THEORETICAL ISSUES IN SYLLABIC PHONOLOGY

A critical study of the theories of syllabification and a proposal concerning the interaction of syllabification and syllable changing rules in the phonology of French.

by

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TABLE OF CONTENTS

0. Introduction.

In this study, a critical overview will be given of four theories of syllabification put forth during the last decade, then a new proposal will be formulated concerning syllabification in French, and finally a principled account will be given of the syllable changing processes of schwa-deletion and semivocalization in French.

1. Proposed theories of syllabification & their problems.

1.0 Introduction.

Most proposals of phonological rules that refer to syllable boundaries do so without stating the status of such boundaries. Presumably, the authors of these proposals assume that the syllable boundaries are present at the underlying level, before the application of any phonological rule. Problems arise, however: certain deletion rules (especially rules of syncope), insertion rules, and rules like glide formation appear to alter the syllabic structure of a string of segments. This state of affairs would necessitate readjustments in the distribution of the syllable boundaries.

Because of such problems, the need for a theory of syllabification was felt. From 1972 onwards, several theories of syllabification have been developed. With respect to the point in the derivation of the application of the syllabification and possible resyllabification, they can be divided into three groups:

i. syllabification at the underlying level followed by resyllabification, each time a rule has applied. This persistent syllabification is advocated by, among others, Vennemann (1972), Hooper (1972)[1] and Lowenstamm (1979), the latter in a hierarchical framework[2].

ii. syllabification at the underlying level, followed by specified processes of resyllabification. This point of view is held by Kahn (1976) and Selkirk (forthc.).

iii. syllabification at a later stage in the derivation after the application of certain rules. Broselow (1979) argues for this in her account of the phonology of Egyptian Arabic.

In this chapter, I will give an overview of the positions of Vennemann (1972), Hooper (1972), Lowenstamm (1979) Selkirk (forthc.), and finally Broselow (1979). I will also treat some problems relating to these analyses.

1.1. Vennemann/Hooper

1.1.1. Vennemann.

Vennemann (1972) argues for a persistent syllabification. He mentions Fudge (1969), who

> "has to define two concepts of the syllable, one at an abstract level which is not defined in phonetic terms, and one at a concrete level which is defined in phonetic terms." (p.15)

Vennemann then goes on (p.15):

> "This division deprives the notion of its universal aspects and intuitive value which derive from its phonetic properties. It is, however, an inevitable consequence of a grammatical model allowing abstract entities not interpretable by universal linguistic principles. In the model of transformational-generative grammar, which incorporates a Naturalness Condition prohibiting the use of symbols not interpretable by universal linguistic principles, the syllable <u>can</u> be defined in phonetic terms at all levels in an intuitively correct way with the use of largely universal syllabification rules, but the discouraging question is: at what level <u>should</u> it be defined?"

He then confronts the reader with his derivation of Northern Standard German (ich) <u>radle</u> [ra:tlə] '(I) go by bicycle' (p.16), which I give here as (1):

(1)	/rad/	'bicycle', nom.[rat], gen.[ra:d+ə s]
	/rad+ə l/	'go by bicycle'
	/rad+ə l+ə/	'(I) go by bicycle'
	rád ə l ə	(stress assignment)
	rá$d ə $l ə	(<u>syllabification</u>)
	rá:$d ə $l ə	(Open syllable lengthening)
	rá:$d l ə	(syncope)
	rá:d$l ə	(<u>syllabification</u>)
	rá:t$l ə	(devoicing)
	[rátlə]	

The second syllabification in (1) transfers the syllable boundary on the ground of the <u>Law of Initials</u> proposed by Vennemann earlier in his article (p.11). It says: "medial syllable-initial clusters should be possible word-initial clusters". <u>dl</u>, which occurs in (1) as a syllable-initial cluster immediately after syncope has applied, is not a possible word-initial cluster in German.

After having given this example, Vennemann continues (p.16):

> "This example demonstrates that syllabification is not a one time affair in the grammar. It cannot be restricted to the phonetic representation because phonological rules crucially depend on it. It cannot be restricted to the underlying phonological, or systematic phonemic, representation because a phonological rule (such as syncope or epenthesis) may change the syllabification of a string, while one further rule depends on the unchanged syllabification, another, on the changed syllabification. It has further been suggested (...) that syllabification also plays a role in the morpheme structure conditions of the lexicon. My hypothesis, which has been adopted by Hooper, is therefore: syllabification rules are persistent rules (...), i.e. anywhere rules: After each step in the derivation, the string is checked against the syllabification rules, and the resyllabification occurs if there is a conflict".

As we will see, Vennemann's analysis presented in (1) is very questionable and suffers from serious flaws. First of all, note that after syncope the second syllable boundary has disappeared. In Vennemann's conception, this cannot be the result of the persistent checking of the strings against the syllabification rules with subsequent resyllabification in the case of a conflict. After syncopation and before resyllabification, the string will be as in (2):

(2) rá:dlə

As we have seen, the outcome of the resyllabification should be as in (3):

(3) rá:d$lə

It seems strange to delete the second syllable boundary in (2) first and then to transfer the first one to the place of the second (or, alternatively, to delete the second syllable boundary and then to delete the first one and subsequently to insert a syllable boundary in the same place where the second syllable boundary was previously deleted). It seems more reasonable to assume that, if an unpermissible syllabification is encountered by the syllabification rules against which it is checked, all syllable boundaries of a given string are erased and a new syllabification takes place. The alternative, erasure of individual syllable boundaries seems less well-motivated because the locations of the syllable boundaries may be interdependent.

Another, more serious, problem connected with the analysis in (1) is the status of the form /rad/ 'bicycle'. The High German pronunciation in [ra:t] (Mangold (1974)). In the same pronouncing dictionary we find (p.62):

> "In bestimmten einsilbigen Wörtern können betonte lange Vokale vor folgenden Konsonanten gekürzt werden; z.B. Bad [ba:t] > [bat], Glas [gla:s] > [glas], grob [gro:p] > [grop] (...)."
>
> ('In certain one syllable words long stressed vowels can be shortened before consonants; e.g. Bad [ba:t] > [bat] ('bath'), Glas [gla:s] > [glas] ('glass'), grob [gro:p] > [grop] ('coarse') (...).'

Thus we may ask whether the underlying form really contains a short vowel. It is clear that if this is not the case, the argument used by Vennemann that one rule depends on the unchanged syllabification and another on the changed syllabification is not valid, because Open syllable lengthening need not apply. Also, Schirmunski (1962) writes (p.187, with phonetic forms transcribed here into IPA, R.N.):

> "Die einsilbigen Wortformen mit geschlossener Silbe können zum Unterschied von den flektierenden zweisilbigen Formen mit offener Silbe, die gedehnt werden, die Kürze lautgesetzlich bewahren, wenn nicht grammatische Analogie die Länge verallgemeinert. Die niederdeutschen Mundarten bewahren diesen Lautwechsel, z.B. [dax] 'Tag' - [dɔ:ç] 'Tage', [slax] 'Schlag' - [slɛç] 'Schläge', [vɛx] 'Weg' - [vɛ:ç] 'Wege', [rat] 'Rad' - [rœ(d̂)] 'Räder' (...).
> Hieraus ergibt sich die in der niederdeutschen Form der Litteratursprache übliche Bewahrung der Kürze in den Wörten dieses Typs: im Nom. Sing. der Substantive [tax] 'Tag', [vɛç] 'Weg', [tsux] 'Zug', [grap] 'grab' [rat] 'Rad' (...)"
>
> ('The one syllable word forms with a closed syllable can, in contrast with the inflecting bisyllabic forms with an open syllable, which are lengthened, keep their shortness according to the sound laws, if grammatical analogy does not make the lenght general. The Low German dialect keep this sound alternation, e.g. [dax] 'day' - [dɔç] 'days', [slax] 'stroke' - [slɛç] 'strokes', [vɛx] 'road' - [vɛ:ç] 'roads', [rat] 'bicycle, wheel' - [rœ(d̂)] 'bicycles, wheels' (...).
> This produces the usual preservation of the shortness in the Low German form of the standard language (i.e. Northern Standard German, R.N.) of words of this type: in Nom Sing. of the nouns: [tax] 'day', [vɛx] 'road', [tsux] 'train', [grap] 'grave', [rat] 'wheel, bicycle' (...).')

Thus Schirmunski, who is writing in a historical perspective, indicates that, historically speaking, there is a lengthening. But this diachronic rule has not resulted in a synchronic one: on the contrary, the one syllable words in question only keep the shortness of their vowels because

they have maintained the ablaut[3] with regard to their plural forms, so grammatical analogy does not require their vowels to become long. This implies that, if there is no ablaut, grammatical analogy does require the vowel of a one syllable word to become long. Thus there is no (synchronic) Open syllable lengthening involved here. Moreover, it should be noted that the phenomenon of length alternation like in [rat] vs. [ra:tlə] only occurs in the case of underlying one syllable forms, which constitutes a suspiciously limited distribution[4].

I will conclude, then, that the analysis given by Vennemann is unsound and that it is much more reasonable to assume that the underlying form is /ra:d/, and that a shortening rule applies to this and other one syllable forms, as suggested by Mangold.

A further conclusion is that, if there is no Open syllable lengthening involved in the derivation of [ra:tlə], there are no longer two rules, one of which depends on an unchanged syllabification, the other on a changed one. One single syllabification can now do the job, provided that we do not place it at the level of lexical representation, but somewhere later in the derivation, after the rule of syncope has applied. Vennemann thus has not given a proof of a multiple syllabication, let alone of a persistent syllabification.

One further remark on Vennemann's article should still be made here: on page 13, he contrasts the Northern Standard German pronunciation [ra:t$lə] with [ra:$dlə], which would be the "refined Standard pronunciation". He then infers that (i) "different syllabification is a possible dialect difference" and that (ii) "resyllabification is a form of phonological change". As far as I have been able to check with native speakers[5], the High German standard pronunciation is [ra:d ə l]. This is so because the first person singular inflection is zero instead of a schwa (cf. ich lauf vs. ich laufe 'I walk'; this variation exists throughout the German dialects and throughout the lexicon, the tendency

to omit the schwa is stronger in the South). The "refined Standard pronunciation" Vennemann refers to is possibly the artificial Bühnenaussprache ('stage pronunciation') which was introduced at the end of the last century as the first attempt to achieve a standard language. Writing about the Bühnenaussprache, Siebs (1920,p.78) considers the voiced dental stop in forms like [ra:dlə] to be the result of a progressive assimilation (a phenomenon which one can often observe in over-precise pronunciations[6]):

> "Erscheintsilbeschliessendes b, d, g, vor stimmhaft anlautenden Endungen wie -lich,-lein, -ling,-nis, oder-bar, -sam,-sal,-sel, so ist b, d, g mässig zu verharten, aber keineswegs behaucht auszusprechen wie sonst im Auslaut: ausserdem ist darauf zu achten, dass der Anlaut der Folgesilbe tunlichst stimmhaft gesprochen werde: also lieblich ist nicht etwa liplich zu sprechen und nicht etwa mit stimmlosen l."
>
> ('When a syllable final [b],[d], [g] appears before endings beginning with a voiced sound like [liç], [lain], [liŋ], [nis], or [ba:r] [za:m], [z ə l],then [b],[d],[g] must be strengthened moderately, but by no means aspirated as otherwise at the end of a syllable: moreover one must make sure that the first sound of the next syllable is pronounced with as much voicing as possible: so lieblich should not be pronounced [liplıç] nor with a voiceless [l].')

This quotation shows the artificiality of the Bühnenaussprache and it seems rather hazardous to base a conclusion on such an artificial pronunciation[7].

1.1.2. Hooper.

Hooper (1972) also argues for a persistent syllabification. Unfortunately, her evidence is as unconvincing as that of Vennemann. She first gives a syllable boundary insertion rule (p.536), which I give here as (4):

$$(4)\quad \emptyset \rightarrow \$ / [+\text{syll}]_0 \left\{ [-\text{syll}]_0 \_\_ \left\{ \begin{matrix} [-\text{son}] \\ [+\text{cons}] \end{matrix} \begin{matrix} [+\text{son}] \\ [-\text{nas}] \end{matrix}_0 \right\} \right\} [+\text{syll}]$$

She then writes (p.536):

> "I propose that rule 22 (here rule (4)) is a universal rule for the insertion of $-boundaries, and as such is included in the metatheory. The rule operates in specific languages at no cost at the universal grammar."

Two pages further (p.538) she goes on:

> "It appears, then, that rule 22 (4) operates first among the readjustment rules, inserting $-boundaries in the string before they enter the phonological component. Then, as the phonological rules alter the string of segments, the conditions of rule 22 (4) reapply to adjust the $-boundaries."

Then Hooper gives the derivation of <u>regnen</u> in Northern and Standard German (p.539), which I give here as (5) (for a full explanation and justification of the rules she refers to Vennemann (1968)):

(5)

NORTHERN	STANDARD	
regVn+Vn	regVn+Vn	'to rain'
regVnVn	regVnVn	rule 22 (i.e.(4))
re:gVnVn	re:gVnVn	Open syllable lengthening
re:$gə$nən	re:$gə$nən	Vowel reduction
re:gnən	re:gnən	Syncope
re:g$nən	re:$gnən	rule 22; modified in the Standard dialect[8]
re:ɣ$nən		Spirantization of /g/
re:x$nən		Final devoicing
re:ç$nən		/x/-fronting
[re:çnən]	[re:gnən]	Final phonetic form

This analysis is quite questionable on the point of the application of Open syllable lengthening. German has underlying long vowels in closed syllables. Examples can be found in (6):

(6)a. /kre:ps/ [kre:ps] 'cancer'

b. /ve:g/ [ve:k] 'way'

According to Philip (1974) there does not even exist an underlying short vowel /e/, contrary to /ɛ/, which exists underlyingly as both a long and short vowel in both open and closed syllables.

If one rejects the highly questionable application of Open syllable lengthening here and assumes that /e/ is long underlyingly, there

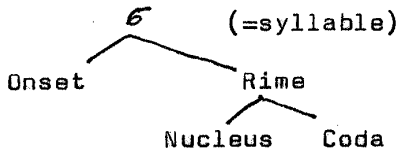
is no longer motivation for a multiple syllabification here. As in the example given by Vennemann, a single syllabification not applying at the underlying level but at an intermediate one, suffices.

I will end this section, then, with the conclusion that neither Vennemann nor Hooper has given us evidence for a multiple or persistent syllabification and that the forms they confront us with rather point into the direction of a single derivation applying at some intermediate level[9].

1.2. Lowenstamm.

Lowenstamm (1979) is a proponent of a hierarchical structure of the syllable. He advocates the well-known Onset-Rime bipartion, in which the rime is subdivided into Nucleus (Peak) and Coda, cf. (7):

(7)



(for an overview of the justification of a hierarchy in the syllable, as well as for an overview of the different proposals of a hierarchic structure in the syllable, see Selkirk (forthc.), section 3.1.).

Lowenstamm conceives syllabification as follows (p.97):

(8) i. syllable structure is entered into the lexicon together with segmental strings.

ii. segmental strings are syllabified at any time.

Note the the syllabification in (8ii) is in fact a resyllabification, because in Lowenstamm's conception, syllable structure is present in the lexicon. The nature of the syllabification device as proposed by Lowenstamm is as in (9):

(9) i. strings are analyzed by a syllable template, subject to the principles of ii.

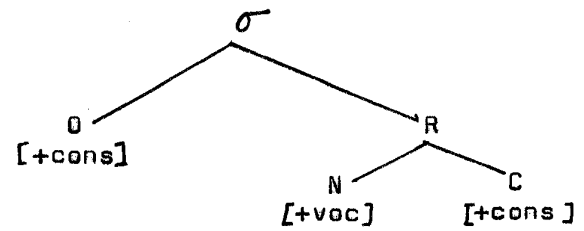
ii. a. Principle I. - minimize the number of syllables

b. Principle II. - minimize the degree of markedness of each syllable.

iii. reanalyze by ii.

The syllable template is as in (10):

(10)



(10) is interpreted in accordance with the Feature Percolation Conventio

(FPC) (p.98)[10]:

(11) FPC: If a node in a tree is labelled with a particular feature or feature complex, then all segments dominated by the node in question must possess the feature or features.

He then goes on (p.98):

> "each of the nodes O, N, C, R, branches in principle in unlimited fashion but in fact, subject to language particular restrictions - So, for instance,in a CVCV language O and R only have one branch. In a (2,3) language (i.e. a language in which the onset can contain two segments and the rimes three, R.N.),the expansion for O and R are 2 and three branches respectively, and so on. The minimal expansion for any syllable in any language is, however, CV, or more precisely, O, R. (...) On the other hand branches optionally dominate phonological material [+segment]."

The last sentence in this quotation means that branches can dominate zero material. Together with the minimal expansion for any syllable O,R this means that syllables starting with a vowel have a zero onset. (Lowenstamm's theory also provides for zero rimes, which he uses in his analyses of Yiddish and Old English phenomena; the zero rimes do not show up in the the final phonetic form, because they are replaced by a schwa (or sometimes another vowel) (due to epenthesis), or because of syncope.) Lowenstamm makes phonological rules refer to these obligatory zero elements by the feature [-segment].

Somewhat further, he states:

> "(71) (i.e. my (9), R.N.) reapplies at all times indicated. However there is an area where these principles of optimal syllabification may not be followed, namely the lexical representation, i.e. items may be entered with non-optimal syllable structure (although at a cost in terms of markedness)."

This, of course, constitutes a breach of the principle of persistent syllabification, because it is among other things by the principle of lowest possible markedness (i.e. (9ii), principle II) that syllabification operates. I will come back to this in subsection 1.2.2.

1.2.1. The notion of markedness of the syllable.

In (9iib), principle II refers to the notion of markedness of the syllable. How can one decide about the degree of markedness of a given syllable? For this, we must turn to section 2.1. of Lowenstamm's dissertation. There he gives the following rule for the feature [segment] (p.69). The environment for this rule is the categories O (onset) and R (rime).

(12) [u segment] → [+segment] / [$_{O/R}$ ____]

Rule (12) is interpreted in accordance with Kean's (1975) complement convention and is in fact a collapsing of four specifications shown in (13):

(13)a. [u segment] → [+segment]/[$_{O/R}$ ____]

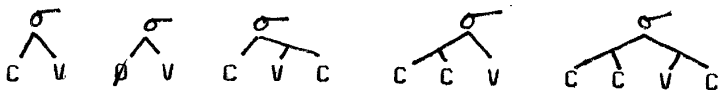
b. [m segment] → [-segment]/[$_{O/R}$ ____]

c. [u segment] → [-segment]/~[$_{O/R}$ ____]

d. [m segment] → [+segment]/~[$_{O/R}$ ____]

(13a) indicates that the unmarked value for segment is [+segment] in non-branching onsets and rimes. In the same context, [-segment] (i.e. null onsets and rimes) is the marked value of [segment]. In all other contexts, i.e. in all cases of branching onsets and rimes, the marked value of [segment] is [+segment]. In order to let the reader fully understand the workings of the rule, Lowenstamm gives some syllabic structures with rule (12) applied to them. I will give them here as (14):

(14) syllabic structures



seg u u m u u m m m m u m m m m

The line seg in (14) represents the segmental level, which is a matrix of features consisting of the values u and m as in Kean (1975); this level constitutes with the syllabic level, consisting of binary trees at least up to syllable level, the lexical representation of a lexical item. It is the segmental level that decides about the markedness of a syllable. The structures in (14) are of increasing markedness, except for the third and fourth structure, which are of an equal degree of markedness. According to Lowenstamm, we are not allowed to add the value of markedness of the onset to that of the rime, but we should consider the degree of markedness of the onset and of the rime separately. This prohibition is stated by Lowenstamm in connection with the typology of languages, with respect to the number of segments they allow in the onset and in the rime. He states that the number of segments allowed in the rime will always be greater than, or equal to, the number of segments in the onset. He can thus speak of, e.g., a (2,3,) language, i.e. a language in which the onset of a syllable can contain at most two segments and the rime at most three segments; then the markedness value of the maximal syllable in that language is 3 and not 5. Despite the prohibition, I think it is reasonable to say that the final structure in (14) is more marked than the third or fourth structure in (14), which have the same degree of markedness in the rime and the onset respectively. I will go deeper into this matter in section 2.4. of the next chapter.

