Chapter 2: SCHWA DELETION AND EPENTHESIS IN FRENCH

French has a famous and notoriously complex pattern of alternation between ^ and schwa. Consider the following pair:

(1) ALTERNATION BETWEEN ^ AND schwa:

a. carafe de vin
[b̥araf°v̥°n] 'carafe of wine'

b. pichet de vin
[piʃ°dve̞n] 'pitcher of wine'

The crucial difference between (1a) and (1b) lies in the realization of the preposition de, which surfaces as [d\] in (1a) and as [d] in (1b). This type of alternation based on the presence or absence of [\] – generally called e muet 'mute e' or schwa 1 (even when it does not have, when it surfaces, the phonetic value attributed to schwa in the IPA) – is omnipresent in French and is subject to numerous factors: segmental, morphological, syntactic, prosodic, stylistic, sociolinguistic, etc. (see Verluyten 1988 for a summary). A general account of the distribution of this vowel represents a seemingly unsurmountable challenge.

What everybody agrees on is that schwa surfaces to break up or avoid complex consonant clusters. Analyses mainly fall into two groups: sequential and prosodic. They all fail short of accounting for /œ/ and /Ø/ in from what could be characterized as the genuine accentual shape of /œ/ and /Ø/ in the context it governs. Unlike other vowels used to refer to this vowel, and more precisely /œ/ and /Ø/.

Chapter 2: The French schwa

This chapter is organized as follows. I first lay out my assumptions about the underlying status of schwa and synthesize the data that I believe any theory of the distribution of this vowel has to account for. These generalizations that I believe adequately characterize the main segmental factors involved in the behavior of schwa. These are precisely the generalizations that were established in the previous chapter, ... that the phonological representations of the words in the data from what has been reanalyzed as stable /œ/ or have disappeared from the underlying representation. Representative examples are 1) squelette 'skeleton', which is always pronounced [skœl\t] *[skl\t] and for which I adopt the underlying representation /skœl\t/, and 2) samedi 'Saturday', systematically pronounced [skœm\d\] ...

3.1. BASIC FACTS

3.1.1. THE UNDERLYING STATUS OF SCHWA

The underlying status of schwa has generated a substantial body of literature. Are we dealing with vowel epenthesis or vowel deletion? What is the domain of application of the process of schwa? Among various syllable structure theories, I will assume that the specific division of work I propose is different from what has been reanalyzed as stable /œ/ or have disappeared from the underlying representation. Representative examples are 1) squelette 'skeleton', which is always pronounced [skœl\t] *[skl\t] and for which I adopt the underlying representation /skœl\t/, and 2) samedi 'Saturday', systematically pronounced [skœm\d\].

Unlike other vowels used to refer to this vowel, and more precisely /œ/ and /Ø/.
See Morin (1978) for additional suffixes, which are very restricted and not productive. Mazzola (1992) and Coflette (2000a) also argue against Martinet for reasons of predictability. However, the unpredictability of schwa in the initial syllable is used by many authors (Hansen, 1994; Walker, 1996) to explain the stabilization of schwa in Parisian French.

I leave compounds aside, which seem to behave mostly like sequences of words from the segmental point of view, with less variation in the number of syllables in the second member of the compound. The relevant facts are described in Leon (1966) and analyzed in Dell (1973/1980/1985), Morin (1974), Verluyten (1988), Noske (1993).

There is an additional junctural context where schwa may appear: between elements of the pronunciation of words in the citation form follows from a requirement in French that all prosodic words or utterances contain a vowel. Dechaine (1990, 1992, for the reason that a schwa is pronounced in the citation form of these words.

One may legitimately suspect that there are arguments for positing underlying schwas at morpheme boundaries (other than tradition and orthography). Dell (1973/1980/1985) is the author that most explicitly and systematically argues against these arguments, empirical arguments being very limited (mainly the behavior of schwa before h-aspire' words and the suffix -rions/-riez, conditional present tense). Morin (1978) and Tranel (1981) convincingly argue against these theoretical and empirical arguments. Tranel, however, retains underlying schwas in clitics (1st/2nd person plural forms of the -rions/-riez, conditional present tense).

The distribution of schwa vs. ^ at boundaries depends on independent phonological and morphological conditions, and vowels do not have to be posited underlyingly. The distribution of schwa across contexts depends on the specific phonological and morphological conditions. The phonological and morphological conditions are the deciding factor in determining whether a schwa appears or not.

Chapter 2: The French schwa
Chapter 2: The French schwa

At word boundaries (including verb-pronoun boundaries):

- *actepénible*  
  \[\text{painful act} /\text{akt penibl}/ \]

- *fermeto**  
  \[\text{close yourself} /\text{f´rm twa}/ \]

Morpheme-internal:

- *undemand*  
  \[\text{a request} /\text{yn d\må¤d}/ \]

It is an absolute rule that schwa never appears next to a vowel. In this respect schwa contrasts with all other vowels in French, which freely appear in hiatus. Underlying schwas are all in interconsonantal position, and epenthesis never takes place at a boundary that is adjacent to a vowel. The following examples illustrate the failure to epenthesize next to a vowel.

- *(3) NO SCHWA NEXT TO A VOWEL:*  
  a. *beauté*  
  \[\text{beauty} /\text{bo+te}/ \]
  * \[\text{bo te} \]

  b. *louerai*  
  \[\text{rent+FUT.1SG} /\text{lu+re}/ \]
  * \[\text{lu re} \]

  c. *geste adroit*  
  \[\text{agile gesture} /\text{Ω´st adrwa}/ \]
  * \[\text{Ω´st adrwa} \]

Utterance-initial (post-pausal) and utterance-final (pre-pausal) schwas are also not found in the speech described here. Note that utterance-initial schwas occur in other varieties, e.g. the colloquial French of lower-middle-class Parisians (according to Morin's (1987a) subjective description) and in Que'bec French. The analysis proposed here naturally accounts for the absence of epenthesis at utterance edges in the dialect under consideration, but also allows for the existing variation on this point.

