Schwa or "ghost" vowels in French: a Harmonic Phonology account

Georgi Jetchev

The purpose of this article is to demonstrate that it is possible to account for the data on French schwa in the post-SPE nonlinear framework of Harmonic Phonology with only three levels of representation, no extrinsic ordering and no cyclic application of rules (relations between levels). This is a representational analysis (schwa is represented underlyingly as a floating vocalic segment [Œ]) which avoids the typical drawbacks of such analyses listed in Walker (1996).

In accordance with the critical review of the Government Phonology's account for French schwa in Lyche & Durand (1996), the analysis put forward here is not a 'unified account' of all the alternations traditionally covered under the label 'French schwa'. Some subsets of the data are treated as cases of allomorphy. Two types of schwa (ghost Œ-vowels), that only partially overlap with other authors' classifications, have been distinguished: the $Œ_A$ ghost vowels are present in M-level representations as floating segments, while the $Œ_B$ ghosts, which exhibit different patterns of alternation, are viewed as resulting from default vowel insertion. The manifestation of both types of ghosts proves to be conditioned by restrictions on syllable structure in French. The different levels (M and W vs. P) exhibit syllable structures that are constrained in a different way. Only on P-level, where stress is assigned in French, some of the rules involving resyllabification are sensitive to the rhythmic structure of the utterance.

1. Background

Two articles published in 1996 (Lyche & Durand 1996 and Walker 1996) are rather critical against the treatments of French schwa that have been proposed in the framework of different post-SPE (nonlinear) generative models. But the criticism in these two articles adopts a very different perspective. Walker (1996) is radically opposed to what he calls "representational analyses of schwa" and argues in favor of a "concrete" and "morphophonemic or morpholexical" approach to the behavior of schwa in French. Lyche & Durand (1996) are not against a representational approach to schwas; they rather argue against a "radical one-block approach, as advocated by Government Phonology" where lexical phonology is not kept distinct from postlexical phonology. They arrive at the conclusion that "Since Dell's (1973) treatment of French schwa with its twelve rules, a great number of analyses have

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been proposed, but, as far as we can see, none has achieved the same level of descriptive adequacy" (Lyche & Durand 1996:467).

According to Walker (1996) a "representational analysis" is an analysis where schwa is given a representation which is different from the representations of the other mid front rounded vowels in French, which are stable (nondeleting, nonalternating) vowels. The latter are usually included under the archiphoneme //Œ// and transcribed as /œ/, the mid-open vowel, [ø], the mid-close vowel, or /Œ/, a notation used by Wioland (1991) and in one dictionary of pronunciation (Taulelle 1989) to cover a whole range of variable realizations, from mid-open to mid-close, in the cases of neutralization.

As we did in our work on Bulgarian ghost vowels ('yers'), cf. Jetchev (to be published), we will advocate a mixed type of analysis for French ghost vowels ('schwa'), where most of the alternations are treated as due to representational differences with the nonalternating counterparts of schwa, but a morphophonemic treatment is proposed for the rest. There are strong generalizations on the data from French schwa that should be captured by means of a representational analysis. However, some subsets of the data, corresponding to what is traditionally referred to as 'exceptions', require a morphophonemic (allomorphic) treatment.

2. *Avoiding heterogeneous data*

Being one of the main domains of phonological variation in French, together with liaison, the phenomenon traditionally referred to as *French E muet* or *French schwa* is often subjected to analyses that are based on heterogeneous data, i.e. data that belong to "qualitatively different varieties of French" (Morin 1987). There is often strong disagreement concerning even the basic data on *French E muet*. Morin (1987) points out the risks that runs the phonologist who tackles the problem of French schwa:

> Data on which recent theoretical analyses have been based are not always homogeneous. Even statistical surveys do not necessarily represent a coherent system [...]. Often, analyses are based on traditional presentations to which new data are added, whose sources are rarely identified. [...] Another source of disagreement is what I called monitored French, which is analyzed on a par with other more traditional data. Its interpretation is often presented as unambiguous, whereas duplicate experiments show much more variability. (Morin 1987:837-8).

Morin exemplifies the first typical misuse of data with the treatment of French schwa in Noske (1982) based on markedness of syllable types: part of the data contradict the traditional accounts of standard French.[1] In another article, Morin (1988:252) cites Rialland's work (Rialland 1986) as providing data that are obtained in monitored experimental conditions and "not yet independently supported". This is an instance of the second typical misuse according to Morin. Thus, a problem with Hyman's analysis of French schwa as a 'weightless vowel' (Hyman 1985: 60-64) could be that it is entirely based on Rialland's data.

Some of the recent phonological developments based on French schwa take into account specific varieties of French. Durand (1990:27-30), for instance, is a standard generative treatment of schwa in Midi French and Durand (1995) accounts for the same data [2] in a Dependency Phonology framework. The main work on French schwa in the framework of Government Phonology – Charette's thesis (1988) – uses subsets of data that are specific for the author's dialect of Quebec French: in some cases, reference to this variety is explicit; [3] in other cases, one tends to attribute the significant deviation from other authors' data (usually representative of the Parisian varieties of French) to specific patterns of Quebec French. [4]

A positive aspect of Scheer's analysis of French schwa (1996:330-358) is that it accounts for two different groups of French speakers: those that can realize *fort(e)resse* 'fortress' and *le d(e)gré* 'the degree' without a schwa (group A) and those that cannot (group B). Moreover, Scheer is aware of the existence of many additional subgroups of speakers (Scheer 1996:336). But the pattern described by Dell, allowing for *le d(e)gré* and prohibiting *fort(e)resse*, is neither that of Scheer's group A nor that of his group B.

Noske (1982) is criticized by Morin for assuming that schwa is deleted not only after a single consonant (*froidement* 'coldly'), but also after a sequence 'liquid+obstruent' (*débarquement* 'unloading', *sveltement* 'slenderly') or '/s/+obstruent' (*manifestement* 'obviously'), though not deleted after other sequences of two consonants (*exactement* 'exactly'). However, it is not impossible that this be the characteristic pattern of deletions for a specific group of speakers of French.

The analysis that I propose here is based mainly on data from Dell (1985), the most exhaustive description available in the literature on French schwa I know about. Additional examples come from three articles by the same author, where he treats of some specific aspects: schwa following a cluster *obstruent+liquid* (Dell 1976), a series of contiguous syllables containing schwa (Dell 1978b) or stress

and rhythmic patterns in French (1984). Unfortunately, as far as I know, Dell's data have not been tested by empirical inquiry with a group of speakers. The author says his goal is to provide a thorough description of his own variety of French, being aware of the disagreements that it will arouse:

> Le comportement de schwa est l'un des domaines où les variations d'un locuteur à l'autre sont très fréquentes, même entre gens dont les prononciations sont très semblables. Il est donc à prévoir que de nombreux lecteurs, même universitaires, parisiens, et de la même génération, se trouveront en désaccord sur un point ou sur un autre avec les données qui servent de base à notre discussion (Dell 1985:195).

However, there is one important advantage of Dell's data: they are homogeneous. The variety they represent can be characterized as a rather "conservative" [5] variety of the language spoken by educated Parisian speakers of standard French.

The two most typical characteristics of this variety, as far as schwa is concerned, are best formulated by Morin (1987):

- the phonetic distinction between nondeleted schwa and the mid front rounded vowel has been neutralized (Morin 1987:825);
- schwa, i.e. alternating [Œ], does not delete when it is preceded by a group of two consonants word-internally, even when the result is syllabifiable (Morin 1987:835).

Dell's data on French schwa have been taken as a point of reference by some French-speaking phonologists looking for a description of schwa in a variety of French that is close to what they consider to be the "social norm". These data are the basis for the description in the chapter on *French E muet* in Tranel 1987, whose main goal is to teach standard pronunciation to foreign students of French phonetics. When specifying the behavior of schwa in the Saint-Etienne regional variety of French, Morin (1983) also takes as a point of reference the variety of standard French described by Dell (1973). [6]

3. *The issue of the underlying or epenthetic nature of French schwa*

Lyche & Durand (1996) consider that the issue of the underlying nature of French schwa has not been satisfactorily resolved by Government phonology:

> Charette attempts to give schwa in French a unified treatment. It is our contention that unless **at least two types of schwa** are considered, some basic facts will remain unaccounted for. [...] The first type is best treated within a lexical level and the second within the postlexical level (Lyche & Durand 1996:461).

Lyche & Durand establish a correspondence between their own distinction of 'anchored' vs. 'nonanchored' schwas and the distinction of 'nucleus' vs. 'non nucleus' schwas found in Rialland (1986), which in turn parallels the more traditional distinction of 'masculine' vs. 'feminine' schwas; see Cornulier (1982:134-137).

3.1. The nature of 'anchored' schwas

'Anchored' schwas correspond to 'nucleus' schwas in 'word-edge' syllables including schwas in function monosyllabic words.

'Anchored' schwas are found in the initial syllable of polysyllables (e.g. *neveu* 'nephew', *demain* 'tomorrow', *venir* 'come', *tenailles* 'pincers', *(ça) sera* '(this) will be', *(on) devrait* '(one) should', *secrétaire* 'secretary', ***monsieur*** 'sir' [m(Œ)sjø]), but also in function monosyllabic clitic words (namely in *le, je, me, te, se, ce, de, ne, que*) and in prefixes (*re-, de-*, e.g. *in repartir* 'set off again', *devenir* 'become'). The behavior of French prefixes being similar to that of proclitics, [7] we consider internal syllables that immediately follow a prefix as initial of 'phonological word', e.g. *re+demander, de+venir* contain an 'anchored' schwa both in the prefix and in the initial syllable of the root. [8]

Anchored schwas cannot be accounted for by epenthesis. Consider the following data:

(1)	Jacques secoue ... 'Jack is shaking ...'	ʒaksŒku	*ʒaksku
	Jacques skie 'Jack is skiing'	*ʒaksŒki	ʒakski
	cette pelouse 'this lawn'	sɛtpŒluz	?sɛtpluz
	cette place 'this place'	*sɛtpŒlas	sɛtplas

Dell (1985:187) has demonstrated that the few treatments that deny phonological status to this type of schwa in French and consider it to be an automatic vowel or "lubrifiant phonique" (Martinet 1972 [9] and

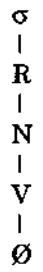
other functionalists, e.g. François 1974 and Bazylko 1981 [10]) are unable to account for the data in (1).

Hirst (1985:96-97) does not need underlying schwas, because he adopts the Single-Segment Hypothesis: he treats every complex onset that cannot be split up by schwa in French as a single segment, thus contrasting /p͡las/ (3 segments, /p͡l/, /a/ and /s/) with /pluz/ (4 segments, /p/, /l/, /u/ and /z/). The same solution is adopted by Angoujard (1997:90, note 29).

All other phonological approaches propose a specific underlying structure to encode anchored schwa as different from the mid front rounded vowels /œ/ and /ø/. Fischer (1980) introduces an additional distinctive feature [-stable], whose notation is the diacritic [°], and admits that the deletion rules affect only /œ°/ to the exclusion of /œ/ which is [+stable] like all the other vowels of French. A rule of œ°-Realization changes the feature [-stable] of non deleted schwas to [+stable].

Haden's analysis (Haden 1965) contrasts a 'morphophonemically stable' /ø/ (with the variant /ø'/ ascribing the distinction between mid-open /œ/ and mid-close /ø/ to the phonemic feature of length /'/) and an element {/+/} whose three variants (/ə/, /—/ or 'open transition' [11] and zero or 'close transition' [12]) are 'phonotactically determined'. Phonetically, /ø/ and /ə/, the first of the three variants of {/+/}, are identical: they are realized as [œ].