1.2.2. The role of the feature [segment] in French Truncation.

As mentioned above, Lowenstamm allows for lexical items to be entered with non-optimal syllable-structure. I will now give the example of this of this given by Lowenstamm, because it will be important to us later on. The example concerns French Truncation, by which Lowenstamm understands deletion of consonants as well as

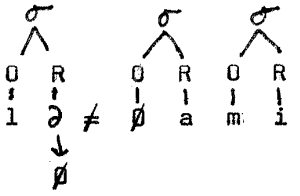
of vowels before vowels and consonants respectively. He formalizes the rule as follows:

(15) French Truncation:

$$\begin{bmatrix} \alpha\text{voc} \\ -\alpha\text{cons} \end{bmatrix} \longrightarrow \emptyset \;/\; \_\_\_\_ \neq [-\alpha\text{segment}]$$

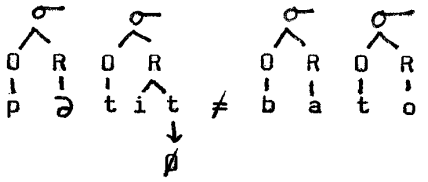
This rule accounts for the deletion of ə in (16) as well as that of t in (17):

(16)



'the friend'

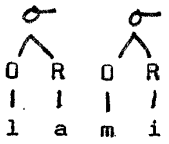
(17)



'little boat'

Resyllabification will apply to (16) according to the principles I and II of (9ii) and will produce (16'):

(16')



Glides have always been a problem for the formulation of rules for the French truncation phenomena. In some words they trigger, when in word-initial position, the deletion of a preceding vowel and do not trigger the deletion of a preceding consonant, and in some words they act the other way round, cf. (18)[11]:

(18)a. absence of vowel deletion before glides (absence of elision)

/lə≠wiski/ [lə wiski] *[lwiski] 'the whisky' (le whisky)

/lə≠jaurt/ [lə jaurt] *[ljaurt] 'the yoghurt' (le yaourt)

/lə≠ɥit/ [ləɥit] *[lɥit] 'the (number) eight' (le huit)

b. absence of consonant deletion before glides (liaison)

/lez≠wi/ [lezwi] *[lewi] 'the gills' (les ouies)

/lez≠jø/ [lezjø] *[lejø] 'the eyes' (les yeux)

/lez≠ɥitr/ [lezɥitr] *[lɥitr] 'the oysters' (les huîtres)

c. vowel deletion before glides (elision)

/lə≠wi/ [lwi] *[lə wi] 'the gill' (l'ouie)

/lə≠jɔ̃/ [ljɔ̃] *[lə jɔ̃] 'the ion' (l'ion)

/lə≠ɥitr/ [lɥitr] *[lə ɥitr] 'the oyster' (l'huître)

d. consonant deletion before glides (absence of liaison)

/lez≠wiski/ [lewiski] *[lezwiski] 'the whiskys' (les whiskys)

/lez≠jaurt/ [lejaurt] *[lezjaurt] 'the yoghurts' (les yaourts)

/lez≠ɥit/ [lɥit] *[lez ɥit] 'the eights' (les huits)

Chomsky & Halle propose as a solution to this problem the introduction of a diacritic to the feature matrix of the glides in words as in (18a) and (18d), and they formulate the following two rules:

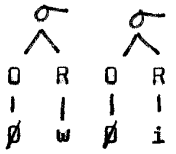
(19) $\begin{bmatrix} -\alpha\text{syll} \\ \alpha\text{cons} \end{bmatrix} \rightarrow \emptyset \; / \; \_\_\_\_ \neq \begin{bmatrix} \alpha\text{cons} \\ -\text{diacritic} \end{bmatrix}$

(20) $\begin{bmatrix} -\alpha\text{syll} \\ \alpha\text{cons} \end{bmatrix} \rightarrow \emptyset \; / \; \_\_\_\_ \neq \begin{bmatrix} -\alpha\text{syll} \\ +\text{diacritic} \end{bmatrix}$

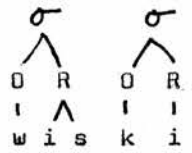
There are many problems connected with this analysis, as demonstrated by Lowenstamm, but they are not of concern to us here.

The solution Lowenstamm uses is that of non-optimal syllable-structure: his hypothesis is that words like the ones in (18b) and (18c) have a structure as in (21):

(21)



while words like the ones in (18a) and (18d) would have a structure as in (22):

(22) 

Moreover, Lowenstamm does not accept the feature [syllabic], because he shows syllabicity to be dependent on the position an element occupies within the syllable structure; instead, he uses the feature [vocalic]. Also, he postulates that glides have the specification [+vocalic, +consonantal], instead of the usual [-syllabic, -consonantal]. We can now see that rule (15) can account for vowel deletion when a vowel immediately precedes a structure as in (21), because the obligatory onset (recall that the minimal expansion of the syllable is O,R) does not contain a segment, so it is specified [-segment].
(15) also accounts for consonant deletion in the case of a consonant immediately preceding a structure as in (22), because the first onset of this structure does not contain a segment, hence it is specified [+segment].

1.2.3. The Nuclear Integrity Constraint.

After having written his dissertation, Lowenstamm has apparently abandoned the idea of a non-optimal syllable structure for words like the ones in (18b,c). It should be noted that the words like those in (18a,d), the less marked ones, are mostly words of foreign origin. This is, of course, counter-intuitive. An alternative is offered by Kaye & Lowenstamm (1980). Instead of (21), they propose a structure as in (23):

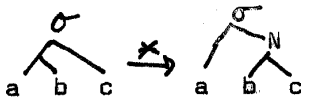
(23) 

In (23), the glide and the vowel find themselves both in the nucleus.

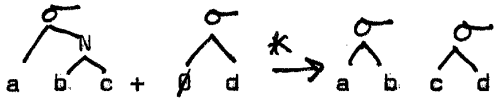
They are subject to the Nuclear Integrity Constraint (NIC), which says:

(24) NIC[12]:

a. Material may not be resyllabified into a non-null nucleus:



b. Resyllabification of the nucleus must involve the entire nucleus:



As additional justifications for diphthongs as in (23) in French they give (i) the vowel-diphthong alternations in (25)

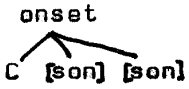
(25) e ~ wa : verra -voir '(he) will see - to see'

{ø / u} ~ ɥi : {peux / pouvons} - puisse '{(he) can / (we) can} - (he) can (subjunctive)'

ə ~ jɛ : tenir - tienne 'to hold - (he) holds (subjunctive)'

(ii) they postulate a consonant-sonorant-sonorant constraint for French, cf. (26):

(26) * onset

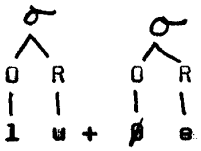


Consider the alternation in (27):

(27) [lu]~[lwe] loue - louer 'he rents -to rent'

lwe is formed because (28a) is resyllabified into (28b):

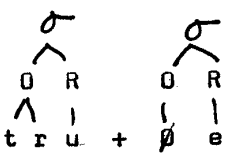
(28)a.



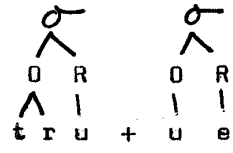
b.

Because of their non-acceptance of the feature [syllabic], Kaye & Lowenstamm do not distinguish between u and w (or between i and j or y and ɥ). Recall that glides are, in Lowenstamm's theory, [+voc, +cons], the Feature Percolation Convention allows them to be in the onset and the coda as well as in the nucleus.

Because of the consonant-sonorant-sonorant constraint (26), *[trwe] is not possible, which would otherwise have been formed out of the morphemes in (29a); the existent phonetic form is that in (29b):

(29)a. 

'punch a hole' (trouer)

b. 

((28b) is usually transcribed as [truwe]. The second u in (29b) is formed by an epenthesis rule; I will treat the full range of phenomena concerning French glides in chapter 3.

Despite the impossibility of *[trwe], there exist such phonetic forms as in (30):

(30)a. [trwa] 'three' (trois)

b. [trɥit] 'trout' (truite)

c. [plɥi] 'rain' (pluie)

d. [brɥi] 'noise' (bruit)

Kaye and Lowenstamm claim that these form contain a diphthong, exclusively dominated by the nucleus, thus (26) cannot block their derivation.

The French Truncation rule in (15) can account for the vowel deletion phenomena if we accept the structure in (23) as well as it could if we accepted (21), but with (23), we no longer need the more marked structure for the indigenous words, nor do we have a non-optimal syllable structure.

1.2.4. A critism of Lowenstamm's proposals.

The proposals made by Lowenstamm and Kaye are questionable on several points. First of all, and most importantly, the assumption that syllable structure is present in the lexicon must be questioned. Assuming that together with the segmental strings, syllabic structures are present in the lexicon has serious consequences for the assumed nature of the language capacity of the human species. The memory capacity needed under this assumption is considerably larger than the one needed under the assumption that only segmental strings are present in the lexicon. Moreover, the syllabic structure of a segmental string in a language is generally predictable. This has led linguists

who have occupied themselves with questions dealing with syllabic structure - regardless of whether they assume a hierarchical or a purely linear phonological structure - to device a mechanism that assigns syllabic structure to a given segmental string. It is rather strange that Kaye and Lowenstamm assume that this predictable syllabic structure is entered into the lexicon, which is usually thought of as a repository of idiosyncrasies, not of regularities[13]. I therefore think it is preferable to assume that syllabic structure is assigned by a syllabification mechanism somewhere in the phonological component.

Secondly, a word must be said about the French Truncation rule (15) proposed by Lowenstamm. This rule deletes any vowel in front of a zero element (in practice an empty onset; recall that the expansion of the syllable into the onset is obligatory, but that the onset is only optionally filled). If we abstract away from the intervening zero element, this means that any vowel is deleted in a position before another vowel. The rule, however, produces the wrong results. Apart from two isolated cases[14], only schwas are deleted in front of another vowels, while other vowels cannot be deleted in that position, cf (31):

(31) néanmoins [neɑ̃mwɛ̃] 'nevertheless'

Apart from this inadequacy, it should be noted that the collapsing of the deletion of schwa before vowels and of the deletion of obstruents and nasals before consonants seems counter-intuitive. The deletion of obstruents before consonants is a process that is no longer productive, as a result of which there are many every-day words in French that are not subject to this process. Cf. (32):

(32) espérer /ɛspere/ [ɛspere] 'to hope'

The deletion of schwa in prevocalic position, on the other hand, seems a very regular process and may be part of a more extensive process of schwa-deletion (cf. my account of the schwa-deletion phenomena in chapter 3).

Thirdly, it should be noted that the French Truncation rule poses problems in connection with the Nuclear Integrity Constraint. Consider the form in (33), which I give here with the underlying structur as in a linear framework:

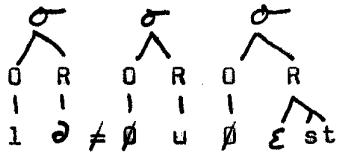
(33) l'ouest / lə ≠u ɛst/ 'the west'

This form has two phonetic realizations, which I give here in (34)[15]:

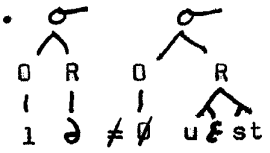
(34)a. [lu ɛst] b. [lwɛst]

According to Lowenstamm's proposal the deletion of schwa has apparently taken place here because of a zero element following the schwa, i.e. a zero onset. For (34a) and (34b) the structures from which these forms derive are as in (35a) and (35b) respectively:

(35)a.



b.



We should now look at the structure in (35b). This structure contains a branching nucleus. Because of the requirement of the NIC that material may not be resyllabified into a non-null nucleus, this nucleus must also be underlyingly branching. This means that (35a) and (35b) must be two different underlying forms, because they cannot be derived from each other. It has to be concluded, then, that in order to account for both (34a) and (34b), two underlying forms, i.e. two lexical entries, are needed in Lowenstamm's theory. This is an inherent weakness of that theory, and either the Nuclear Integrity Constraint or the French Truncation rule will have to be changed if one wants to avoid this situation.

Despite these three points of criticism, I think that Lowenstamm's proposals contain some interesting points, among which the principle of syllabification to lowest possible markedness, to which I will come back in chapters 2 and 3.

1.3. Selkirk: specified resyllabifications.

Selkirk (forthcoming) also assumes a hierarchical structure in the syllable, but, in contrast with Lowenstamm, she does not assume that syllabification is a unitary and persistent process. She conceives syllabification in accordance with the following scheme:

(36) Basic Syllable Composition (BSC)

Stress

Resyllabification

The Basic Syllable Composition is conceived by Selkirk as a set of well-formedness conditions on underlying phonological representation, which is thought of as already having syllabic structure. How this syllabic structure has come into being, she does not say, but I will assume that it will be by some structure building device, analogous to the principles building <u>feet</u>, <u>prosodic words</u>, etc. as presented in Selkirk (1980, to appear).

BSC consists of three parts:

i. a syllable template

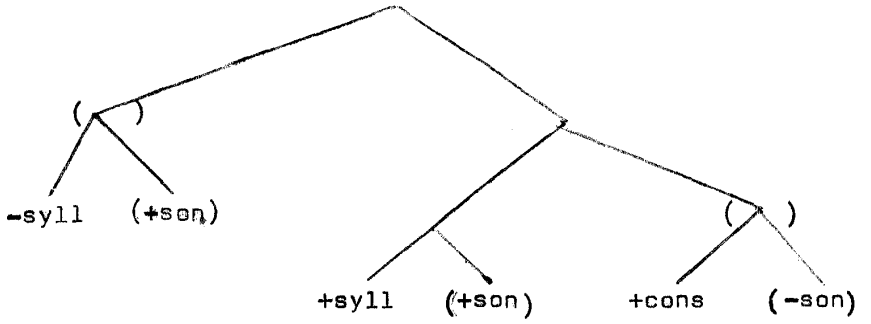
ii. a set of collocational restrictions

iii. the maximal syllable onset principle:

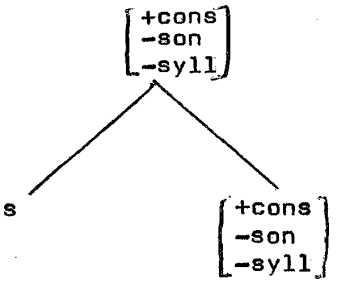
> In the syllable structure of an utterance, the onsets of syllables are maximized, in conformance with the (other) principles of BSC.

The syllable template is language specific, unlike the template in Lowenstamm's proposal. For English Selkirk proposes a general template, which specifies the gross features of BSC in the language, cf. (37), and an auxiliary one, which permits combination of <u>s</u> plus obstruent to function like a single obstruent with respect to the general template, cf. (38):

(37)



(38)



The features in (38) are interpreted in accordance with the Feature Percolation Convention (cf.(11)). The segments whose features find themselves between parentheses are optional. This is also the case for the onset and coda in (37), which are also in a position between parentheses. The templates include only major class features. For a justification of these particular templates I refer the reader to Selkirk's book; they are given here only by way of illustration.

An example of a collocational restriction in English is:

(39) "the second consonant of the coda must be coronal".

The maximal syllable onset principle has been proposed by many linguists as a universal principle[16]. The deviations from it in the final phonetic representation are accounted for by resyllabification.

Stress in (36) is the application of some device assigning stress (it can be conceived of in the usual sense, but Selkirk (1980) conceives of stress assignment as the result of a tree building process; however, it is not of consequence here).

Resyllabification in (36) stands for one or more rules changing the syllable structure of a string; these rules crucially refer to, among others, the feature [stress]. The resyllabification rules are subject to the Principle of Syllabic Structure Preservation:

(40) The Principle of Syllabic Structure Preservation:

> The derived syllable structure produced by rules of resyllabification must conform to the syllable template of the language.

As an example I give here a resyllabification rule proposed by Selkirk for English, together with an example of its application and of the working of the Principle of Syllabic Structure Preservation.

As a resyllabification rule, Selkirk proposes (41):

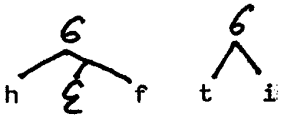
(41)

$$X \begin{Bmatrix} [-\text{cons}] \\ [+\text{cons}] \end{Bmatrix} [-\text{syll}] \begin{bmatrix} +\text{syll} \\ -\text{stress} \end{bmatrix} Y \quad \begin{matrix} \text{OBL} \\ \text{OPT} \end{matrix} \Rightarrow$$

1	2	3	4	5
1	2+3	∅	4	5

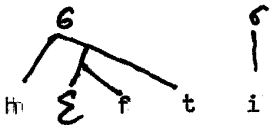
This rule will optionally change (42a) into (42b):

(42) hefty

a. 

b. 

However, a structure as in (43) will be forbidden, because of the Principle of Syllabic Structure Preservation:

(43) * 

1.3.1. A criticism of the Principle of Syllabic Structure Preservation.

In this subsection I will criticize Selkirk's proposal on one point: the Principle of Syllabic Structure Preservation. Below I will give evidence from Odawa, French and Dutch that adoption of this principle would make it impossible to account for certain obvious restrictions on underlying or intermediate structure. A further remark

on the phonology of Dutch will be made.

1.3.1.1. Odawa.

Lowenstamm (1979, p.73) mentions the following situation in Odawa, a dialect of Ojibwa:

> "Odawa (like other Ojibwa dialects) is a (2,3,) language with branching onsets limited to those whose second member is a glide. The above characterization is valid only at the level of underlying representation. Odawa has a rule which in general stresses even numbered syllables starting from the beginning of the word, as well as all final syllables. A later rule deletes all unstressed vowels."

Lowenstamm then gives two examples, which I give here as (44) and (45):

Starting with a form like (44a) we derive (44b)

(44)a. /masina?ikan/ 'book' b. [msin?ikan]

The inflected form (45a) yields (45b)

(45)a. /ni-masina?ikan/ 'my book' b. [nmasna?kan]

Lowenstamm then goes on (p.73):

> "The effect of the syncope rule is to create surface onsets that cannot exist at the level of underlying representation, e.g. ms, nm. External evidence (Kaye (1975), Kaye & Nykiel (1979)) indicates that the operative syllabic constraints are at the underlying level and not the surface level, i.e., ms, nm are not possible Odawa onsets."

After the syncope rule, resyllabification will have to take place. According to Selkirk's proposal, the Principle of Syllabic Structure Preservation will have to be operative now. If this were the case, the syllable template would have to allow for the ms and nm onsets. But then there would be no expression in the template of the constraints prohibiting the ms and nm onsets at the underlying level. Because Selkirk says nothing about a possible reapplication of the set of collocational restrictions, we can assume that these restrictions are only operative at the underlying level, contrary to the restrictions expressed by the syllable template, which must work after each resyllabification. We may then assume that the constraints prohibiting ms and nm onsets at the underlying level

are included in the set of collocational restrictions. I do not think, however, that Selkirk intended the restrictions expressed by the syllable template to have a wider scope than those of the set of collocational restrictions, because she writes:

> A grammar must (...) provide for some statement of the notion 'possible syllable of L', this statement being distinct from any phonological representation of the language. Let us suppose that for each language this statement is in the form of a template and an accompanying set of phonotactic (=collocational, R.N.) constraints somewhat in the spirit of Fudge (1969), and Hooper (1976), but with differences that will become apparent. These together specify all possible syllable types of the language, and can be thought of as serving as well-formedness conditions on the phonological representation of the language."

Thus we see that it would be reasonable to include the set of collocationa restrictions in the Principle of Syllabic Structure Preservation, althought Selkirk does not do so (in the preliminary version of her book). In that case the phenomena of Odawa would constitute a violation of the principle.

As mentioned above, Selkirk includes only major class features in the main and auxiliary template. It seems reasonable that if one makes this restriction, it should also be required that all restrictions that can be stated in merely major class features must be expressed by means of the main template or an auxiliary template, in order to prevent a situation of arbitrary choice. Under this assumption too, Odawa is a counter-example to the Principle of Syllabic Structure Preservation, because the restriction prohibiting ms and nm onsets at the underlying level is statable in major class features (because the second member of the onset must be a glide).

