4. Ghost [Œ] vowels in French

4.1. Discussion of the 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 Noske's earlier treatment of French schwa (Noske 1982)[1] based on markedness of syllable types: part of the data contradict the traditional accounts of standard French.[2] 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, while Durand (1995) accounts for the same data[3] in a Dependency Phonology framework. The main work on French schwa

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[1] The questionable data from Noske (1982) are abandoned in Noske's unified account for schwa and gliding in French (Noske 1993:192-240).

[2] 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*).

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

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 (p.89, ex.14), in other cases, the significant deviation from other authors' data for the Parisian varieties of French could be attributed to specific patterns of Quebec French (for instance, p.117 ex.24 and p.339 ex.8). 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). Scheer is also aware of the existence of many additional subgroups of speakers (Scheer 1996:336). The problem is that the empirical data on which the distinction of the two main varieties (A and B) has been done are not included in Scheer's thesis.

The analysis that I propose here is based on data from Dell (1985), the most exhaustive description available in the literature on French schwa I know about, and some additional examples found in articles by the same author, namely Dell (1976), Dell (1978) and Dell (1984). Unfortunately, these data have not been tested by empirical inquiry with a larger 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 advantage of Dell's data: they are homogeneous. The variety they represent can be characterized as a rather 'conservative' (as Dell himself recognized in a personal communication) 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 formulated by Morin (1987) as follows:

- the phonetic distinction between nondeleted schwa and [Œ][4], 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).

[4] The exact meaning of the capital 'Œ' as phonetic symbol is given below .

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 of French 'E muet' in Tranel's *The Sounds of French* (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).[5]

The variety described by Dell (1973, 1985) coincides neither with group A nor with group B of Scheer (1996). Like group A it admits of schwa syncope in *le d(e)gré* 'the degree' but like group B it prevents schwa from deleting in *fort(e)resse* 'fortress'.

4.1.1. The system of mid vowels in modern standard French

Following Wioland (1991), we assume that the Parisian variety of standard French neutralizes the opposition between mid-open and mid-close vowels, ɛ ~ e, ɔ ~ o and œ ~ ø, respectively, in syllables that Wioland refers to as "unstressable" ("inaccentuables"), namely those that never find themselves at the end of a rhythmic unit and, therefore, never receive final stress. However, many of these "unstressable" syllables can bear emphatic stress ("accent d'insistance"). Given that in French emphatic stress is incompatible with lengthening (it uses only pitch and intensity, to the exclusion of duration, as perceptual cues, cf. Mertens 1987:85-88, Vaissière 1991) and that final stress systematically requires lengthening of the syllable, a more adequate term for Wioland's "unstressable" would be "non lengthenable" syllables. Wioland assumes that the realizations of the mid vowels in closed "non lengthenable" syllables are rather open and recommends to transcribe them as [ɛ], [ɔ], [œ]. As for open "non lengthenable" syllables, the mid vowels that appear in them may cover a range of different realizations from mid-close to mid-open and Wioland recommends to transcribe them with the capital letters [E], [O], [Œ].[6] French schwa is always

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[5] "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)

[6] «L'oreille française, du fait de la rapidité de l'articulation dans cette position peu importante, n'est pas sensible à une différenciation des timbres vocaliques respectifs. Aussi est-il pédagogiquement préférable de transcrire respectivement par les archiphonèmes [O], [Œ] et [E] afin de ne pas donner à la prononciation de ces voyelles une importance qu'elles n'ont pas.» (Wioland 1991:82)

found in an open "non lengthenable" syllable. The phonetic realization of nondeleted schwa coincides with [Œ].[7] Only where a closed syllable is created as a consequence of the deletion of another schwa in the immediately following syllable (see 4.2.3.1), the realization of nondeleted schwa is mid-open [œ], e.g. *je n(e) sais pas*, with the first schwa realized and the second schwa deleted, will be transcribed [.ʒœn.sɛ .pa.] with [œ] instead of [Œ], because the non-realization of schwa in *ne* makes the preceding syllable closed.

Table 1 below sums up the different realizations of the mid vowels in all four syllable types. Where the opposition mid-close vs. mid-open is possible, I give both vowels related by '~'. In the cases of neutralization of the opposition, the actual realization of the respective mid vowel is given: mid-close (o, ø), mid-open (ɛ , ɔ, œ), or the whole range from mid-close to mid-open (E, O, Œ).

French mid vowels	Non lengthenable syllables		Lengthenable syllables	
	Closed	Open	Closed	Open
front unrounded	ɛ	E	ɛ	e ~ ɛ
back rounded	ɔ	O	ɔ ~ o	o
front rounded	œ	Œ	œ ~ ø[8]	ø

Table 1

4.1.2. Alternating and non-alternating [Œ] in French

I assume that, phonetically, nondeleted schwa (traditionally transcribed by means of the IPA symbol [ə]) is not different from the realization of the nonalternating mid front rounded vowels in open non lengthenable syllables: [Œ]. The difference is that schwa is a ghost [Œ] vowel, a vowel that alternates with zero. Not all [Œ] vowels in French are involved in vowel-zero alternations. Some of them are stable vowels and never undergo syncope.

[7] «La graphie «e» suit donc les mêmes tendances générales de prononciation que les autres voyelles inaccentuées à deux timbres et ne relève pas d'un cas particulier.» (Wioland 1991:82)

[8] [ø] is pronounced for 'eu' when the syllable is closed by [z] or [t]. Otherwise [œ] is pronounced.

According to Tranel (1987:87), the two sequences given in (1a-b) below are homophonous when the alternating [Œ] in (1a) is pronounced. Likewise, those in (2a-b) are homophonous according to Dell (1984:99) if the alternating [Œ] at the end of autre is realized. The difference is that the sequences in (1a) and (2a) contain an alternating [Œ] (respectively, in the article *le* and at the end of *autre*), while those in (1b) and (2b) contain an [œ] which is non-alternating (namely, in *leur* and *œuf*, respectively): a realization with syncopation of [œ] is unacceptable for the latter sequences.

(1)a	dans le rétablissement 'in the re-establishment'	dɑ̃lŒrEtablismɑ̃	dɑ̃lrEtablismɑ̃
(1)b	dans leur établissement 'in their shop'	dɑ̃lœrEtablismɑ̃ [9]	* dɑ̃lrEtablismɑ̃
(2)a	l'autre faux plat 'the other false dish'	lotrŒfopla	lotfopla
(2)b	l'autre œuf au plat 'the other fried egg'	lotrœfOpla	* lotfOpla

Alternating [Œ] is found in monosyllabic clitics like *le* (namely *je*, *me*, *te*, *se*, *ce*, *de*, *ne*, *que*), but also in the initial syllable of polysyllables (e.g. *neveu*, *demain*, *repartir*, *tenailles*, *(ça) sera*, *(on) devrait*, *secrétaire*, *monsieur*), in prefixes (*re-*, *de-*, e.g. in *repartir*, *devenir*), and at the end of words like *autre* (e.g. *pauvre*, *possible*, *taxe*, *casque*, (*il) parle*). [10] The behavior of French prefixes being similar to that of proclitics[11], we consider internal syllables that immediately follow a prefix as initial of phonological word, e.g. *re+d**e**mander*, *de+v**e**nir* contain alternating [Œ] both in the prefix and in the initial syllable of the root.[12]

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[9] In transcribing our examples, including those taken from other authors, we follow the principles established in Wioland 1991. Thus, we transcribe [œ] in *leur*, as it is in a stressable syllable, even though it does not happen to be under stress in the example in question, but cf. *Je connais votre établissement, mais je préfère le leur*. 'I know your shop, but I prefer theirs.' In the latter example *leur* finds itself in a stressed syllable.