Multilinear phonologies use different underlying structures for anchored schwa. Anderson (1982) represents schwa as "structurally-present syllabic nucleus with no associated phonological features" (p. 551):

(2)


Hyman (1985) is a reaction against Anderson's approach and adopts a representation of schwa as a vowel that is not linked to a 'weight unit' [13] underlyingly (a 'weightless' [ə]); see the first schwa in (4) below.

Tranel (1987b) surveys the advantages that the framework of nonlinear phonology offers to the treatment of French schwa. He first considers the "Empty-Vowel Hypothesis", concludes that "the empty vowel formalism does not actually embody any kind of explanatory progress over a traditional linear model of representation" (p. 849) and advocates for a "floating representation of schwa", that is, a representation of schwa as a segment which has no corresponding skeletal slot (in this article Tranel uses C-slots and V-slots):

a stable vowel *a schwa*

Floating schwas can only be syllabified by a language-specific rule that applies later than basic syllabification.

For Tranel the representation as floating segments encodes the fundamental fact that "schwa cannot in and of itself form a syllable" and that "its phonetic occurrence ultimately depends on forced or real choices related to syllable structure".

Noske (1993) criticizes Tranel's analysis because it "can only predict a small subset of the data" when variable realizations are possible in the case of subsequent schwas (p. 203-204). He also finds that there is an artificial "conspiracy" between the rule of Schwa-Syllable Formation and the floating nature of schwa. The underlying structure that Noske posits for an underlying alternating schwa is an empty V-slot. As for nonalternating schwas, they are, like full vowels, represented as V-slots linked to segmental material:

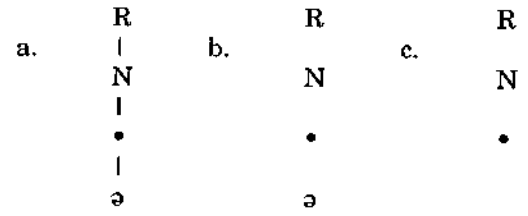
a stable schwa *an alternating schwa*

Noske maps the segmental string to a syllable template (composed of subsyllabic nodes) and this process generates empty nodes. The empty V-nodes trigger optionally new syllable structure imposition. They are then filled by schwa default value assignment.

In his three-dimensional model including segmental, skeletal and syllable constituent [14] autosegments, Encrevé (1988:212-232)

introduces two different representations for schwa in French. For 'anchored' schwa he uses a combination of a floating vowel [ə], a skeletal slot and syllable constituents R and N with no association lines between them (3b). Compare this to the representation for a stable schwa (3a) as in *brevet* 'certificate', *bretelle* 'sling' (Encrevé 1988:232):

(3)



Angoujard (1997:92, fig.3.20) encodes schwas underlyingly as empty peaks in the rhythmic grid, that is, peaks that have no correspondence on the segmental tier:

Government Phonology treats French schwa as an underlyingly present empty nucleus (Charette 1988, 1991). In the CVCV version of Government Phonology (Scheer 1996:330-358) the empty nucleus has a lexically encoded "melody" [ə] underneath. [15]

3.2. The nature of 'nonanchored' internal schwas

Nonanchored internal schwas are of two types:

- internal 'nucleus' or 'masculine' schwas;
- internal 'non nucleus' or 'feminine' schwas inserted at morphological boundaries.

3.2.1. 'Nonanchored' schwas that are internal 'nucleus' schwas

Nonanchored schwas corresponding to internal 'nucleus' ('masculine') schwas are found in non-peripheral syllables (not in the first syllable of a word and not at the word-end).

For Lyche & Durand, forms where "the schwa never surfaces"

and "there is no internal morpheme boundary" are "stored as such in the lexicon" (Lyche & Durand 1996:462). Dell (1995:8-9) also considers that the schwa in a word like *mat'las* "need not have any phonological counterpart". Rialland (1986) confirms a finding by Delattre (1966) that the consonant clusters in words with and without internal nucleus schwa like *brod'quin* 'boot'/*vodka*, *carr'four* 'crossroads'/*parfait* 'perfect', *souv'rain* 'sovereign'/*avril* 'April' are realized in the same way. She also tends to represent these words without underlying schwa: "dans certains de ces exemples l'existence d'un schwa peut être mise en doute, aucun indice dans la syllabe précédente n'indiquant sa présence et le [ə] n'étant pas restituable dans la conversation courante" (Rialland 1986:217).

We do not discuss here the problem raised by Dell (1995:8) about the underlying representation of words like *Fontain'bleau, pich'nette* 'flick (of the finger)' where the internal schwas are nonanchored and, hence, systematically dropped, but still needed to derive correctly the nasal consonant coda in [fɔ̃.tɛn.blo] and to avoid /ʃn/ as morpheme-final cluster in /piʃn+ɛt/. [16] Different solutions to this problem can be found if underlying representations of more 'concrete' type than Dell's are used.

Other internal 'nucleus' schwas happen to be nonalternating; see 3.4.1 and 3.4.2.

3.2.2. 'Nonanchored' schwas that are internal 'non-nucleus' schwas

Nonanchored internal schwas corresponding to 'non-nucleus' ('feminine') schwas are found at a morphological boundary site.

Dell (1978a:3) notes that the few derivational suffixes of French for which there are good reasons to assume that they are consonant-initial (*-ment*, adverbial, *-ment*, nominal, *-té, -rie, -ron, -let, -ton*) require the insertion of schwa when added to a base that ends in a consonant (*finement* 'finely', *jaillissement* 'gush', *naïveté* 'naivety', *gaminerie* 'mischievousness', *beauceron* 'inhabitant of Beace', *rondelette* 'plump', *Jeanneton*) and this schwa is systematically maintained in phonetic forms when the base ends in more than one consonant (*fortement* 'hard', *retardement* 'delay', *fermeté* 'firmness', *garderie* 'day nursery', *forgeron* 'black smith', *percheron* 'horse breed from Perche', *aigrelet* 'vinegary'). But the rule of schwa insertion (ə-INS, p.5) is not phonologically conditioned: it does not apply in *perdrix* 'partridge' /pɛrdri/ where the same consonantal cluster /rdr/ as in *garderie* /gard+ri/ is found word-internally, but with no morphological boundary in between. Besides, the insertion rule does not seem to apply systematically (it applies only optionally) before inflectional conson-

ant-initial suffixes, e.g. the -/r/ suffix of the future and the conditional: *gardera* 'will keep, 3p. sg.', *garderait* 'would keep, 3p. sg.' /gard+r+a/, /gard+r+ɛ/ that may be pronounced both as [gardra], [gardrɛ] and [gardəra], [gardərɛ].

We will consider the appearance of schwa in these items as morphophonologically-conditioned according to the following principle: "If the segments in question are inserted only in specific morphological contexts and not globally, the appearance of these segments must be analyzed morphologically, i.e., as part of the lexical representation of the forms in which they are found" (Piggott & Singh 1985:447).

Following an idea of Walker (1993:59), we will consider "there to be two phonologically-conditioned allomorphs of consonant-initial [derivational] suffixes such as *–(e)ment* and *–(e)ron*: normal /mɑ̃/ and /ʀɔ̃/, restricted /œmɑ̃/ and /œʀɔ̃/." The so-called restricted allomorph happens to be a case of nonalternating schwa; see 3.4.2.

Therefore, nonanchored internal 'schwas' will be treated here as a case of allomorphy and will not be considered as subjected to the purely phonological account for French schwa which will be put forward below.

Moreover, we do not include in the set of data to be accounted for the alternations triggered by the so-called Closed Syllable Adjustment (see Verluyten 1988:11-12, Morin 1988, Tranel 1988), because like Tranel (1987b:853) we consider that "ə ~ ɛ alternations are more accurately viewed as lexical allomorphies than as the product of a truly phonological operation".

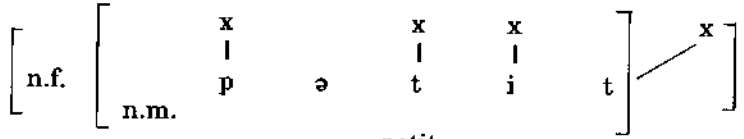
3.3. The nature of 'nonanchored' final schwas

Nonanchored final schwas correspond to word-final 'non nucleus' schwas.

Most authors, including Dell, consider orthographic word-final schwas to be underlyingly present.

Some authors represent final schwas differently from 'anchored' schwas. Hyman (1985) suggests that they be represented as "an underlying featureless weight unit", e.g. in *petite*, the feminine of *petit* 'little':

(4)



Encrevé (1988) uses a different representation for 'nonanchored' final and internal schwa (e.g. in *ourse bleue* 'blue she-bear', *matelot* 'sailor', *casserole* 'saucepan', etc.): a combination of a floating skeletal slot and syllable constituents R and N with no association lines and no corresponding segmental autosegment; see (3c) above. This representation triggers the so-called 'false' epenthesis, while the 'true' epenthesis is another possibility which occurs after word-final consonant clusters (e.g. in *ours bleu* 'blue bear').

Following Tranel (1981), it will be claimed here that they need not be represented in lexical forms and can be triggered by epenthesis.

Words with final orthographic (and etymological) schwa do not behave differently from consonant-final words in French. Dell states that, except in poetry and songs, "tout mot qui se prononce [XCC] devant une pause ou une voyelle peut se prononcer [XCCə] devant une consonne ... Cette généralisation vaut pour tous les mots, qu'ils prennent ou non un «e muet» final dans l'orthographe." (Dell 1985:236-7).

In *verlan*, a way of pronouncing some French words based on a linguistic game that inverts the order of syllables, consonant-final monosyllables with and without a final orthographic *e* give identical forms, cf. Méla (1991:77). Méla's data show that both *mère* 'mother' and *mer* 'sea' give [mɛ.rŒ] by 'resyllabification' at an intermediate stage and then [rŒ.mɛ] by 'permutation'. [17]

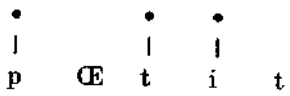
Tranel (1981:286) gives some additional arguments against the alleged evidence for the underlying presence of so-called "protective schwas" that correspond to word-final 'nonanchored' schwas. He demonstrates that for all three contexts of phonetic manifestation of "protective schwas" (at the end of words ending in a consonant cluster before a consonant-initial word; before *rien* 'nothing'; before 'h-aspiré' words) it is possible to detect realizations of words without final orthographic (and etymological) *e* that take phonetic [Œ]:

texte possible 'possible text'	*contact possible* 'possible contact'
[tɛkstŒpOsibl]	[kɔ̃taktŒpOsibl]
il ne mange rien 'he eats nothing'	*il ne perd rien* 'he loses nothing'
[ilnŒmɑ̃ʒŒrjɛ̃]	[ilnŒpɛrŒrjɛ̃]
cette haie 'this hedge'	sept haies 'seven hedges'
[sɛtŒɛ]	[sɛtŒɛ]

Pronunciations with [Œ] for *contact possible, il ne perd rien, sept haies* are less frequent than those with no [Œ], but Tranel attributes this tendency to the influence of orthography. [18]

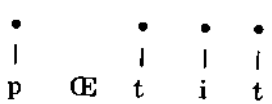
Another argument for positing underlying word-final schwas is their functioning as morphological markers. These schwas are traditionally viewed as eliminated by late rules that are extrinsically ordered after such phonological processes as vowel nasalization and consonant deletion. In an autosegmental phonological framework, the markers in question may be encoded as skeletal slots (cf. Tranel 1995:807, Paradis & El Fenne 1995:187). The phonological difference between the masculine *petit* 'little' (5a) and the feminine *petite* (5b), the indicative *(il) sort* 'he goes out' (6a) and the subjunctive *(qu'il) sorte* (6b), can be attributed to the underlying floating vs. anchored final [t]. Skeletal slots are then provided by the feminine and subjunctive morphology, respectively, in order to anchor the final floating [t] of the masculine or the indicative.

