3:421-441.

Leben, W. (1971) "Suprasegmental and Segmental Representation of Tone". Studies in African Linguistics. suppl.2:127-143

Levin, J. (1985). "A Metrical Theory of Syllabicity". Ph.D. dissertation, MIT.

Liberman, M. & A. Prince. (1977). "On Stress and Linguistic Rythm". Linguistic Inquiry 8.

Lowenstamm, J. (1981). "On the MCA Approach to Syllable Structure". Linguistic Inquiry. 12:4.

Lowenstamm, J. (1981). "C-commande comme principe de la phonologie universelle". Lecture given at the bi-annual colloquium of Paris VIII University. Ecole Normale Supérieure, Paris.

Lowenstamm J. (1986). "A propos d'une hypothèse sur la forme primitive du type B en amharique". in Revue Québécoise de Linguistique, 16:157-180.

Lowenstamm, J. (1988). "What is the syllable structure of Ngizim?". Paper presented at the 19th African Linguistic Conference, Boston University.

Lowenstamm, J. (to appear). "Prosodic Government". in Langues Orientales Anciennes Philologie et Linguistique. no.2, Peeters (éd), Louvain-Paris.

Lowenstamm, J. & J.D. Kaye. (1982). "Compensatory lengthening in Tiberian Hebrew". paper presented at the "Minifestival on Compensatory Lengthening", Harvard University.

Lowenstamm, J. & J.D. Kaye. (1985). "Compensatory lengthening in Tiberian Hebrew". in Studies in Compensatory Lengthening. L. Wetzels & E. Sezer (eds). Foris.

Lowenstamm, J. & J.F. Prunet. (1985a). "On certain Nominal Patterns in Tigrinya". in Précis of the 15th Conference on African Linguistics (UCLA). Studies in African Linguistics, supplement 9.

Mascaró, J. (1976). "Catalan Phonology and the Phonological Cycle". Ph.D. dissertation, MIT.

Morin, Y.C. (1978). "Thes status of Mute "e". in Studies in French Linguistics. vol.1.2.

Morin, Y.C. (1982). "Cross-Syllabic Constraints and the French 'E-muet'". Journal of Linguistic Research. 2.3:41-56

Neidle, C. (1979). "Syllable structure, markedness, and the distribution of the 'mute' e in French". unpublished ms.

Nieves, R. (1987). "Consonant assimilation in Spanish of Cordoba". ms. Paris 7.

Nikiema, E. (1987a). "Le gouvernement propre en phonologie: Elision et épenthèse vocaliques en tangale", ms. UQAM.

Nikiema, E. (1987b). "Vocalic Epenthesis Reanalyzed: The Case of Tangale", ms. UQAM.

Nikiema, E. (to appear). "Gouvernement Propre et Licenciement en Phonologie: Le cas du tangale", in Langues Orientales Anciennes Philologie et Linguistique no.2 Peeters (éd), Louvain-Paris.

Paradis, C. (1986). "Phonologie et morphologie lexicales: les classes nominales en pulaar (Fula)". unpublished Ph.D dissertation, Université de Montréal.

Picard, M. (1983). "Deux règles universelles de démarcation syllabique". Revue Québécoise de Linguistique. 12.2:69-102

Piggott, G. (1983). "Extrametricality and Ojibwa stress", in McGill Working Papers in Linguistics, vol.1.1.

Piggott, G. L. (1984). "Deletion in Parametric Phonology". Paper presented at the Ottawa-Montreal Phonology Workshops, University of Ottawa.

Piggott, G.L. & R. Singh. (1984). "The Empty node: An Analysis of Epenthesis". McGill Working Papers in Linguistics, 1.2:65-109

Piggott, G.L. & R. Singh. (1985). "The phonology of epenthetic segments". Revue Canadienne de Linguistique, 30:4, pp. 415-453.

Prunet, J.F. (1983). "Segments flottants et liaison". Unpublished ms. UQAM.

Prunet, J.F. (1985). "Nasalization and Word-Syntax". McGill Working Papers in Linguistics. 2.2, pp. 30-55.

Prunet, J.F. (1986). "Spreading and locality domains in phonology". Ph.D. dissertation , McGill University.

Prunet, J.F. (1987). "Liaison and Nasalization in French", Studies in Romance Languages, C. Neidle & R.A. Nunez Cedeno (eds). Foris.

Prunet, J.F. & C. Tellier. (1984). "Autonomie des niveaux et gouvernement en phonologie: l'abrègement vocalique en pulaar". McGill Working Papers in Linguistics. 2:1, pp. 65-90.

Reinhart, T. (1983). Anaphora and Semantic Interpretation. The University of Chicago Press.

Reuland, E. (1983). "Governing-ing", Linguistic Inquiry 14.1

Rialland, A. (1985). "Schwa et Syllabes en français". Studies in Compensatory Lenghtening., Wetzels L. & E. Sezer (eds), Foris.

Rocca, I. (1988). "Theoretical Implications of Spanish Word Stress". Linguistic Inquiry 19.3: 393-423.

Schein, B. & D. Steriade. (1986). "On geminates". Linguistic Inquiry 17.4.

Selkirk, E. (1978). "Comments on Morin's paper: The French Foot: On the status of "mute" e. in Studies in French Linguistics, vol.1.2.

Steriade, D. (1982). "Greek Prosodies and the Nature of Syllabification. Ph.D. dissertation MIT.

Tourville, J. (1988a). "La formation du progressif des verbes en san de Kiembara: une analyse phonologique". Rapport du groupe de recherche en linguistique africaniste. UQAM.

Tourville, J. (1988b). "La structure syllabique du san de Kiembara". Rapport du groupe de recherche en linguistique africaniste. UQAM.

Tranel, B. (1974). "Le cas de l'effacement facultatif du schwa en français: quelques implications théoriques". in Recherches Linguistiques à Montréal. vol.1.

Tranel, B. (1974). "The phonology of nasals vowels in Modern French", Ph.D. dissertation, San Diego.

Vergnaud, J.R. (1982). "On the Foundations of Phonology". Paper presented at the 1982 GLOW Colloquium, Paris.

Warnant, L. (1986). Dictionnaire des rimes orales et écrites, Larousse.

Wetzels, L. & E. Sezer (eds) (1986). Studies in compensatory lenghthening. Dordrecht: Foris Publications.