- *(4) NO SCHWA UTTERANCE-INITIALLY AND UTTERANCE-FINALLY:*  
  a. *je parlais*  
  \[\text{I spoke}/\text{Ω=parl´}/ \]
  * \[\text{Ωparl´} \]

  b. *la piste*  
  \[\text{the track} /\text{la=pist}/ \]
  * \[\text{lapist} \]

From the facts illustrated in (3) and (4), it follows that schwa occurs only between two consonants. It has long been noticed that the distribution of schwa depends largely on what precedes the boundary or the underlying schwa. But the following context also has an effect. In reviewing the relevant data about schwa, I find it useful to distinguish the following cases: (i) when the vowel preceding the schwa is followed by only one consonant, (ii) when the vowel preceding the schwa is followed by more than one consonant, and (iii) when the vowel preceding the schwa is followed by another vowel.

Note that the distinction between optional and excluded schwas after one consonant is a subtle one and should not be interpreted too radically. One could argue that schwa is always possible, but I consider schwa to be excluded, and the analysis would not be radically altered by considering it simply more marked or less likely.

The complexity of the distribution of schwa and the fact that most studies of it focus on a subset of the data make it useful to have a complete picture presented in a condensed form. This will also allow us to get a clearer idea of the empirical adequacy of the analyses I present and discuss below.

Strong emphasis expressed by initial stress may for instance license schwa in forms like *doucement*  
\[\text{gently, slowly}/\text{du=s\må~}/ \]
or *donne-lui!*  
\[\text{give him!}/\text{dø=n\l¥i}/ \]

Schwa also seems to appear quite freely in the sequence *µ-m*, e.g. in *enseignement*  
\[\text{teaching}/\text{å~s´µ}/ \]
and *dignement*  
\[\text{with dignity}/\text{diµ}/ \]. I leave this sequence aside here.
### Table 3: Distribution of Schwa Across Various Morphological and Segmental Contexts

<table>
<thead>
<tr>
<th>Context</th>
<th>Schwa Required</th>
<th>Schwa Optional</th>
<th>Schwa Excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Before derivational suffixes</td>
<td><strong>OBLIGATORY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Before future/conditional endings (except cond. 1/2 plural)</td>
<td></td>
<td></td>
<td><strong>EXCLUDED</strong></td>
</tr>
<tr>
<td>c. Before conditional 1st/2nd plural endings</td>
<td></td>
<td></td>
<td><strong>EXCLUDED</strong></td>
</tr>
<tr>
<td>d. At clitic boundaries</td>
<td></td>
<td></td>
<td><strong>EXCLUDED</strong></td>
</tr>
<tr>
<td>e. At word boundaries</td>
<td></td>
<td></td>
<td><strong>EXCLUDED</strong></td>
</tr>
<tr>
<td>f. Morpheme-internally</td>
<td></td>
<td></td>
<td><strong>OPTIONAL</strong></td>
</tr>
<tr>
<td>g. In the preceding table, a vowel always intervenes between the relevant consonants (10, 18).</td>
<td></td>
<td></td>
<td><strong>EXCLUDED</strong></td>
</tr>
<tr>
<td>h. In the context of the short and long forms of the verb, the schwa in the short form is generally excluded (7, 9).</td>
<td></td>
<td></td>
<td><strong>OPTIONAL</strong></td>
</tr>
<tr>
<td>i. The important point is that the sequence [Crj] is banned.</td>
<td></td>
<td></td>
<td><strong>OPTIONAL</strong></td>
</tr>
<tr>
<td>j. In the context of the short and long forms of the verb, the schwa in the short form is generally excluded (7, 9).</td>
<td></td>
<td></td>
<td><strong>OPTIONAL</strong></td>
</tr>
</tbody>
</table>

---

### Notes

- **Schwa Required**: Schwa is required in these contexts.
- **Schwa Optional**: Schwa is optional in these contexts.
- **Schwa Excluded**: Schwa is excluded in these contexts.

As repeatedly mentioned in research on schwa, the tendency is for schwa to be absent when only one consonant precedes, irrespective of the number of consonants in the preceding syllable. The context of the short and long forms of the verb is crucial in determining the presence or absence of schwa. **Schwa Required** is indicated when the presence of schwa is obligatory, **Schwa Optional** when schwa is optional, and **Schwa Excluded** when schwa is excluded.
Optional Schwa After a Post-Pausal Consonant:

Chapter 2: The French schwa

(24) OPTIONAL SCHWA AFTER A POST-PAUSAL CONSONANT:

a. le salut
"the greeting" /l=saly/ [l(\saly)]

b. te fais pas de bile
"don't worry" /t=f\pa d=bil/ [t(f\padbil)]

c. demande-la
"request it" /d=m\d la/ [d(m\dla)]

d. je suis
"I am" /\s¥i/ [\s¥i] [ßs¥i]

In this case, schwa is generally optional, irrespective of the nature of the consonants.

The two examples in (24a,c) thus contrast with their utterance-medial counterpart given in (19) and (22), in which schwa is obligatory. The tolerance for practically any two-consonant cluster phrase-initially is well-known and discussed in numerous sources, from Grammont (1914/1961) and Fouche' (1959) to Dell (1973/1980/1985), Rialland (1986), Tranel (1987a), and Noske (1993). Notice that these phrase-initial sequences may violate the Sonority Sequencing Principle, for example the sequence [ls] in (24a).