(5) a.



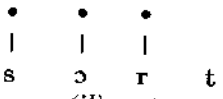
petit

b.



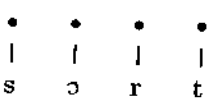
petite

(6) a.



(il) sort

b.



(qu'il) sorte

In Tranel (1987b) a floating schwa is freely represented at the end of words and, in standard French, the context XCC] __ [CV is required for the phonetic occurrence of a schwa between words.

3.4. The nature of nonalternating schwas

Nonalternating schwas are usually related to complex spellings like *eu, œu* and *ue* (e.g. ***jeu**nesse* 'youth, young people', ***leu**rrer* 'deceive', ***cueillir*** 'pick', ***sœu**rette* 'little sister', ***creu**ser* 'dig, hollow out').

However, Œ-vowels that are orthographically represented, like most alternating schwas, by a simple *e* without diacritic do not alternate with zero at all in the following cases:

3.4.1. After two consonants that are analyzed in a branching onset: *crevasse* 'crevice', *mercredi* 'Wednesday', *saugrenu* 'ridiculous', *amplement* 'fully, amply', where kʀ-, -gʀ-, -pl- are complex onsets;

3.4.2. After two consonants that are analyzed syllabically in a

coda+onset sequence: *forgeron* 'blacksmith', *gouvernement* 'government', *hurlement* 'howl', *calmement* 'calmly', *brusquement* 'abruptly', *fumisterie* 'skiving, shirking', where the two consonants preceding schwa (-ʀʒ-, -ʀn-, -ʀl-, -lm-, -sk-, -st-) are distributed in two different syllables – the first one is in the coda of the preceding syllable, the second one builds the onset of the syllable whose nucleus is [Œ]). [19]

3.4.3. In a prefix before a stem which coincides with an *h-aspiré* word: *dehors* 'outside', *rehausser* 'heighten'.

3.4.4. In items where a process of stabilization of a previous alternating schwa seems to have taken place: *(des) querelles* 'quarrels', *(du) fenouil* 'fennel', *(agent) secret* 'secret agent', *(la) femelle* 'the female', *(la) guenon* 'the female monkey', *(à) peser* 'to be weighed', *(la) vedette* 'the star', *(il faut) sevrer* 'we/you must wean'. [20]

3.4.5. In derivatives of items that exhibit regularly alternating schwa: *meneur* 'leader' [mŒnœr], *cheminer* 'to walk' [ʃŒmine], *semailles* 'sowing' [sŒmaj] vs. *mener* 'to lead' [m(Œ)ne], *chemin* 'path' [ʃ(Œ)mɛ̃], *semer* 'to sow' [s(Œ)me] (cf. Dell 1985:229).

At the end of this survey of the different types of schwa ('anchored', 'nonanchored'; 'nucleus', 'non nucleus'; internal, final) and given the above summary of nonalternating schwas, we conclude that there are only two types of schwa in French which are really alternating, that is, which can be realized either as [Œ] or zero:

- Type A: the schwas that correspond to 'anchored' or 'nucleus' schwas in syllables at the word-edge (3.1)
- Type B: the schwas that correspond to final 'nonanchored' schwas (3.3)

The internal nonanchored schwas are nonalternating (3.4.2) and can be treated as cases of lexical allomorphy (3.2.1).

4. The two types of alternating Œ-vowels

4.1. Difference in the patterns of alternation

Alternating Œ-vowels of the two types display different patterns of alternation in identical segmental and prosodic environment.

Œ-vowels of type A ($Œ_A$-vowels) can be dropped after one consonant as in (7a), but not after two consonants as in (7b).

(7)	a.	*Jean secoue (la branche)* 'John is shaking (the branch)'	ʒɑ̃sku	ʒɑ̃sŒku
		Jean se courbe 'John is bending down'	ʒɑ̃skurb	ʒɑ̃sŒkurb
		Henri le soutient 'Henry supports him'	ɑ̃rilsutjɛ̃	ɑ̃rilŒsutjɛ̃
	b.	*Jacques secoue (la branche)* 'Jack is shaking (the branch)'	*ʒaksku	ʒaksŒku
		Jacques se courbe 'Jack is bending down'	*ʒakskurb	ʒaksŒkurb
		Pierre le soutient 'Peter supports him'	*pjɛrlsutjɛ̃	pjɛrlŒsutjɛ̃

By contrast, Œ-vowels of type B ($Œ_B$-vowels) allow of syncopation after more than one consonant, as demonstrated in (8).

(8)	*toutes taxes comprises* 'inclusive of tax'	tuttakskɔ̃priz	tuttaksŒkɔ̃priz
	duplex confortable 'comfortable duplex'	dyplɛkskɔ̃fɔrtabl	dyplɛksŒkɔ̃fɔrtabl
	il parle souvent 'he often speaks'	ilparlsuvɑ̃	ilparlŒsuvɑ̃

$Œ_B$-vowels cannot receive emphatic stress (Dominicy 1984:8). Conversely, $Œ_A$-vowels including Œ-vowels in prefixes, can bear emphatic stress; e.g. in *re+demander* 'ask again' both syllables containing [Œ] can be emphasized (*REdemander, reDEmander*), because they are initial in their phonological domain (prefix and base, respectively); cf. Dominicy 1984:20. [21]

Additional evidence for the special status of $Œ_B$-vowels is provided by the patterns of alternation in sequences of two contiguous syllables, where the first one contains an $Œ_B$-vowel, while the second one contains an $Œ_A$-vowel, see the examples in (9) taken from Dell (1973) and Dell (1978b). The pattern is different in sequences where the two contiguous syllables contain both $Œ_A$-vowels, see (10). In (9) one can see that the first $Œ_B$-vowel cannot be retained if the second $Œ_A$-vowel is dropped. It seems that an $Œ_A$-vowel is more resistant to syncopation than0 an $Œ_B$-vowel. The pattern of (10a), which is the opposite of (9) is due to the impossibility of $Œ_A$-vowels to be realized after two consonants, cf. (7b). This is not the case in (10b) where both Œ-vowels are of type A and both can be syncopated, because the first one is preceded by only one consonant.

(9)	*on aborde le virage* 'we enter the curve'	ɔ̃nabɔrdŒlŒviraʒ	ɔ̃nabɔrdlŒviraZ	* ɔ̃nabɔrdœlviraʒ
	ils partent demain 'they leave tomorrow'	ipartŒdŒmɛ̃	ipartdŒmɛ̃	* ipartœdmɛ̃
	la veste de Paul 'Paul's jacket'	lavɛstŒdŒpɔl	lavɛstdŒpɔl	* lavɛstœdpɔl
	quatorze devoirs 'fourteen pieces of homework'	katɔrzŒdŒvwar	katɔrzdŒvwar	* katɔrzœdvwar
	l'autre melon 'the other melon'	lotrŒmŒlɔ̃	lotmŒlɔ̃	* lotrœmlɔ̃
	porte-fenêtre 'French window'	pɔrtŒfŒnɛtr	pɔrtfŒnɛtr	* pɔrtœfnɛtr

(10)	a. *(une) patte de renard* 'fox's paw'	patdŒrŒnar	* patdrŒnar	patdœrnar
	elle te demande 'she asks for you'	ɛltŒdŒmɑ̃d	* ɛltdŒmɑ̃d	ɛltœdmɑ̃d
	b. *(une) queue de renard* 'fox's tail'	kødŒrŒnar	kødrŒnar	kødœrnar
	on te demande 'they ask for you'	ɔ̃tŒdŒmɑ̃d	ɔ̃tdŒmɑ̃d	ɔ̃tœdmɑ̃d

4.2. Difference in the sensitivity to rhythmic structure

The syncopation of $Œ_A$-vowels can be sensitive or not sensitive to rhythm according to the number of consonants that immediately precede the $Œ_A$-vowel. As for $Œ_B$-vowels, their distribution (occurrence/non-occurrence) seems to be always constrained by rhythm.

The syncopation of $Œ_A$-vowels depends first of all on the number of preceding consonants: if only one consonant precedes, syncopation is always possible, i.e. it cannot be blocked by the rhythmic pattern of the utterance; if two consonants precede, syncopation is restricted to certain rhythmic configurations.

The examples in (11) below, taken from Dell (1984:75), exhibit identical segmental strings and different rhythmic structure. Dell represents (11a) with a primary stress (level 1 stress) on the final syllable of *demain*, a secondary stress (level 2 stress) on the final syllable of *préférerais* and no stress on *pas*. Conversely, in (11b) there is a level 2 stress on *pas* and no stress on *préférerais*. Thus, the alternating [Œ] of *venir* finds itself in an internal syllable of the second rhythmic unit in (11a), but in the initial syllable of the second rhythmic unit in (11b). In both cases syncopation can occur.

(11) a. *tu préférerais / pas venir demain?* typrEfer'rɛ typrEfer'rɛ
2 0 1 pavŒnirdŒ'mɛ̃ pavnirdŒ'mɛ̃
'Would you prefer not to come tomorrow?'
b. *tu préférerais pas / venir demain?* typrEferrɛ'pa typrEferrɛ'pa
0 2 1 vŒnirdŒ'mɛ̃ vnirdŒ'mɛ̃
'Wouldn't you prefer to come tomorrow?'

As can be seen in (12), which repeats an example found in Delattre (1966:21), syncopation of the $Œ_A$-vowel in *venir* is also allowed in pre-stress syllable if there is only one consonant preceding it.

(12) *il veut venir* ivøvŒ'nir ivøv'nir
'he wants to come'
il veulent venir ivœlvŒ'nir * ivœlv'nir
'they want to come'

When an $Œ_A$-vowel is preceded by more than one consonant, its syncopation is still not impossible, but it seems to be restricted to some speakers of Standard French only and to very fast speech. Consider the following statements by Dell:

> il semble que **dans la parole très rapide** le schwa d'un petit nombre de mots commençant par #Cə- puisse tomber même si le mot précédent est terminé par une consonne [...] Les faits touchant ce point **varient d'un locuteur à l'autre**. Certains semblent se tenir toujours strictement à VCE1 [Dell's rule that prevents schwa from deleting in this context] même dans le débit le plus rapide (Dell 1983:230).

Moreover, this $Œ_A$-syncopation is impossible in pre-stress syllable; see (13a). It is allowed only in a syllable separated from the stressed one by at least one intervening syllable; see (13b). The examples in (13) are taken from Dell (1985:231).