I have made two conjectures, the first about the inclusion of the set of collocational restrictions in the Principle of Syllabic Structure Preservation, the second about the inclusion of all restrictions statable in merely major class features in the templates. Both conjectures are quite reasonable. If we did not make them, the Principle of Syllabic Structure Preservation would not be able to predict

unequivocally and in a principled way whether or not a given restriction will rule out a given form. This would make Selkirk's proposal unfalsifiable. Adoption of one of the conjectures (or both) makes the Odawa case a counter-example to the Principle of Syllabic Structure Preservation.

1.3.1.2. French.

Consider the following alternations in French, most of which are adjective-adverb pairs[17]:

(46)a.	probable	[prɔbabl]	'probable'
b.	probablement	[prɔablə mɑ̃]	'probably'
(47)a.	simple	[sɛ̃pl]	'simple'
b.	simply	[sɛ̃plə mɑ̃]	'simply'
(48)a.	aveugle	[avœgl]	'blind'
b.	aveuglement	[avœglə mɑ̃]	'blindly'
(49)a.	cercle	[sɛrkl]	'circle'
b.	encerclement	[ɑ̃sɛrklə mɑ̃]	'encirclement'
(50)a.	libre	[libr]	'free'
b.	librement	[librəmɑ̃]	'freely'
(51)a.	âpre	[apr]	'rude'
b.	âprement	[aprə mɑ̃]	'rudely'
(52)a.	tendre	[tɑ̃dr]	'tender'
b.	tendrement	[tɑ̃drə mɑ̃]	'tenderly'
(53)a.	autre	[otr]	'other'
b.	autrement	[otrə mɑ̃]	'in another way, differently'
(54)a.	maigre	[mɛgr]	'thin'
b.	maigrement	[mɛgrə mɑ̃]	'thinly'
(55)a.	médiocre	[mediɔkr]	'mediocre'
b.	médiocrement	[mediɔkrə mɑ̃]	'in a mediocre way'
(56)a.	ivre	[ivr]	'drunk'
b.	ivrement	[ivrə mɑ̃]	'drunkenly'

The first members of the word pairs in (46-56) can also be pronounced with a final schwa. We can thus infer that the final schwa can be

optionally deleted. We see that the adverbial forms contain an obligatory schwa. Compare these forms with those in (57)[18]:

(57)a. pudiquement [pudikmə̃] 'chastely'

b. froidement [frwadmə̃] 'coldly'

c. embarquement [ə̃barkmə̃] 'embarcation'

d. renversement [rə̃vɛrsmə̃] 'reversal'

In these forms, the schwa before the morpheme /-mə̃/ has been deleted, contrary to the second members of the word pairs in (46-56), where the schwa cannot be deleted. The question can now be asked: why can the schwas in the first members of the word pairs in (46-56) be deleted, while the second members of these word pairs cannot? I think the answer must be found in the assumption that French cannot have codas of which the second member is a sonorant, but that this restriction can be violated because a resyllabification can take place, in which a stressed syllable retracts the obstruent-liquid pair in the onset of the next syllable to its coda (cf. my account for this in chapter 2). After the resyllabification has taken place, the schwa is deleted (cf. chapter 3). It should be noted that a sequence of an obstruent followed by a sonorant constitues a higly marked coda according to the well-known sonority hierarchy (cf., e.g. Hooper (1976)p.203). Also, the sequence cannot be found anywhere in French codas except in forms like the first members of the pairs in (46-56). The restriction prohibiting this sequence can undoubtedly be expressed in the template.

We thus see that the French phenomena too, form a counter-example to Selkirk's Principle of Syllabic Structure Preservation. I will give a comprehensive account of the phenomena of French schwa deletion in chapter 3.

1.3.1.3. Dutch.

In Dutch we find the following forms:

(58) hij loopt /hɛj # lo:p+t/ [hɛjlo:pt] 'he walks'

(59) zij maakt /zɛj # ma:k+t/ [zɛjma:kt] 'she makes'

The morpheme +t - the present third person singular ending - is here part of the coda together with another stop. A coda consisting of two stops cannot be found in Dutch except in sequences like these[19]: lexical items plus verbal endings (as well as in loan words). So here too, there seems to be a violation of a well-formedness condition. This well-formedness condition is not expressible in major class features[20], and probably will therefore be part of the set of collocational restrictions. If we adopt the assumption that the set of collocational restrictions is included in the Principle of Syllabic Structure Preservation (a very plausible assumption, as we have seen in subsection 1.3.1.1), the Dutch case is another counter-example against the Principle of Syllabic Structure Preservation.

A further remark on the phonology of Dutch must be made here. The question must be raised where in the derivation the restriction prohibiting codas consisting of two stops is applicable. It appears to apply only within morpheme boundaries and only in lexical items. This amounts to saying that syllabic constraints are operative in the lexicon. So part of Lowenstamm's proposal for syllabification, viz. the assumption that syllabic structure is present in the lexicon, may be right for Dutch.

1.4. Broselow: late syllabification in Cairene Arabic.

Broselow (1979) treats the role of syllabification in Cairene Arabic. She refers to her dissertation (Broselow (1976)) for a justification of the rules.

According to Broselow, syllabification takes place rather late in

the phonology of Cairene Arabic, after the application of certain phonological rules. She mentions (p.360) that

> "the arguments that have been advanced in the literature for ordering rules of syllable structure assignment before some phonological rules are either (i) the phonological rule may be simplified by being permitted to refer to syllable structure, or (ii) some generalization may be captured which is lost or obscured if the rule is written in terms of segments rather than syllable structure."

She then shows that two sandhi rules of the language, Epenthesis (EP) and High Vowel Deletion (HVD) are by no means simplified if their environment is described in terms of syllable structure. For the details I refer the reader to her article.

In her article, she only shows that there is no need for syllabification rules to apply at the underlying level; she then formulates an alternative ordering hypothesis which I will give below. But first, I will show that the data given by Broselow <u>force</u> us to assume a late syllabification in Cairene.

For this we have to turn to section 3 of her article. There she mentions Kahn's (1976) arguments for syllable structure conditions in English, which are essentially of the form: all possible medial clusters in English may be analyzed into a possible word-final cluster, followed by a possible word-initial cluster. She then demonstrates the need for syllable structure conditions in Cairene. She mentions a major condition on Cairene Arabic syllables: no syllable may begin with more than one nonsyllabic segment, i.e. the maximal number of consonants preceding the vowel (or any other [+syll] segment) is one. She goes on (p.373):

> "However, regular triconsonantal verbs, which have the shape CaCaC or CiCiCi in the perfect, have imperfect stems of the shape CCVC. The stem vowel is either /a/, /i/ or /u/; it is impossible to predict which vowel a given stem will take".

She gives the following examples (p.373):

(60)[21]

	Perfect	Imperfect	
a/a	kasar	-ksar	'break'
a/i	katab	-ktib	'write'
i/i	libis	-lbis	'dress'
i/a	ʃirib	-ʃrab	'drink'
a/u	sakan	-skun	'live'

She goes on (p.373):

> "Since the shape of the imperfect stem is not predictable, it must under normal assumptions be listed in the lexicon; hence morphemes beginning in two consonants must be allowed."

However, the imperfect stems always take prefixes of the form (C)V, which means that the syllable structure condition prohibiting an initial consonant cluster is not violated, cf (61) (Broselow (1979) p.373):

(61)a. jiktib 'he writes'
b. tiktib 'she writes, you (m) write'
c. aktib 'I write'
d. niktib 'we write'

We see that the condition prohibiting an initial consonant cluster must apply at a point in the derivation where syllabification applies or has applied. It follows that the condition cannot be a morpheme structure condition. Hence the need for syllable structure conditions. I will assume with Broselow and Kahn that these conditions are embodied in the syllable structure assignment rules themselves (note that this assumption makes these conditions function rather like the syllable template in Selkirk's proposal). Now I can give evidence that syllabification must take place rather late in the phonology of Cairene Arabic.

One preliminary assumption has still to be made, viz. that all restrictions are expressed by the syllable structure conditions instead of syllable structure conditions. This assumption is also made by Kahn (1976) and Hooper (1976). Not making it would mean introducing a redundancy, because then we would have morpheme structure conditions along with syllable structure conditions, and the need for a separate set of condi-

tions applicable to the lexicon has not been demonstrated, in contrast to the need for syllable structure conditions.

Consider the functioning of the rule of EP, which, according to Broselow, is with HVD "perhaps the most clearly motivated and pervasive rule of the language"(p.360); the effects of this rule can be seen in (62), where the i in (62d) has been inserted by the functioning of EP:

(62)a. kátab 'he wrote'

b. makatábʃ 'he didn't write'

c. katábt 'you (m) wrote'

d. makatábtiʃ 'you (m) did not write'

The rule of EP breaks up clusters of three consonants, which are never found on the surface in Cairene Arabic. So we must infer that there is a syllable structure condition prohibiting clusters of three consonants. Apparently, this syllable structure condition is not applicable at the time of the application of EP. Since syllable structure conditions are embodied in the syllable structure assignment rules, syllabification must apply after the application of EP, which means that syllabification takes place at a later stage in the derivation than the underlying level.

The ordering hypothesis Broselow gives instead of a hypothesis involving syllabification at the underlying level is (p.368):

(63) Rules which insert, delete, or change the position of vowels in a string must precede rules of syllable structure assignment and therefore must also precede all rules which crucially refer to syllable structure.

1.4.1. A counter-example to Broselow's ordering hypothesis.

Counterevidence to Broselow's ordering hypothesis (63) is provided by the French forms in (64a) and (64b):

(64)a. bon /bɔ n/ [bɜ̃] 'good' (m)

b. bonne /bɔnə / [bɔn] 'good' (f)

The rule of nasalization in French, which deletes a nasal consonant in syllable-final position and nasalizes the preceding vowel, has applied

in (64a), but has not applied to (64b) after the deletion of the schwa. It has to be infered, then, that the rule of nasalization which crucially refers to syllable structure, is ordered before the rule which deletes the schwa. Thus syllable structure has to be present at the point of the derivation at which the rule deleting the schwa applies, which means that the assignment of the syllable structure has already taken place at this stage of the derivation.

1.4.2. Concluding remarks to Broselow's article.

I think that Broselow's idea that the assignment of syllable structure may take place at a later point in the derivation than at the underlying level is an interesting view. In chapter 2, it will be shown that also for French, one has to assume that the syllabification does not take place at the underlying level, but after the application of at least one phonological rule. One should fear, however, that the ordering hypothesis in (63), however attractive, is too strong, as illustrated by the French counter-example.

1.5. Concluding remarks to chapter 1.

In this chapter we have encountered four different proposals concerning syllabification. Three of them include the assumption that syllable structure is present, or is assigned, at the underlying level. This assumption is language universal. However, Broselow has shown that this assumption would complicate the descriptions of certain rules in Cairene Arabic. She therefore makes the assumption that syllabification takes place rather late in the phonology of Cairene Arabic. In addition, I have shown that the data given by Broselow force us to conclude that syllabification in Cairene Arabic cannot take place at the underlying level but must be ordered after at least one phonological rule. I therefore think that it

is justified to reject the assumption that syllable structure is universally present at the underlying level.

Two of the proposals treated in this chapter, those of Vennemann/Hooper and Lowenstamm include a persistent syllabification. Vennemann and Hooper have given evidence for this, but this has been shown to be unsound. Nevertheless, I think that persistent syllabification is not a bad principle (In chapter 2, I will adopt the idea of a persistent syllabification, applying once the initial syllabification has taken place.)

Concerning Selkirk's proposal, it has been shown that a number of counterexamples can be found against the Principle of Syllabic Structure preservation, so the Principle may not be very well-motivated. I also think that the Maximal Syllable Onset Principle is not very fruitful either. The idea of specified resyllabifications however, especially resyllabification under the influence of the stress pattern (as in rule (41)), seems attractive, and I will use this idea in chapters 2 and 3 to account for a phenomenon in French.

Notes to chapter 1.

1. Hooper (1976) is left aside here. In that work,"she doesn't assume that syllables can be defined or located in terms of existing segments and words, but rather takes the syllable, like the segment, to be an independent construct which is part of the representation of an utterance. Under this view syllable structure is basic, and the sequencing of segments, along with some of the phonetic properties of segments, are predictable from this basic structure" (Bell & Hooper (1978) p.4).

2. In a hierarchical framework the syllable boundary can be assumed to be situated between two consecutive segments that are not dominated by the same syllable node (σ).

3. In the case of [vɛx] vs. [vɛ:ç] there is of course no real ablaut in the sense of two alternating vowels. Here it is the final consonants which display an alternation.

4. There are in German also polysyllables in which the stressed vowel is short, but they do not display the short-long alternation with regard to their plural form, e.g. Ratte vs Ratten [rat] vs. [ratə n] 'rat, rats'.

5. In particular, I would like to thank Helga Wagner, a speaker of Standard German originating from Offenbach (suburb of Frankfurt/Main), for giving me much of her time and patience.

6. A well-known phenomenon in French is the voicing of s in the word-ending -isme, as in liberalisme, among educated speakers.

7. In a later edition of Siebs' book (edited by others), viz. Siebs (1961), we find (p.79):

> "In vielen Wortformen stösst silbenanlautendes, stimmhaftes b,d,g durch Ausfall eines folgenden Vokals mit l,n,r zusammen: eb(e)nen, Üb(e)ler, gold(e)ne, hand(e)le, Wand(e)rer, Wag(e)ner, reg(e)net. Das kann bei lässigem Sprechen zu veränderter Silbentrennung führen, indem das anlautende b,d,g in den Schluss der vorderen Silbe hinübergezogen und dadurch stimmlos wird, so etwa: (...) es reg-net [re:k-nə t]oder niederdeutsch [re:ç-nə t]). In gepflegter Sprache wird das b,d,g,in der Regel - unter Einfluss verwandter Formen - zur zweiten Silbe gezogen und jedenfalls stets stimmhaft gesprochen: (...) Bil-dler, Re-dner (...) leu-gne (...)."

'In many word forms syllable-initial, voiced b,d,g clusters with l,n,r due to the disappearance of a following vowel: [eb(ə)nən] 'to smooth', [yb(ə)lə r] 'evil', [gɔld(ə)nə] 'golden', [hand(ə)lə] '(I) act', [vand(ə)rər] 'hiker', [vag(ə)nər] 'cartwright', [reg(ə)nət] '(it) rains' This can lead to a changed syllable division in the case of careless pronunciation, because the syllable-initial b,d,g is taken into the former syllable and becomes consequently voiceless, thus: [re:k-nət] or Low-German [re:ç-nət](see section 1.1.2.,R.N.) In cultivated language b,d,g is as a rule taken into the second syllable, under influence of related forms, in any way it is always pronounced in a voiced way: [bil-dlər] 'sculptor', [re-dnər] 'speaker', [lɔi-gnə]'(I) deny'.

Thus we see that the authors of this edition of Siebs' book indeed locate the syllable boundary in different places for the two pronunciations. If this were indeed so, it could be explained by a violation of the Law of initials, because of analogy, as indicated by the authors of the 1961 edition of Siebs' work. This still does not mean, however, that a syllable boundary would have been transferred. The difference in the placement of the syllable boundaries could simply be the result of a different (initial) insertion, later in the derivation. The later edition of Siebs' work is probably Vennemann's source.

8. Hooper does not say how her rule has been changed in the standard dialect, but I assume that the specification $[-son]\begin{bmatrix}+son\\-nas\end{bmatrix}_0$ has been changed into: $[-son][+son]_0$. It is rather strange that Hooper first declares her rule(22) (here (4)) to be a universal rule and then modifies it for the standard dialect.

9. This does not mean that the principle of a persistent syllabification should be rejected. I will adopt a modified version of the idea of persistent syllabification in my account of the syllabification in French (see chapter 2).

10. For a justification of FPC I refer the reader to Vergnaud & Halle (1978) and Vergnaud (1979).

11. The forms in (18) are of the form Lowenstamm gives in his examples. They lack underlying final schwas or /z/'s in the plural endings of nouns, which are usually assumed underlyingly. If they are indeed assumed, the formulation of the truncation rule will have to be changed to include some boundary of a higher order than the word boundary (≠), e.g. the boundary of a phonological phrase (see Selkirk (to appear)). The truncation rule will then have to be formulated as:

$$\left[\begin{matrix}\alpha\text{voc}\\ -\alpha\text{cons}\end{matrix}\right] \rightarrow \emptyset \,/\_\_ \left\{\begin{matrix}\neq\\ £\end{matrix}\ [-\alpha\text{segment}]\right\}$$

(£ means here a phonological phrase boundary; it has been chosen for reasons of convenience).

12. The NIC as given here has been taken from the handout of the conference held by Kaye and Lowenstamm at the GLOW colloquium at Nijmegen in April 1980.

13. It should be noted that the lexical entries display a regularity in the distribution of segments. This is the result of the functioning of the Syllable Structure Conditions: an item not conforming to it will always be blocked by the conditions, unless it has been changed by phonological rules to conform the conditions. In the latter case, it will be entered in the lexicon in its changed form, unless there is a morphological alternation with the unchanged form.

14. These two cases are the obligatory deletion of a in the fem. sing. article /la/ before vowels, and the optional deletion (in careless speech of the y in the second person sing. pronoun /ty/ before vowels.

15. A third possible pronunciation, [luw ɛ st], where the glide is due to an epenthesis rule, is left aside here.

16. Kiparsky (1979) shows that the maximal onset principle is not valid for Finnish and Sanskrit. The principle would thus not be language-universal.

17. These data are from Juilland (1965) and have been checked with native speakers.

18. Not all speakers accept (57c) and (57d). There appears to be a systematic difference between the group of speakers who do and who do not accept the pronunciation in (57c) and (57d).

19. There are two exceptions: naakt [na:kt] 'naked' and markt [mɑrkt] 'market'.

20. This is so because a sequence of two obstruents in the coda is permitted if the first obstruent is [+cont], the second [-cont], as in a word like haast [ha:st] 'hurry', and the feature [continuant] is not a major class feature.

21. The vowels of these two verb-forms are not predictable, but those of other verb-forms are, suggesting indeed that the roots consist only of consonants. This would be an additional reason for a late syllabification. Cf. McCarthy (1979).

2. Syllabification in French.

2.0. Introduction.

In this chapter, a proposal will be formulated concerning the assignment of syllabic structure in French. It will be argued that syllabification takes place at a later stage in the derivation than the underlying level. Then, a theory of syllabification will be worked out making use of the concept of markedness. For this purpose, the concept of markedness will be enlarged, taking into account the number of syllables of which a given form (or 'prosodic unit') consists, as a factor in determining the degree of markedness of that form.

2.1. The point in the derivation at which syllabification takes place.

In this subsection, I will treat the issue of whether or not syllabic structure is present at the underlying level in French. I will argue that it is not. Essentially two arguments will be given for the assumption that syllabification takes place at a later stage in the derivation, after the application of at least one rule.

2.1.1. The truncation phenomena.

The forms in (1) display the conditions of application of the well-known truncation process in French:

(1)a. petit ami /pətit≠ami/ [pətitami] 'little friend'
b. petit papa /pətit≠papa/ [pətipapa] 'little papa'
c. cher ami /ʃɛr≠ami/ [ʃɛrami] 'dear friend'
d. cher papa /ʃɛr≠papa/ [ʃɛrpapa] 'dear papa'

In the phonetic form in (1b), the second t has been deleted. Confronted with these data, one may think that these are the result

of a syllable sensitive rule which deletes obstruents in syllable-final position. This point of view is held by Spa (1975). Like Vennemann and Hooper (see section 1.1.), he assumes an initial syllabification at the beginning of the phonological component (p.78), but in contrast to Vennemann and Hooper he does not assume a persistent syllabification. According to him, the syllabification is repeated at a certain stage of the derivation and he mentions the possibility that "this reinterpretation (= resyllabification, R.N.) is the consequence of a cyclic process that is not the same for all languages" (p.79).