2.2. SYLLABIC ACCOUNTS

With these data in hand, we can review and evaluate the various approaches that have been taken in accounting for the distribution of schwa, in particular the syllabic ones. References to syllable...lundi, l'e est muet toutes les fois que la consonne dont il est precede peut, dans la prononciation, se joindre sans difficulte', sans effort, a la syllabe qui precede ou a celle qui suit." (Lesaint 1871: 33). In more recent times, explicitely syllabic analyses include: Pulgram (1961), Morin (1974), Cornulier (1975), Bouchard (1981), Anderson (1982), Noske (1982, 1988, 1993, 1996), Montreuil (1985), Tranel (1987a, 1999, 2000), Spa (1988), and Carbonneau (1989).

Two segmental restrictions have been mentioned in the literature. First, Dell (1973/1980/1985) claims that schwa must be present if the initial consonants are both stops, as in te casse pas la teflte! "don't overdo it!" /t=kas pa la=t\t/ [t\kaspalat\t]. Morin (1974) disagrees and gives a schwaless pronunciation for te tracasse pas 'don't worry' /t=trakas pa/ [ttrakaspa]. I believe there is a tendency to insert a schwa in such contexts, but this is not an absolute requirement. (See also Grammont 1914/1961: 117-118). Second, Fouche' (1959) suggests that schwa is obligatory if the two consonants are identical. But Rialland (1994) gives the pronunciation [sswar] for ce soir 'this evening' (UR: /s=swar/), Le'on (1966) gives [\\u] for je joue 'I play (UR: /\=\u/), and Male'cot (1976) [ssø~] for ce sont 'these are' (UR: /s=so~/); Morin's example above makes the same point, with a stop rather than a fricative in initial position. Here again, there may be a tendency rather than a law.

To this list could be added two related foot-based analyses – Selkirk (1978) and Withgott (1982) – as well as Charette (1991), whose proposal is cast in Government Phonology. In this framework, the syllable is not necessarily demarcated at vowel or consonant boundaries. The empirical weaknesses of this early syllabic treatment were soon noticed; see Dauses (1973) and Morin (1982). The most obvious shortcoming is that it widely overgenerates, as it predicts schwa omission in consonantal contexts in which it is impossible. Pulgram's proposal is expected to account for all the cases of obligatory schwa in the table above, but its...sequences (26); 2. before 1st/2nd plural conditional endings with all consonant-final verbal stems (27).

Verluyten (1982, 1985a, 1985b) also develops a rhythmic account of the behavior of schwa, which I will not discuss here.
Chapter 2: The French schwa

89 Chapter 2: The French schwa

(25) OBLIGATORY SCHWA BEFORE DERIVATIONAL SUFFIXES:

a. justement
   'justly'  [jœyst]
   * [jœystmå~] (UR: /jœyst+må~/)

b. garderie
   'kindergarten'  [gœardri]
   * [gœardri] (UR: /gœard+ri/)

c. propreté'
   'cleanliness'  [prœprte]
   * [prœprte] (UR: /prœpr+te/)

(26) OBLIGATORY SCHWA BEFORE FUTURE AND CONDITIONAL ENDINGS:

a. doublerai
   'double+FUT.1SG'  [doblre]
   * [doblre] (UR: /dobl+re/)

b. entrerai
   'enter+FUT.1SG'  [entri]
   * [entri] (UR: /ent+ri/)

(27) OBLIGATORY SCHWA BEFORE 1ST/2ND PLURAL CONDITIONAL ENDINGS:

a. gaflterions
   'spoil+COND.1PL'  [gatrjø~]
   * [gatrjø~] (UR: /gat+rjø~/)

b. fumeriez
   'smoke+COND.2PL'  [fymrje]
   * [fymrje] (UR: /fym+rje/)

c. garderiez
   'keep+COND.2PL'  [gadrje]
   * [gadrje] (UR: /gad+rje/)

In all these examples, the schwaless outputs are predicted to be acceptable by Pulgram's law since they contain a permissible word-final sequence followed by a possible word-initial one.

18 For example, the group [stm] in (25) can be decomposed into the word-final cluster [-st] (e.g. liste 'list' [list]) followed by word-initial [-m-]. In some cases the sequence can even be decomposed in two ways. In (25b), [rdr] can be decomposed as [-rd]+[-r] or [-r]+[-dr] ([-rd] as in garde [gard]; [-dr] as in dru [dry]).

The basic problem for Pulgram is that in all the forms in (25)-(27), the stem itself corresponds to a possible word. These morphemes are also morphologically segmented at the syllable boundary.

Overgeneration is the most obvious weakness of Pulgram's approach, which predicts schwa to be obligatory in contexts where it is optional. It also undergenerates, in that it predicts schwa to be obligatory in contexts where it is optional. It is also underspecified, in that it predicts schwa to be obligatory in contexts where it is optional.

2.2.2. SUBSEQUENT ANALYSES

Subsequent analyses tried to develop a more restrictive theory, which would eliminate the important overgeneration problem encountered by Pulgram's approach (Morin 1974; Bouchard 1981; Anderson 1982; Noske 1988, 1993, 1996; Tranel 1987a). This was done by restricting the notion of possible syllables in French and limiting the resyllabification possibilities. The approach revised accordingly. See Morin (1987a) for insightful comments on these and other problematic data.
Chapter 2: The French schwa

where it is indeed obligatory. As this system turns out to be too restrictive in other contexts, we will see how it can be relaxed or amended to improve its empirical adequacy.