(13) a. *la terre se vend* latɛrsŒvɑ̃ * latɛrsvɑ̃
'the land sells'
b. *la terre se vend bien* latɛrsŒvɑ̃bjɛ̃ latɛrsvɑ̃bjɛ̃
'the land is selling well'

As reported by Morin (1983:82), for speakers of the Parisian variant of standard French, the deletion of $Œ_A$-vowels after two consonants is the easier the more distant is the $Œ_A$-vowel from the following stressed syllable (within the same rhythmic unit):

au bord de l'eau ObɔrdŒ'lo ?? Obɔr'dlo
'at the water's edge'
au bord de la mer ObɔrdŒla'mɛr ? Obɔrdla'mɛr
'at the seaside'
au bord de l'Atlantique ObɔrdŒlatlɑ̃'tik Obɔrdlatlɑ̃'tik
'on the coast of the Atlantic'

The same sensitivity to rhythm is observed with $Œ_A$-syncopation in utterance-initial syllables (i.e. after a pause): the longer the distance from stress, the easier the syncopation of $Œ_A$. Consider the following data from Morin (1983:76): [22]

ce gars 'that lad' sŒ'ga ?? 'sga
ce garçon 'that boy' sŒgar'sɔ̃ ? sgar'sɔ̃
ce garçon-là 'that boy' sŒgarsɔ̃'la sgarsɔ̃'la

$Œ_B$-vowels exhibit a similar sensitivity to the rhythmic pattern of the utterance. Look at the examples in (14) taken from Tranel (1987a: table 6.24). The manifestation of the $Œ_B$-vowel is favored before a monosyllabic stressed word and disfavored when the hypothetical syllable that would result from the phonetic realization of the $Œ_B$ is at least one syllable distant from the final stressed syllable in the rhythmic unit. A similar rhythm-sensitive pattern of Œ/zero alternation is found in compounds where the first constituent has two consonants before its final *e*. This *e* may or may not be pronounced if the second constituent contains more than one syllable and must be pronounced if the latter is monosyllabic, see (15).

(14) *la carte verte* 'the green card' lakartŒ'vɛrt ? lakart'vɛrt
la carte vermeille 'the red card' ? lakartŒvɛr'mɛj lakartvɛr'mɛj
il parle trop 'he talks too much' ilparlŒ'tro ? ilparl'tro
il parle trop peu 'he talks too little' ? ilparlŒtro'pø ilparltro'pø

(15) *garde-meuble* 'furniture storehouse' gardŒ'mœbl * gard'mœbl
garde-malade 'home nurse' gardŒma'lad gardma'lad
ouvre-boîte 'can opener' uvrŒ'bwat * uv'bwat
ouvre-bouteille 'bottle opener' uvrŒbu'tɛj uvbu'tɛj

The non-manifestation of $Œ_B$-vowels, like that of $Œ_A$-vowels after two consonants, is hardly possible in pre-stress position. As for syncopation of $Œ_A$-vowels after only one consonant, there seems to be no restriction related to rhythm.

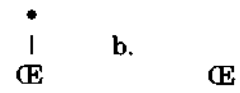
5. Harmonic Phonology analysis

The analysis put forward here in the framework of autosegmental phonology uses the M/W/P model (Goldsmith 1990, Goldsmith 1993:21-33) with three levels of representation. It is based on different non-linear representations for different types of Œ-vowels; see (16).

We account only for alternating schwas: 'nonanchored' internal schwas are nonalternating – they either drop systematically or are maintained unexceptionally (stable schwa). We consider their presence/absence in underlying representations to be cases of allomorphy (see 2.2).

For 'anchored' schwas the representation as underlying floaters is adopted, that is, as /<Œ>/, where the angled brackets mean that the segment inside them is devoid of skeletal position; see (16b). As for stable (nonalternating) schwas (cf. 3.4), they will be represented as Œ-segments provided with a skeletal position; see (16a).

(16) a. b.



The other category of vowels alternating with zero in French coincides with 'nonachored' final schwas. We consider them of epenthetic nature (see 3.3) and do not represent them underlyingly at all.

We do not adopt the terms of 'anchored' (vs. 'nonanchored') as used by Lyche & Durand (1996) because, in our model, this would mean a segment that is 1) provided with a skeletal position; 2) underlyingly associated to its skeletal position. Yet what Lyche & Durand call 'anchored schwas' are, in our interpretation, schwas that are underlyingly devoid of skeletal position and, therefore, not associated (anchored) to the skeleton.

Therefore, we would reserve the term of 'anchored Œ-vowel' to stable (nondeleting or nonalternating) Œ-vowels like those in *crever* [krŒve], *marguerite* 'daisy' [margŒrit], *pauvreté* 'poverty' [pOvrŒte], *chasteté* 'chastity' [ʃastŒte], etc.

5.1. Summary of underlying representations

Here is a summary of our assumptions about underlying representations of the different types of schwa in French:

• 'anchored schwas': nonanchored (floating) vocalic segments [Œ]; see *petit*, (17)

• 'nonanchored' internal schwas: if silent –*matelas* 'mattress', (18) – not represented; if stable, that is, always pronounced –*marguerite*, (19) – an anchored (non floating) segment [Œ]

• 'nonanchored' final schwas: not represented (will be derived through default epenthesis); see *être* 'be', (20)

As for 'nonanchored' internal schwas, they are given here a morphophonemic (allomorphic) treatment.

We adopt the following additional assumptions about the underlying forms of French words:

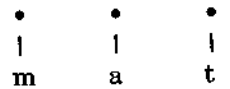
• liaison consonants: nonanchored (floating) consonantal segments [z], [t], [r], etc.; see *petit*, (17)

• fixed word-final consonants: anchored consonantal segments (not followed by underlying schwa); see *marguerite*, (19)

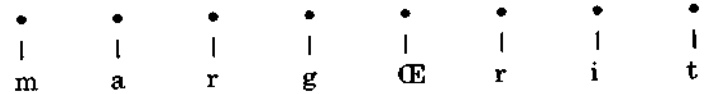
• 'aspirate-h' words: a skeletal slot devoid of any segmental contents that acts as the edge of a 'syllable island', that is, prevents resyllabification involving the vowel that immediately follows it; [23] see *housse* 'cover', (21)

(17)

(18)



(19)



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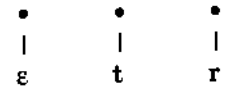

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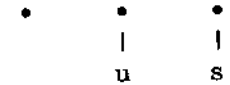


5.2. *Syllabification principles in Harmonic Phonology and the French syllable*

I assume that in French syllabification of all segmental material is required at W-level ("the deepest level at which phonotactic conditions can be stated", see Goldsmith 1990:123), but there is some rudimentary syllabification already at M-level.

Goldsmith (1990:122) introduces the notion of 'early' or 'partial' syllabification which "can serve the purpose of exposing problems for the phonology, generally in the guise of unsyllabified (i.e. unsyllabifiable) material". This early syllabification is opposed to 'complete' syllabification, "a far stricter well-formedness condition" on representations that holds true, according to Goldsmith, at W-level.

Both partial (M-level) and complete (W-level) syllabification in French are assumed to be constrained by the restrictions that Dell (1995) defines for what he calls the 'level L', "the latest stage where the segment sequences which constitute 'words' still abide by the phonotactic constraints which are in force in the lexical representations of lexemes" (Dell 1995:23). Dell notes that, at a further stage, cluster-creating rules dealing with word sequences (or with inflectional material such as the future tense suffix) generate "clusters which are not phonologically admissible in the lexical representations of lexemes" (Dell 1995:24). In our interpretation, this means that at level P, the level of systematic phonetics which serves as the interface with the phonetic component, the restrictions on possible syllable structures are less rigid.

A segment can be syllabified only if it is provided with a skeletal slot. Therefore, floating segments (Œ-vowels, liaison consonants) cannot be syllabified before being anchored to the skeleton, i.e. they remain outside syllable structure on M-level.

In Harmonic Phonology syllabification is taken to apply "throughout the derivation". At each level, syllabification applies "in a minimal fashion", i.e. in such a way as to build the largest syllables (i.e. the smallest number of syllables) consistent with the language's restrictions on possible syllables.

The restrictions on syllable structure for French are best described in Dell (1995). In this work Dell summarizes assumptions on syllabification in French from earlier publications: Bouchard (1980), Plénat (1987) and Rialland (1994).

An important assumption in Dell's analysis is that the French syllable can have a complex (branching) onset, but only a simple (non-branching) coda. The same assumption about the coda of the

French syllable ("there can only be one consonant in the coda in the French syllable") has been made by Bouchard (1980:20) and plays a crucial role in this author's treatment of French schwa.

We should note that some descriptions of French syllabification (Wioland 1985, Laks 1995) include superheavy syllable types with complex "codas" such as CVCC (e.g. *cible* /.sibl./ 'target') or CCVCCC (e.g. *quartz* /.kwartz./ 'quartz'). These complex "codas" are generally restricted to word-final position. But, as has been demonstrated by Dell (1995), "allowing more than one consonant in codas would lead to unnecessary complications".

The syllabification of intervocalic clusters is subjected to the following three assumptions (Dell 1995:14):

a) a prevocalic consonant is tautosyllabic with the following vowel;

b) in an OBLI cluster the two consonants are tautosyllabic;

c) a postvocalic consonant is tautosyllabic with the preceding vowel, provided no conflict arises with (a) and (b) above.

OBLI (cf. Dell 1995:7) refers to any sequence of an OBstruent and a LIquid except if:

- both are coronals (tl, dl ; sl, zl, ʃl, ʒl)
- the first segment is a coronal fricative (sr, zr, ʃr, ʒr)

Thus, the following combinations of consonants can be well-formed complex onsets in French (Dell 1995:11):

(22) OBLI

$$\left\{\begin{matrix} p \\ b \\ f \\ v \\ k \\ g \end\right\} + \left\{\begin{matrix} r \\ l \end\right\}$$

$$\left\{\begin{matrix} t \\ d \end\right\} + r$$

s + voiceless stop (*sp, st, sk*)
s + OBLI (where OB is a voiceless stop: *spl, spr, str, skl, skr*)

According to Dell's assumptions, word-internal three- and four-consonantal clusters are decomposed in a simple coda and a complex onset, e.g. *mercredi* 'Wednesday' [mɛr]$_\sigma$[krŒ]$_\sigma$[di]$_\sigma$, *abstrait* 'abstract' [ab]$_\sigma$[strɛ]$_\sigma$.

In Harmonic Phonology all autosegmental material has to be licensed at W-level (Goldsmith 1990:124); elements not licensed at this level will not proceed to the post-lexical phonology, i.e., they are deleted. Licensers are prosodic units: the syllable node is the primary licenser. But there are also secondary licensers. Besides the coda node, another kind of secondary licenser (the element referred to as 'Ω') appears at word-boundary and licenses "extrasyllabic elements which constitute word-final 'appendices' that are licensed (hence, not deleted) without being part of any syllable.

A similar idea is found in Bouchard (1980): he admits the existence in French of a third constituent besides the onset and the rime: the 'appendix', which can be found only in word-final syllables (Bouchard 1980:39, note 10).

In our analysis in the framework of Harmonic Phonology, we assume that the word-end in French can license word-final extrasyllabicity. The word-final appendix (Ω-constituent) in French has the same composition as a word-initial onset – it may be:

- a simple onset (*herbe* 'grass' [ɛr]$_\sigma$[b]$_\Omega$, *peste* 'plague' [pɛs]$_\sigma$[t]$_\Omega$)
- a complex onset of two consonants (*ordre* 'order' [ɔr]$_\sigma$[dr]$_\Omega$, *cercle* 'circle' [sɛr]$_\sigma$[kl]$_\Omega$)
- a complex onset of three consonants (*dextre* 'right-hand' [dɛk]$_\sigma$[str]$_\Omega$).