[10] All French words that end in a consonant cluster exhibit an alternating [Œ] word-finally even when the latter is not orthographic and not etymological like in *ours*[Œ] *blanc* 'polar bear'.

[11] Slavic prefixes also behave like proclitics, see Booij & Rubach (1994).

[12] 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).

Nonalternating [Œ] is usually related to complex spellings like «eu», «œu» and «ue» (e.g. *j**eu**nesse*, *l**eu**rrer*, *c**ue**illir*, *s**œu**rette*, *cr**eu**ser*), but can also be orthographically represented, like most alternating [Œ]'s, by a simple «e» without diacritic, e.g. *cr**e**vasse*, *gr**e**nier*, *pr**e**mier*, *br**e**douiller*, *mercr**e**di*, *saugr**e**nu*, *ampl**e**ment* where [Œ] occurs after two consonants that are analyzed in a branching onset; *forg**e**ron*, *gouvern**e**ment*, *hurl**e**ment*, *calm**e**ment*, *brusqu**e**ment*, *fumist**e**rie*, where the two consonants preceding [Œ] 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])[13]; *d**e**hors, r**e**hausser* where we find a non-syncopating [Œ] in a prefix before a stem which coincides with an 'h-aspiré' word; *(des) qu**e**relles*, *(du) f**e**nouil*, *(agent) s**e**cret, (la) f**e**melle, (la) gu**e**non, (à) p**e**ser, (la) v**e**dette, (il faut) s**e**vrer* where a process of stabilization of a previous alternating [Œ] seems to have taken place[14]. There are also some cases of allomorphic roots: the base form exhibits an alternating [Œ], e.g. in *m**e**ner* 'to lead', *ch**e**min* 'path', *s**e**mer* 'to sow', whereas some derivatives present a stable, non-syncopating [Œ], e.g. in *m**e**neur* 'leader' *ch**e**miner* 'to walk', *s**e**mailles* 'sowing' (cf. Dell 1985:229).

4.1.3. Two classes of alternating [Œ]'s

Alternating [Œ]'s display two different patterns of alternation in identical segmental and prosodic environment.
[Œ]'s of initial syllable of polysyllables (s*e*coue) and [Œ]'s in monosyllables (s*e*, l*e*) can be dropped after one consonant as in (3a), but not after two consonants as in (3b).

[13] 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].

[14] The Saint-Etienne dialect of French allows syncopation of [Œ] in the initial syllable of the same words, see Morin (1983:84-85).

(3)a	Jean s*e*coue (la branche)	**ʒɑ̃**sku	**ʒɑ̃**sŒku
	'John is shaking (the branch)'		
	Jean s*e* courbe	**ʒɑ̃**skurb	**ʒɑ̃**sŒkurb
	'John is bending down'		
	Henri l*e* soutient	**ɑ̃**rilsutjɛ̃	**ɑ̃**rilŒsutjɛ̃
	'Henry supports him'		
(3)b	Jacques s*e*coue (la branche)	* **ʒ**aksku	**ʒ**aksŒku
	'Jack is shaking (the branch)'		
	Jacques s*e* courbe	* **ʒ**akskurb	**ʒ**aksŒkurb
	'Jack is bending down'		
	Pierre l*e* soutient	* pj**ɛ**rlsutjɛ̃	pj**ɛ**rlŒsutjɛ̃
	'Peter supports him'		

By contrast, polysyllable-final [Œ]'s, i.e. word-final [Œ]'s that do not constitute the only syllable of the word, e.g. in *taxe*, *(il) parle*, allow of syncopation after more than one consonant, as demonstrated in (4); cf. also *match (nul)* [matʃ(Œ)nyl], *ours (blanc)* [urs(Œ)blɑ̃], where an [Œ] may appear word-finally in the absence of orthographic «e».

(4)	toutes tax*e*s comprises	tuttaksk**ɔ̃**priz	tuttaksŒk**ɔ̃**priz
	'inclusive of tax'		
	duplex confortable	dyplEkskɔ̃f**ɔ**rtabl	dyplEksŒkɔ̃f**ɔ**rtabl
	'comfortable duplex'		
	il parl*e* souvent	ilparlsuv**ɑ̃**	ilparlŒsuv**ɑ̃**
	'he often speaks'		

[Œ]'s that exhibit the second pattern of alternation (see 4) cannot receive emphatic stress (Dominicy 1984:8). Conversely, alternating [Œ]'s displaying the first syncopation pattern (see 3), including [Œ] in prefixes, can bear emphatic stress; e.g. in *r**e**+d**e**mander* 'ask again' the syllables containing [Œ] can be emphasized

(REdemander, reDEmander), because they are initial in their phonological domain (prefix and stem, respectively); cf. Dominicy 1984:20.[15]

For convenience, I call Class 1 [Œ]'s those that exhibit the pattern in (3) and may receive emphatic stress, while [Œ]'s that display the pattern illustrated in (4) and cannot bear emphatic stress will be further referred to as Class 2 [Œ]'s.

Additional evidence for the special status of Class 2 [Œ]'s is provided by the patterns of manifestation of [Œ] in sequences of two contiguous syllables, where the first one contains a Class 2 [Œ], while the second one contains a Class 1 [Œ], see the examples in (5) taken from Dell (1973) and Dell (1978). The pattern is different in sequences where the two contiguous syllables contain both Class 1 [Œ]'s, see (6). In (5) one can see that the first (Class 2) [Œ] cannot be retained if the second (Class 1) [Œ] is dropped. It seems that a Class 1 [Œ] is more resistant to syncopation than a Class 2 [Œ]. The pattern of (6a), which is the opposite of (5) is due to the impossibility of Class 1 [Œ]'s to be realized after two consonants, cf. (3b). This is not the case in (6b) where both [Œ]'s are of Class 1 and both can be syncopated, because the first one is preceded by only one consonant.