2.2.2.1. Step 1: the most restrictive approach

The correct theory of schwa must be able to derive all the cases of obligatory schwa insertion/retention (see table 3). In order to do so, let us propose the following approach.

- **Constraint on Syllable Well-Formation**
- **Constraint on Syllable Formation**
- **Constraint on Syllable Duration**

For example, consider an input /VC1C2VC3/ where C2 is a permissible onset. What constitutes a permissible onset is not entirely clear, but in any case, stop+liquid (except /tl, dl/) and /f/+liquid clusters have to be included into the set of acceptable onsets, with the possible addition of /s/ before the cluster.

Let us see more specifically the effect of the assumptions in (29) on the behavior of schwa. I list below all the contexts in which schwa is obligatory. There are five of them; the last three are just repetitions of data in (25)-(27) discussed in the context of Pulgram’s proposal.

(30) **OBLIGATORY SCHWA MORPHEME-INTERNALLY:**

<table>
<thead>
<tr>
<th>MORA</th>
<th>MORA</th>
<th>MORA</th>
</tr>
</thead>
<tbody>
<tr>
<td>une demande</td>
<td>/yn då̃d/</td>
<td>[yndå̃d]</td>
</tr>
<tr>
<td>sept melons</td>
<td>/sºt mº̃lø~/</td>
<td>[sºtmº̃lø~]</td>
</tr>
</tbody>
</table>

(31) **OBLIGATORY SCHWA AT CLITIC BOUNDARIES:**

<table>
<thead>
<tr>
<th>MORA</th>
<th>MORA</th>
<th>MORA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annick le salut</td>
<td>/anik l=saly/</td>
<td>[anikl=saly]</td>
</tr>
<tr>
<td>Philippe te conduit</td>
<td>/filip t=kød¥i/</td>
<td>[filipt=kød¥i]</td>
</tr>
</tbody>
</table>

(25') **OBLIGATORY SCHWA BEFORE DERIVATIONAL SUFFIXES:**

<table>
<thead>
<tr>
<th>MORA</th>
<th>MORA</th>
<th>MORA</th>
</tr>
</thead>
<tbody>
<tr>
<td>juste</td>
<td>/Ωyst+må~/</td>
<td>[Ωyst+må~]</td>
</tr>
<tr>
<td>garderie</td>
<td>/gard+ri/</td>
<td>[gard+ri]</td>
</tr>
</tbody>
</table>

(26') **OBLIGATORY SCHWA BEFORE FUTURE AND CONDITIONAL ENDINGS:**

<table>
<thead>
<tr>
<th>MORA</th>
<th>MORA</th>
<th>MORA</th>
</tr>
</thead>
<tbody>
<tr>
<td>doublerai</td>
<td>/dubl+re/</td>
<td>[dubl+re]</td>
</tr>
<tr>
<td>entrerai</td>
<td>/æ̃tre/</td>
<td>[æ̃tre]</td>
</tr>
</tbody>
</table>

(27') **OBLIGATORY SCHWA BEFORE 1ST/2ND PLURAL CONDITIONAL ENDINGS:**

<table>
<thead>
<tr>
<th>MORA</th>
<th>MORA</th>
<th>MORA</th>
</tr>
</thead>
<tbody>
<tr>
<td>gaflterions</td>
<td>/gat+rjø~/</td>
<td>[gat+rjø~]</td>
</tr>
<tr>
<td>fumeriez</td>
<td>/fym+rje/</td>
<td>[fym+rje]</td>
</tr>
</tbody>
</table>

Let us see more specifically the effect of the assumptions in (29) on the behavior of schwa. I list below all the contexts in which schwa is obligatory. There are five of them; the last three are just repetitions of data in (25)-(27) discussed in the context of Pulgram’s proposal.

2.2.2.2. Step 2: relaxing the assumptions

The assumptions in (29) correctly and straightforwardly predict the obligatory presence of schwa in the output in the first four cases. Their input is of the form /VC1C2-C3V/ (31, 25’, 26’) or /VC1C2VC3/ (30), which, as shown above, are unsyllabifiable without schwa. I illustrate in (32) with the examples in (30a) and (25b) how exhaustive syllabification ... repair strategies other than vowel insertion, in particular consonant deletion, are unavailable for independent reasons.

(32) **OBLIGATORY SCHEMA BEFORE 1ST AND PLURAL CONDITIONAL ENDINGS:**

<table>
<thead>
<tr>
<th>MORA</th>
<th>MORA</th>
<th>MORA</th>
</tr>
</thead>
<tbody>
<tr>
<td>c’année</td>
<td>’yan/</td>
<td>[yan]</td>
</tr>
<tr>
<td>quartier</td>
<td>quartjø~</td>
<td>[quartjø~]</td>
</tr>
</tbody>
</table>

2.2.2.3. Step 3: applying a more realistic approach

The syntactic and phonological properties of the French schwa, which is obligatorily inserted in certain contexts, have been the subject of much debate and discussion in linguistic studies. It is important to note that the assumption on syllable well-formation alone is not sufficient to derive the empirical data. In order to do so, let us propose the following approach.