Our analysis of syllabification of word-final clusters differs from Dell's in two points:

1. Citing Plénat (1987) as his source of inspiration, Dell suggests that the word-final onsets of potential syllables ("degenerate syllables") belong to the rhyme of the last syllable, a kind of "super-rhyme", while we consider them, as in the framework adopted for the present analysis, as an autonomous constituent (the appendix, Ω) which is directly linked to the word-node without being part of any syllable.

2. Dell analyzes word-final single consonants and OBLI clusters as **onsets** of "degenerate syllables", while we prefer to represent the single consonant or the obstruent of the OBLI cluster as **coda** of the final syllable leaving the liquid of the OBLI cluster alone in the Ω-constituent (appendix): *mettre* 'put' [mɛt]$_\sigma$[r]$_\Omega$, *table* 'table' [tab]$_\sigma$[l]$_\Omega$.

If syllabification applies as assumed by Harmonic Phonology, nothing prevents the obstruent of a word-final OBLI cluster from syllabifying as coda of the preceding consonant. Conversely, syllabification of *mettre*, *table* on M-level as *[mɛ]$_\sigma$tr, *[ta]$_\sigma$bl (which would lead

to *[mɛ]$_\sigma$[tr]$_\Omega$, *[ta]$_\sigma$[bl]$_\Omega$ on W-level) is a violation of the principle according to which syllabification must apply in a minimal fashion, i.e., so as to create the largest possible syllables: actually, [mɛt]$_\sigma$ is a larger syllable than [mɛ]$_\sigma$, both being consistent with the restrictions on possible syllables in French.

Moreover, having rejected Dell's idea of the 'super-rhyme' where the 'degenerate syllable' serves as a kind of coda in order to close the preceding syllable, we would be unable to account for high vowel laxing in Quebec French occurring only in closed syllables (e.g., *équilibre* 'balance' [ekilɪbr], cf. Dumas 1994:96) if the obstruent of a word-final OBLI cluster was not analyzed as coda of the preceding syllable.

6. <Œ>-Anchoring

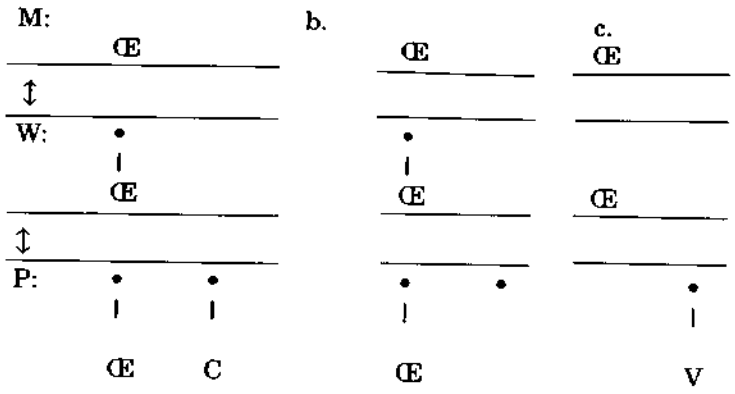
The first 'rule' that affects floating Œ-vowels is a cross-level rule that applies between the first and the second level. This rule is a kind of triple correspondence between the three levels. Remind that in Harmonic Phonology rules are not derivations of one level's representation from the other. Levels (M, W, P) are only different ways of describing the same linguistic expression (Goldsmith 1993:30). The representations of the three levels are simultaneous and it is possible to define a rule (relation between two levels) which refers to elements of each of the three levels.

This allows us to describe a correspondence between M- and W-level's representations referring at the same time to the P-level representation of the same string of segments.

(M,W) <Œ>-ANCH: A floater <Œ> anchors between levels M and W unless it is followed by an onsetless syllable at P-level.

So-called *h-aspiré* words that prevent liaison consonants from anchoring into the skeleton and (optionally, at least for some speakers and some *h-aspiré* words) word-final fixed consonants from undergoing *enchaînement* (Encrevé 1988:196-203) are assumed to begin with a floating (empty) skeletal slot (cf. Goldsmith 1990:57). Hence, their first syllable is not onsetless: it is provided with an empty onset. Thus, a floater that finds itself before an *h-aspiré* word on P-level undergoes <Œ>-Anchoring, example (23b), as if it found itself before a consonant-initial word as in (23a).

(23) a.



b.

c.

Consequently, a floating <Œ> does not anchor only if followed immediately by a vowel at P-level. In the latter case, <Œ> remains unassociated to the skeleton at W-level and is deleted by Stray Erasure at P-level; see (23c).

7. Œ-Deletion

The next rule is another triple correspondence, but it describes a structural correspondence affecting levels W and P, referring at the same time to the M-level's representation of the same string of segments.

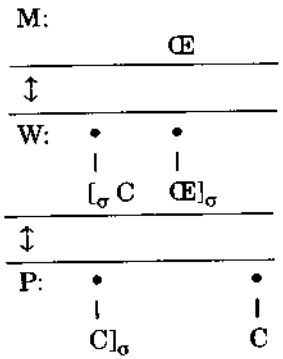
(W,P) Œ-DEL: An Œ may delete between levels W and P if
1) it matches a floater <Œ> at M-level;
and
2) it is followed by a consonant at P-level;
and
3) the preceding consonant is allowed to resyllabify at P-level.

The second condition is needed to prevent Œ-Deletion before the empty skeletal slot in the onset of the initial syllable of an *h-aspiré* word; see (25c). Actually, an alternating $Œ_A$ never deletes before an *h-aspiré* word. This is an essential difference between consonant-initial words and *h-aspiré* words; see (24). As has been pointed out by Tranel (1995:811), *h-aspiré* words exhibit some properties of their own.

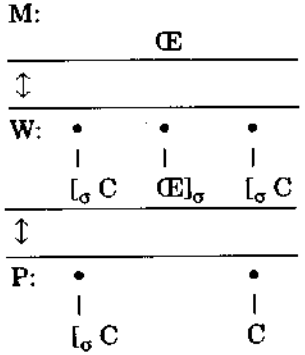
(24)			
	dans le haut 'at the top'	[dɑ̃lŒo]	* [dɑ̃lo]
	dans le bas 'at the bottom'	[dɑ̃lŒba]	[dɑ̃lba]

The resyllabification of the preceding consonant at P-level can be leftward or rightward. In the former case the consonant is reanalyzed as coda of the preceding syllable (25a), while in the latter case a complex onset is created in the following syllable (25b).

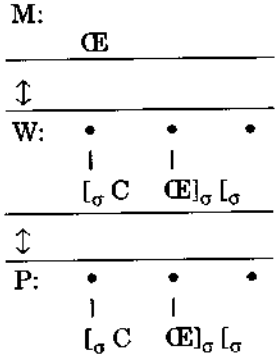
(25) a.



b.



c.



For all speakers of French, there are no restrictions to the resyllabification of a consonant as coda of the preceding syllable at P-level. That is why the deletion of a W-level Œ that matches an <Œ> at M-level is always possible when it is preceded by a single consonant which is syllabifiable to the left at P-level.

At least for some speakers of French (represented by Dell's pronunciation), there are some restrictions to the P-level resyllabification of a consonant in a complex onset:

- it is restricted to very fast speech;
- it is constrained by rhythmic structure: a complex onset cannot be created at P-level in a stressed syllable.

The above restrictions affect only P-level resyllabification, not

W-level syllabification, where complex onsets do occur in stressable syllables, i.e. syllables that may be stressed at P-level.

Consider now the examples in (26) from Morin (1983:74):

(26) a. *(il n'a) pas de scrupule* padskrypyl padŒskrypyl
'he has no scruples'

b. *(je ne veux) pas de ce crétin* * padskrEtɛ̃ padsŒkrEtɛ padŒsŒkrEtɛ̃
'I don't want this cretin' padœskrEtɛ̃

Together, the rules of <Œ>-ANCH and Œ-DEL account for the fact that [dskr] ([tskr] with voice assimilation) is a possible sequence in (26a), but not in (26b). In (26a) [skr] is built as a complex onset on W-level; [d] finds the coda of the preceding syllable vacant at P-level and resyllabifies to the left, see (27). This gives [dskr]. In (26b) the onset that is created on the word-level is [kr]. When the first Œ deletes, see (28a), the coda has been already occupied by [d]; therefore, [s] is unable to resyllabify as coda and the second Œ cannot be deleted. The second Œ may undergo Œ-DEL only if the first Œ has been retained, see (28b). In the latter case, [s] resyllabifies as coda of the syllable created with the retained Œ as nucleus: [dœs].

(27)

M	pa	d<Œ> ↓	skrypyl	<Œ>-ANCH
W	$[pa]_\sigma$	$[dŒ]_\sigma$ ↓	$[skry]_\sigma[pyl]_\sigma$	Œ-DEL
P	$[pad]_\sigma$		$[skry]_\sigma[pyl]_\sigma$	

(28) a.

M		pa	d<Œ> ↓	s<Œ> ↓	krEtɛ̃	<Œ>-ANCH
W		[pa]	[dŒ]	[sŒ]	[krE][tɛ̃]	Œ-DEL
P	(i)	[pad]		[sŒ]	[krE][tɛ̃]	

b.

M		pa	d<Œ> ↓	s<Œ> ↓	krEtɛ̃	<Œ>-ANCH
W		[pa]	[dŒ] ↓	[sŒ]	[krE][tɛ̃]	Œ-DEL
P	(ii)	[pa]	[dœs]		[krE][tɛ̃]	

In (29) below I give the account for example (13), section 4.2. The coda of the preceding syllable being occupied by [r], [s] cannot resyllabify to the left. However, given that [sv] (realized as [zv] by some

speakers) is a possible onset in French (cf. *svelte* 'slender'), [s] resyllabifies into the onset of the following syllable. Resyllabification is possible, because the following syllable is not stressed at P-level. Therefore, the deletion of Œ is also possible.

(29)

M	la	tɛr	s<Œ> ↓	vɑ̃	bjɛ̃	<Œ>-ANCH
W	$[la]_\sigma$	$[tɛr]_\sigma$	$[sŒ]_\sigma$ ↓	$[vɑ̃]_\sigma$	$[bjɛ̃]_\sigma$	Œ-DEL
P	$[la]_\sigma$	$[tɛr]_\sigma$		$[svɑ̃]_\sigma$	**$[bjɛ̃]_\sigma$** [24]	

In (30) the deletion of Œ in *de* is impossible, because the consonant cluster that would result – [dkr] or [tkr] with voice assimilation – is not an admissible onset; see (22).

(30) *un bac de crapauds* 'a tub of toads' ɛ̃bakdŒkra'**po** * ɛ̃bakdkra'**po**

The deletion in (31a) is much easier than in (31b), cf. Dell (1985:231), because [sp] is a well-formed onset in French (cf. *sport* [spɔr], *perspicace* 'perspicacious' [pɛr.spi.kas]), whereas [tp] is hardly possible as a complex onset; see (22).

(31) a. *pour se peigner* 'to comb oneself' pursŒpE'ɲe purspE'ɲe
b. *pour te peigner* 'to comb yourself' purtŒpE'ɲe ? purtpE'ɲe

At the beginning of an utterance, i.e. for the syllable that immediately follows a pause, there is a considerable loosening of the restrictions on admissible consonant clusters in French (Dell 1985:226): after a pause we can even observe deletions that generate sequences with sonority reversals, e.g. *liquid+fricative* as in *r(e)venez demain* 'come back tomorrow', *fricative+stop* as in *j(e)tez-y un coup d'œil* 'take a glance at it', *liquid+stop+liquid* as in *r(e)trouvez-moi cet argent* 'find again that money for me'. However, a sequence of two stops is inadmissible, e.g. in *debout sur une table* 'get up on a table' a pronunciation [dbu] for *debout* is excluded. This means that the restrictions on syllable structure resulting from resyllabification that takes place on P-level are less rigid than those on M-level and W-level syllabification.