(5)	on abord*e* l*e* virage	ɔ̃nabɔrdŒlŒviraʒ	ɔ̃nabɔrdlŒviraʒ	* ɔ̃nabɔrdœlviraʒ
	'we enter the curve'			
	ils part*e*nt d*e*main	ipartŒdŒmɛ̃	ipartdŒmɛ̃	* ipartœdmɛ̃
	'they leave tomorrow'			
	la veste d*e* Paul	lavEstŒdŒpɔl	lavEstdŒpɔl	* lavEstœdpɔl
	'Paul's jacket'			
	quatorz*e* d*e*voirs	katɔrzŒdŒvwar	katɔrzdŒvwar	* katɔrzœdvwar
	'fourteen pieces of homework'			
	l'autr*e* m*e*lon	lotrŒmŒlɔ̃	lotmŒlɔ̃	* lotrœmlɔ̃
	'the other melon'			
	port*e*-f*e*nêtre	pɔrtŒfŒnɛtr	pɔrtfŒnɛtr	* pɔrtœfnɛtr
	'French window'			

(6)a	une patte d*e* r*e*nard	patdŒrŒnar	* patdrŒnar	patdœrnar
	fox's paw			

[15] Emphatic stress is marked by capitalization of the respective syllable.

	elle t*e* d*e*mande	ɛltŒdŒmɑ̃d	* ɛltdŒmɑ̃d	ɛltœdmɑ̃d
	'she asks for you'			
(6)b	une queue d*e* r*e*nard	kødŒrŒnar	kødrŒnar	kødœrnar
	'fox's tail'			
	on t*e* d*e*mande	ɔ̃tŒdŒmɑ̃d	ɔ̃tdŒmɑ̃d	ɔ̃tœdmɑ̃d
	'they ask for you'			

4.1.4. Sensitivity to rhythm

The syncopation of Class 1 alternating [Œ]'s can be sensitive or not sensitive to rhythm according to the number of consonants that immediately precede [Œ]. As for Class 2 [Œ]'s, their distribution (occurrence/non-occurrence) seems to be always constrained by rhythm.

4.1.4.1. Rhythm-insensitive [Œ]-syncopation

The syncopation of Class 1 alternating [Œ]'s 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 (7) below, taken from Dell (1984:75), exhibit identical segmental strings and different rhythmic structure. Dell represents (7a) 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 (7b) 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 (7a), but in the initial syllable of the second rhythmic unit in (7b). In both cases syncopation can occur.

(7)a	tu préférerais / pas v*e*nir demain?	typrEfɛr'rɛ	typrEfɛr'rɛ
	2 0 1	pavŒnirdŒ'mɛ̃	pavnirdŒ'mɛ̃
	'Would you prefer not to come tomorrow ?'		
(7)b	tu préférerais pas / v*e*nir demain?	typrEfɛrrɛ'pa	typrEfɛrrɛ'pa
	0 2 1	vŒnirdŒ'mɛ̃	vnirdŒ'mɛ̃
	'Wouldn't you prefer to come tomorrow ?'		

As can be seen in (8), which repeats an example found in Delattre (1966:21), syncopation of [Œ] in *venir* is also allowed in pre-stress syllable if there is only one consonant preceding it.

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

4.1.4.2. Rhythm-sensitive [Œ]-syncopation

When a Class 1 [Œ] 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, the latter type of [Œ]-syncopation is impossible in pre-stress syllable (see 9a). It is allowed only in a syllable separated from the stressed one by at least one intervening syllable (see 9b). The examples in (9) are taken from Dell (1985:231).

(9)a	la terre s*e* vend	latɛrsŒvɑ̃	* latɛrsvɑ̃
	'the land sells'		
(9)b	la terre s*e* 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] after two consonants is the easier the more distant is [Œ] from the following stressed syllable (within the same rhythmic unit):

(10)	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	ObɔrdlatlAɑ̃'tik
'on the coast of the Atlantic'		

The same sensitivity to rhythm is observed whit [Œ]-syncopation in utterance-initial syllable (i.e. after a pause): the longer the distance from stress, the easier the syncopation of [Œ]. Consider the following data from Morin (1983:76)[16].

(11)	c*e* gars	'that lad'	sŒ'ga	?? 'sga
	c*e* garçon	'that boy'	sŒgar'sɔ̃	? sgar'sɔ̃
	c*e* garçon-là	'that boy'	sŒgarsɔ̃'la	sgarsɔ̃'la

Class 2 [Œ]'s exhibit a similar sensitivity to the rhythmic pattern of the utterance. Look at the examples in (12) taken from Tranel (1987:table 6.24). The manifestation of [Œ] is favored before a monosyllabic stressed word and disfavored when the hypothetical syllable that would result from the phonetic realization of [Œ] is at least one syllable distant from the final stressed syllable in the rhythmic unit. A similar rhythm-sensitive pattern of [Œ]-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 (13).

(12)	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

[16] «en effet la syncope est plus facile dans *ce garçon-là,* que dans *ce garçon,* et surtout dans *ce gars.*» (Morin 1983:76)

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

The non-manifestation of Class 2 [Œ]'s, like that of Class 1 [Œ]'s after two consonants, is hardly possible in pre-stress position. As for syncopation of Class 1 [Œ]'s after only one consonant, there seems to be no restriction related to rhythm.

4.1.5. The nature of Class 1 and Class 2 alternating [Œ]'s: underlying or epenthetic?

As for Class 1 alternating [Œ]'s, their distribution cannot be accounted for by epenthesis. Consider the following data:

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

Except Hirst (1985:96-97), who treats every complex onset that cannot be split up by schwa in French as a single segment, the few treatments that deny phonological status to French schwa and consider it to be an automatic vowel, "lubrifiant phonique" (Martinet 1972 and some followers of his school of Functionalist Linguistics, e.g. François 1974 and Bazylko 1981), are unable to account for the data in (14), as was demonstrated by Dell (1985:187).

All other phonological theories propose a specific underlying structure to encode Class 1 alternating [Œ]'s in the lexical form of words that exhibit them. Linear phonology posits an underlying segment /ə/; multilinear phonologies use different underlying structures for schwa: a combination of a floating vowel and a floating skeletal slot or a floating skeletal slot with no segment (Three-dimensional Phonology, Encrevé 1988:212-232,), an underlyingly present empty nucleus

(Government Phonology, Charette 1988, 1991), an empty nucleus with a lexically encoded "melody" [ə] underneath[17] (the CVCV version of Government Phonology, Scheer 1996).

As for the status of Class 2 alternating [Œ]'s, opinions are divided. Most authors, including Dell, consider orthographic word-final [Œ]'s to be underlyingly present. I will claim that they need not be represented in lexical forms and can be triggered by epenthesis.