For the form in (2), in which the phenomenon of <u>liaison</u> (= non-application of truncation) occurs, Spa posits the derivation in (3) (p.80-81; the boundaries higher than the word-boundary between which the resyllabification process takes place are represented as ≠≠; Spa refers to Dell (1973) for a justification of the rules of ELISION, V-E, VCE_2)[1]:

(2) petites amies /pətit+ə+z≠ami+əz/ [pətitzami] 'little friends (fem.)'

(3)

≠pətit+ə+z≠ami+ə+z≠≠	underlying form
$pə$ti$tə z$amiə z	SYLLABIFICATION
¦	ELISION, not applicable
ø	V-E
$pə$ti$tə$zamiz	REINTERPRETATION (resyllabification)
¦ ¦	TRONC
ø	VCE_2

In (3), the truncation rule (TRONC) applies to the <u>z</u> at the end of the form, but not to the one in the middle, because this <u>z</u> is not in syllable-final position at the stage of the derivation at which TRONC applies (i.e. after REINTERPRETATION).

As noted by Spa himself there are two major problems connected with his analysis. The first problem concerns forms as those in (4)

(4)a. petit rat /pətit≠rat/ [pətira] 'little rat'

b. petites roues /pətit+ə+z≠ru+z/ [pətitru] 'little wheels'

For these forms the ordering of the rules as in (3) does not produce the correct results, cf. (5) (p.81):

(5)	≠pətit≠rat##	underlying form
	$pə$titrat	SYLL
	$pə$ti$trat$	REINT
	ø	TRONC
	*[pətitra]	surface form

Spa proposes two possible solutions to this problem (p.81-82):

(i) the lexicon prescribes for these words the exceptional rule ordering TRONC, REINT, which would give the correct results.

(ii) the normal order REINT, TRONC is maintained but a provision is linked with REINT which blocks its application in the case of a C$ $\begin{bmatrix}+son\\-voc\end{bmatrix}$ sequence.

The first solution is not a real solution, because it appears to be totally adhoc. Treating an apparently regular phenomenon as an idiosyncrasy does not increase the explanatory power of the grammar.

The second solution must be rejected on the ground that an intervocalic tr cluster is always taken into the onset of the latter syllable in French. The forms in (6) and (7) receive the same pronunciation, and native speakers locate the syllable boundary to the left of the tr cluster.

(6) petit trou /pətit≠tru/ [pətitru] 'little hole'

(7) petites roues/pətit+ə+z≠ru+z/ [pətitru] 'little wheels'

The second problem connected with Spa's analysis concerns the fact that no instances can be found of the syllable sensitive truncation rule applying morpheme-internally. This fact in itself is not surprising, because morpheme-internally a syllable-final obstruent would always be deleted and would consequently be lost in the lexicon. The real problem is, however, that there are many every day words in French which are pronounced with a syllable final morpheme-internal obstruent, e.g. rester [rɛste], esperer [ɛspere]. Spa argues that these phonetic forms must be due to the prononciation savante 'scholary pronunciation',

and that words like these are marked as irregular in the lexicon.

I feel that this reasoning is very unconvincing. If these pronunciations are artificial, one must be able to notice a tendency in careless speech to omit the syllable-final obstruents. There is not the slightest tendency among French speakers, however, to pronounce words like <u>esperer</u> and <u>rester</u> as *[ɛpere] and *[rɛte] respectively. Historically speaking, the rule may have existed as a syllable-sensitive rule, but it is undeniable that present-day French allows for obstruents at the end of a syllable.

The two problems connected with the analysis of the truncation phenomena as being the result of a syllable-sensitive rule presented above are too serious for one to solve them by means of idiosyncratic markings in the lexicon. Instead of formulating a rule referring to phonological boundaries, I think it is preferable to formulate the truncation rule as a rule referring to syntactic and morpheme boundaries. This has been done by Dell (1973, p.258; 1980, p.157):

(8) Dell's truncation rule

$$[-son] \rightarrow \emptyset \; / \_\_ \left\{ \begin{matrix} \left\{ \begin{matrix} + \\ \neq \end{matrix} \right\} C \\ \# \# \end{matrix} \right\}$$

This rule is more complicated than the one proposed by Spa, but produces adequate results. The fact that this rule is more complicated than the one formulated by Spa (which is probably its historical form) may not be accidental. The rule is no longer productive in the sense that new words, including slang words whose pronunciation cannot be attributed to some scholarly pronunciation, are not subject to the truncation rule, as for instance <u>mec</u> [mɛk] 'guy'. It seems not unnatural that a rule that is falling into decay becomes more complicated to formulate.

2.1.2. Two arguments against syllabification taking place at the underlying level.

Having exposed the problems connected with the analysis of the truncation phenomena as being the result of a syllable-sensitive rule, and having shown that it is better to assume a rule that refers to syntactic and morphological boundaries, I will now give two arguments against the assumption that syllabification takes place at the underlying level.

The first argument concerns the organisation of the grammar. Selkirk (1979) proposes the principle of a mapping mechanism converting the syntactic structure into the phonological structure. Although Selkirk is not explicit about it, it seems more than reasonable to assume that the syntactic structure is no longer present once the mapping mechanism has applied. (Otherwise a multidimensional representation would be needed, enlarging considerably the required storage and processing capacity of the language organ). Syllabification is assumed to be part of this mapping mechanism. It can thus be inferred that once syllabification has applied, the syntactic and morphological structure is no longer present. Under these assumptions, the truncation rule, which as has been shown in section 2.1.1., must refer to syntactic boundaries, has to apply before syllabification takes place.

The second argument against syllabification taking place at the underlying level is provided by the syllable structure of forms like the adjective in (9):

(9) ils sont petits /p ə titz/ 'they are small'

If the syllabification applies prior to the truncation rule, which deletes the z, the syllabification of petits would be as in (10):

(10) $p ə $titz$

This would mean that tz would form the coda of the second syllable. Such a coda however, never shows up at the surface in French[2]. The syllabification device will have to include in one way or the other the notion of 'possible syllable', as embodied in the proposals of, among others, Kuryłowicz (1947), Vennemann (1972), Hooper (1972), Kahn (1976), Vogel (1977), Broselow (1979), Selkirk (forthc.) and Vergnaud & Halle (1978). The notion of 'possible syllable' would thus have to be extended to include a coda consisting of a tz cluster, which would only occur in underlying syllables. This is far from elegant, the more so since tz would constitute a rather marked coda because it violates the well-known sonority or strength hierarchy, proposed by, among others, Jespersen (quoted by Malmberg (1962)), Saussure (1915) and Hooper (1972, 1976): a fricative is considered to be less 'strong' or more 'sonorous' than a voiceless stop. Its unmarked position with regard to the voiceless stop is at the side of the nucleus. But in a tz coda, the position of the fricative is at the side of the syllable boundary. Thus French would have to be marked for this exception to the sonority hierarchy, only on the ground that an underlying syllable, not a phonetic one, displays such an order of segments. This would be a complication of the grammar.

If one adopts Lowenstamm's position, which is that syllabic structure is present in the lexicon, the argument dealing with the extention of the notion of 'possible syllable' no longer holds, because Lowenstamm does not use this notion in his theory. But the mere fact remains that underlyingly the rather marked tz coda has to be assumed.

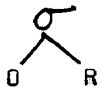
All these troubles can be done away with if one adopts the principle of an initial syllabification taking place later in the derivation, just as in Egyptian Arabic (cf. section 1.4.), which also shares with French the related phenomenon of syllable divisions regardless of

word boundaries (traditionally called enchaînement by French grammarians).

The assumption of a later initial syllabification also strengthens the concept of the syllable. Under this assumption, it is not necessary to distinguish between a morphological and a phonological syllable, which would refer to boundaries constituted by different principles, as in Spa's proposal.

2.2. The notion of 'possible French syllable'.

In this section, I will give a definition of the notion of possible French syllable'. It will be assumed that the syllable is hierarchical in nature, as proposed by Selkirk (forthc.), Vergnaud & Halle (1978) and Lowenstamm (1979). The syllable will be thought of as being obligatorily expanded into onset and rime, as in Lowenstamm's proposal, but unlike Selkirk's proposal, in which the expansion into onset is optional (but in which the expansion into rime is obligatory). Lowenstamm's proposal allows for nodes to be empty. An empty node, however, is more marked than a node filled with one segment. In this way, the fact is expressed that a syllable consisting of only one vowel is more marked than a CV syllable. There are numerous phonological processes (vowel insertion, consonant insertion and deletion) that result in a CV syllable. Processes resulting in a syllable structure of V syllables, however, have been rarely, if ever, attested. Thus, with Lowenstamm, I will assume as a universal syllable structure:

(11) 

(σ= syllable, O = onset, R = rime)

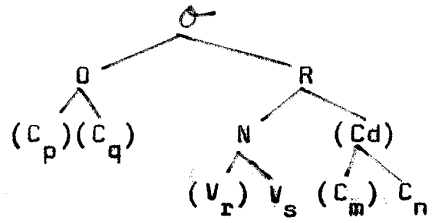
I consider the remainder of the syllable structure of a language, however, to be language-specific, because of the vast differences one encounters among languages in this respect. Lowenstamm allows empty nimes for Yiddish and Old English, which are already present in the lexicon and in which vowels are inserted at some stage of the deriva-

tion (Lowenstamm (1979) p.12-43) For French, however, there is little or no evidence for such extensive epenthesis processes as proposed By Lowenstamm for Yiddish and Old English. Also, as shown in section 2.1., there is evidence that syllable structure in French is not present in the lexicon. There is thus no reason to assume that a French rime can be empty at any stage of the derivation[3].

2.2.1. A syllable template for French.

I will assume the following syllable template for French, which together with a set of conditions on the coocurrence of segments will express the notion of 'possible French syllable':

(12) a syllable template for French



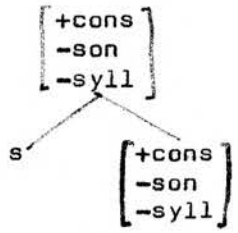
(Cd = coda
N = nucleus)

It should be noted, that according to this template, the rime is only optionally expanded into a coda, but that the coda, if it is present, cannot be empty.

2.2.2. An auxiliary template.

In addition to the template expressed in (12), I will adopt an auxiliary template, which will account for the sequences of s + obstruent which can occur in French onsets and codas. These sequences would otherwise be excluded by the conditions on the cooccurrence of segments (see section 2.2.3., below). This auxiliary template expresses that an s + obstruent cluster may be analyzed as one obstruent.

(13) auxiliary template



This template is interpreted in accordance with the Feature Percolation Convention (FPC) (cf.(11) of chapter 1.). As the reader will notice, this auxiliary template is identical to the one proposed by Selkirk (forthc.) in order to account for similar phenomena in English (see section 1.3.).

2.2.3. A strength scale and a set of conditions on the syllable template.

I will assume the following strength hierarchy for French. This hierarchy is rather similar to the language-universal ones proposed by Jespersen (1920), Saussure (1915) and identical to Vogel's (1977) universal strength scale:

(14) a strength scale for French.

obstruents/nasals/liquids/glides

4 3 2 1

The following conditions on the main syllable template (12) will refer to the above strength scale:

(15) a set of conditions on the main syllable template

i. $p > q$

ii. if $q = 2$, then $p = 4$

iii. $m = 2$

iv. if $m = 2$, then $n = 4$

Note that C_m is optional, thus condition iii. does not imply that the premise of condition iv. is automatically fulfilled.

Conditions (15i) and (15ii) express the fact that French onsets can consist of a cluster of obstruent+nasal[4], obstruent+liquid, nasal+glide, as well as liquid+glide, but not of a cluster oftwo obstruents[5], two nasals, two liquids, two glides, nasal+liquid.
Conditions (15iii) and (15iv) express the fact that a French coda may consist of a cluster of liquid+obstruent[6], but cannot consist of two obstruents[7], two nasals, two liquids [8], two glides, liquid+nasal [9], nasal+obstruent[10].

Apart from the conditions in (15), which refer to the strength scale, I will make here an hypothesis concerning the segments that can be found in the nucleus. This hypothesis will be an alternative to the Nuclear Integrity Constraint (NIC), proposed by Kaye and Lowenstamm (1980) (see section 1.2.3.). Instead of assuming as Kaye and Lowenstamm, that the segments in a branching nucleus are linked together in the lexicon (a consequence of Lowenstamm's assumption that syllabic structure is present in the lexicon) and that these segments remain linked together throughout the derivation (a consequence of NIC), I assume that a branching nucleus (which, as Kaye and Lowenstamm have shown, can only consist of wa, jɛ and ɥi) is in fact filled with only one (diphthongal) phoneme which nevertheless occupies two segmental slots in the nucleus. The reason for this latter assumption is that it is often observed that the fact that a syllable contains a diphthong or a long vowel (which also has to be one phoneme) is often a conditioning factor for numerous phonological (especially prosodic) processes. In recent proposals in the metrical phonology the phenomena in question have been accounted for by means of the assumption of a branching nucleus. It goes without saying that a phoneme cannot be split up, thus the part of NIC prohibiting this is now accounted for in a natural way. Additional evidence for the assumption of certain diphthongs as phonemes is the fact that it is only wa, jɛ and ɥi that are found in branching nuclei (cf. section 1.2.3.) One other feature of NIC has still to be accounted for, before this condition can be abolished altogether: the fact that according

to NIC, no material may be entered into the nucleus, if one segment is already present. I will account for this by the following condition which I will call the Branching Nucleus Constraint (BNC):

(16) BNC: The elements in a branching nucleus should be part of one single phoneme.

BNC also accounts for the fact that no other diphthongs than wa, jɛ, ɥi can be found in the nucleus.

2.3. The syllabification rules.

The notion of 'possible French syllable' has now been defined, and we can now procede to define the syllabification process. Apart from Hooper's proposal, essentially only one principle has been proposed as governing the process of syllabification: the Maximal Cluster Approach (MCA) as it is termed by Lowenstamm. Before formulating my own proposal, I will show the inadequacies of this principle with regard to the syllabification in French.

2.3.1. The Maximal Cluster Approach.

The Maximal Cluster Approach is based on a claim made by non-generative phonologists, e.g. Kuryłowicz (1947), according to whom consonant clusters are possible syllable onsets and codas if they are observed word-initially or word-finally respectively. It has been proposed in different versions by Kahn (1976), Vogel (1977), and Selkirk (forthc.). The essence of these proposals is that a given string of segments is syllabified in three steps:

(i) one syllable is associated with each [+syll] segment of the string.
(ii) a maximum number of consonants preceding each [+syll] segment is associated with the syllable containing the relevant [+syll] segment. The consonants must form a permissible word-initial cluster.
(iii) the remaining consonants are associated with the syllable containing the [+syll] segment preceding them. These consonants must form a a permissible word-final cluster[11].

It has been pointed out by Lowenstamm (1979,p.38) that this approach is inadequate for French. The MCA would syllabify words like

(17) aspirer [aspire]'to breath'

(18) ausculter [ɔskylte] 'to auscultate'

(19) astuce [astys] 'wit'

as:

(17') $a$spire

(18') $ɔ$skylte

(19') $a$stys$

These syllabifications, however, are incorrect. The correct ones are:

(17'') aspire

(18'') $ɔs$kylte

(19'') astys$

Lowenstamm motivates this type of syllabification by the functioning of the rule of Closed Syllable Adjustment, which changes e, ɔ to ɛ in closed syllables. He shows that this rule apparently functions to produce the ɛ in the second members of pairs as:

(20)a. étudiant [etydjɑ̃] 'student'

b. estudiantin [ɛstydjɑ̃tɛ̃] 'typical of students'

(21)a. gérer [ʒere] 'to manage'

b. gestion [ʒɛstjɔ̃] 'management'

(22)a. fêter [fete] 'to celebrate'

b. festin [fɛstɛ̃] 'festive'

More motivation in favour of a syllabification of the type of the forms in (17''), (18''), (19'') can be found in the fact that there are many French words starting with ɛ followed by s + stop, cf.(23), but no words starting with e followed by s + stop.

(23)a. Eskimo [ɛskimo] 'eskimo'

b. espoir [ɛspwar] 'hope'

c. estomac [ɛstoma] 'stomach'

It can thus be inferred that in forms like (20b), (21b) and (22b), the rule of Closed Syllable Adjustment must have applied because of the fact that the s belongs to the first syllable.

The MCA makes the wrong predictions in (17'), (18') and (19') because sp, st and sk are possible French word-initial clusters, as can be seen in (24):

(24)a. spécial [spesjal] 'special'

b. station [stasjɔ̃] 'station'

c. scandale [skɑ̃dal] 'scandal'

A possible solution would be provided by assuming a readjustment rule, transferring the s from the onset to the coda of the previous syllable, if it is preceded by a vowel and followed by a plosive. This solution has been adopted by Selkirk (forthc.). As is the case with the readjustment needed if one adopts a syllabification at the underlying level, no independent motivation can be found for such readjustment process[12]. This is why this solution should be rejected.

A readjustment would also be needed if one would adopt the proposal made by Hooper (1972), treated in section 1.1.2.. I repeat here her universal syllable boundary insertion rule:

(25) Hooper's universal syllable boundary insertion rule:

$$\emptyset \rightarrow \$ \;/\; [+\text{syll}] \left\{ [-\text{syll}]_0 \_\_ \left\{ \begin{matrix} [-\text{son}] \; [+\text{son} \\ [+\text{cons}] \; [-\text{cons}]_0 \end{matrix} \right\} \right\} [+\text{syll}]$$

As noted by Lowenstamm, Broselow (1976,p.50) shows that Hooper's rule would produce incorrect results for Egyptian Cairo Arabic, because it would syllabify a word like (26) as in (26'), while the correct syllabification is as in (26''):

(26) /abjad/ 'white'

(26') $a$bjad$

(26'') abjad$

Thus this proposal would have to be complemented by a readjustment rule, transferring the syllable boundary to the right of the b. But in that case, a generalization will have been lost, because, as Broselow writes (p.50): "all this cumbersome machinery serves to obscure the fact that Egyptian Cairo Arabic never allows more than one [-syll] segment to begin a syllable."

We may conclude that MCA as well as Hooper's proposal do not give the correct results for certain languages, and would necessitate readjustment rules in order to account for these languages. These readjustment rules, however, seem to be exempt of explanatory power. In addition, it may be concluded that a syllabification device will have to include the notion of 'possible syllable' in order to account for cases like the one of Egyptian Arabic[13].

2.3.2. Lowenstamm's alternative to MCA.

An alternative principle to the MCA has been adopted in the syllabification proposal made by Lowenstamm (1979,p.97). This proposal, which I have already partially treated in section 1.2., is repeated here as (27) and (28):

The proposal rests on two hypotheses:

(27)i. syllable structure is entered into the lexicon together with the segmental strings

ii. segmental strings are syllabified at any time

The syllabification device proper is as in (28):

(28)i. strings are analyzed by a syllable template, subject to the principles of ii.

ii. a. Principle I - minimize the number of syllables

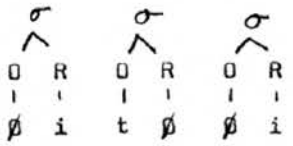
b. Principle II - minimize the degree of markedness of each syllable

iii. reanalyze by ii.

As shown in section 2.1., it is problematic to assume that syllabic structure is present at the underlying level in French, thus Lowenstamm's hypothesis (27i) has to be rejected. Hypothesis (27ii) will then have to be changed to the assumption that the segmental strings are syllabified at any time, <u>once the initial syllabification has taken place</u>.

Principle I of (28ii) is needed in Lowenstamm's framework, because that framework allows for zero rimes; without Principle I, a word like <u>iti</u> could have a structure like:

(29)



If one rejects the possibility of zero rimes, as I do (cf. section 2.2.), Principle I of (28ii) becomes superfluous.