- **Constraint on Syllable Well-Formation**
- **Constraint on Syllable Duration**

This approach will allow us to derive all the cases of obligatory schwa, which is indeed obligatory.
Chapter 2: The French schwa

How (29) predicts schwa insertion / retention:

<table>
<thead>
<tr>
<th>Input</th>
<th>Possible outputs</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>/yn d\må~d/</td>
<td>*[yn.dmå~d]</td>
<td>Excluded by (29b): [d] cannot resyllabify across a deleted /\</td>
</tr>
<tr>
<td></td>
<td>*[ynd.må~d]</td>
<td>Excluded by (29a): [nd] is not allowed as a complex coda</td>
</tr>
<tr>
<td></td>
<td>*[yn.d.må~d]</td>
<td>Consonantal nuclei are not allowed</td>
</tr>
<tr>
<td></td>
<td>*[yn.d.\må~d]</td>
<td>OK</td>
</tr>
</tbody>
</table>

b. /gard+ri/*[gar.dri] | Excluded by (29b): [d] cannot resyllabify across a boundary |
| | *[gard.ri] | Excluded by (29a): [rd] is not allowed as a complex coda |
| | *[gar.d.ri] | Consonantal nuclei are not allowed |
| | *[gar.d.\ri] | OK |

Notice that the first output in (32a) – *[yn.dmå~d] – could be excluded without the assumption concerning resyllabification (29b). The sequence [dm], it can be argued, does not form a possible onset...

perdrix 'partridge' [p´r.dri]. Yet schwa cannot be omitted here. It is for cases like these that the assumption (29b) is crucially needed.

We still have to discuss the case of the 1st/2nd plural conditional endings (27'). The relevant underlying sequences here are of the form /(C)C+rjV/. With stems ending in a two consonant-cluster, like gard- in (27'c), schwa insertion is derived in the same way as in (32) above. But what about stems ending in only one consonant, like gafl- and fum- in (27'a-b)? Here it is not clear that schwa insertion is predicted by the assumptions in (29). The input is of the form /VC+rjV/. The stem-final consonant is automatically licensed in coda position... If [rj] is assumed to be an acceptable onset, nothing so far rules out forms like *[fym.rje] (27'b) and *[gat.rjø~] (27'a) and schwa insertion is not predicted. To derive obligatory schwa insertion in these cases, let us assume that [rj] is not a possible onset. This is not an implausible assumption. It is supported by the fact that this sequence occurs word-initially – for instance in rien 'nothing' [rj´~] – but not word-internally after a consonant *[VCrjV].

The initial /r/ in /rj´~/ would then be considered extrasyllabic (see following section), and in a word like parier 'to bet' [par.je], the syllable boundary would be put between the two consonants. Extrasyllabic consonants being allowed only at domain edges, an output like *[fymrje] (27'b) would not be syllabically well-formed. The schwa inserted at the morphological boundary then provides a coda for the /r/ to go into.

We have now derived by means of the two assumptions in (29) all the cases of obligatory schwa in table 3. This represents a substantial improvement over Pulgram's analysis, which predicted schwa to be obligatory in all the contexts in the rightmost column in table 3. Yet there are four contexts in which schwa may be omitted in certain forms:...
The French schwa is never obligatory at word boundaries, although in some contexts, as in (33c), the pronunciation with schwa can be considered highly preferable (see section 2.3.2 regarding such examples).

(33) OPTIONAL SCHWA AT WORD BOUNDARIES:
   a. acte pe’nible
   b. bourse pleine
   c. rythme sauvage

These examples straightforwardly follow if we assume that consonants not admitted in the coda are licensed by extrasyllabicity word-finally. I presented in section 1.2.1.1. various approaches to... attach directly to the prosodic word. The schwa-less output in (33b) would then have the representation in (34):

(34) EXTRASYLLABICITY OF WORD-FINAL CONSONANTS:

The optionality of schwa in most future and non-1st/2nd plural conditional forms (35) could be accounted for by assimilating the boundary to a word level one. These verbal endings may be analyzed as some kind of word-level affix, contrasting with derivational suffixes (cf. the mandatory schwa in garderie[gardrice]). The stem-final consonant would then be allowed to be extrasyllabic, as in (34) above.

Table 3 contains future/conditional forms in which I consider schwa to be obligatory, e.g. doublerai['double+FUT.1SG'] [dublre]. Given the proposed correspondence between the future/conditional and word boundaries, one may wonder why schwa is not always optional in the future/conditional as I... as we will see in section 3.4. So there may be a real contrast between word and future/conditional boundaries.

(35) OPTIONAL SCHWA BEFORE FUTURE AND CONDITIONAL ENDINGS:
   a. garderai
   b. postera

The same mechanism of extrasyllabicity can be used domain-initially to account for word-initial /rj/ sequences (36a), as we assumed above that this sequence was not a possible onset. This account of /rj/ extends to other /r/+glide sequences /rw/, as in (36b).

(36) OPTIONAL SCHWA WORD-INITIALLY BEFORE /r/+GLIDE SEQUENCES:
   a. aime rien
   b. Patrick Roy

These examples require discussion of an additional point. I mentioned above that there are no word-internal [Crj] sequences. But internal [Crw] and [Cr¥] sequences are found, as in endroit['location'] [ådrwa] and autrui['others'] [otr¥i]. The preceding consonant, however, can only be a stop or /f/, that is exactly the consonants that precede /r/ in complex onsets. We adopt the hypothesis that in these words (and others like surcroît['addition'] [syrkrwa]) the glide forms a diphthong with the following vowel and is not in onset position (Noske 1982, 1988; Rialland 1986). Crucially, the glide option is not available in words like roi['king'] [rwa]. This is consistent with the fact that schwa cannot usually appear before words beginning with an /OrG/ sequence: Patrick Droit[patrikdrwa] *[patrikdrwa] contrasts with Patrick Roy[patrikrwa] [pa.trik.rwa].
Chapter 2: The French schwa

EXTRASYLLABICITY OF WORD-INITIAL /r/ FOLLOWED BY A GLIDE:

Phonological phenomena linked to the schwa are seen most clearly by a closer look at the evolution of the schwa in different contexts.