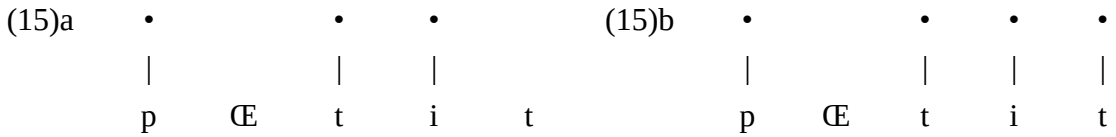
Words with final orthographic (and etymological) alternating [Œ] do not behave differently from consonant-final words in French. Dell states that, except in poetry and songs, «tout mot qui se prononce [XCC] devant une pause ou une voyelle peut se prononcer [XCCə] devant une consonne … Cette généralisation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

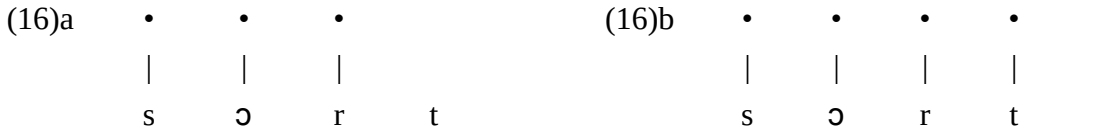
In «verlan», a way of pronouncing some French words based on a linguistic game that inverts the order of syllables, consonant-final monosyllables with and without a final orthographic «e» give identical forms, cf. Méla (1991:77). According to Méla's analysis, both *mère* 'mother' and *mer* 'sea' give [mE.rŒ] by «resyllabification» at an intermediate stage and [rŒ.mE] by «permutation» that may become [rœm] by «truncation».

Tranel (1981:286) gives some additional arguments against the alleged evidence for the underlying presence of so-called «protective schwas» that correspond to our Class 2 alternating [Œ]'s. 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, as in *text**e** possible* [tɛkstŒpOsibl] 'possible text'; before *rien* 'nothing', as in *il ne mang**e** rien* [ilnŒmɑ̃ʒŒrjɛ̃] 'he eats nothing'; before «h-aspiré» words, as in *cett**e** haie* [sɛtŒɛ] 'this hedge') it is possible to detect realizations of words without final orthographic (and etymological) «e» that take phonetic [Œ], e.g., *contact possible* 'possible contact' pronounced [kɔ̃taktŒpOsibl]; *il ne perd rien* 'he loses nothing' realized as [ilnŒpɛrŒrjɛ̃]; *sept haies* 'seven hedges' with the phonetic realization [sɛtŒɛ]. The latter pronunciations are less frequent than the former, but Tranel attributes this to the influence of orthography: 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

[17] 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.

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)
Another alleged argument for positing underlying word-final schwas is their functioning as morphological markers: according to many phonologists of French, the feminine marker, the first-conjugation thematic vowel and the subjunctive marker are schwas. These schwas are 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' (15a) and the feminine *petite* (15b), the indicative *(il) sort* 'he goes out' (16a) and the subjunctive *(qu'il) sorte* (16b), can be attributed to the underlying floating/anchored final [t]. Skeletal slots are provided by the feminine and subjunctive morphology, respectively, in order to anchor the final floating [t].





4.2. Harmonic Phonology analysis

The analysis put forward here is in the framework of Harmonic Phonology (cf. Goldsmith 1990, Goldsmith 1993:21-33). It makes use of the three-level M/W/P model with three levels of representation, see chapter 2 (2.4.1). This will enable us to compare the account for the French data with that for the Bulgarian ghost vowels.

Our analysis aims at accounting for the different patterns of alternating [Œ]'s described above:

- for the distinction between Class 1 and Class 2 alternating [Œ]'s

- for the distinction between rhythm-sensitive and rhythm-insensitive syncopation of Class 1 alternating [Œ]'s.

Class 1 alternating [Œ]'s are assumed to be present in M-level representations. To distinguish them from non-alternating [Œ]'s, we will represent the former as floating segments [Œ], i.e. underlying segments with no skeletal slot to be anchored to[18]. Conversely, non-alternating [Œ]'s have their own skeletal slot and are underlyingly anchored to the skeleton. Compare the M-level representations of *neveu* 'nephew' with an alternating Class 1 [Œ] and *jeunesse* 'youth' with a stable non-alternating [Œ]:

neveu jeunesse

Following Goldsmith (1990:123), I assume that French syllables are constructed at W-level («the deepest level at which phonotactic conditions can be stated») 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. A segment can be syllabified only if it is provided with a skeletal slot. Therefore, anchoring is a pre-condition for syllabification of floaters. In this analysis I use the symbol <Œ> for a floating [Œ] at M-level.

4.2.1. The French syllable: structural restrictions

An important assumption in the present analysis is that the French syllable can have a complex (branching) onset, but only a simple (non-branching) coda.
Some descriptions of French syllabification (Wioland 1985, Laks 1995) include superheavy syllable types with complex 'codas' such as (C)VCCC, CGVCCC, e.g. quartz /kwartz/ 'quartz', etc. These complex 'codas' are restricted to word-final position

[18] This is an instance of what Tranel erroneously calls «skeletal flotation»: segments that are viewed as «lexically marked as unable to project their own skeletal slot» (Tranel 1995:801) as opposed to «syllabic flotation» and to «double flotation», the latter being represented by Encrevé's 1988 three-dimensional analysis (cf. Tranel 1995a). As Pierre Encrevé pointed out to me, the skeleton cannot float if there is no skeletal slot available. What floats is the segment [Œ].

Word-internal three- and four-consonantal clusters can be decomposed in a simple coda and a complex onset, e.g. *mercredi* [mɛr.krŒ.di], *abstrait* [ab.strɛ]. The only French words whose word-internal clusters escape such decomposition I know about are *arctique* 'Arctic' and the two compounds *parcmètre* (with the alternative form *parcomètre*) 'parking meter' and *voltmètre* 'voltmeter'.

Plénat (1987) describes the syllable structure only of words "with masculine final endings", i.e. with no final orthographic 'e'. Many of them end in two (*ours* 'bear', *film* 'film', *ouest* 'west', *concept* 'concept') or three consonants (*hertz* /ɛrts/). Rialland (1994) includes in the inventory of word-final clusters also words with "feminine endings", i.e. with final orthographic 'e'. She proposes the following maximal template for word-final clusters in French: "coda + extrasyllabic consonant + potential branching onset":

> "The coda position has only one slot […] the structure of the remaining part of the cluster is the same as the one we find in word-initial position. To account for this similarity we posit the same constituents in the template, that is, an extrasyllabic position preceding a potential onset which can itself contain two positions. […] Moreover, the potential syllable becomes a full syllable when the schwa is pronounced. These consonants in post-coda position can be considered a special type of extrasyllabic consonants, since they are only potentially syllabified." (Rialland 1994:§3.2)

The maximal template is illustrated by *dextre* /dɛkstr/ 'right-hand' and *cepstre* 'cepstrum'.