Principle II of (28ii) provides us with an interesting alternative to the MLR. Recall from section 1.2.1. that Lowenstamm proposes a markedness convention with regard to the feature [segment]. This convention results in the following markedness metric (Lowenstamm (1979)p.62):

(30)

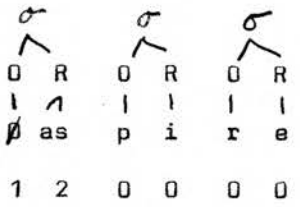
onset	rime	markedness
C	V	0
ø	ø	1
CC	VC	2
CCC	VCC	3
$C_1 \ldots C_n$	$VC_1 \ldots C_{n-1}$	n

Furthermore, Lowenstamm claims that there is no level of markedness for syllables (p.64), such that the markedness of the syllable cannot be computed by adding the markedness of the onset to that of the rime. Lo Lowenstamm yet uses the concept of syllable markedness, by which he means an ordered pair whose first member is the markedness specification of the onset and the second the markedness specification of the rime(p.67).

Let us now return to the problem of the syllabification of words like

the ones in (17), (18) and (19). The correct syllabification of (17), displayed in (17'') would have the following markedness values for onsets and rimes according to the markedness scale in (30), cf. (31):

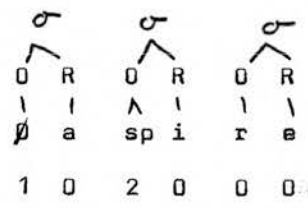
(31)



(markedness value)

The syllabification that is predicted by the MCA (displayed in (17') would have the following markedness values for onsets and rimes:

(32)



(markedness value)

The difference between (31) and (32) is that in (31), the coda of the first syllable has markedness value 2, and the onset of the second syllable markedness value 0, while in (32), these values are just the inverse. Principle II of (28ii) cannot predict the correct syllabification, because it says nothing about the way the markedness values are spread over the word (or prosodic unit across which the syllabification takes place).

2.3.3. An adaptation and elaboration of Lowenstamm's theory.

The inability of Principle II to correctly predict the syllabification of words like [aspire] might lead the reader to the conclusion that this principle should also be rejected. I think, however, that such a conclusion would have been drawn too hastily. The idea that syllabification is governed by a tendency to achieve the lowest possible markedness seems a potentially insightful principle to account for the syllabic

divisions across the string of segments, without resorting to otherwise unmotivated readjustments. Rather than trying to define yet another principle governing the syllabification process, it seems better to focus our attention to the markedness scale in (30). Recall from section 1.2.1. that this metric is based on the following markedness convention:

(33) [u segment] → [+segment] / $[_{O/R}$ ___]

This markedness convention is, in accordance with Kean's (1975) complement convention, a collapsing of the following four specifications:

(34)a. [u segment] → [+segment] / $[_{O/R}$ ___]

b. [m segment] → [-segment] / $[_{O/R}$ ___]

c. [u segment] → [-segment] / $\sim[_{O/R}$ ___]

d. [m segment] → [+segment] / $\sim[_{O/R}$ ___]

The environment $[_{O/R}$ ___] means a non-branching onset or rime, the environment $\sim[_{O/R}$ ___] means a branching onset or rime. If one does not accept the possibility of zero rimes, which is not needed in French (cf. section 2.2.), and which is of a rather abstract character because empty rimes, in contrast with empty onsets, never show up at the surface, the nature of the markedness convention in (33) becomes rather strange. It refers to the possibility of zero rimes, while this possibility does not exist. In the framework of the template in (12), it is only the coda, not the entire rime, that can be phonetically absent[14]. Instead of (33), I propose, therefore, two markedness conventions, one for onsets and one for codas:

(35) [u segment] → [+segment] / $[_{O}$ ___]

(36) [m segment] → [+segment] / $[_{Cd}$ ___]

The markedness convention for onsets (35) is the same as the markedness convention (33), but with the exclusion of the interpretation as $[_R \_\_]$. As (33), markedness convention (35) is interpreted in accordance with Kean's (1975) complement convention.

The markedness convention for codas in (35) expresses the fact that a CVC syllable can be considered as being more marked than a CV syllable, a CVCC syllable as more marked than a CVC syllable, etc. Markedness convention (36) should <u>not</u> be interpreted in accordance with the complement convention. There are two practical reasons for this: If we interpret (36) in accordance with the complement convention, one of the specifications would be:

(37) $[\text{u segment}] \rightarrow [\text{-segment}] / [_{Cd} \_\_]$

There is no case in which (37) will have any meaning, because a coda, if present, cannot be empty (see note 14). Another of the specifications would be:

(38) $[\text{u segment}] \rightarrow [\text{+segment}] / \sim [_{Cd} \_\_]$

This specification would clearly lead to absurd results, because it would specify a segment in a branching coda as unmarked. The result would be that a CCC coda would be specified as completely unmarked. It should be remarked that the assumption that (36) should not be interpreted in accordance with the complement convention is a mere provision without theoritical motivation. According to Kean (1975), only markedness conventions referring to major class features should not be interpreted in accordance with the complement convention. Although not a major class feature, the feature [segment] is of some more fundamental order than, e.g., the feature [strident]. It should also be noted that because of the branching character of the coda in (38), it is the juxtaposition and not the superposition of features that is relevant for the convention in that specification. Nevertheless, the fact remains that (35), which also refers to the feature [segment] <u>must</u> be interpreted

in accordance with the complement convention. The theory of markedness clearly awaits further elaboration with regard to the markedness of syllable structure[15].

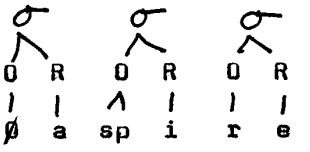
With the assumption of (35) and (36), the following markedness scale can be drawn:

(39)

onset	rime	markedness value
C	V	0
∅	VC	1
CC	VCC	2
CCC	VCCC	3
C_n	VC_n	n

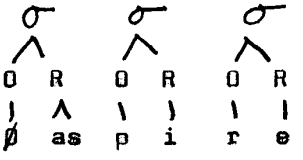
Principle II of (28ii) can now predict the correct syllabification of [aspire]. According to the markedness scale in (39), the markedness values of the onsets and rimes of the syllabifications as displayed in (17') and (17'') will be:

(40)a.



1 0 2 0 0 0

b.



1 1 0 0 0 0 (markedness values)

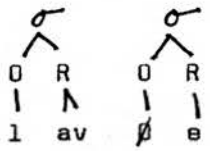
As one sees, the syllabification as in (40b) only has two onsets or rimes with markedness value 1, while (40a) has a rime with markedness value 1 and an onset with markedness value 2. Because of the lower markedness, Principle II of (28ii) will select (40a) as the correct syllabification.

At this point, something must still be decided concerning Principle II of (28ii). Probably, Lowenstamm proposed this principle only in view of cases like the French form /lav+e/ 'to wash'. Because of his assumption that syllable structure is present in the lexicon, the structure of the lexical part of this form will be originally as in (41):

(41)

A morphological rule will now create the form as in (42) (with markedness value according to Lowenstamm's markedness scale as displayed in (30):

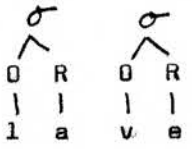
(42)



0 2 1 0 (markedness values)

Because of Principle II of (28ii), the string will be resyllabified as:

(43)



0 0 0 0 (markedness values)

In this case, the markedness values of all onsets and rimes have decreased or remained the same. In the case of the choice between (40a) and (40b) however, it is the markedness of the coda of the first syllable <u>together</u> with that of the onset of the second syllable that must be considered. This is why I introduce here the notion of <u>syllabic markedness of a word (or prosodic unit)</u>:

(44) The syllabic markedness of a prosodic unit can be computed in the following way:

i. determine the markedness of all onsets and rimes by means of (39);

ii. add all markedness values;

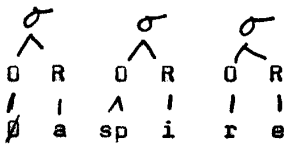
iii. add to this sum 1 for each syllable.

(44iii) is based on the assumption that a word consisting of <u>n</u> syllables is less marked than a word consisting of <u>n</u>+1 syllables, other things being equal (e.g. in the case of merely CV syllables). (43iii) will receive

further motivation in section 3.2. (on schwa-deletion) and 3.3. (on semivocalization).

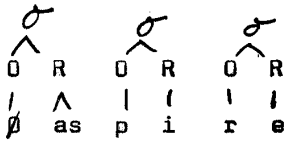
The syllabic markedness values of the syllabifications of [aspire] are:

(45)a.



1+ 0 + 2+ 0 +0 +0 + 3 (= number of syllables) = 6

b.



1 + 1 +0+ 0 + 0 +0 + 3 (= number of syllables) = 5

The principle of syllabification to lowest possible markedness rightly predicts that (45b) is the correct syllabification.

2.4. A summary of the syllabification proposal.

At this point, it is useful to give a summary of the proposals on syllabification that I have made in the previous sections of this chapter. I have given motivation for the following proposals concerning French syllabification:

(46)i. syllabification does not take place at the underlying level, but at a later stage, after the application of the truncation rule;

ii. once the initial syllabification has taken place, syllabification takes place at any time;

(47) The syllabification proper takes place according to the following principle:
- minimize the syllabic markedness of the prosodic unit across which the syllabification takes place, in accordance with the syllable templates (12) and (13), subject to the conditions in (15), that refer to the strength scale in (14).

2.5. A provision for stop+liquid clusters and a proposal for a specified resyllabification under the influence of stress.

The proposal on syllabification in French has still to be modified

and enlarged on two points. The first one concerns the behaviour of stop+liquid clusters, while the second concerns a specified resyllabification under the influence of stress.

2.5.1. A provision for stop+liquid clusters.

The syllabification proposal that I have made in the previous sections would predict the wrong syllabification for words like (48):

(48) libr**e**ment /librəmɑ̃/ 'freely'

According to the proposal, (49a) would be selected as the correct syllabification, because its syllabic markedness is lower than that of (49b):

(49)a.

0 +1 + 0 +0 + 0 +0 + 3 (= number of syllables) = 4

b.

0 +0 +2 + 0 + 0+ 0 + 3 (=number of syllables) = 5

This is clearly the wrong prediction. There can be found no instances in French in which the segments of a stop+liquid sequence are not tautosyllabic. I will hypothesize therefore that the two segments in such a sequence cannot be split up into two different syllables. Moreover, I will hypothesize that a stop+liquid cluster receives markedness value 1 instead of 2, which it would get according to the markedness scale in (39). The major reason for this will be given in section 3.1.2.2.. But at this point, some motivation can be given. Pillinger (1981) has shown that in Latin, a CL cluster behaves differently from a cluster consisting

of a cluster of a consonant followed by another (tautosyllabic) consonant that is not a liquid in two ways by means of evidence from stress and meter. This can be found in (50), which is a scheme reproduced from the handout of Pillinger's talk:

(50)

	CC	CL
stress:	renders penultimate heavy	does not render penult. heavy
metre:	renders syllable heavy	does not render syll. heavy
degemination:	occurs if one C is part of a geminate cluster	does not occur if C is part of a geminate cluster

This evidence from Latin provides motivation for the assumption that a CL cluster is less marked than a CC cluster, and that under certain circumstances it acts as a single consonant.

Here, a word must be said about the concept of syllabic markedness developed earlier in this chapter. It might strike the reader as odd that it is only the number of segments of a given form that determines the syllabic markedness of a given form. Indeed, as the above case from Latin shows (as well as the French case that will be treated in section 3.1.2.2.), also the nature of the segments in question might be a factor in determining the syllabic markedness of a given form. In fact, a more elaborated concept of syllabic markedness than the one put forth in the present work may have to express the interaction of several, sometimes conflicting, tendencies, like (i) the tendencies to avoid a breach of the sonority hierarchy, (ii) the tendency to achieve a CV syllable, and also (iii) the tendency to achieve a maximal onset. The exact nature of this interaction may or may not be different for individual languages.

2.5.2. A specified resyllabification under the influence of stress.

Like Selkirk (see section 1.3.), I will assume that a specified resyllabification takes place under the influence of stress. This resyllabification will apply once the stress has been assigned.

I will assume that like the general syllabification process, this resyllabification will apply persistently once it has first applied. I will also assume that this resyllabification process takes precedence over the general syllabification process during its reapplications. Also, for reasons that will become clear in section 3.1.1.2., I will assume that the syllable templates can be violated by this resyllabification process. Thus in a sense, this resyllabification process is 'stronger' than the general syllabification process.

The nature of the resyllabification process is as follows: a stressed syllable will attract segments from the onset of the following syllable, if this lattter is unstressed. Selkirk (forthc., see (41) of the previous chapter) has made a similar proposal for English, while Hoard (1971) and Basbøll (1972) have integrated the attraction of segments under the influence of stress in their accounts of the syllabification in English and Danish respectively. I will tentatively formulate this resyllabification as follows:

(51) $X \begin{bmatrix} +\text{syll} \\ +\text{stress} \end{bmatrix} C_0 \; \$ \left\{ \begin{matrix} [-\text{syll}] \\ \\ [-\text{syll}]_2 \end{matrix} \right\} \begin{bmatrix} +\text{syll} \\ -\text{stress} \end{bmatrix} \; Y$ OBL OPT

1 2 3 4 5 6 7 ⇒

1 2 3+5 4 ∅ 6 7

The full motivation for this resyllabification will be given in section 3.1.1.2., in the account for the obligatory deletion of schwa in (52) and the optional deletion of schwa in (53):

(52) elle est petite /ɛl#ɛt#pətit+ə/ → ∅ 'she is small'

(53) astre /astrə/ → ∅ 'star'

2.6. Concluding remarks to chapter 2.

In this chapter, I have made a proposal for the syllabification in French, on the basis of an idea put forth in Lowenstamm (1979), viz. syllabification to lowest possible markedness. Additional motivation for the proposal will be provided in chapter 3. It has been necessary to make a provision for stop+liquid clusters. The fact that this provision is needed calls for a more elaborated theory of syllabic markedness, also taking into account the nature of the phonological segments. A theory of collocational properties of segments will have to be developed and will have to be integrated into the theory of markedness.

Notes to chapter 2.

1. Dell (1973,p.258-9) formulates these rules as follows:

   ELISION: $\partial \rightarrow \emptyset$ / ___ ([-seg]) [+syll] OBL

   V-E : $\partial \rightarrow \emptyset$ / V___ OBL

   VCE_2 : $\partial \rightarrow \emptyset$ / VC___(≠)C OBL

2. Apart from words like axe [aks] 'ax', I assume that the marked coda in this form is the result of a specified resyllabification under the influence of stress, in which the syllable template can be violated. I will treat this specifies resyllabification in section 2.5.2..

3. As will be shown in section 2.3., I will assume that a string of segments is resyllabified after the application of each phonological rule, provided that the first syllabification has taken place. Thus a deletion of a vowel will always be followed by a resyllabification, and as a result there will not occur an empty nucleus.

4. There are just a few French words that have an onset consisting of an obstruent+nasal cluster, e.g. pneu [pnø]'tyre', snob [snɔb]'snob' and smaragdite [smaragdit] 'emerald'. These words are mostly of foreign origin, thus the question is debatable whether obstruent+nasal really constitutes a possible French onset.

5. In section 2.2.2., a provision has been made for onsets and codas consisting of s+obstruent by means of the auxiliary template in (13).

6. This can be seen in (57a) and (57b) of the previous chapter, embarquement [ɑ̃barkmɑ̃]'embarcation' and renversement [rɑ̃vɛrsmɑ̃] 'reversal'. See also note 18 of the previous chapter.

7. There are codas consisting of s+obstruent, accounted for by the auxiliary template (13). Codas like these can be found in one of the realizations of words like brusquement /bryskəmɑ̃/ 'suddenly' which, according to Juilland (1965) can be pronounced as both [bryskəmɑ̃]and [bryskmɑ̃]. According to this and other sources on French pronunciation, however, exactement /ɛgzaktəmɑ̃/ cannot be pronounced as *[ɛgzaktmɑ̃]. For the word-final codas in words

like exact [ɛgzakt], as well as parle [parl] 'speak' and vacarme [vakarm] 'tumult', an explanation will be given in section 3.5.2..

8. Cf. note 7.

9. Cf. note 7.

10. It has been shown in section 1.4.1. that the Nasalization rule, which deletes the nasal consonant and nasalizes the preceding vowel, applies before the rule which deletes the final schwa (Schwa-deletion). This implies that in words like plante /plantə/ [plãt], the nasal consonant is not in the same syllable as the t, at any level at which it is present. Hence it is not necessary to allow for a coda consisting of a nasal consonant + obstruent.

11. Vogel (1977)proposes as her 'Law of codas' that the remainder of the consonants must be associated to the syllable containing the [+syll] segment preceding them, regardless of whether or not they form a permissible word-final cluster.

12. One could argue that such readjustments represent the language-specific part of the syllabication process, while MCA represents the language-universal part. Still, the readjustments would have to be related with other phenomena in the language in question.

13. A closer look reveals that rule (25) incorporates in its environment the expression of 'possible onset' in the languages studied by Hooper (as well as Vennemann) i.e. Spanish, German and Icelandic. In fact (25) will give the correct results for most West-European languages, which are the languages most studied.

14. If the coda is phonetically absent, the rime has not been expanded into a coda, because if it was, at least one segment would be present, because the coda is obligatory expanded into at least one segment cf. template (12). This means that there can be no zero codas.

15. Deirdre Wheeler has brought to my attention that Cairns and Feinstein (1980) have written a paper concerning the markedness of segments in syllables. In that paper it is not only the number of segments, but also their nature that is proposed as relevant to the relative markedness of syllables. Unfortunately I have been unable to consult this paper.

3. Schwa-deletion and Semivocalization in French: a modular approach.

3.0. Introduction.

In this chapter, a close look will be taken at two processes in French: the deletion of schwa and the change: high vowel → glide (semivocalization). It will be shown that the various phenomena of schwa-deletion and semivocalization, which at first sight appear to be of a disparate character, can be accounted for by the assumption of two phonological rules, one for schwa-deletion and one for semivocalization. These two rules will be formulated without an environment, but will be subject to two conditions The assumption of rules without environment which are subject to certain condition has proved to be useful in syntax, (see, e.g., Chomsky & Lasnik (1977).

3.1. French Schwa-deletion.

3.1.0. Introductory remarks.

Dell (1973; 1980), Selkirk (1978) and Vergnaud and Halle (1978) have given accounts for the phenomena of schwa-deletion in French. Of these three accounts, the one by Dell is by far the most complete as far as the data that have to be accounted for are concerned. But unfortunately, Dell's proposals seem to be only observationally adequate, because his rules do not represent important generalizations. In all, he needs no less than ten rules[1], some of which include quite complicated environments. Dell himself writes quite revealingly (1973,p.195;1980,p.169) that the dialect of French he <u>describes</u> (italics mine) is his own idiolect, at that there may be considerable differences between speakers even if they have very much the same background. These differences are according to him "too considerable to be ignored or treated as accidental vagaries around a fictitious 'average pronunciation'".

Unfortunately this approach has not provided us with much insight into what regularities or laws govern the phenomena a schwa-deletion which

at first sight appear to be of a disparate character. The first thing one notices is that only schwa, and no other vowel, can be deleted in French (apart from three isolated cases[2]). By positing his ten rules, Dell treats this fact as a mere accident. This arouses suspicions that an important generalization has not been captured, and the reader will see below, in section 3.1.2., that more such suspicions will arise. But first, I will treat in section 3.1.1. the only two analyses of French schwa-deletion phenomena to my knowledge that are of a principled character: the metrical analyses of Selkirk (1978) and of Vergnaud and Halle (1978). After having exposed the limitations of these analyses, I will give another principled account, involving one of the most simple phonological rules theoretically possible. It will be shown that the differences in idiolect can often be accounted for by differences in the 'possible syllable' for individual speakers.

3.1.1. The metrical proposals.

3.1.1.1. Selkirk.

Selkirk (1978) uses the notion of <u>foot</u> (the term is borrowed from Libermann (1975) and Libermann & Prince (1977). The <u>foot</u> is a higher order unit composed of syllables, like the syllable is a higher order unit composed of segments. The principles governing the composition of feet in particular languages are thought to be partly univarsal, partly language-specific.