Chapter 2: The French schwa
I do not believe the judgments given in (40)-(41) are problematic. Supporting evidence for the examples in (40) and (41) is not hard to find, and the judgments reported in the preceding paragraph will not change if the underlying schwa is deleted. The context for the deletions is clear: the schwa is deleted in all cases where it follows a vowel-final determiner. But the other two are certainly not impossible, and this is made clear in Dell (1973/1980/1985), whose examples with an underlying schwa: Daloads (1973); Bazylko (1976); Male'cot (1976); Leόn (1987); Gadet (1997) (see also van Eibergen (1992) and van Eibergen & Belrhali (1994) for similar examples in Grenoble-French).

Granting the grammaticality of the examples in (40)-(41), let us now see their implications for a syllabic approach to the distribution of schwa. The underlined consonants cannot be licensed if one adopts the assumptions in (39). To show this I will use the example in (40e), [tykrwakilfok]. This output contains a cluster [kßf], in which the middle [ß] is problematic. There are three possibilities for its licensing, which all fail.

- First, it cannot be licensed by forming a complex onset with the following consonant [f]. Hence the ungrammaticality of *[...okß.ßfa....].

- Second, it cannot resyllabify with the following consonant [f] and form a complex onset with it because resyllabification across a boundary is prohibited (39b). Hence the ungrammaticality of *[...ok.ßfa....].

- Third, it cannot be licensed by phrase-initial or word-final extrasyllabicity because it does not appear in one of these positions. Hence the ungrammaticality of *[...ok.ß.fa....].

A schwa should therefore automatically be inserted to license [ß], but this is not the case. The same reasoning applies to the unlicensed consonants in (40) and (41), in which the two middle ones cannot be licensed in the preceding coda, the following onset, or through extrasyllabicity. In (41a), the schwaless output *[s´t.d.må~d]*, in which the two middle consonants cannot be licensed in the preceding coda, the following onset, or through extrasyllabicity, is real in that deletion is more likely in the first form, where the schwa is present.

I do not see what additional assumptions or amendments could save these cases. One could relax assumption (39b) that prohibits resyllabification across a boundary or deleted schwa. The underlined consonants would then be allowed to resyllabify to the right and form a complex onset with the following consonants. But this would simply not work. In each of the clusters which the unlicensed consonant is part of in (40) and (41), the last two consonants do not form a legitimate onset. Hence the unlicensed consonants cannot be licensed by forming a complex onset with the following segment. But this would not change the nature of the problem.

Extending the domain of extrasyllabicity by allowing it to apply to the unlicensed consonants in (40) and (41) will obviously not work either. It is hard to see how we could constrain extrasyllabicity to apply to the unlicensed consonants in (40) and (41) in order to get the necessary disyllabic forms in (40c) and (41a), where the unlicensed consonants in (40) and (41) will be extrasyllabic. Hence the ungrammaticality of *[s´t.d.må~d]*. I do not see why these examples in (40)-(41) can be made grammatical by any additional assumptions or amendments.
Chapter 2: The French schwa

Consonant clusters they contain have to be exhaustively syllabified. The only way to achieve this is by adopting a more permissive definition of a possible syllable in French. This brings us back to Pulgram’s (1961) proposal, in which all attested word-initial and word-final sequences form acceptable onsets and codas. We saw why this approach was not restrictive enough. ... are bound to undergenerate the attested facts, that is predict schwa to be obligatory where it is not, as in (40)-(41).

### 2.2.3. Schwa and Variability

A general weakness of syllabic treatments which I have not yet mentioned is their failure to account for the omnipresent and inherent variability of the process of schwa insertion/deletion. They are bound to undergenerate the attested facts, that is predict schwa to be obligatory where it is not, as in (40)-(41).

#### (43) /C-C(C)/

- **CONTEXTS WHERE SCHWA IS NORMALLY EXCLUDED:**
  - Before derivational suffixes:
    - fruiterie ‘fruit store’ /fr¥it+ri/ [fr¥itri] * [fr¥itri]
  - Before future/conditional endings (other than 1st/2nd plural cond):
    - gaflterai ‘spoil+FUT.1SG’ /gat+re/ [gatre] * [gatre]
  - At word boundaries:
    - attaque penible ‘painful attack’ /atak penibl/ [atakpenibl] * [atakpenibl]
    - attaque frontale ‘frontal attack’ /atak frø~tal/ [atakfrø~tal] * [atakfrø~tal]

Second, within this optional domain we find all degrees of likelihood and naturalness for the presence of a schwa, from the very marginal to the almost obligatory. As Cornulier (1975: 105) puts it: “A chaque instant, il existe entre l’élision obligatoire et l’impossible, une infinie mouvante de degrés qu’il est absurde de quantifier en quelques nombres entiers. Tel est le continu qui échappe, par essence, à la réduction à une combinatoire abstraite de phonèmes discrets et alignés.” This continuum is based in part on independent phonological and morphological factors (disregarding the sociolinguistic ones), and any theory of schwa should identify and integrate them.

I believe it is in part the failure to recognize this variability that has led to judgments marking as ungrammatical some of the forms in (40) and (41) above. Recall for example that (41c) is rejected by ... interpretation of such judgments brings us to two major generalizations about the distribution of schwa, which I call the loi des deux consonnes (after Leray 1930) and the “law of alternating schwas”. These have become commonplaces of the literature on this topic, and it is worthwhile to see their effect on the distribution of schwa, where they come from, and how they are related to each other.

The pronunciation laws are described in the classic sources on the pronunciation of Standard French, e.g. Grammont (1914/1961) and Fouche (1959).