7.1. Two and more Œ's in contiguous syllables

(28a) and (28b) are instances of the more general pattern of ghost [Œ] alternation in sequences of two and more contiguous sylla-

bles containing Œ's. The derivations in (32a-c) account for three of seven possible realizations (ii, iii, iv) of the sequence *(j'ai) envie de te le demander* 'I feel like asking you about it' where

• none of the Œ's is deleted:
(i) [ɑ̃vidŒtŒlŒdŒmɑ̃de];
• two of four Œ's are deleted:
(ii) [ɑ̃vidtœldŒmɑ̃de],
(iii) [ɑ̃vidœtlœdmɑ̃de],
(iv) [ɑ̃vidtŒlœdmɑ̃de];
• one of four Œ's is deleted:
(v) [ɑ̃vidtŒlŒdŒmɑ̃de],
(vi) [ɑ̃vidœtlŒdŒmɑ̃de],
(vii) [ɑ̃vidŒtœldŒmɑ̃de],
(viii) [ɑ̃vidŒtŒlœdmɑ̃de].

The following generalizations can be drawn: 1) it is impossible to drop more than two Œ's in a sequence of four; 2) it is impossible to delete simultaneously two Œ's in contiguous syllables. Both generalizations are direct consequences of the way of application of Œ-DEL.

(32) a.

M		ɑ̃vi	d<Œ>	t<Œ>	l<Œ>	d<Œ>mɑ̃de	
			↓	↓	↓	↓	
W		[ɑ̃]$_\sigma$[vi]$_\sigma$	[dŒ]$_\sigma$	[tŒ]$_\sigma$	[lŒ]$_\sigma$	[dŒ]$_\sigma$[mɑ̃]$_\sigma$ [de]$_\sigma$	<Œ>-ANCH
			↓		↓		
P	(ii)	[ɑ̃]$_\sigma$[vid]$_\sigma$		[tœl]$_\sigma$		[dŒ]$_\sigma$[mɑ̃]$_\sigma$ [de]$_\sigma$	Œ-DEL

b.

M		ɑ̃vi	d<Œ>	t<Œ>	l<Œ>	d<Œ>mɑ̃de	
			↓	↓	↓	↓	
W		[ɑ̃]$_\sigma$[vi]$_\sigma$	[dŒ]$_\sigma$	[tŒ]$_\sigma$	[lŒ]$_\sigma$	[dŒ]$_\sigma$[mɑ̃]$_\sigma$[de]$_\sigma$	<Œ>-ANCH
					↓	↓	
P	(iii)	[ɑ̃]$_\sigma$[vi]$_\sigma$	[dœt]$_\sigma$		[lœd]$_\sigma$	[mɑ̃]$_\sigma$[de]$_\sigma$	Œ-DEL

c.

M		ɑ̃vi	d<Œ>	t<Œ>	l<Œ>	d<Œ>mɑ̃de	
			↓	↓	↓	↓	
W		[ɑ̃]$_\sigma$[vi]$_\sigma$	[dŒ]$_\sigma$	[tŒ]$_\sigma$	[lŒ]$_\sigma$	[dŒ]$_\sigma$[mɑ̃]$_\sigma$[de]$_\sigma$	<Œ>-ANCH
				↓		↓	
P	(iv)	[ɑ̃]$_\sigma$[vid]$_\sigma$		[tŒ]$_\sigma$	[lœd]$_\sigma$	[mɑ̃]$_\sigma$[de]$_\sigma$	Œ-DEL

7.2. Special behavior of certain sequences of monosyllables

According to Morin (1983:77-78) and Tranel (1987a:92-93), some sequences of monosyllabic clitics with alternating [Œ] tend to have a fixed pronunciation, e.g. *je ne* with the first [Œ] always pronounced; *ce que* with the second [Œ] always pronounced. However, when a vowel-initial word follows, the first [Œ] in *je n'* can be dropped and that of *ce qu'* can be retained :

je ne sais pas 'I don't know'	ʒŒnŒsɛpa	ʒœnsɛpa	* ʒnŒsɛpa
je n'ose pas 'I don't dare'		ʒŒnozpa	ʒnozpa
ce que j'ai vu 'what I saw'	sŒkŒZɛvy	* sœkʒɛvy	skŒʒɛvy
ce qu'on voit 'what I see'		sŒkɔ̃vwa	skɔ̃vwa

Following Morin, we will analyze *je ne* and *ce que* as "amalgams" only when they are found before a consonant. Thus *je ne* will be represented with a stable first Œ (/ʒŒn<Œ>/) and *ce que* with a stable second Œ (/s<Œ>kŒ/), while before a vowel they are ordinary sequences of monosyllabic clitics, each containing two floaters: *je n'* /ʒ<Œ>n<Œ>/, *ce qu'* /s<Œ>k<Œ>/.

8. The mechanism responsible for the alternation of Œ$_B$-vowels

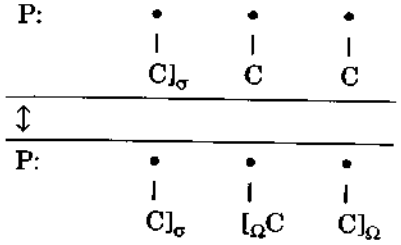
As mentioned above, in French some licensed extrasyllabic material is allowed word-finally. There are two possibilities for licensed extrasyllabic consonants in French: they may be anchored or floating. The latter function as liaison consonants: if skeletal slot insertion occurs (cf. Tranel 1995:806), they become anchored and may syllabify with the following vowel or as a coda of the preceding syllable in the cases of *liaison sans enchaînement* (cf. Encrevé 1988:177).

Licensed extrasyllabic consonants that are anchored may either be integrated in syllable structure by means of creating an appendix (cf. Goldsmith's Ω-licenser) or remain extrasyllabic. Even in the latter case, being underlyingly anchored, they cannot be deleted: they remain as an ill-formed structure at P-level. The intra-level rule of [Œ]-Insertion (see 8.3) is a kind of repair strategy aiming at well-formed syllabification of such anchored unsyllabified consonants.

8.1. Ω-Creation

We posit the following rule as responsible for the creation of word-final appendices, i.e. for the presence of word-final licensed extrasyllabic material:

(P/P) Ω-CRE (optional, blocked in pre-stress position): Optionally create a Ω-appendix with anchored consonants that remain unsyllabified at the word-end at P-level, unless the following syllable is stressed.



Ω-CRE

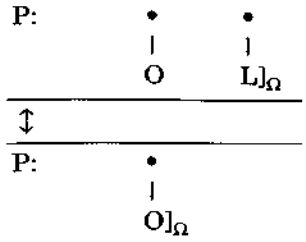
W-CRE does not apply if the following word is vowel-initial and not a syllable island, because in this case *enchaînement* takes place, i.e. the word-final consonant gets syllabified with the following vowel at P-level.

W-CRE is non applicable if the consonants in question are immediately followed by a stressed syllable. It is generally admitted that French has no word stress. Hence, stress assignment in French is assumed to apply at a level that corresponds to the P-level of Harmonic Phonology.

8.2. Liquid Deletion

This rule affects only liquids in appendices. It is obligatory unless the word finds itself before a pause.

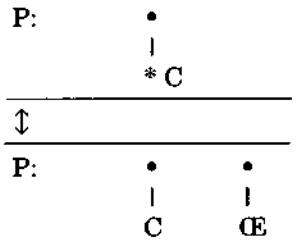
(P/P) L-DEL (optional before a pause): Delete the final liquid in a Ω-appendix if preceded by an obstruent. (L = liquid, O = obstruent)



L-DEL

8.3. [Œ]-Insertion

(P/P) Œ-INS: An [Œ] is inserted after an anchored consonant that would otherwise remain unsyllabified at P-level. (*C = unsyllabified consonant)



Œ-INS

If a cluster of anchored consonants happens to remain unsyllabified, Œ-INS applies just once, after the last unsyllabified consonant.

The three (P, P) rules – Ω-CRE, L-DEL and [Œ]-INS – suffice to account for the two possible realizations of *l'arbre pourri* 'the rotten tree' – [larbpuri] and [larbrŒpuri], see (33) and (34) below – as well as for the impossibility of *[larbrpuri] and *[larbŒpuri]. The first is impossible because [Œ]-INS is obligatory, once Ω-CRE and L-DEL have not applied. The second one is excluded as the liquid deletion implies a previous Ω-appendix creation, i.e. syllabification of [br] as $[br]_{\Omega}$ which prevents Œ-INS from applying on $[b]_{\Omega}$, already licensed.

(33)	M		l<Œ> arbr	puri	
	W		l<Œ> [ar]$_\sigma$br	[pu]$_\sigma$[ri]$_\sigma$	(<Œ>-ANCH)
	P		[lar]$_\sigma$br	[pu]$_\sigma$[ri]$_\sigma$	
			↓		Ω-CRE
		(i)	[lar]$_\sigma$[br]$_\Omega$	[pu]$_\sigma$[ri]$_\sigma$	
			↓		L-DEL
			[lar]$_\sigma$[b]$_\Omega$	[pu]$_\sigma$[ri]$_\sigma$	
(34)	M		l<Œ> arbr	puri	
	W		l<Œ> [ar]$_\sigma$br	[pu]$_\sigma$[ri]$_\sigma$	(<Œ>-ANCH)
	P		[lar]$_\sigma$br	[pu]$_\sigma$[ri]$_\sigma$	
					(Ω-CRE)
		(ii)	[lar]$_\sigma$br	[pu]$_\sigma$[ri]$_\sigma$	
			↓		Œ-INS
			[lar]$_\sigma$[brŒ]$_\sigma$	[pu]$_\sigma$ [ri]$_\sigma$	

All three (P,P) rules are repairs for getting well-formed syllabification. Ω-CRE and L-DEL are more specific than Œ-INS. The first two rules regard only specific classes of consonants: only word-final unsyllabified consonants (Ω-CRE), only appendix-final liquids (L-DEL). Being more specific, Ω-CRE and L-DEL, in accordance with the Elsewhere Condition, precede Œ-INS which applies to every consonant otherwise remaining unsyllabified at P-level. By definition, L-DEL can be undergone only by liquids that are part of a Ω-constituent. Therefore, it cannot take place before Ω-CRE. Œ-INS applies after every anchored consonant (consonant cluster) that has not been rescued (by Ω-CRE) or eliminated (by L-DEL).

9. Interaction of Œ-Deletion and [Œ]-Insertion

Being a (W,P) rule, Œ-DEL takes precedence over Œ-INS, a (P,P) rule. This accounts for the patterns of [Œ]-manifestation in (9) above. Let's look at the derivation of some of the examples: *(la) veste de Paul*, see (35a-b), and *l'autre melon*, see (36a-b).