According to Selkirk, French is different from English whose feet normally consist of two, perhaps three, syllables. But in French, the feet consist generally of one syllable (Selkirk mentions that the traditional distinction between syllable-timed languages like French and stress-timed languages like English can perhaps be viewed as following from the difference in the general definition of foot in the two languages). But there are cases in which the French foot can consist of two syllables, because, according to Selkirk, in addition to a

general principle that makes a foot out of each syllable, a second principle is at work, according to which a foot that consists of a syllable whose second element is a schwa can be merged with the preceding foot, cf. the principles of French Foot Formation in (1) (⊆ is the symbol used for foot):

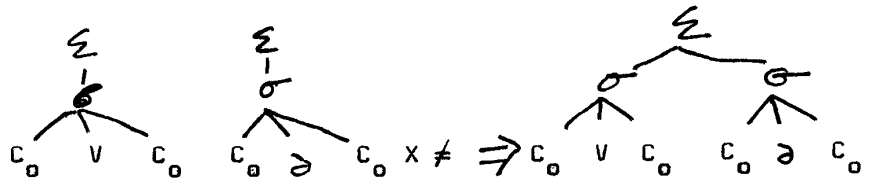
(1) Selkirk's French Foot Formation:

I. The simple Foot

OBL

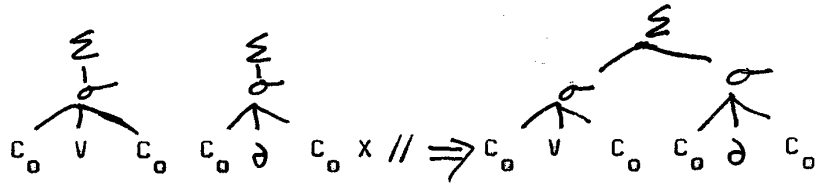
II. The Derived Foot

A.



OBL
(R to L)

B.

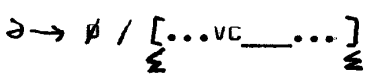


OPT

Rules (I), (IIA) and (IIB) apparently apply in the given order. (IIA) is differentiated from (IIB) in two ways: (IIA) operates between word boundaries, and is obligatory, while (IIB) has the entire utterance as its domain, and is optional.

Somewhat later in her article (p.7), Selkirk gives a rule of schwa-syncope, which refers to the notion of foot:

(2) Selkirk's ə-syncope:



OBL

This rule accounts for the deletion of schwa in forms like those in (3):

(3)a. souvenir /suvənir/ [suvnir] 'to remember'

b. promène /prɔmənə/ [prɔmɛn] 'walk'[3]

c. promener /prɔməne/ [prɔmne]'to walk'

The rule cannot delete the schwas in forms like those in (4):

(4)a. couleuvre /kulœvrə/ [kulœvr] 'kind of snake'

b. exactement /ɛgzaktəmɑ̃/[ɛgzaktəmɑ̃] 'exactly'

In (4a), the schwa can be deleted depending on other factors, in particular the stress pattern of the sentence, as indicated by Dell (1973) and others, cf. my account of this phenomenon in section 3.1.2.2.(below). The deletion of schwa in forms like the ones in (3) is obligatory because both rule (IIA) of (1) (which forms bisyllabic feet in the forms of (3) and the schwa-syncope rule in (2) are obligatory. However, if a word boundary occurs between a syllable containing a schwa and the preceding syllable, the deletion of schwa is optional, because in that case a bisyllabic foot can only be formed by application of rule (IIB), which is optional, and the SD of the rule of schwa-syncope in (2) properly includes a bisyllabic foot. The sentence in (5) thus has five possible realizations, which are displayed in (6):

(5) Il a envie de te revoir /il≠a≠ɑ̃vi≠də≠tə≠rə+vwar/ 'he feels like seeing you again'

(6)a. [ilaɑ̃vidətərəvwar]

b. [ilaɑ̃vidtərvwar]

c. [ilaɑ̃vidətrəvwar]

d. [ilaɑ̃vidtərəvwar]

e. [ilaɑ̃vidətərvwar]

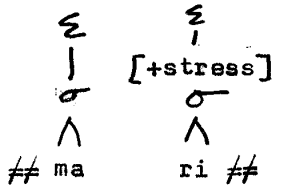
Selkirk also makes use of the French Foot Formation in order to account for two other phenomena in French: stress assignment and the change of e, ə to ɛ in certain environments, among which closed syllables.

For stress assignment she simply posits the rule:'stress the last foot in a word', cf.(7):

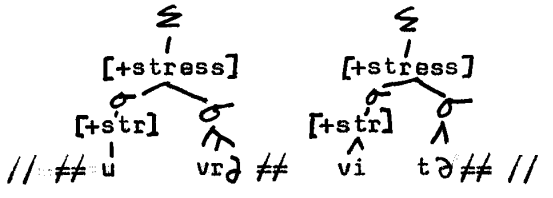
(7) $\mathcal{E} \rightarrow$ [+stress] / ___ ≠

She then gives two examples of the functioning of this rule (p.8), cf.(8):

(8)a. mari 'husband'



b. ouvre vite 'open quickly'



In the formulation of rule (7), no mention of ə needs to be made, because the realization of stress on the first syllable inside the feet in forms like (8b) follows automatically from the fact that it is in some sense the 'nucleus' of the foot or 'supersyllable'. Put in terms of the framework of Liberman & Prince (1977), the syllable on the left is stressed because it is the strong or S of a S–W pair.

For the change of e, ə to $\mathcal{E}$, Selkirk posits the rule:

(9) $\left\{\begin{matrix} e \\ ə \end{matrix}\right\} \rightarrow \mathcal{E} / \left[_{\mathcal{E}} \; C_0 \_\_ W \; \right]_{\mathcal{E}}$

$W \neq \emptyset$

This rule can account for the alternation e/$\mathcal{E}$ and ə/$\mathcal{E}$ in the pairs of (10):

(10)a. cédait [sedɛ]/ cède [sɛd] 'gave in/gives in'

b. célébrait [selebrɛ]/ célèbre [selɛbr] 'celebrated/famous'

c. insérait [$\hat{\mathcal{E}}$serɛ] / insère [$\hat{\mathcal{E}}$sɛr], insertion [$\hat{\mathcal{E}}$sɛrsjɔ̃] 'included/includes, inclusion'

d. sevrait [səvrɛ]/ sèvre [sɛvr] 'weaned/weans'

This rule can also account for the occurences of $\mathcal{E}$ in forms like those in (11), where it is not in a closed syllable:

(11)a. céderiez [sɛdərje] 'would give in'

b. sèvrerez [sɛvrəre] 'will wean'

c. (elle est) célèbre donc [selɛbrədɔ̃k] 'so (she is) famous'

d. sèvre-le [sɛvrələ] 'wean it'

Selkirk concludes that she has given a unified account of the phenomena involving schwa in French by using a prosodic approach: according to her, the special status of French "mute" e follows from its special status in prosodic structure.

However, below I will demonstrate that this conclusion is overly optimis tic.

3.1.1.2. Inadequacies and limitations of Selkirk's proposal.

In this subsection, I will give instances of schwas that are maintained in places where, according to Selkirk's proposal, they should be deleted, and of schwas that are deleted in places that Selkirk's proposal does not account for. It will be shown that in these latter cases, the deletions of schwa have certain features in common with schwa-deletions that Selkirk does account for. In other words, it will become clear that a generalization has not been captured.

The first instance concerns the apparent optionality of the deletion of schwas which according to Selkirk's proposal of French Foot Formation would be part of the second syllable of a bisyllabic foot, whose syllables are part of the same word. Vergnaud & Halle (1978, section 5.2.) give three different phonetic realizations of the form in (12), cf. (13):

(12) tu devenais /ty≠dəvənɛ/ 'you became'

(13)a. [tydəvnɛ]

b. [tydvənɛ]

c. [tydəvənɛ]

Selkirk's proposal can only account for (59a), because rule (IIA) of the rules of French Foot Formation in (1) obligatorily makes a foot out of the first two syllables of /dəvənɛ/, and the rule of schwa-syncope in (48) in also obligatory. How can this situation be dealt with if one wishes to maintain the essence of Selkirk's proposal ? (13c) could be

accounted for by making the rule of Schwa-Syncope optional. In that case the rule cannot account anymore for the obligatoriness of the schwa-deletion in (3b), /prɔmənə/ [prɔmɛn], but this is not a problem in itself, because a rule deleting the final schwa is needed anyhow for the deletion of schwa in words like (4a) /kulœvrə/ [kulœvr], cf. my treatment of this phenomenon in section 3.1.2.2. (below).

It is more difficult to accommodate Selkirk's proposal in order to account for (13b). It could be accounted for by not assuming (IIA) but only (IIB). Bisyllabic feet would then only optionally be formed out of two monosyllabic feet, the second of which has a schwa as its vowel. Another possibility would seem to reverse the order of rules (IIA) and (IIB). But in both these cases other problems arise: stress assignment in (7) would not be able to account for the stress in (14):

(14) il sèvre /il≠sə̀vrə/ [ilsɛ̀vr] 'he weans'

In (14), the first schwa of the underlying form has been changed to ɛ̲ by application of rule (9). If one assumes only rule (IIB), which is optional, no bisyllabic foot would need to be formed out of /sə̀vrə/, and the stress assignment rule in (7) would assign stress to the final syllable of the word, which has a schwa as its vowel. This is clearly the wrong result. (as indicated by Selkirk, the final schwa is deleted depending on stress assignment, thus the stress assignment rule will have to apply before the deletion). The reversal of the order of rules (IIA) and (IIB) would present the same problem. Because of the optionality of (IIB), a possible outcome would be:

(15) [ilsə] [vrə]
ɛ ɛ ɛ ɛ

Rule (7) would assign stress to the second foot in the form in (15), which again would mean stressing the final syllable containing schwa. It has to be concluded, then, that Selkirk's proposal cannot be adapted to account for the deletions of schwa of the type displayed in (13b),

unless the rule of stress assignment (7), which occupies a central place in Selkirk's proposal, is dropped.

Another type of instances that is problematic for Selkirk's proposal is the possible deletion of schwa in forms like the ones in (16) and (17), versus the non-deletion of schwa in (18)[4]:

(16)a. pudiquement /pydikəmɑ̃/ [pydikmɑ̃] 'chastely'

b. bombement /bɔ̃bəmɑ̃/ [bɔ̃bmɑ̃] 'bombing'

c. froidement /frwadəmɑ̃/ [frwadmɑ̃] 'coldly'

(17)a. débarquement /debarkəmɑ̃/ [debarkmɑ̃] 'debarcation'

b. escarpement /ɛskarpəmɑ̃/ [ɛskarpmɑ̃] 'steep slope'

c. heurtement /œrtəmɑ̃/ [œrtmɑ̃] 'collision'

d. renversement /rɑ̃vɛrsəmɑ̃/ [rɑ̃vɛrsmɑ̃] 'reversal'

e. énervement /enɛrvəmɑ̃/ [enɛrvmɑ̃] 'excitement'

f. émergement /emɛrʒəmɑ̃/ [emɛrʒmɑ̃] 'emergence'

g. écorchement /ekɔrʃəmɑ̃/ [ekɔrʃmɑ̃] 'flaying'

h. sveltement /svɛltəmɑ̃/ [svɛltmɑ̃] 'slimly'

i. burlesquement /byrlɛskəmɑ̃/ [byrlɛskmɑ̃] 'burlesquely'

j. manifestement /manifɛstəmɑ̃/ [manifɛstmɑ̃] 'manifestly'

(18)a. probablement /prɔbabləmɑ̃/ [prɔbabləmɑ̃] 'probably'

b. simplement /sɛ̃pləmɑ̃/ [sɛ̃pləmɑ̃] 'simply'

c. aveuglement /avœgləmɑ̃/ [avœgləmɑ̃] 'blindly'

d. encerclement /ɑ̃sɛrkləmɑ̃/ [ɑ̃sɛrkləmɑ̃] 'encirclement'

e. librement /librəmɑ̃/ [librəmɑ̃] 'freely'

f. âprement /aprəmɑ̃/ [aprəmɑ̃] 'rudely'

g. tendrement /tɑ̃drəmɑ̃/ [tɑ̃drəmɑ̃] 'tenderly'

h. autrement /otrəmɑ̃/ [otrəmɑ̃] 'differently'

i. maigrement /mɛgrəmɑ̃/ [mɛgrəmɑ̃] 'meagrely'

j. médiocrement /mediɔkrəmɑ̃/ [mediɔkrəmɑ̃] 'in a mediocre way'

k. ivrement /ivrəmɑ̃/ [ivrəmɑ̃] 'in a drunk way'

l. exactement /ɛgzaktəmɑ̃/ [ɛgzaktəmɑ̃] 'exactly'

Selkirk's proposal can only account for the deletion of schwa in the forms in (16). It cannot account for the fact that also in the forms in (17), the schwa can be deleted. In the underlying forms in (17), the schwa is preceded by a liquid+obstruent cluster or an /s/+obstruent cluster, whereas the SD of the rule of Schwa-Syncope in (2) only has one consonant preceding the schwa. If one takes a close look at the differences between the forms in (16) and (17) (where the schwa can be deleted) on the one hand, and the forms in (18) on the other, one notices that the consonant or consonants that precede the schwa in the forms in (16) and (17) constitute a possible coda in French, while the consonant cluster in the forms in (18) do not form a possible coda (cf. section 2.2.).

This leads to the conclusion that it is not unlikely that the notion of 'possible syllable' plays an important role in the processes of schwa-deletion in French, and may indeed be a major conditioning factor. Apart from the fact that Selkirk's proposal does not account forthe deletion of schwa in the forms in (17), it seems that she has failed to capture an important generalization.

Apart from the problems concerning the deletion of schwa, another objection may be raised against Selkirk's proposal. For this we must look once again at the underlying form in (12) tu devenais /ty≠dəvənɛ/. According to Selkirk's rules of Foot Formation in (1), the division in feet must be as in (19):

(19) [ty] [dəvə] [nɛ]
Ft Ft Ft Ft Ft Ft

Rule (9), the rule changing e,ə to Ft if these vowels are preceded by a consonant and followed by non-null material within the same foot, would have to apply to the foot [dəvə] (Ft Ft), making it [dɛvə] (Ft Ft). The phonetic form, however, cannot be *[dɛvənɛ]. Other forms to which rule (9)

apparently does not apply can be found in (20):

(20)a. derechef /dərə ʃɛ f/ [dər(ə) ʃɛ f] *[dɛr(ə) ʃɛ f] 'once more'

b. démesure /demə syrə/ [dem(ə)syr] *[dɛm(ə)syr] 'excess'

c. développer /devəlɔpe/ [dev(ə)lɔpe] *[dɛv(ə)lɔpe] 'to develop'

d. revenir /rəvənir/ [rə v(ə)nir] *[rɛv(ə)nir] 'to come back'

In the forms in (21), a foot can optionally be formed out of the two syllables containing schwa (by virtue of rule (IIB) of (1)). Rule (9) would have to apply subsequently, but would produce the wrong outcome:

(21)a. je ne crois pas /ʒə ≠nə≠krwa≠pa/ [ʒən(ə)krwapa] *[ʒɛn(ə)krwapa]
'I do not believe'

b. tu le reverras /ty≠lə≠rəvɛra/ [tyl(ə)rəvɛra] *[tylɛrə vɛra]
'you will see him again'

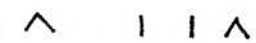
I see no way that rule (9) could be modified in order to account for its non-application to the forms in (20) and (21). The rule has been devised by Selkirk replacing the well-known rule of Closed Syllable Adjustment (which changes e, ə to ɛ in closed syllables), in order to account also for the phonetic forms in (11). Because of the counter-examples in (20) and (21), rule (9) has to be rejected and one may fear that the occurences ɛ in the phonetic forms in (11) can only be accounted for by a morphological rule, that historically may have a phonetic motivation.

As a conclusion to this criticism of Selkirk's proposal, it can be said that Selkirk's proposal can only account for a fairly limited number of cases of schwa-deletion in French, that she has apparently obscured certain generalizations that can be made, and that the metrical rule she proposes in order to account for the phenomena of the alternations e/ɛ and ə/ɛ is empirically inadequate. It has furthermore been shown that if one wishes to broaden Selkirk's analysis in order to account for more cases of schwa-deletion, another feature of her proposal, viz. the rule of stress assignment, cannot be maintained.

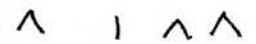
3.1.1.3. Vergnaud & Halle.

Vergnaud & Halle (1978, 5.2.) propose an account for certain types of schwa-deletion in French in which they "lean heavily on the solution advanced by Selkirk (1978) (...)" (p.5-7). According to their proposal, full vowels and schwas in the context CC___ are represented by branching nodes, while other vowels may or may not be branching. As an illustration, they give all possible representations of <u>tu devenais</u>, given here as (22):

(22) /ty d əvə nɛ/

a. 

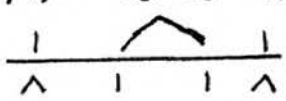
b. 

c. 

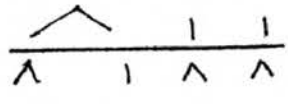
d. 

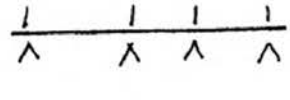
They assume that it is the branching or non-branching character of rimes that is relevant for foot formation, and that feet are not sensitive to the branching character of any other constituents of the syllable. (p. 5-5). Furthermore, they assume that"in French words a non-branching syllable is paired into a binary foot with its neighbour on the left and that this pairing is done by scanning the word from right-to-left in a maximal fashion" (p. 5-9). In the case of (22), the following sequences of feet are formed:

(23) /ty də və nɛ/

a. 

b. 

c. 

d. 

The line in each one of the representations in (23) separates the foot level from the syllable level. Vergnaud & Halle posit as their rule of 'e-muet elision'the rule:

(24) $\partial \rightarrow \emptyset \; / \; \overset{F}{\wedge}\_\_$

Vergnaud & Halle can thus account for the following three phonetic forms of <u>tu devenais</u>:

(25)a. [tydəvnɛ]

b. [tydvənɛ]

c. [tydəvənɛ]

3.1.1.4. Inadequacies and limitations of Vergnaud & Halle's proposal.

The shortcomings of the proposal by Vergnaud & Halle are much the same as the ones of Selkirk's, as will be shown in this section.

First a word must be said about the data given by the authors on page 5-8. They contrast the words in (26) in which schwa-deletion is possible, with those in (27),in which according to them, schwa-deletion is not possible (p.5-7,5-8):

(26)a. souvenir [suv(ə)nir] 'souvenir'

b. jalousement [ʒaluz(ə)mɑ̃] 'jalously'

c. passera [pas(ə)ra] 'will pass'

d. volera [vol(ə)ra] 'will fly, will steal'

(27)a. parvenir [parvənir] 'to arrive'

b. exactement [ɛgzaktəmɑ̃] 'exactly'

c. percera [pɛrsəra] 'will pierce'

d. soufflera [suflə̃ra] 'will whistle'

These data are, however, incorrect. (27a) and (27c) <u>can</u> be pronounced without schwa. For (27a) confirmation of this fact can be found in Martinet & Walter (1973) (who in fact do not list [parvnir], but do list

[parvny] and [parvnɔ̃]'(we) arrive', 'arrived').

For (27c) Dell proposes his rule E-FUT (see note 1). Again it should be noted that the group of consonants preceding the schwa in the forms in which the schwa can be deleted (27a,c) form a possible French coda, whereas the group of consonants preceding the schwa in forms where it cannot be deleted (27b,d) do not.

Secondly, it should be noted that because of the fact that only schwas preceded by only one consonant may be non-branching, bisyllabic feet cannot be formed in forms like (14), repeated here as (28):

(28) il sèvre /il≠səvrə/ [ilsɛvr] 'he weans'

This means that Selkirk's rule of stress assignment in (7) cannot assign stress to the syllable containing ɛ, but will assign stress to the syllable containing schwa. Also, in forms with only one intervocalic consonant preceding the schwa like (29)

(29) fine /finə/ [fin] 'delicate'

a bisyllabic foot is only optionally formed according to Vergnaud & Halle's proposal, because a schwa preceded by only one consonant may or may not be branching. This means that stress will not be unequivocally assigned to the first syllable in the underlying form in (29).