The same assumptions about French syllable structure are made by Bouchard (1980:20): «there can only be one consonant in the coda in the French syllable». Bouchard also admits the existence in French of a third constituent besides the onset and the rime: the appendix, which is found only in word-final syllables (Bouchard 1980:39, note 10).In the framework of Harmonic Phonology, the occurrence of consonant clusters word-finally can be attributed to the property of the word-end to function as an additional licenser (the Ω-licenser, cf. Goldsmith 1990:127). In French, the word-end licenses word-final extrasyllabicity, see 4.2.4.1 below. The Ω -constituent in French words can be composed of a single consonant (*herbe* 'grass' /[ɛr]$_{\sigma}$[b]$_{\Omega}$/, *peste* 'plague' /[pɛs]$_{\sigma}$[t]$_{\Omega}$/, *mettre* 'put' /[mɛt]$_{\sigma}$[r]$_{\Omega}$/, *table* 'table' /[tab]$_{\sigma}$[l]$_{\Omega}$), of two consonants (*ordre* 'order' /[ɔr]$_{\sigma}$[dr]$_{\Omega}$/, *cercle* 'circle' /[sɛr]$_{\sigma}$[kl]$_{\Omega}$) or of three consonants (*dextre* 'right-hand' /[dɛk]$_{\sigma}$[str]$_{\Omega}$/).

4.2.2. <Œ>-Anchoring

(M,W) <Œ>-ANCH: A floater <Œ> anchors between levels M and W if it does not find itself before 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 '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 (see fig.1b) as if it found itself before a consonant-initial word (see fig.1a).

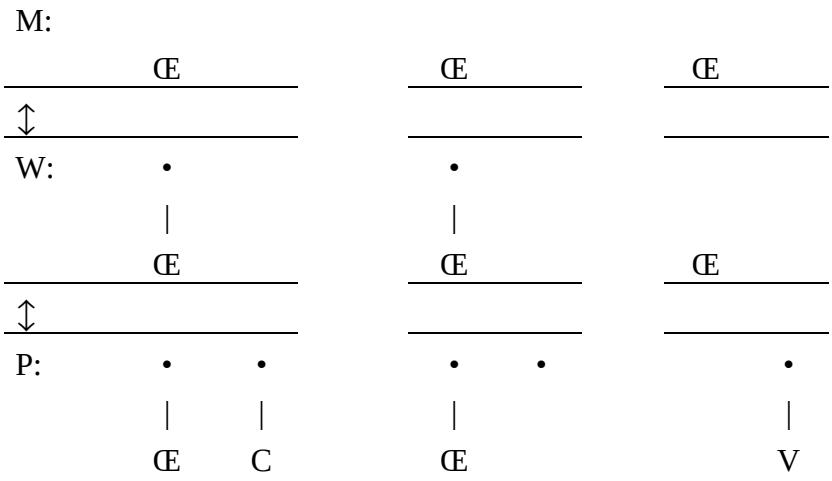


fig.1a fig.1b fig.1c

Consequently, a floating <Œ> does not anchor only when it is 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 (fig.1c).

4.2.3. Œ-Deletion

(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 first condition for deletion of Œ refers to level M in a cross-level rule that relates levels W and P. This is not a problem in the framework of Harmonic Phonology,

given that levels (M, W, P) are only different ways of describing the same linguistic expression (Goldsmith 1993:30). The representations of all three levels may interact between them. According to Goldsmith the existence of (M,P) rules is not excluded even though it is denied by the traditional hierarchical conception of phonology (Goldsmith 1993:32).

The second condition is needed to exclude Œ-Deletion before the empty skeletal slot in the onset of the initial syllable of an 'h-aspiré' word (fig. 2c). Actually, an alternating Class 1 [Œ] never deletes before an 'h-aspiré' word. This is an essential difference between consonant-initial words and 'h-aspiré' words; see (17). As has been pointed out by Tranel (1995:811), 'h-aspiré' words exhibit some properties of their own.

(17)	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 (fig.2a), while in the latter case a complex onset is created in the following syllable (fig.2b).

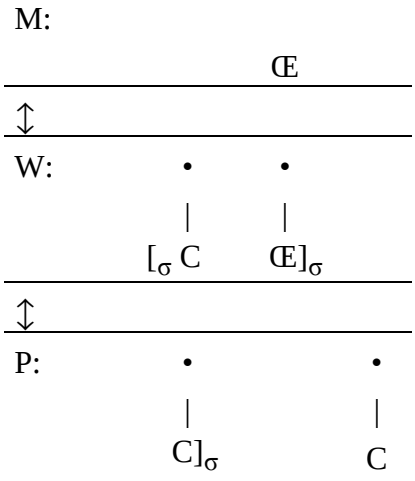


fig.2a

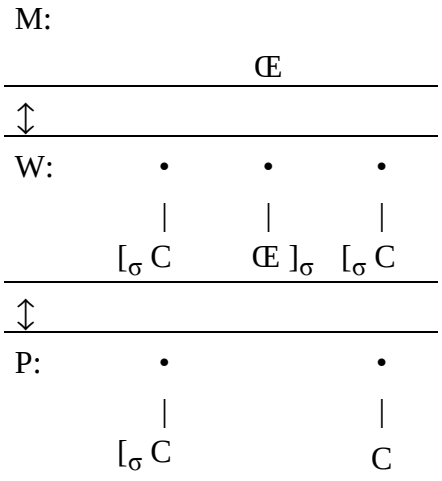
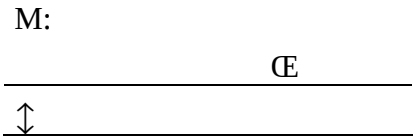


fig.2b



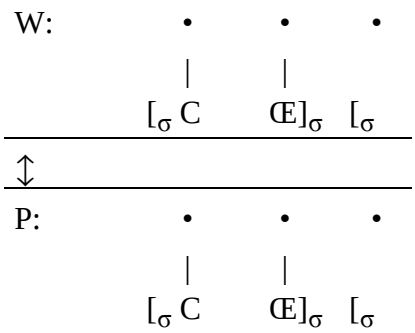


fig. 2c

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 the examples in (18) from Morin (1983:74):

(18)a	(il n'a) pas d*e* scrupule 'he has no scruples'	padskrypyl	padŒskrypyl	
(18)b	(je ne veux) pas d*e* c*e* crétin 'I don't want this cretin'	* padskretɛ̃	padsŒkretɛ̃ padœskretɛ̃	padŒsŒkretɛ̃

Together, the rules of <Œ>-ANCH and Œ-DEL account for the fact that [dskr] ([tskr] with voice assimilation) is a possible sequence in (18a), but not in (18b). In (18a) [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 (19). This gives [dskr]. In (18b) the onset that is created on the word-level is [kr]. When the first Œ deletes, see (20a), 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 (20b). In the latter case, [s] resyllabifies as coda of the syllable created with the retained Œ as nucleus: [dœs].

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

(20)a	M		pa	d<Œ>	s<Œ>	kretɛ̃	
				↓	↓		<Œ>-ANCH
	W		[pa]	[dŒ]	[sŒ]	[kre][tɛ̃]	
				↓			Œ-DEL
	P	(i)	[pad]		[sŒ]	[kre][tɛ̃]	

(20)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 (21) below I give the account for example (9). The coda of the preceding syllable being occupied by [r], [s] cannot resyllabify to the left. However, given that [sv] 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.