(35)	a.	M		vɛst	d<Œ>	pɔl	
					↓		<Œ>-ANCH
		W		[vɛs]$_\sigma$ t	[dŒ]$_\sigma$	[pɔl]$_\sigma$	
		P		[vɛs]$_\sigma$ t	[dŒ]$_\sigma$	[pɔl]$_\sigma$	(Œ-DEL)
					↓		Ω-CRE
			(i)	[vɛs]$_\sigma$[t]$_\Omega$	[dŒ]$_\sigma$	[pɔl]$_\sigma$	
							(Œ-INS)
				[vɛs]$_\sigma$[t]$_\Omega$	[dŒ]$_\sigma$	[pɔl]$_\sigma$	
	b.	M		vɛst	d<Œ>	pɔl	
					↓		
		W		[vɛs]$_\sigma$ t	[dŒ]$_\sigma$	[pɔl]$_\sigma$	
		P		[vɛs]$_\sigma$ t	[dŒ]$_\sigma$	[pɔl]$_\sigma$	(Œ-DEL)
							(Ω-CRE)
			(ii)	[vɛs]$_\sigma$ t	[dŒ]$_\sigma$	[pɔl]$_\sigma$	
				↓			Œ-INS
				[vɛs]$_\sigma$[tŒ]$_\sigma$	[dŒ]$_\sigma$	[pɔl]$_\sigma$	
(36)	a.	M		l<Œ> otr	m<Œ>l$\tilde{5}$		
					↓		<Œ>-ANCH
		W		l<Œ> [ot]$_\sigma$ r	[mŒ]$_\sigma$[l$\tilde{5}$]$_\sigma$		
		P		[lot]$_\sigma$ r	[mŒ]$_\sigma$[l$\tilde{5}$]$_\sigma$		(Œ-DEL)
				↓			Ω-CRE
			(i)	[lot]$_\sigma$ [r]$_\Omega$	[mŒ]$_\sigma$[l$\tilde{5}$]$_\sigma$		
				↓			L-DEL
				[lot]$_\sigma$	[mŒ]$_\sigma$[l$\tilde{5}$]$_\sigma$		
	b.	M		l<Œ> otr	m<Œ>l$\tilde{5}$		
					↓		<Œ>-ANCH
		W		l<Œ> [ot]$_\sigma$ r	[mŒ]$_\sigma$[l$\tilde{5}$]$_\sigma$		
		P		[lot]$_\sigma$ r	[mŒ]$_\sigma$[l$\tilde{5}$]$_\sigma$		
							(Ω-CRE)
			(ii)	[lot]$_\sigma$ r	[mŒ]$_\sigma$[l$\tilde{5}$]$_\sigma$		
				↓			Œ-INS
				[lo]$_\sigma$ [trŒ]$_\sigma$	[mŒ]$_\sigma$[l$\tilde{5}$]$_\sigma$		

9.1. The treatment of quelques, presque

A small set of words, namely *presque* 'almost' and *quelques* 'a few', exhibit a pattern of [Œ]-manifestation which is different from that illustrated in (9) and accounted for in (35-36), where two contig-

uous syllables contain a $Œ_B$ + $Œ_A$ combination, and similar to the pattern of (10b) where the combination is $Œ_A$ + $Œ_A$). Example (37) is taken from Tranel (1987a:105, table 6.30) and example (38) from Dell (1985:255).

(37) *quelques secondes* kɛlkŒsŒgɔ̃d kɛlksŒgɔ̃d [25] kɛlkœzgɔ̃d
'a few seconds'

(38) *(il pourrait) presque jeter la balle* prɛskŒʒŒte prɛskʒŒte prɛskœʃte
'he could almost throw the ball'

With our representations and rules, it is possible to assume that the special behavior of the words in question is due to the underlying presence of a floater <Œ> in their M-level representation: /prɛsk<Œ>/, /kɛlk<Œ>/. This makes the pattern of *presque jeter* different from that of *quatorze jetons* given in (9) above, where there is no final floater underlyingly. Here is the account for *quelques secondes* realized as [kɛlkœzgɔ̃d]:

M	kɛlk<Œ>	s<Œ>gɔ̃d	
	↓	↓	<Œ>-ANCH
W	$[kɛl]_σ[kŒ]_σ$	$[sŒ]_σ[gɔ̃d]_σ$	
		↓	Œ-DEL
P	$[kɛl]_σ[kœz]_σ$	$[gɔ̃d]_σ$	

9.2. The treatment of entre, contre

entre 'between' and *contre* 'against' are another special case according to Dell (1978b) and Dell (1985:240). As with *quelques* and *presque*, the realizations in the right column (example (39)) are acceptable, whereas those of the middle column (with the first Œ retained and the second Œ dropped) are judged as impossible. Otherwise, realizations with deletion of the liquid are not impossible. Actually they occur before a pause; see (40). Assuming that the underlying forms are /ɑ̃tr<Œ>/, /kɔ̃tr<Œ>/ with underlying floater <Œ> to account for the acceptability of the right column realizations, the impossible forms of the middle column remain without explanation.

(39) *entre Genève et Paris* ɑ̃trŒʒŒnɛvepari * ɑ̃tʒŒnɛvepari ɑ̃trœʒnɛvepari
'between Geneva and Paris'
contre le mur kɔ̃trŒlŒmyr * kɔ̃tlŒmyr kɔ̃trœlmyr
'against the wall'

As for the examples in (40) taken from Dell (1985:240), the deletion of the final <Œ> there occurs before a pause (which could be a silence or a psychological pause).

(40) *(il faut) s'asseoir entre pour être à l'aise* saswarɑ̃trŒpurɛtralɛz
'one must sit in between to be comfortable' saswarɑ̃tpurɛtralɛz
ceux qui sont contre lèvent la main søkisɔ̃kɔ̃trŒlɛvlamɛ̃
'those who are against raise their hand' søkisɔ̃kɔ̃tlɛvlamɛ̃

The floater cannot anchor by <Œ>-ANCH, for the pause exerts the same effect as an immediately following vowel:

M	kɔ̃tr<Œ>		
			(<Œ>-ANCH)
W	$[kɔ̃t]_σ$ r<Œ>		
			(Œ-DEL)
P	$[kɔ̃t]_σ$ r<Œ>	(pause)	
	↓		Ω-CRE
	$[kɔ̃t]_σ[r]_Ω$<Œ>	(pause)	
	↓		L-DEL
	$[kɔ̃t]_σ$ <Œ>	(pause)	
	↓		Stray Erasure
	$[kɔ̃t]_σ$	(pause)	

9.3. The treatment of words like pègre, astre, buffle

In the variety of French described by Dell, words like *pègre* 'underworld', *astre* 'star', *buffle* 'buffalo' never lose their final liquid despite the fact that they end in an OBLI cluster (cf. Dell 1976, Dell 1985:238):

(la) pègre parisienne pɛgrŒparizjɛn * pɛgparizjɛn
'the Parisian underworld'
(c'est le roi de) la pègre lapɛgr * lapɛg
'he is the king of the underworld'

In our framework, these words should be treated as lexically marked not to undergo Ω-CRE. As only liquids inside a Ω-constituent are subjected to the effects of L-DEL, the words in question will be prevented from undergoing L-DEL and, hence, their final liquid will always be preserved.

10. Conclusion

The distinction between the two types of alternating schwas that we defined – $Œ_A$-vowels and $Œ_B$-vowels – is encoded in M-level representations. In our interpretation of the data only $Œ_A$-vowels are present underlyingly. $Œ_B$-vowels are introduced by a rule of epenthesis ([Œ]-INS).

Among $Œ_A$-vowels, those whose manifestation is sensitive to rhythm were distinguished from those whose syncopation occurs independently of rhythm according to the type of resyllabification that takes place at P-level (creation of a coda/of a complex onset). Assuming that in French constraints on possible syllable structure are different at M/W-level and P-level, we account for the fact that (at least in the variety of French described here) speakers drop ghost [Œ] much more easily after a single consonant, which resyllabifies leftwards in coda position, than after a group of two consonants, where the second consonant resyllabifies rightwards, thus creating a complex onset at P-level. Complex onset creation proves to be more constrained on P-level (by resyllabification) than on M/W-level (by syllabification). In the former case it is possible only in syllables that are not stressed. Creation of word-final appendices in order to license extrasyllabic consonants, a syllabification procedure specific to P-level (Ω-Creation), is also prevented when the immediately following syllable is stressed. As for coda creation, it is equally constrained on both levels M/W and P: it may always apply if the coda position is vacant and if only a single consonant is (re)syllabified as coda.

Contrary to what is alleged by Walker (1996:218), our representational approach does not require special rules to syllabify the "abstract segment" (the floating Œ-segment) neither "to merge it with /ø/ or /œ/ (an obligatory neutralization rule that applies in non-derived environments) or delete it". Syllabification of floaters is a direct consequence of their anchoring to the skeleton. Œ-segments that remain floating are subjected to Stray Erasure.

Moreover, the rules (relations between levels) do not seem to be problematic: they do not require cyclicity or extrinsic ordering. As an (M,W) rule <Œ>-ANCH precedes Œ-DEL that is a (W,P) rule. The (P,P) rules responsible for the behavior of $Œ_B$-vowels are intra-level rules. They apply after the cross-level rule of Œ-deletion. [Œ]-INS systematically inserts [Œ] in pre-stress position, because the rule of Ω-CRE that precedes it in accordance with the Elsewhere Condition (being a more specific repair for unsyllabified consonants), is rhythm-sensitive: the latter rule is blocked when the immediately following

syllable is the stressed syllable of the rhythmic unit. Thus, the consonants left unsyllabified after the application of Ω-CRE, namely those in pre-stress position, have to undergo the more general repair rule: [Œ]-INS.

The system of cross-level and intra-level rules adopted here is able to account for the main patterns of ghost [Œ] alternation in the variety of French described.

Some special cases had to be encoded in M-level representations playing with the triple possibility (in whatever autosegmental framework using the skeleton) for a schwa to be represented underlyingly as: an anchored segment Œ; a floating segment <Œ>; no segment (further generated by default vowel insertion).

Other subsets of the data traditionally considered under the label 'French schwa' such as Closed Syllable Adjustment (Œ ~ ɛ alternations) and internal 'nonanchored' schwas were given a morphophonemic (allomorphic) account.

The framework of Harmonic Phonology proved to be appropriate for the treatment of French schwa for the following reasons: the three levels of representation being simultaneous, reference to all three in a single relation (rule) is possible; the interplay of intra-level and cross-level rules and the Elsewhere Condition suffice to adjust the ordering of rules; the syllabification principles (application in a minimal fashion, licensing of word-final 'extrasyllabic' material) are appropriate to explain the conditioning of the ghost vowel alternations by syllable structure.

Address of the author:

Department of Romance Studies, University of Sofia *St. Kliment Ohridski*, 15 Tsar Osvoboditel Blvd., 1504 Sofia, Bulgaria, e-mail: jetchev@fcml.uni-sofia.bg

Notes

[1] Noske assumes that schwa is deleted after a single consonant (*froidement*), after a sequence 'liquid+obstruent' (*débarquement, sveltement*) or '/s/+obstruent' (*manifestement*), but not after other sequences of two consonants (*exactement*). The questionable data from Noske (1982) are abandoned in Noske's unified account for schwa and gliding in French (Noske 1993:192-240).

[2] A detailed description of the data on schwa in Midi French can be found in Durand, Slater & Wise (1987).

[3] P. 89, (14).