Thirdly, Selkirk's rule (9), which changes e,ə to ɛ, will not be able to change the leftmost schwa in the underlying form in (28) into ɛ, because it is not followed by material within the same foot as rule (9) requires. In the case of only one intervocalic consonant as in (30)

(30) il mène /il≠mənə/ [ilmɛn]

a bisyllabic foot is only optionally formed (exactly as in (29)), so rule (9) cannot always apply, which it should.

It must be concluded that although Vergnaud & Halle declare that their proposal 'leans heavily' on Selkirk's, it in fact deprives Selkirk's

analysis of a major part of its motivation, viz. the accounts of the phenomena concerning the distribution of stress, as well as the alternations e/ɛ and ə/ɛ.

3.1.2. An alternative proposal.

Having shown the inadequacies of the proposals by Selkirk and Vergnaud & Halle, I will procede by formulating a new proposal in order to account for the phenomena of schwa-deletion in French. I will assume only one rule of schwa-deletion, to which certain conditions will be applicable. Thus the fact will be expressed that only schwa, and no other vowel, can be deleted in French (apart from the three isolated cases mentioned in note 2). As a matter of fact it is this fact alone that is expressed by the rule:

(31) Schwa-deletion:

$$ə \rightarrow \emptyset$$

As the reader will notice, rule (31) is formulated without environment. Instead of formulating an environment for this rule, I will assume that this rule is member of a class of rules without environment (of which, as will be shown in section 3.2., also the rule of Semivocalization is a member), to which the following conditions are applicable:

(32) The Syllabification Condition:

The output of the environmentless rules must be exhaustively syllabifiable.

(33) The Markedness Condition:

The environmentless rules may not apply if the syllabic markedness value of their output would be higher than that of their input, they can apply if the syllabic markedness value of their output is equal to that of their input, they should apply if the syllabic markedness value of their output is lower than that of their input.[5]

3.1.2.1. Motivation for the Syllabification Condition.

First the Syllabification Condition in (32) will be treated. This condition does not need to be stated as an independent condition,

because it is in fact a consequence of the persistent character of the syllabification mechanism. In section 2.3.2., motivation was provided for the assumption that syllabification is persistent once the initial syllabification has applied. In addition, it was shown in section 1.4.1. that the rule of Schwa-deletion is applicable at a place in the derivation where the syllabic structure is already present. Hence the syllabification mechanism automatically applies to the output of the rule of Schwa-deletion (as we will see in section 3.2., the rule of Semivocalization must be ordered after Schwa-deletion, thus the syllabification mechanism must also apply to the output of that rule). The Syllabification Condition in (31) follows then from the straightforward assumption that if the syllabification mechanism fails to syllabify a given string, the further derivation of that string is blocked.

We have already seen the working of the Syllabification condition in sections 3.1.1.2. and 3.1.1.4., in which it was shown that in the cases mentioned on these sections, the schwa cannot be deleted if the group of consonants preceding it do not form a possible coda. Another instance of the working of the condition can be found in the forms in (34) and (35) (the examples are taken from Dell (1973) p. 231):

(34) insistera /ɛ̃sistə+r+a/ [ɛ̃sist(ə)ra] 'will insist'

(35) soufflera /suflə+r+a/ [suflərа] *[suflra] 'will whistle'

In the phonetic form in (35), the schwa is obligatorily present, because fl does not constitute a possible French coda (except when in utterance-final position, see section 3.1.2.2.) and lr is not a possible French onset.

Additional motivation for the Syllabification in (32) is provided by the forms in (36) and (37), which are taken Dell (1973) p.229:

(36) Henri devrait partir /ɑ̃ri≠dəv+r+ɛ≠part+ir/ [ɑ̃rid(ə)vrɛpartir]
'Henri would have to leave'

(37) Jacques devrait partir /ʒak≠dəv+r+ɛ≠part+ir/ [ʒakdəvrɛpartir]
*[ʒakdvrɛpartir] 'Jacques would have to leave'

The difference between these forms is that in the case of (36), the syllable containing schwa is immediately preceded by a vowel (abstracted away from the word boundary), whereas in (37) it is preceded by a consonant. The result of the deletion of schwa in the underlying form would be the consonant sequence kdvr. This sequence cannot be analyzed in a possible coda followed by a possible onset, hence the derivation is blocked by the Syllabification Condition. In (36) on the other hand, the deletion of schwa results in the consonant sequence dvr, which is analyzable in a possible coda (d) followed by a possible onset (vr)[6].

The Syllabification Condition is partially reflected in the output condition OLICONS proposed by Dell (1976, p.85; 1980, p.215)[7]:

(38) OLICONS: $*[-son]\begin{bmatrix}+son\\+cons\\-nas\end{bmatrix}[+cons]$

This condition replaces the condition in Dell's rule E-FUT prohibiting OL clusters in the input of this rule (see note 1). and it also accounts for the fact that the impossibility of (40b) as phonetic realization of (39):

(39) astre nouveau 'new star'

(40)a. [astrənuvo]

b. *[astrnuvo]

(According to Dell the underlying form is: /astr≠≠nuvo/ and an optional epenthesis rule is applicable to this form. In the case of non-application of this epenthic rule the derivation is blocked by OLICONS. OLICONS does not block the derivation of astre /astr/, pronounced in isolation or at the end of a sentence, in the case of non-application of the epenthesis rule. As a result, the phonetic form can be both [astrə] and [astr]).

Dell's condition OLICONS can be dispensed with by assuming the Syllabification Condition, which as we have seen does not need to be stated independently (in contrast with OLICONS), but follows from the assumption of the persistent character of the syllabification mechanism.

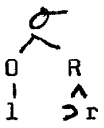
3.1.2.2. Motivation for the Markedness Condition.

Concerning the working of the Markedness Condition, I will give here examples of cases in which the rule of Schwa-deletion is made obligatory by the working of the Markedness Condition, then of cases in which Schwa-deletion is optional, and finally of a case in which the working of the Markedness Condition prohibits the deletion of schwa.

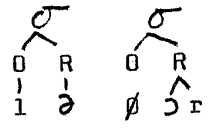
First three cases of obligatory schwa-deletion, i.e. cases in which the Markedness Condition blocks the derivation of the string in case of non-application of the rule of Schwa-deletion will be exemplified. Our first example concerns the form in (41):

(41) l'or /lə≠ɔr/ [lɔr] *[ləɔr] 'the gold'

The resulting syllabic markedness values of the phonetic forms in the case of application and non-application of Schwa-deletion can be seen in (42):

(42)a. 

0 + 1 + 1 (=numb. of syll.) = 2

b. 

0 +0 + 1 +1 + 2 = 4

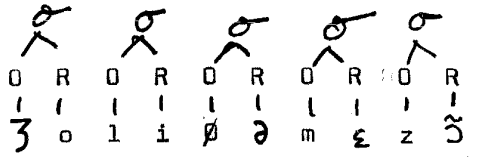
The Markedness Condition prohibits the derivation of the form in (42b), in which Schwa-deletion has <u>not</u> applied, because its syllabic markedness value is higher than that of the form in (42a), in which Schwa-deletion <u>has</u> applied. Another example can be found in the form in (43):

(43) jolie maison /ʒoli+ə≠mɛzɔ̃/ [ʒolimɛzɔ̃] *[ʒoliəmɛzɔ̃] 'bonny house'

The resulting syllabic markedness values of the phonetic forms in the

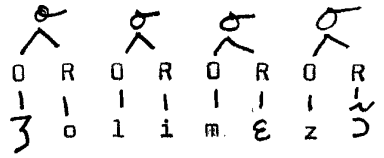
case of application and non-application of Schwa-deletion can be seen in (44):

(44)a.



0 +0 +0 +0 +1 +0 +0+ 0 +0 +0 + 5 (=number of syll.) = 6

b.

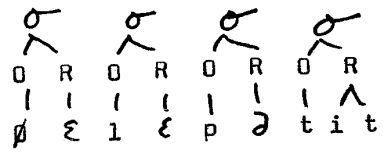


0 +0 +0 +0 +0 +0 +0 +0 + 4 (=number of syll.) = 4

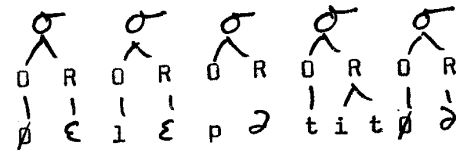
The Markedness Condition prohibits the derivation of the form in (44b), because its syllabic markedness is higher than that of (44a). The third example of obligatory schwa-deletion has already been mentioned as (53) in chapter 2, and is repeated here as (45):

(45) elle est petite /ɛl≠ɛ≠pətit+ə/ [ɛlɛpətit] *[ɛlɛpətitə]

It has been hypothesized in section 2.5.2. that the second t in this form has been retracted to the preceding syllable by a specified resyllabification which overrules the general syllabification principle of syllabification to lowest possible markedness. This hypothesis was made analagous to similar proposals for English and Danish. Further motivation is provided by the form in (45). The assumption that the second t in this form has been retracted to the preceding syllable makes it possible to account for the obligatory deletion of schwa here. Compare the two syllabic markedness values ensuing from deletion and non-deletion of schwa respectively:

(45)a. 

1 +0 +0 +0 +0 +0 +0 +1 + 4 (= number of syll.) = 6

b. 

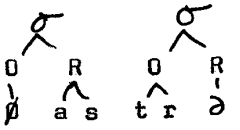
1 +0 +0 +0 +0 +0 +0 +1 +1 +0 + 5 (= numb. of syll.) = 8

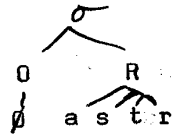
The Markedness Condition blocks the derivation of the form in (45b), because its syllabic markedness value is higher than that of (45a). (In the form in (44), also the first schwa can be deleted (optionally), but that is not of concern to us here).

We should now look at the form in (53) of the previous chapter, repeated here as (46):

(46) astre /astrə/ [astr(ə)] 'star'

in this form the deletion of the schwa is optional. The optionality is here not a consequence of the working of the Markedness Condition, but of the fact that the specified resyllabification under the influence of stress is optional in the case of two consonants following the rightward boundary of the stressed syllable. Thus the two possible syllabic configurations for this form are:

(47)a. 

b. 

In the form in (47b), the schwa has been obligatorily deleted, analogous to the deletion of schwa in (44), but in (47a), the deletion of schwa is not possible (recall the impossibility of empty nuclei postulated in section 2.2.). It is the fact that both (47a) and (47b) are possible

syllabic configurations associated with the form in (46), that makes the deletion of schwa in (46) optional. As mentioned in section 2.5.2., syllabic configuration as in (47b) constitutes a violation of the syllable template and in this case even of the sonority hierarchy. Indeed it is only in cases like these that codas like the one in (47b) can occur, i.e. and the end of the prosodic unit across which the syllabification takes place. Compare (48a,b) and (49a,b):

(48)a. probable /prɔbablə/ [prɔbabl(ə)] 'probably'

b. probablement /prɔablə+mɑ̂/ [prɔablәmɑ̂] *[prɔablmɑ̂] 'probably'

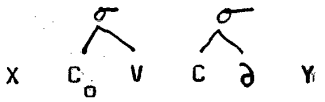
(49)a. (ce train est) le vôtre /lə≠votrə/ [lәvotr(ə)] '(this train is) yours'

b. votre train /vɔtrə≠trɛ̃/ [vɔtrәtrɛ̂] *[vɔtrtrɛ̃] 'your train'

(Another possible phonetic form in (49b) is: [vɔtːrɛ̂], but that is not of concern to us here). The forms in (48a) and (49a) display a optional schwa-deletion analagous to that in (46), but in (48b) and (49b) the deletion of schwa is not possible, because the schwa is not preceded by a stressed syllable, hence the resyllabification rule (51) of the previous chapter has mot been able to apply.

We now come to cases in which the working of the Markedness Condition makes the deletion of schwa optional. Most of the forms in which the deletion of schwa is optional have the following structure:

(50)



The deletion of the schwa in these cases decreases the number of syllables by one, but adds a segment to the rime of the preceding syllable, the result being:

(51)

The result of the deletion of schwa in cases like these is that the syllabic markedness value remains the same, because decreasing the

number of syllables by 1 means decreasing the syllabic markedness values by 1, but adding a consonant to the rime increases it by 1. The Markedness Condition thus predicts that the deletion of schwa in cases like these is optional. Examples can be found in the form (13a,b,), (16a,b,c), (20a,b,c,d) and (36) (above).

Another example in which schwa-deletion is optional can be found in the form in (34), repeated here as (52):

(52) insistera /ɛ̃sistə+r+a/ [ɛ̃sist(ə)ra] 'will insist'

The Markedness Condition would normally block the deletion of schwa in this form, because the deletion would cause the onset of the last syllable of the form to be doubly filled, which increases the markedness value by 2, while the decrease in the number of syllables is only one, so the overall increase in the syllabic marked value is 1. Cases like these, however, are accounted for by the provision made for obstruent+liquid clusters made in section 2.5.1., by which such clusters are assigned markedness value 1 instead of 2. The above case provides additional motivation for this provision[8].

Finally, I will give an example in which the deletion of schwa is blocked by the working of the Markedness Condition. For this, we must consider the underlying form in (12), repeated here as (53):

(53) tu devenais /ty≠dəvənɛ/

The three possible phonetic realizations given in (13a,b,c) are repeated here as (54a,b,c):

(54)a. [tydəvnɛ] b. [tydvənɛ] c. [tydəvənɛ]

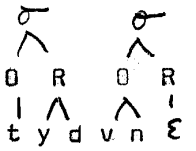
The form is (55), however, is impossible:

(55) *[tydvnɛ]

This derivation of this form is blocked because its syllabic markedness

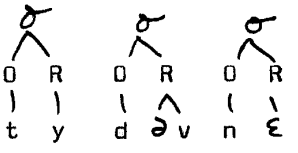
is higher than those of (54a,b,c), cf. (56) and (57):

(56)



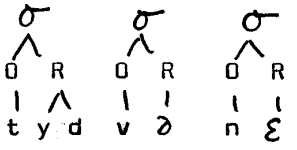
0 + 1 + 2 +0 + 2 (=number of syllables) = 5

(57)a.



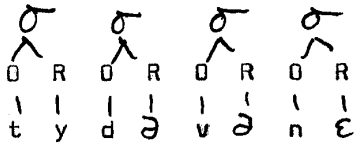
0 +0 + 0 + 1 +0 +0 +3 = 4

b.



0+ 1 + 0 +0 + 0 +0 +3 = 4

c.



0 +0 +0 +0 +0 +0 +0 +0 +4 = 4

3.1.2.3. Remaining problems concerning schwa-deletion.

I will treat here shortly four cases in which the theory outlined in this chapter does not give the right predictions. In two of these cases possible solutions will be given.

The first case concerns examples like the ones in (26a,b,c,d), repeated here as (58a,b,c,d) with their underlying forms:

(58)a. souvenir /suvənir/ [suv(ə)nir] 'souvenir'

b. jalousement /ʒaluz+əmɑ̃/ [ʒaluz(ə)mɑ̃] 'jalously'

c. passera /pasə+r+a/ [pas(ə)ra] 'will go through'

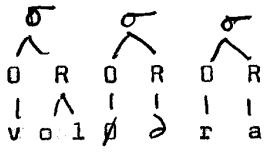
d. volera /volə+r+a/ [vol(ə)ra] 'will fly. will steal'

Although Vergnaud & Halle give here the schwa-deletion as optional, it is obligatory according to Dell (1973; 1980) and most of the native

speakers I have been able to consult. Indeed for most speakers of standard French, the deletion of schwa seems to be obligatory if only one intervocalic consonant precedes the schwa, and if there is no word boundary between that consonant and the preceding vowel.

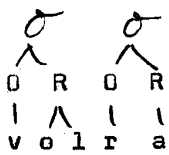
The obligatoriness can be accounted for in two ways. The first one is that the markedness value of the rime does not increase by 1, but by a lower value. This amounts to saying that the decrease of the syllabic markedness value in the forms in (58) caused by the decrease in the number of syllables is not completely compensated by the increase of the markedness values of the rimes preceding the schwa. Another solution would be to postulate a resyllabification applying every time a full vowel is followed by a schwa. This means that the idea of a specified resyllabification proposed in section 2.5.2. is enlarged to include also resyllabifications under the influence of secondary stress. The schwa then finds itself in a syllable of which the onset is empty. The deletion of the schwa decreases the syllabic markedness of the form as is the case in the forms in (43) and (46), cf. (59a,b,c,d):

(59)a.



0+ 1 +1+ 0 +0 +0 + 3 (=number of syll.) = 5

b.



0 +1 +0 +0 + 2 = 3

The idea of a syllabification according to this principle has been put forth by Basbøll (1978).

The contrast between the obligatoriness of the schwa-deletion within one word and the optionality of the schwa-deletion if the syllable preceding the schwa belongs to a different word, can be the result of the fact that a word boundary can be optionally analyzed as a boundary for syllabification. In the case it <u>is</u> a boundary for syllabification, it is consequently also a boundary for the computation of the syllabic markedness values, because the notion of syllabic markedness developed in section 2.3.3. crucially relates to syllabification. In that case the deletion of schwa would be forbidden, and in the opposite it would be obligatory.

A second problem concerning schwa-deletion has been noted by Dell (1973,p.232; 1980,p.208). It concerns the forms:

(60)a. hésiteriez /ezitə+riez/ [ezitərje] * [ezitrje] 'would hesitate'

b. volerions /volə+r+iɔ̃z/ [volərjɔ̃] *[volrjɔ̃]'would fly, would steal'

The problem here is that the schwa in these forms cannot be deleted, while it can in the corresponding forms of the <u>futur</u>:

(61)a. hesiterez /ezitə+r+ez/ [ezit(ə)re] 'will hesitate'

b. volerons /volə+r+onz/ [vol(ə)rɔ̃] 'will fly'[9]

For this problem a straightforward solution can be found. It must be assumed that the morphemes <u>-ions</u>, <u>-iez</u> contain underlyingly a glide instead of a high vowel. Evidence for this can be found in the minimal pair:

(62)a. à Lyon /a≠liɔ̃/ [aljɔ̃]~[aliɔ̃] 'in Lyons'

b. allions /al+jɔ̃z/ [aljɔ̃] *[aliɔ̃] '(we) went'

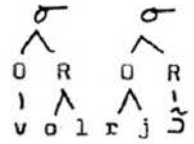
While the form in (62a) can be pronounced both with a high vowel and a glide (the second pronunciation being the result of the application of the rule of Semivocalization, to be treated in section 3.2.), the form in (62b) can only be pronounced with a glide, because it contains a glide underlyingly. The impossibility of the deletion of schwa in

The forms in (60) follows from the assumption that the morphemes -ions, -iez contain a glide underlyingly. The deletion of schwa in (60a) would cause the onset of the last syllable in this form to become trj. This is an unpermissible onset, because the syllable templates proposed in section 2.2. do not allow for an onset consisting of three segments (except if the first and second segments are an s and an obstruent respectively), thus the derivation is filtered out by the Syllabification Condition. The deletion of schwa in the form in (60b) is blocked by the Markedness Condition. Deletion of the schwa would increase the syllabic markedness value of the form:

(63)a.

0 +0 +0 + 1 +0 +0 + 3 (=number of syll.) = 4

b.



0 +1 + 2 +0 +2 (=number of syll.) = 5

I will come back to the problems involving the verb-endings -ions, -iez in section 3.2.4..

The third problem concerning schwa-deletion is the fact that the deletion of the schwa in the negative particle ne takes precedence over the deletion of another schwa. This fact is noted by Dell (1973,p.255; 1980,p.236). Compare the forms in (64) and 65):

(64) je le demande /ʒə≠lə≠dəmɑ̃də/ [ʒəldəmɑ̃d] [ʒdlədmɑ̃d] 'I ask it'

(65) je ne demande pas /ʒə≠nə≠dəmɑ̃də≠paz/[ʒəndəmɑ̃dpa] *[ʒnədmɑ̃dpa]
'I do not ask'

In (64) either the schwa in le or the one in demande can be deleted, but in (65) only the schwa in ne can be deleted. To this problem (for which Dell has formulated a rule that seems entirely adhoc [10]) I see no solution. It can only be stated that the schwa in ne is more

accessible for deletion than other schwas.