(21)	M	la	tɛr	s<Œ>	vɑ̃	bjɛ̃	
				↓			<Œ>-ANCH
	W	$[la]_{\sigma}$	$[tɛr]_{\sigma}$	$[sŒ]_{\sigma}$	$[vɑ̃]_{\sigma}$	$[bjɛ̃]_{\sigma}$	
				↓			Œ-DEL
	P	$[la]_{\sigma}$	$[tɛr]_{\sigma}$		$[svɑ̃]_{\sigma}$	**$[bjɛ̃]_{\sigma}$** [19]	

In (22) 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.

(22) un bac d*e* crapauds 'a tub of toads' **ɛ̃**bakdŒkra'**po** * **ɛ̃**bakdkra'**po**

The deletion in (23a) is much easier than in (23b), cf. Dell (1985:231), because [sp] is a well-formed onset in French (cf. *sport*, *perspicace* [pɛr.spi.kas]), whereas [tp] is hardly possible as a complex onset.

(23)a pour s*e* peigner 'to comb oneself' pursŒpE'**ɲe** purspE'**ɲe**

(23)b pour t*e* 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.

4.2.3.1. Two and more Œ's in contiguous syllables

(20a) and (20b) are instances of the more general pattern of ghost [Œ] alternation in sequences of two and more contiguous syllables containing Œ's. The derivations in (24) account for three of seven possible realizations of the sequence *(j'ai) envie d**e** t**e** l**e** d**e**mander* 'I feel like asking you about it': (i) [**ɑ̃**vidŒtŒlŒdŒm**ɑ̃**de]; two of four [Œ]'s are deleted: (ii) [**ɑ̃**vidtœldŒm**ɑ̃**de], (iii) [**ɑ̃**vidœtlœdm**ɑ̃**de],

[19] 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.

(iv) [**ɑ̃**vidtŒlœdm**ɑ̃**de]; one of four [Œ]'s is deleted: (v) [**ɑ̃**vidtŒlŒdŒm**ɑ̃**de], (vi) [A)vidœtlŒdŒmA)de], (vii) [**ɑ̃**vidŒtœldŒm**ɑ̃**de], (viii) [**ɑ̃**vidŒtŒlœdm**ɑ̃**de]. 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.

(24)a

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

(24)b

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

(24)c

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

4.2.3.2. Special behaviour of certain sequences of monosyllables

According to Morin (1983:77-78) and Tranel (1987:92-93), 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-inital word follows, the first [Œ] in *je n'* can be dropped and that of *ce qu'* can be retained, see (25).

(25)	j*e* n*e* sais pas	ʒŒnŒsɛpa	ʒœnsɛpa	* ʒnŒsɛpa
	'I don't know'			
	j*e* n'ose pase		ʒŒnozpa	ʒnozpa
	'I don't dare'			
	c*e* qu*e* j'ai vu	sŒkŒʒɛvy	* sœkʒɛvy	skŒʒɛvy
	'what I saw'			
	c*e* qu'on voit		sŒkɔ̃vwa	skɔ̃vwa
	'what I see'			

Morin analyzes *je ne* and *ce que* as "amalgams" only when they are found before a consonant, i.e. *je ne* /ʒŒn<Œ>/ with stabilization of the first Œ, *ce que* /s<Œ>kŒ/ with stabilization of the second Œ, while before a vowel they are ordinary sequences of monosyllabic clitics containing floaters: *je n'* /ʒ<Œ>n<Œ>/, *ce qu'* /s<Œ>k<Œ>/.

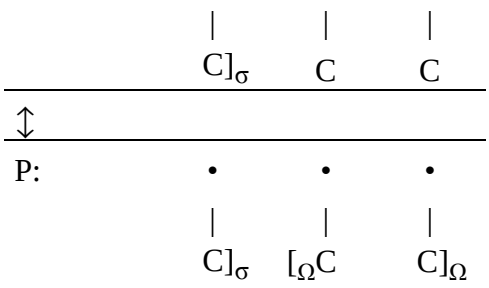
4.2.4. Rules relating to Class 2 [Œ]'s

In French there is additional loosening of restrictions to syllabification in word-final position also. 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 4.2.4.3) is a kind of repair strategy aiming at well-formed syllabification of such anchored unsyllabified consonants.

4.2.4.1. Ω-Creation

(P/P) Ω-CRE (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.

W: • • •

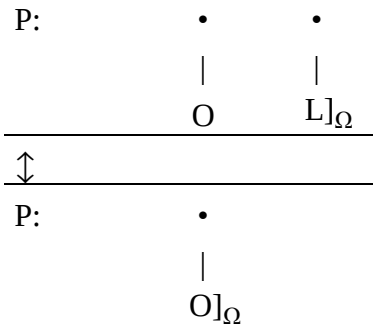


Ω-CRE

Ω-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.

4.2.4.2. Liquid Deletion

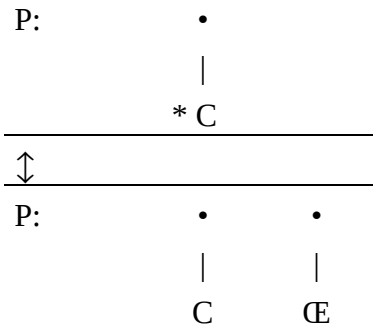
(P/P) L-DEL (optional before a pause): Delete the final liquid in a Ω-appendix if preceded by an obstruent. (L=liquid, O=obstruent)



L-DEL

4.3.4.3. [Œ]-Insertion

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



Œ-INS

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 (26) and (27) below – as well as for the impossibility of *[larbrpuri] and *[larbŒpuri]. The first is impossible because L-DEL is obligatory, once a Ω-appendix has been created. Otherwise there would be an [Œ]-insertion. 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 syllabified.

(26)	M		l<Œ>	arbr	puri.	
						(<Œ>-ANCH)
	W		l<Œ>	$[ar]_{\sigma}$br	$[pu]_{\sigma}[ri]_{\sigma}$	
	P			$[lar]_{\sigma}$br	$[pu]_{\sigma}[ri]_{\sigma}$	
				↓		Ω-CRE
		(i)		$[lar]_{\sigma}[br]_{\Omega}$	$[pu]_{\sigma}[ri]_{\sigma}$	
				↓		L-DEL
				$[lar]_{\sigma}[b]_{\Omega}$	$[pu]_{\sigma}[ri]_{\sigma}$	

(27)	M		l<Œ>	arbr	puri.	
						(<Œ>-ANCH)
	W		l<Œ>	$[ar]_{\sigma}$br	$[pu]_{\sigma}[ri]_{\sigma}$	
	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 certain classes of unsyllabified consonants: only word-final unsyllabified consonants (Ω-CRE), only unsyllabified liquids (L-DEL). Being more specific, Ω-CRE and L-DEL precede Œ-INS in accordance with the Elsewhere Condition. 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).