**The loi des deux consonnes** states that a schwa is pronounced in every potential site (i.e. boundary or underlying schwa) that is preceded by two consonants. So inputs of the form /CC*C/ surface as [CC\C]. The law of alternating schwas follows from the loi des deux consonnes. Consider any sequence of two potential sites in a row /C*C*C/. If schwa is omitted in the first one, which is indicated by the underlined gap, the second one is necessarily preceded by two consonants, and is therefore an onset. The loi des deux consonnes then predicts that schwa cannot be omitted in the second site as well.

The loi des deux consonnes is a generalization of the pronunciation laws described above, which are based on independent phonological and morphological factors (disregarding the sociolinguistic ones). Any theory of schwa should take into account the distribution of schwa, where they come from, and how they are related to each other.

The loi des deux consonnes states that a schwa is pronounced in every potential site (i.e. boundary or underlying schwa) that is preceded by two consonants. So inputs of the form /CC*C/ surface as [CC\C]. The law of alternating schwa is a subcase of the loi des deux consonnes: it states that in a series of potential sites separated by one consonant, a schwa is pronounced in at least every other site. So in inputs like /C*C*C*C.../, schwa is not omitted in two consecutive sites. These pronunciation laws are described in the classic sources on the pronunciation of Standard French, e.g. Grammont (1914/1961) and Fouche (1959).
The distribution of schwa is highly variable. There is a continuum of acceptability and frequency of schwa omission/insertion, and nowhere can we establish clear patterns. And dismissing forms not conforming to the loi des deux consonnes based on the right column violates it.

We can now understand the origin of the ungrammaticality judgments assessed by Anderson and Noske to some of the forms in (40) and (41). We readily see that these examples all contradict the loi des deux consonnes in each case where in (40): (i) The feature [a] is assigned to a pronunciation and (41) the feature [-[a] is assigned to a pronunciation. And even though I believe the status of the two laws as tendencies is quite clear in French, there are still some ongoing debates.

Conform to the loi des deux consonnes

\[ \begin{array}{c|c|c}
\text{Consonnes} & \text{Sinon} & \text{Prononciation} \\
\hline
\text{J} & \text{[a]} & \text{[a]} \\
\text{N} & \text{[a]} & \text{[a]} \\
\text{P} & \text{[a]} & \text{[a]} \\
\text{R} & \text{[a]} & \text{[a]} \\
\end{array} \]

Violate the loi des deux consonnes

\[ \begin{array}{c|c|c}
\text{Consonnes} & \text{Sinon} & \text{Prononciation} \\
\hline
\text{J} & \text{[a]} & \text{[a]} \\
\text{N} & \text{[a]} & \text{[a]} \\
\text{P} & \text{[a]} & \text{[a]} \\
\text{R} & \text{[a]} & \text{[a]} \\
\end{array} \]
borders between what could be considered standard and non-standard patterns. I believe an acceptable theory of the distribution of schwa has to derive these preferences; there is no point in idealizing the facts.

2.2.4. A FLEXIBLE APPROACH TO SYLLABLE WELL-FORMEDNESS?

Acknowledging the variability of the distribution of schwa and the need for more flexibility, Morin (1974), Cornulier (1975), Tranel (1987a, 1999, 2000) and, to some extent, Bouchard (1981), suggest that the variability of schwa distribution is rooted in these variations. This is expressed in the following quotes:

"Much of the burden of the analysis ultimately rests on an adequate account of syllable structure in French, in particular on a detailed understanding of allowed onsets and codas. The variability typically observed in so-called ‘schwa deletion’ is rooted in these context-dependent syllable well-formedness, the differences in (42) (p. 115) and the following ones: the clusters in (43) (p. 116) differ in the nature of the underlying segment, a triphong in (42) and (43) which are perfectly grammatical for (42) and (43) which are perfectly grammatical for (43) and (44) are pronounced differently in (43) and (44) which are perfectly grammatical for (43) and (44)."

"Le fait qu’entre les emplois obligatoires et les emplois interdits d’e, il existe des emplois plus ou moins e’vitables ou imposées reflète le fait qu’entre une séquence impossible et une séquence très facile à syllabiser, toutes les nuances sont concevables." (Cornulier 1975: 115)

"An analysis based on a flexible approach to the syllable and context-dependent syllable well-formedness, however, remains to be developed. The authors cited above did not go beyond mere suggestions, exhaustively contained in the preceding quotes. In more recent work, Tranel (1999, 2000), working in Optimality Theory, offers the first glimpse of what a flexible-syllable analysis of the distribution of schwa would look like. He accounts for a range of phenomena, such as schwa omission in contexts that are considered standard and non-standard patterns."

These examples show the possible sites where schwa could surface: the underlying schwa in (42a-b) and the first clitic boundary in (42c-d). Schwa omission yields a three-consonant cluster, which is more acceptable in (42c-d) than in (42a-b). A more complete account would also have to incorporate, is that “stops are more acceptable before a liquid than before an obstruent.”

Other similar contrasts could be extracted and the relevant differences integrated into statements on possible syllabifications, or relative ease of syllabification. This approach could then be used for the description of schwa, which is discussed in the next section."

(42) SEGMENTALLY-BASED CONTRASTS IN THE ACCEPTABILITY OF SCHWA OMISSION:

| a. | sept fenêtres | ‘seven windows’ /s´t fn´tr/ | *[s´tfn´tr] |
| b. | sept demandes | ‘seven requests’ /s´t d`md/ | *[s´tdm`d] |
| c. | chef de la gare | ‘master of the station’ /ß´f d=la=gar/ | *[ß´fdlagar] |
| d. | chef de sa gare | ‘master of his station’ /ß´f d=sa=gar/ | ??[ß´fdsagar] |

These examples contain one possible site where schwa could surface: the underlying schwa in (42a-b) and the first clitic boundary in (42c-d). Schwa omission yields a three-consonant cluster, which is more acceptable in (42c-d) than in (42a-b). A more complete account would also have to incorporate, is that “stops are more easily syllabified before a liquid than before an obstruent.”