The fourth problem concerns the deletion of schwa in syllables in utterance-initial position, cf. the forms in (66):

(66)a. venez ici /vən+ez≠isi/ [vneisi] 'come here'

b. te fais pas de bile /tə≠fɛ≠pa≠də≠bil/ [tfɛpadbil] 'don't worry ' (slang)

In these cases, the deletion of schwa appears to violate the Markedness Condition and, in the case of (66b), even the Syllabification Condition. I see unfortunately no solution to this problem.

3.2. Semivocalization.

3.2.0. Introductory remarks.

In this section it will be shown that a very simple rule that is formulated without an environment, can account together with the Syllabification Condition and the Markedness Condition, for the phenomena in French concerning the alternation high vowel/glide. The most elaborate proposal concerning this alternation made thusfar, de Kok & Spa (1978; 1980) will be used as an illustration in order to show that the present proposal accounts for the phenomena in question in a principled and natural way. First, a summary of the proposal by de Kok & Spa will be given.

3.2.1. de Kok & Spa.

In their 1978 article, de Kok & Spa propose the following rules (p.68-69):

(67) DIER: $[+\text{cons}] \rightarrow [-\text{cons}] / \$C_2 \begin{bmatrix} \overline{+\text{voc}} \\ -\text{round} \end{bmatrix}$ OBL[11]

(68) SEMI-VOC: $[+\text{voc}] \rightarrow [+\text{cons}] / \begin{bmatrix} \overline{+\text{high}} \\ -\text{mid} \\ -\text{stress} \end{bmatrix} V$ OPT

In addition to these to rules they propose the following global constraint:

(69) OLISEM:

$$/\$[-\text{son}]_1 \begin{bmatrix} +\text{son} \\ +\text{cons} \\ -\text{nas} \end{bmatrix}_1 \begin{bmatrix} -\text{son} \\ +\text{high} \\ -\text{mid} \end{bmatrix} / \supset \left[\$[-\text{son}]_1 \begin{bmatrix} +\text{son} \\ +\text{cons} \\ -\text{nas} \end{bmatrix}_1 \begin{bmatrix} -\text{cons} \\ +\text{high} \\ -\text{mid} \end{bmatrix} \right]$$

This condition reads in words (p.70):

> "if at the underlying level a syllable boundary is followed by the sequence: one or more obstruents, one or more non-nasal sonorant consonants (=liquid or glide), and a closed vowel, then the syllable boundary must also be followed by this sequence at the surface level".

The ordering of the rules is DIER, SEMI-VOC (de Kok & Spa (1978) note 3)[12]

Some examples of the application of DIER as given by the authors (1978,p.69) are:

(70)a. Adrien adrjɛ̃ → adriɛ̃ 'Adrien'

b. grief grjɛf → griɛf 'grievance'

c. vivrions vivrjɔ̃ → vivriɔ̃ 'would live'

Some of the examples of the application of SEMI-VOC are (p.70):

(71)a. tuer tye → tɥe 'to kill'

b. skier skie → skje 'to ski'

c. il y a il i a → il j a 'there is'

Some of the examples of sequences that are forbidden by OLISEM are (p.70):

(72)a. trouer true → *trwe 'to punch a hole'

b. influence ɛ̃flyɑ̃s → *ɛ̃flɥɑ̃s 'influence'

c. appuyer apɥie → *apɥje 'to lean'

Not forbidden by OLISEM are (p.71):

(73) a. truite [trɥit] 'trout'

b. proie [prwa] 'prey'

c. groin [grwɛ̃] 'muzzle'

(Apart from these three rules, de Kok & Spa also propose an epenthesis rule, which inserts a homorganic glide after a high vowel, thus allowing for phonetic forms as: [grijɛf], [skije], [ɛ̃flyɥɑ̃s]. This rule, however, is not of concern to us here.)

3.2.2. A criticism of the proposal of de Kok & Spa.

The proposal by de Kok & Spa may at first glance arouse suspicions

because there are two rules that work in each other's opposite direction: while DIER converts a glide into a homorganic high vowel, the rule of SEMI-VOC changes a high vowel into a homorganic glide. It also seems strange that the authors assume underlyingly a glide for the forms in (70a,b), while the phonetic forms always display a high vowel. The astute reader taking a closer look at the proposal will also notice that the rules of DIER and SEMI-VOC together with the global constraint OLISEM express three facts in all:

(i) no glide can be preceded by a tautosyllabic OL cluster;

(ii) in other cases there exists a free alternation high vowel/glide in prevocalic position;

(iii) there are exceptions to the statements in (i) and (ii) formed by words whose phonetic forms always display a glide preceded by an OL cluster.

De Kok & Spa have managed to express these facts by constructing two rules, one of which is optional while the other is obligatory and contains the environment: $OL___ (in its revised version, see note 11), and the global constraint OLISEM. Unfortunately this proposal, however observationally adequate, does not have very much explanatory power. It obscures the fact that a glide preceded by tautosyllabic OL cluster constitutes a violation of the notion of'possible French syllable', which as we have seen in section 2.2., can only have an onset consisting of two segments (except in the case of cluster of three segments of which the first and the second are an s and an obstruent respectively). This fact in itself explains why there can be no glide that is preceded by an OL cluster. The exceptions provided for by OLISEM can be explained in a natural way by the assumption of certain diphthongs entirely being dominated by the nucleus. This assumption has been made by Kaye and Lowenstamm and in connection with this assumption they proposed the Nuclear Integrity Constraint (see section 1.2.3.).In section 2.2.3., I have stipulated that these diphthongs are single phonemes.

In connection with this stipulation I proposed the Branching Nucleus Constraint[13]. Part of the facts for which de Kok & Spa formulate their proposal are thus simply a consequence of syllabification.

3.2.3. An alternative proposal.

I will now formulate my own proposal which consists of one rule, which is formulated without environment. As mentioned in the introduction to this chapter and in section 3.1.2., this rule will be part of a class of rules that is subject to two conditions, the Syllabification and the Markedness Condition, which have been formulated in section 3.1.2.. I will formulate the rule as follows:

(74) Semivocalization:

$$\begin{bmatrix} +\text{voc} \\ +\text{hi} \end{bmatrix} \rightarrow [-\text{voc}]$$

I will now give examples of cases in which the Syllabification Condition and the Markedness Condition determine that the rule of Semivocalization is obligatory, optional or forbidden.

The Syllabification Condition forbids the application to the following underlying forms:

(75)a. Adrien /adri$\tilde{\varepsilon}$/ [adri$\tilde{\varepsilon}$] *[adrj$\tilde{\varepsilon}$] 'Adrien'

b. grief /griɛf/ [griɛf] *[grjɛf] 'grievance'

These forms have been used by de Kok & Spa as an illustration of the working of their rule DIER (see (70a,b). Unlike de Kok & Spa, I assume an underlying structure with a high vowel. As already pointed out out in the previous section, an onset consisting of an obstruent+liquid+glide cluster violates the notion of'possible French syllable'. Also, an obstruent+liquid cluster cannot be split up into two different syllables (see section 2.5.1.), thus, in the case of (75a), a syllable structure with a coda filled by the obstruent followed by an onset consisting of a cluster of the liquid and the glide is not possible.

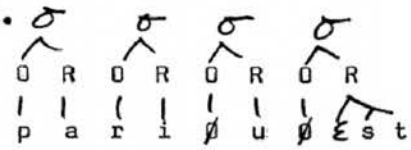
Hence the Syllabification Condition blocks the further derivation of the string if the rule of Semivocalization applies to the underlying forms in (75). For problems connected with the form in (70c), I refer the reader to section 3.2.4..

An example of a case in which the Markedness Condition makes the application of the rule of Semivocalization obligatory can be found in (76):

(76) Paris-Ouest /pari≠uɛst/ [pariwɛst] *[pariuɛst] 'Paris-West'

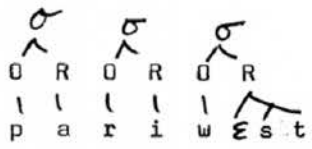
The Markedness Condition blocks further derivation of the string in the case of non-application of the rule of Semivocalization, because the application of the rule decreases the syllabic markedness value of the form, cf. (77a,b):

(77)a.



0 +0 +0 +0 +1 +0 +1 + 2 + 4 (=number of syll.) = 8

b.



0 +0 +0 +0 +0 + 2 + 3 (= number of syll.) = 5

Examples in which the rule of Semivocalization applies optionally are easy to be found, and are essentially of the form: XC $\begin{Bmatrix} i \\ y \\ u \end{Bmatrix}$ VY. Cf. the forms in (78):

(78)a. l'ouest /lə≠uɛst/ [luɛst]~[lwɛst] 'the west'

b. nier /ni+e/ [nie]~[nje] 'to deny'

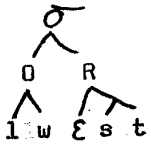
c. nuage /nyaʒ/ [nyaʒ]~[nɥaʒ] 'cloud'

d. tu as vu /ty≠a≠vy/ [tyavy]~[tɥavy] 'you have seen'

In these cases the syllabic markedness values resulting from application and non-application of the rule of semivocalization are the same, cf. (79):

(79)a. 

0 +0 +1 + 2 + 2 (=number of syll.) = 5

b. 

2 + 2 + 1 (=number of syll.) = 5

No clear cases can be found in which the Markedness Condition prohibits the application of Semivocalization, because in those cases the syllabic markedness value of the forms should be increased. For this to be the case, the increase in the markedness value of the onset caused by the complication of the onset may not be counterbalanced by a loss in markedness value caused by the disappearance of an empty onset and a decrease in the number of syllables. In all such cases however, e.g. in the case in which a high vowel is not followed by another vowel, the phonetic formsresulting from the application of Semivocalization are also filtered out by the Syllabification Condition.

Still a word must be said about the specification [-stress] in the formulation of the rule of SEMI-VOC proposed by de Kok & Spa. This specification is needed in order to avoid the application of SEMI-VOC in words like the ones in (80):

(80)a. antieuropéen / ãti+ɸropéɛ̃/ [ãtiɸropeɛ̃] *[ãtjɸropeɛ̃] 'anti-european'

b. miliampère /mili+ãpɛr/ [miliãpɛr] *[miljãpɛr] 'miliampere'

In my proposal, the non-application of semivocalization in these cases follows from the assumption that the boundary between the two formatives in these words is a boundary for syllabification. In that case, the Syllabification Condition blocks the further derivation, because tj and lj are not permissible French codas.

3.2.4. The verb-endings -ions, -iez.

The alternation high vowel/glide in the verb-endings -ions, -iez display a different pattern than the other high vowel/glide alternations. In section 3.1.2.2., it was argued that these forms contain a glide underlyingly. However, there is one case in which these verb-endings show up with a high vowel at the surface: in the case that they are preceded by an OL cluster. An example can be found in (70c) and also in (81):

(81) entrions /ɛ̂t+r+jɔ̂z/[ɑ̃tri(j)ɔ̃] 'would enter'

(The optional j in the phonetic form here is the result of the application of an epenthesis rule, which is not of concern to us here.) For this fact, noted by de Kok & Spa, no explanation can be provided in my theory. Of course the Syllabification Condition forbids the OLG cluster in the onset which would otherwise be the result if the high vowel would not have changed into a glide (which it apparently has) but a special rule must be devised converting a high vowel, which seems rather adhoc (there seems to be a relationship between the Syllabification Condition and the change glide→high vowel, in the sense that the violation of the Syllabification Condition which would otherwise occur, seems to trigger the change glide → high vowel; Formulating a separate rule for this occasion would obscure this relationship).

3.2.5. The question of underlying glides and the ordering of the rules of Schwa-Deletion and Semivocalization.

The question may be asked whether there are underlying glides in French at all. Kaye & Lowenstamm (1980) do not assume them, but hypothesize that the phonetic nature of a high vowel is determined by its place in the syllable. I think that underlying glides do exist, in the verb-endings -ions, -iez, but also in a fairly limited number of

other forms, which are mostly of foreign origin. Cf. the contrast between the forms in (82) and (83) (= (18a,c) of chapter 1):

(82)a. l'ouie /lə≠ui/ [lwi] 'the gill'

b. l'ion /lə≠iɔ̃/ [ljɔ̃] 'the ion'

c. l'huître /lə≠yitrə/ [lɥitr] 'the oyster'

(83)a. le whisky /lə≠wiski/ [ləwiski] *[lwiski] 'the whisky'

b. le yaourt /lə≠jaurt/ [ləjaurt] *[ljaurt] 'the yoghurt'

c. le huit /lə≠ɥit/ [ləɥit] *[lɥit] 'the (number) eight'

As is displayed by the underlying forms given here, I assume that the contrast in the application vs. non-application of Schwa-Deletion between the forms in (82) and those in (83) is due to the fact that in forms in which the deletion of schwa does not take place, there is underlyingly a glide, while in forms where Schwa-Deletion does apply, the schwa is followed by a high vowel.

Because of this, the rule of Schwa-Deletion must apply before the high vowel has turned into a glide, thus Schwa-Deletion must apply before Semivocalization. We have already seen in section 1.4.1., that Schwa-deletion has to follow Nasalization. Nasalization has to follow the initial syllabification because it crucially refers to syllable structure. In section 2.1.2. it was argued that the rule of truncation has to precede the initial syllabification.
We thus come to the following ordering of rules: Truncation, Initial Syllabification, Nasalization, Schwa-Deletion, Semivocalization.

3.3. Concluding remarks to chapter 3.

In this chapter, I have given a principled account of two syllable changing processes in French: the deletion of schwa and the change high vowel → glide. Both processes take place in various contexts. For each of these processes, a very simple rule has been formulated. In addition, two conditions have been formulated to which both

rules are subject. One of these conditions, the Syllabification Condition, does not need to be stated separately in the grammar, but follows from syllabification. By this condition alone, many facts are explained in a natural way, for which quite complicated rules had to be formulated hitherto. Also the other condition, the Markedness Condition, which has to be stated independently but which is also related to syllabification, can account for a great many facts that up to this moment were unexplained, or could only be accounted for by a fairly large number of disparate rules. The basic idea behind my analysis is that the processes of schwa-deletion and semivocalization are governed by the same principles that govern syllabification: the prohibition against violating the notion of 'possible syllable' and the tendency to achieve lowest possible syllabic markedness.

It has also been shown that the 'modular' approach (simplification of the rules as such, connected with the development of a system of (preferably language-independent) conditions, which has been paramount in EST syntax for the last few years, can also be fruitful in generative phonology.

Notes to chapter 3.

1. These rules are in the 1973 version of Dell's book (p.258-9):

ELIS: $ə \longrightarrow \emptyset \; / \; \underline{\quad}\,([-\text{seg}])\,[+\text{syll}]$ OBL

V-E: $ə \longrightarrow \emptyset \; / \; V \; \underline{\quad}$ OBL

PAUS: $\longrightarrow \emptyset \; / \; VC_0 \underline{\quad} \; \S$ OBL

E-FIN: $\longrightarrow \emptyset \; / \; VC_0 \underline{\quad} \neq$ OBL

NE-EX: $ə \rightarrow \begin{bmatrix} -\text{ rule INI} \\ -\text{ rule VCE}_1 \end{bmatrix} \; / \; \begin{Bmatrix} \underline{\quad} \neq nə \neq \\ V \neq_1 nə \neq C \underline{\quad} \end{Bmatrix}$ OBL

INI-EX: $ə \rightarrow [-\text{ rule INI}] \; / \begin{bmatrix} -\text{son} \\ -\text{cont} \end{bmatrix} \underline{\quad} \neq_0 \begin{bmatrix} -\text{son} \\ -\text{cont} \end{bmatrix}$ OBL

INI: $\partial \rightarrow \emptyset$ / $\S$ C___(≠)C OPT

VCE_1: $\partial \rightarrow \emptyset$ / V≠$_1$C___(≠)C OPT

VCE_2: $\partial \rightarrow \emptyset$ / VC___(≠)C OBL

E-FUT: $\partial \rightarrow \emptyset$ / X___+r+ OPT

condition: X ≠ OL

In the 1980 version of his book the formulations of some rules were somewhat altered and the output constraint OBLICONS was added (p.239-41):

$FIN\text{-}DEL_b$: $V \rightarrow \emptyset$ / $\acute{V}C_o$___≠

(replaces PAUS and E-FIN)

VCE_1: $\partial \longrightarrow \emptyset$ / V≠$_1$C___([-seg])[+seg] OPT

VCE_2: $\partial \longrightarrow \emptyset$ / VC___([-seg])[+seg] OBL

FUT-DEL: $\partial \rightarrow \emptyset$ / ___+r+ OPT

(replaces E-FUT)

OBLICONS: $^{*}[-son]\begin{bmatrix}+son\\+cons\\-nas\end{bmatrix}[+cons]$

2. These cases are: the obligatory deletion of the vowel in the feminin definite singular article <u>la</u> /la/, the optional deletion of the vowel in the second person singular pronoun <u>tu</u> /ty/, both in pre-vocalic position, and the obligatory deletion of the <u>i</u> in <u>si</u> /si/.

3. The first schwa in the underlying form in (3b) is converted into <u>ɛ</u> by virtue of rule (9) (below) according to Selkirk's proposal.

4. These data are from Juilland (1965), and have been checked with native speakers.

5. If one attempts to formalize this condition, the α notation may be used, thus making the rule look much simpler than in (33):

Syllabification Condition (formalized):

if $S(\alpha A(R)) < S(-\alpha A(R))$, then $^{*}-\alpha A(R)$,

in which S = syllabic markedness value
A = application
R = member of the set of environmentless rules.

6. As already mentioned in section 2.1.2., French like Cairene Arabic syllabifies across word-boundaries. For the notion of 'possible French syllable' see section 2.2..

7. In Dell (1980) this condition is calles OBLICONS.

8. According to Dell, a schwa can be deleted in the environment CC___r only in the case of a <u>futur</u> (the deletion is not possible if

CC = OL). He cites some forms that are not a futur in which a schwa in the environment CC___r cannot be deleted., e.g. fumisterie [fymistəri] 'hoax'. According to Lerond (1980) and Dubois (1960) however, this form can also be pronounced without a schwa. It thus appears that there is no morphological conditioning involved here, contrary to Dell's suggestion.

9. For most speakers the deletion of the schwa in (60b) is obligatory.

10. i.e. rule NE-EX in note 1.

11. In de Kok & Spa (1980,p.237) the formulation of this rule has been changed into:

$$[+\text{cons}] \rightarrow [-\text{cons}] / [-\text{son}] \begin{bmatrix} +\text{son} \\ +\text{cons} \\ -\text{nas} \end{bmatrix} \begin{bmatrix} \overline{\quad} \\ +\text{voc} \\ -\text{round} \end{bmatrix}$$

On page 245 they explain that this formulation makes it possible to order the rules of DIER and SEMI-VOC in an intrinsic way, thus making possible the pronunciation of skiez /skiez/ as: [skje]. It should be remarked that in my theory (see section 3.2.3., this phonetic form can be accounted for by the fact that skj constitutes a possible French onset (by templates (12) and(13) in chapter 2).

12. In de Kok & Spa (1980,p.245) the rules are ordered intrinsically (see note 11).

13. cf. (16) of chapter 2. It appears that wɛ̂ also belongs to the diphthongs in French that are exclusively dominated by the nucleus, along with wa, jɛ and ɥi. The reason for this is the possibility of (73c), as well as the fact that words like foin, moins, loin 'hay, less, far' are always pronounced as [fwɛ], [mwɛ̃], [lwɛ̃], and never as *[fuɛ̃], *[muɛ̃], *[luɛ̃], which would otherwise have been possible.

4. Conclusion.

In this study, the existing theories of syllabification have been shown to be inadequate on several points. A new theory of syllabification has then been devised for French. Finally, the phenomena of schwa-deletion and semivocalization in French have been accounted for in a principled way, making use of the same principles that were used in the theory of syllabification. Both proposals thus mutually strengthen each other.

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