[4] For instance, p. 117 (24) and p. 339 (8).
[5] Dell, personal communication.
[6] "La description de Dell est la plus précise de toutes. Elle comporte un assez grand nombre de règles qui peuvent être obligatoires ou facultatives; la chute ou l'épenthèse des *e* muets y est conditionnée non seulement par la suite des phonèmes en présence, mais aussi par la présence de frontières prosodiques (début et fin d'énoncé), de frontières de mots et de frontières morphologiques" (Morin 1983:73).
[7] Slavic prefixes also behave like proclitics, see Booij & Rubach (1984).
[8] Glide formation and nasalization provide additional evidence for the stronger boundary between prefix and root compared to root and suffix in French (cf. Basbøll 1981:262 and Hannahs 1995).
[9] For Martinet (1972:394) [də] in *par-devant* [paʁdəvɑ̃] is only the 'vocalized variant' of the consonant /d/.
[10] "l'apparition de [ə] est automatique ... ce segment n'a aucun pouvoir distinctif" (p. 101).
[11] Between non homorganic consonants.
[12] Between homorganic consonants.
[13] The 'weight unit' is almost an equivalent of a skeleton point.
[14] Onset (O), rhyme (R), nucleus (N) and coda (C).
[15] As opposed to empty nuclei devoid of "melodicity", i.e. without segmental content, that correspond to consonant clusters which are traditionally analyzed as complex onsets.
[16] According to Dell, in French all those clusters that can be morpheme-final can also occur at the end of a word.
[17] Both may become [ʁœm] by 'truncation'.
[18] Even when they correspond to orthographic *e*'s, these phonetically realized [Œ]'s "are not the phonetic reflexes of final protective schwas, because they also occur in words where no such schwas may be postulated. [...] In addition, the insertion is constrained by the orthography: the presence/absence of a final *e* at the end of the preceding word tends to reinforce the occurrence/nonoccurrence of the schwa" (Tranel 1981:289).
[19] The presence of non-alternating [Œ] in this series of examples characterizes the standard variant of French spoken in Paris. Some dialects of French, e.g. French spoken in the region of Saint-Etienne described in Morin (1983), have not stabilized [Œ] after two consonants that constitute an inter-constituent cluster (coda+onset). In the Saint-Etienne dialect, the same words contain an alternating [Œ].
[20] The Saint-Etienne dialect of French allows syncopation of [Œ] in the initial syllable of the same words, see Morin (1983:84-85).
[21] Here emphatic stress is marked by capitalization of the respective syllable.
[22] "en effet la syncope est plus facile dans *ce garçon-là*, que dans *ce garçon*, et surtout dans *ce gars*" (Morin 1983:76).
[23] On the notion of 'syllable island' see Tranel (1995:809-814).
[24] This syllable and the other syllables in bold type are the stressed syllables in the respective rhythmic units. We assume that stress in French is assigned at P-level.
[25] This form is not given in Tranel's text, but apparently it is not judged as impossible by this author.

Bibliographical References

ANDERSON, Stephen R. (1982), "The analysis of French schwa: or, how to get something for nothing", *Language* 58:534-573.

ANGOUJARD, Jean-Pierre (1997), *Rythme et qualité*, Paris, Editions du CNRS.

BASBØLL, Hans (1981), "On the function of boundaries in phonological rules", in D.L. Goyvaerts, ed., *Phonology in the 1980s*, Ghent, Story-Scientia:245-269.

BAZYLKO, Sławomir (1981), "Le statut de [ə] dans le système phonématique du français contemporain et quelques questions connexes", *La linguistique* 17(1):91-101.

BOOIJ, Geert & Jerzy RUBACH (1984), "Morphological and prosodic domains in Lexical Phonology", *Natural Language and Linguistic Theory* 8:427-463.

BOUCHARD, Denis (1980), "A voice for «e muet»", *Journal of Linguistic Research* 1(4):17-47.

CHARETTE, Monik (1988), *Some Constraints on Governing Relations in Phonology*, PhD thesis, McGill University.

CHARETTE, Monik (1991), *Conditions on Phonological Government*, Cambridge, Cambridge University Press.

CORNULIER, Benoît de (1982), *Théorie du vers*, Paris, Editions du Seuil.

CORNULIER, Benoît de, & François DELL, eds. (1978), *Etudes de phonologie française*, Paris, Editions du CNRS.

DELATTRE, Pierre (1966), *Studies in French and Comparative Phonetics*, The Hague, Mouton.

DELATTRE, Pierre (1966), "L'E muet dans la coupe syllabique", in Delattre (1966: 168-172).

DELL, François (1973), *Les règles et les sons. Introduction à la phonologie générative*, Paris, Hermann.

DELL, François (1976), "Schwa précédé d'un groupe obstruante-liquide", *Recherches linguistiques* 4: 75-111.

DELL, François (1978a), "Certains corrélats de la distinction entre morphologie dérivationnelle et morphologie flexionnelle dans la phonologie du français", in Morin & Querido, eds., *Montréal Working Papers in Linguistics* 10: 1-10.

DELL, François (1978b), "Epenthèse et effacement de schwa dans les syllabes contiguës en français", in Cornulier & Dell (1978: 75-81).

DELL, François (1984), "L'accentuation dans les phrases en français", in Dell, Hirst & Vergnaud (1984: 65-122).

DELL, François (1985), *Les règles et les sons*. Edition revue et augmentée, Paris, Hermann.

DELL, François (1995), "Consonant clusters and phonological syllables in French", *Lingua* 95, 5-26.

DELL, François, Daniel HIRST & Jean-Roger VERGNAUD, eds. (1984), *Forme sonore du langage. Structure des représentations en phonologie*, Paris, Hermann.

DOMINICY, Marc (1984), "Sur la notation d'E féminin ou masculin en métrique et en phonologie", *Recherches linguistiques* 12:7-45.

DUMAS, Denis (1994), *Nos façons de parler. Les prononciations en français québécois*, Sainte-Foy (Québec), Presses de l'Université du Québec.
DURAND, Jacques (1990), *Generative and Non-Linear Phonology*, London, Longman.
DURAND, Jacques (1995), "Alternances vocaliques en français du midi et phonologie du gouvernement", *Lingua* 95: 27-50.
DURAND, Jacques & Bernard LAKS, eds. (1996), *Current Trends in Phonology: Models and Methods*, ESRI, Salford.
DURAND, Jacques, Catherine SLATER & Hilary WISE (1987), "Observations on schwa in Southern French", *Linguistics* 25(5): 983-1004.
ENCREVÉ, Pierre (1988), *La liaison avec et sans enchaînement. Phonologie tridimensionelle et usages du français*, Paris, Seuil.
FISCHER, Robert A. (1980), "La phonologisation du schwa en français", *Linguisticae Investigationes* 4(1): 21-38.
FRANÇOIS, Denise (1974), *Français parlé: analyse des unités phoniques et significatives d'un corpus recueilli dans la région parisienne*, Paris, S.E.L.A.F.
GOLDSMITH, John A. (1990), *Autosegmental and metrical phonology*, Cambridge MA, Basil Blackwell.
GOLDSMITH, John A. (1993), "Harmonic phonology", in Goldsmith (1993: 21-60).
GOLDSMITH, John A., ed. (1993), *The Last Phonological Rule*, Chicago/London, The University of Chicago Press.
GOLDSMITH, John A., ed. (1995), *The Handbook of Phonological Theory*, Cambridge USA/Oxford UK, Basil Blackwell.
GUÉRON, Jacqueline, Hans OBENAUER & Jean-Yves POLLOCK, eds. (1985), *Grammatical Representation*, Dordrecht, Foris.
HADEN, Ernest F. (1965), "Mute E in French", *Lingua* 13: 166-176.
HANNAHS, S.J. (1995), "The phonological word in French", *Linguistics* 33: 1125-1144.
HIRST, Daniel (1985), "Linearisation and the Single-Segment Hypothesis", in Guéron, Obenauer & Pollock (1985: 87-99).
HULST, Harry van der & Norval SMITH, eds. (1982), *The Structure of Phonological Representations, Part II*, Dordrecht, Foris.
HYMAN, Larry M. (1985), *A Theory of Phonological Weight*, Dordrecht, Foris.
ITÔ, Junko (1989), "A prosodic theory of epenthesis", *Natural Language and Linguistic Theory* 7: 217-259.
JETCHEV, Georgi (to be published), *Ghost Vowels and Syllabification. Evidence from Bulgarian and French*, Bloomington, Slavica Publishers.
KEATING, Patricia, ed. (1994), *Phonological Structure and Phonetic Form*, Cambridge, Cambridge University Press.
LAKS, Bernard (1995), "A connectionist account of French syllabification", *Lingua* 95: 51-76.
LYCHE, Chantal & Jacques DURAND (1996), "Testing Government Phonology ou pourquoi le choix du schwa", in Durand & Laks (1996: 443-471).
MARTINET, André (1972), "La nature phonologique d'*e* caduc", in Valdman (1972: 393-400).
MÉLA, Vivienne (1991), "Le verlan ou le langage du miroir", *Langages* 101: 73-94.

MORIN, Yves-Charles (1983), "Quelques observations sur la chute du *e* muet dans le français régional de Saint-Etienne", *La linguistique* 19: 71-93.
MORIN, Yves-Charles (1987), "French data and phonological theory", *Linguistics* 25: 815-843.
MORIN, Yves-Charles (1988), "De l'ajustement du schwa en syllabe fermée dans la phonologie du français", in Verluyten (1988: 133-189).
NOSKE, Roland G. (1982), "Syllabification and Syllable Changing Rules in French", in Hulst & Smith (1982: 257-310).
NOSKE, Roland G. (1993), *A Theory of Syllabification and Segmental Alternation*, Tübingen, Niemeyer.
PARADIS, Carole & Fatimazohra EL FENNE (1995), "French verbal inflection revisited: constraints, repairs and floating consonants", *Lingua* 95: 169-204.
PIGGOTT, Glyne L. & Rajendra SINGH (1985), "The phonology of epenthetic segments", *Canadian Journal of Linguistics* 30: 415-451.
PLÉNAT, Marc (1987), "On the structure of rime in Standard French", *Linguistics* 25: 867-887.
RIALLAND, Annie (1986), "Schwa et syllabes en français", in Wetzels & Sezer (1986: 187-226).
RIALLAND, Annie (1994), "The phonology and phonetics of extrasyllabicity in French'" in Keating (1994: II-9).
SCHEER, Tobias (1996), *Une théorie de l'interaction directe entre consonnes*, PhD dissertation, Université Paris 7.
TAULELLE, Danielle, ed. (1989), *Le Robert oral-écrit. L'orthographe par la phonétique*, Paris, Dictionnaires Le Robert.
TRANEL, Bernard (1981), *Concreteness in Generative Phonology. Evidence from French*, Berkeley, University of California Press.
TRANEL, Bernard (1987a), *The Sounds of French*, Cambridge, Cambridge University Press.
TRANEL, Bernard (1987b), "French schwa and nonlinear phonology", *Linguistics* 25: 845-866.
TRANEL, Bernard (1988), "A propos de l'ajustement de E en Français", in Verluyten (1988: 89-131).
TRANEL, Bernard (1995), "Current issues in French phonology: liaison and position theories", in Goldsmith (1995: 798-816).
VALDMAN, André, ed. (1972), *Papers in Linguistics and Phonetics to the Memory of P. Delattre*, The Hague, Mouton.
VERLUYTEN, S. Paul, ed. (1988), *La phonologie du schwa français*, Amsterdam, John Benjamins.
WALKER, Douglas C. (1996), "The new stability of unstable -e in French", *French Language Studies* 6: 211-229.
WALKER, Douglas C. (1996), "Schwa and [Œ] in French", *Canadian Journal of Linguistics* 38(1): 43-64.
WETZELS, W. Leo & Engin F. SEZER, eds. (1986), *Studies in Compensatory Lengthening*, Dordrecht, Foris.
WIOLAND, François (1985), *Les structures syllabiques du français*, Genève, Slatkine.
WIOLAND, François (1991), *Prononcer les mots du français*, Paris, Hachette.