4.2.5. 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 (5) above. Let's look at the derivation of some of the examples: (*la) veste de Paul*, see (28) and (29), and *l'autre melon*, see (30) and (31).

(28)	M		vɛst	d<Œ>	pɔl	
				↓		<Œ>-ANCH
	W		$[vɛs]_{\sigma}$ t	$[dŒ]_{\sigma}$	$[pɔl]_{\sigma}$	
						(Œ-DEL)
	P		$[vɛs]_{\sigma}$ t	$[dŒ]_{\sigma}$	$[pɔl]_{\sigma}$	
			↓			Ω-CRE
		(i)	$[vɛs]_{\sigma}[t]_{\Omega}$	$[dŒ]_{\sigma}$	$[pɔl]_{\sigma}$	
						(Œ-INS)
			$[vɛs]_{\sigma}[t]_{\Omega}$	$[dŒ]_{\sigma}$	$[pɔl]_{\sigma}$	

(29)	M		vɛst	d<Œ>	pɔl	
				↓		
	W		[vɛs]$_{\sigma}$ t	[dŒ]$_{\sigma}$	[pɔl]$_{\sigma}$	
						(Œ-DEL)
	P		[vɛs]$_{\sigma}$ t	[dŒ]$_{\sigma}$	[pɔl]$_{\sigma}$	
						(Ω-CRE)
		(ii)	[vɛs]$_{\sigma}$ t	[dŒ]$_{\sigma}$	[pɔl]$_{\sigma}$	
			↓			Œ-INS
			[vɛs]$_{\sigma}$[tŒ]$_{\sigma}$	[dŒ]$_{\sigma}$	[pɔl]$_{\sigma}$	

(30)	M		l<Œ> otr	m<Œ>lɔ̃		
				↓		<Œ>-ANCH
	W		l<Œ> [ot]$_{\sigma}$ r	[mŒ]$_{\sigma}$[lɔ̃]$_{\sigma}$		
						(Œ-DEL)
	P		[lot]$_{\sigma}$ r	[mŒ]$_{\sigma}$[lɔ̃]$_{\sigma}$		
			↓			Ω-CRE
		(i)	[lot]$_{\sigma}$ [r]$_{\Omega}$	[mŒ]$_{\sigma}$[lɔ̃]$_{\sigma}$		
			↓			L-DEL
			[lot]$_{\sigma}$	[mŒ]$_{\sigma}$[lɔ̃]$_{\sigma}$		

(31)	M		l<Œ> otr	m<Œ>lɔ̃		
				↓		<Œ>-ANCH
	W		l<Œ> [ot]$_{\sigma}$ r	[mŒ]$_{\sigma}$[lɔ̃]$_{\sigma}$		
	P		[lot]$_{\sigma}$ r	[mŒ]$_{\sigma}$[lɔ̃]$_{\sigma}$		
						(Ω-CRE)
		(ii)	[lot]$_{\sigma}$ r	[mŒ]$_{\sigma}$[lɔ̃]$_{\sigma}$		
			↓			Œ-INS
			[lo]$_{\sigma}$ [trŒ]$_{\sigma}$	[mŒ]$_{\sigma}$[lɔ̃]$_{\sigma}$		

4.2.5.1. 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 (5) and accounted for in (28)-(31), where two contiguous syllables contain a «Class 2 [Œ] + Class 1 [Œ]»

combination, and similar to the pattern of (6b) where the combination is «Class 1 [Œ] + Class 1 [Œ]»; cf. Tranel (1987:105, table 6.30) and (33) in Dell (1985:255). 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 (5), where there is no final floater underlyingly. The account for *quelques secondes* realized as [kɛlkœzgɔ̃d] is given in (34).

(32)	quelque*s* s*e*condes 'a few seconds'	kɛlkŒsŒgɔ̃d	kɛlksŒgɔ̃d[20]	kɛlkœzgɔ̃d
(33)	il pourrait presqu*e* j*e*ter la balle 'he could almost throw the ball'	prɛskŒʒŒte	prɛskʒŒte	prɛskœʃte

(34)

M	kɛlk<Œ>	s<Œ>gɔ̃d		
	↓	↓	<Œ>-ANCH	
W	$[kɛl]_{\sigma}[kŒ]_{\sigma}$	$[sŒ]_{\sigma}[gɔ̃d]_{\sigma}$		
		↓	Œ-DEL	
P	$[kɛl]_{\sigma}[kœz]_{\sigma}$	$[gɔ̃d]_{\sigma}$		

4.2.5.2. The treatment of *entre, contre*

entre 'between' and *contre* 'against' are another special case according to Dell (1978) and Dell (1985:240). As with *quelques* and *presque*, the realizations in the right column are acceptable, whereas those of the middle column (with the first Œ retained and the second Œ dropped) are judged as impossible. Moreover, realizations with deletion of the liquid are not impossible before a pause; see (35). The forms that are judged unacceptable cannot be accounted for by the resistance of some speakers to complex onset creation at P-level discussed in 4.2.3, because the resyllabiffication here is leftwards, the coda of the preceding syllable being free. 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.

[20] This form is not given in Tranel's text, but apparently it is not judged as impossible by this author.

entr*e* G*e*nève et Paris	**ɑ̃**trŒʒŒn**ɛ**vepari	* **ɑ̃**tʒŒn**ɛ**vepari	**ɑ̃**trœʒn**ɛ**vepari
'between Geneva and Paris'			
contr*e* l*e* mur	k**ɔ̃**trŒlŒmyr	* k**ɔ̃**tlŒmyr	k**ɔ̃**trœlmyr
'against the wall'			

As for the examples in (35) 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). The floater cannot anchor by <Œ>-ANCH, for the pause exerts the same effect as an immediately following vowel; see (36).

(35)	(il faut) s'asseoir entr*e* pour être à l'aise	saswar**ɑ̃**tpur**ɛ**tral**ɛ**z	saswar**ɑ̃**trŒpur**ɛ**tral**ɛ**z
	'one must sit in between to be comfortable'		
	ceux qui sont contr*e* lèvent la main	søkis**ɔ̃**k**ɔ̃**tl**ɛ**vlam**ɛ̃**	søkis**ɔ̃**k**ɔ̃**trŒl**ɛ**vlam**ɛ̃**
	'those who are against raise their hand'		

(36)

M	k**ɔ̃**tr<Œ>		
			<Œ>-ANCH
W	[k**ɔ̃**t]$_{\sigma}$ r<Œ>		
			Œ-DEL
P	[k**ɔ̃**t]$_{\sigma}$ r<Œ>	(pause)	
			Ω-CRE
	[k**ɔ̃**t]$_{\sigma}$[r]$_{\Omega}$<Œ>	(pause)	
			L-DEL
	[k**ɔ̃**t]$_{\sigma}$ <Œ>	(pause)	
			Stray Erasure
	[k**ɔ̃**t]$_{\sigma}$	(pause)	

4.2.5.3. 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 «obstruent+liquid» cluster, see (37) (cf. Dell 1976, Dell 1985:238)[21].

[21] Laks (1977), who studied the loss of French /r/ as a sociolinguistic variable in the speech of 6 teenagers from Villejuif, a suburban area of Paris, distinguished four possible realizations of /r/: voiced, voiceless, zero realizations and 'residual trace'.

(37)	(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 cannot undergo L-DEL and, therefore, their final liquid will always be preserved.

4.3. Conclusion

The distinction between Class 1 and Class 2 [Œ]'s is encoded in M-level representations. I assume that only Class 1 [Œ]'s are present underlyingly. Class 2 [Œ]'s are introduced by a rule of epenthesis (Œ-INS).

Among Class 1 [Œ]'s, 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/creation of a complex onset). Assuming that in French constraints on (re)syllabification are different at W- and P-level, we can account for the fact that (at least in the variety of French described by Dell) speakers much more easily drop ghost [Œ] 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 on W-level is restricted only by the Sonority Sequencing Generalization, while on P-level it is much more constrained, being hardly possible for some speakers and possible only in very fast speech for others and only in syllables that are not stressed. Creation of word-final appendices from licensed extrasyllabic consonants, which is a specific P-level syllabification procedure, is also prevented when the immediately following syllable is stressed (Ω-Creation, 4.2.4.1). As for coda creation, it is equally constrained on both levels W and P: it may always apply if the coda position is vacant and if only a single consonant is (re)syllabified as coda.

Our Harmonic Phonology analysis of ghost [Œ] vowels in French need not establish extrinsic ordering of rules. As an (M,W) rule <Œ>-ANCH precedes Œ-DEL that is a (W,P) rule. The (P,P) rules relating to Class 2 [Œ]'s (cf. 4.2.4.1, 4.2.4.2 and 4.2.4.3) 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 here, cf. (19), (20), (21), (26), (27), (28), (29), (30), (31).
Moreover, the formalism admits of either positing underlying floaters for ghost [Œ] vowels or introducing them by the rule of [Œ]-INS in contrast to underlyingly anchored [Œ] vowels that are not ghosts. Thus, it is possible to account for some special cases that characterize the variety of French described here: «amalgams» of monosyllabic clitics (4.2.3.2) ; words like *presque*, *quelques* (4.2.5.1), *entre*, *contre* (4.2.5.2) that exhibit more complex patterns of [Œ]/zero alternations.

4.4. Contrasting the Bulgarian and French ghost vowel alternations

Both in Bulgarian and French a threefold distinction has been established for part of the mid vowels:

	Bulgarian	French
stable vowels	**ə**, **e**	Œ
ghost vowels that are underlying floaters	**ə**, **e**	Œ
ghost vowels that are default vowel insertions	**ə**	Œ

Between the rules that account for the ghost vowel alternations there are some similarities and many differences.

Similarities:
1) The rule that anchors floaters is a (M,W) cross-level rule in both language.

2) In both Bulgarian and French the rule that is responsible for default vowel insertions is an intra-level obligatory rule triggered by unsyllabified consonants.

Differences:
1) The rule that anchors floaters is differently conditioned in Bulgarian and in French:
- in Bulgarian it depends on M-level syllabification: a floater anchors iff the next consonant remains unsyllabified at M-level

- in French W- and P-levels are also involved: a floating vowel anchors if the next syllable is provided with an onset (be it empty) at W- or P-level

2) French has a rule that deletes [Œ]-vowels matching a floater at M-level: Œ-DEL. Œ-DEL is an optional cross-level rule and it is conditioned by possible resyllabification of consonants at P-level.
Bulgarian has no such rule. Consequently, possible resyllabification at P-level is irrelevant for ghost vowel realizations in this language.

3) The Bulgarian Rule of Schwa Epenthesis obligatorily applies to every unsyllabified consonant at W-level. The corresponding French rule (Œ-INS) is also compulsory: it applies to anchored unsyllabified consonants (floating unsyllabified consonants that represent so-called 'liaison consonants' escape this rule and are eventually subjected to Stray Erasure), but is preceded by two optional rules that are more specific repairs aiming at total syllabification: a rule creating word-final appendices that optionally syllabifies word-final anchored consonants (Ω-CRE); a rule that deletes unsyllabified liquids (L-DEL). Thus, Œ-INS is triggered only where neither Ω-CRE nor L-DEL have applied.

4) In Bulgarian the default vowel – [ə] – is inserted to the left of the unsyllabified consonant, while in French the default vowel – [Œ] – is inserted to the right of the unsyllabified consonant.

5) The Bulgarian rule of default vowel epenthesis is a W-level rule, while the corresponding French rule applies at P-level. Both are intra-level harmonic rules.

6) The Bulgarian rules of Floater Anchoring and Schwa Epenthesis are related to the two lower levels (M and W); cf. fig.3a. In French, the set of rules responsible for ghost vowel alternations involves P-level also (fig.3b).

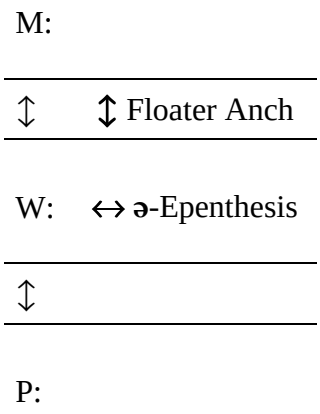


fig.3a

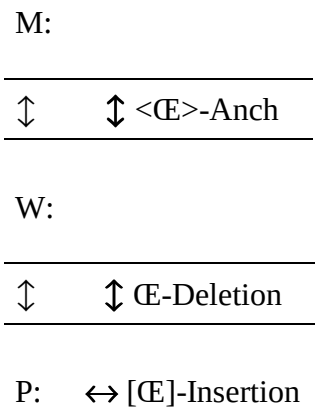


fig.3b

7) As far as the Bulgarian ghost vowel alternations are concerned, the P-level is not involved at all. Consequently, in Bulgarian the alternations are restricted within word boundaries.

8) The French rule Œ-DEL and the rules that interact with Œ-INS at P-level (Ω-CRE and L-DEL) are always optional. This yields a great amount of variation in realizations of (sequences of) words containing ghost vowels in French. As for Bulgarian, a given inflected or derived form of an alternating (GV or metathetic) root systematically exhibits either the form with the ghost vowel realized or that without the ghost vowel, thus excluding variable realizations of the same form.

9) Stress being assigned at different levels in Bulgarian (W-level) and in French (P-level), the interaction of ghost vowel alternations with stress patterns is located at W-level in Bulgarian, whereas in French, the rules and constraints that are rhythm-sensitive (Ω-CRE, Œ-INS, resyllabification of a consonant in a complex onset) are located at P-level.