Other similar contrasts could be examined and the relevant difference integrated into statements on possible syllabifications, or relative ease of syllabification. This approach could then be used for the description of schwa, which is discussed in the next section."

(43) POSITIONAL EFFECTS ON SCHWA OMISSION:

Le fait que les mots en fin de phrase sont généralement plus acceptables que les mots en début de phrase, reflète le fait que le début de phrase est généralement plus facile à syllabiser que la fin de phrase. (Tranel 1987a: 859-860)
The French schwa

Chapter 2: The French schwa

The behavior of schwa. The advantages of the syllable then become unclear. In fact, the syllabic rules proposed for the contrasts in (42) - "fricatives are more easily syllabified than stops, and 6. the effect of the adjacent prosodic boundary. I discuss each of these factors in turn in section 2.3.

2.3. Sequential Generalizations

2.3.1. Adjacency to Vowels

Generalization 1:
Consonants want to be adjacent to a vowel, and preferably followed by a vowel.

The distribution of schwa is obviously conditioned by the desirability for consonants to be adjacent to a vowel. This will be demonstrated by looking at the various contexts in which schwa can appear as a result of the adjacency of the syllable. Things become interesting with potential sites that are flanked by consonants. As we will see however, there is a clear frequency effect: schwa more readily appears in sequences of three consonants. We will see, however, that there is a clear frequency effect: schwa more readily appears in sequences of three consonants. This is demonstrated by looking at the various contexts in which schwa can occur as a result of the adjacency of the syllable.

31 Recall that there is no occurrence of schwa-final or prepausal schwa.

32 We will see, however, that the effect of the prosodic boundary on schwa is that it is almost always excluded. This aspect of the data is investigated in section 2.3.6; until then I limit my attention to utterance-internal positions.

One obvious question is: What distinguishes clitics and morpheme-internal positions, where schwa is optional in /VC*CV/, from the other contexts, where it is normally excluded if there is only one consonant on either side? We will see, however, that the effect of the prosodic boundary on schwa is that it is almost always excluded. This aspect of the data is investigated in section 2.3.6; until then I limit my attention to utterance-internal positions.
### Table 4: Likelihood of schwa in /VC*CV/ vs. /VCC*CV/ and /VC*CCV/

<table>
<thead>
<tr>
<th>Context</th>
<th>VC*CV</th>
<th>VCC*CV</th>
<th>VC*CCV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before excluded derivational suffixes (5) /fr¥it+ri/</td>
<td>[fr¥itri]</td>
<td>CC*C</td>
<td>obligatory</td>
</tr>
<tr>
<td>(10) /gat-rje/</td>
<td>[gat\rje]</td>
<td>C*CC</td>
<td>obligatory</td>
</tr>
<tr>
<td>Future/cond endings (6) /gat+re/</td>
<td>[gatre]</td>
<td>CC*C</td>
<td>optional</td>
</tr>
<tr>
<td>(17) /gard+re/</td>
<td>[gard\re]</td>
<td>CC*C</td>
<td>obligatory</td>
</tr>
<tr>
<td>At clitic optional boundaries (7) /ani l=grø~d´/</td>
<td>[anil\grø~d´]</td>
<td>CC*C</td>
<td>optional</td>
</tr>
<tr>
<td>/pl´~d=psikøløg/</td>
<td>[pl´~d\psikøløg]</td>
<td>CC*C</td>
<td>optional</td>
</tr>
<tr>
<td>At word boundaries excluded C*CC (11) /ani l=saly/</td>
<td>[anil\saly]</td>
<td>CC*C</td>
<td>optional</td>
</tr>
<tr>
<td>/pl´~d=psikøløg/</td>
<td>[pl´~d\psikøløg]</td>
<td>CC*C</td>
<td>optional</td>
</tr>
<tr>
<td>Morpheme-optional C*CC (13) /´m rj´~/</td>
<td>[´m\rj´~]</td>
<td>CC*C</td>
<td>excluded</td>
</tr>
<tr>
<td>(12) /atak frø~tal/</td>
<td>[atakfrø~tal]</td>
<td>CC*C</td>
<td>optional</td>
</tr>
<tr>
<td>(8) /atak penibl/</td>
<td>[atakpenibl]</td>
<td>CC*C</td>
<td>optional</td>
</tr>
<tr>
<td>(20) /akt penibl/</td>
<td>[akt\penibl]</td>
<td>CC*C</td>
<td>optional</td>
</tr>
<tr>
<td>Internally (9) /la=f\n´tr/</td>
<td>[laf\n´tr]</td>
<td>CC*C</td>
<td>optional</td>
</tr>
<tr>
<td>(23) /yn f\n´tr/</td>
<td>[ynf\n´tr]</td>
<td>CC*C</td>
<td>obligatory</td>
</tr>
<tr>
<td>(22) /yn d\må~d/</td>
<td>[yn\d\må~d]</td>
<td>CC*C</td>
<td>excluded</td>
</tr>
</tbody>
</table>

For the last three contexts – at clitic and word boundaries and morpheme-internally – one may nevertheless observe an asymmetry between /VC*CCV/ and /VCC*CV/, the latter favoring schwa ... Grammont (1914–1961), to claim that the distribution of schwa really depends on the number of preceding consonants. 

Only Fouche' (1959) notices the effect of the following segments, as he distinguishes between the CC*C and CC*CC contexts at word boundaries, schwa being generally absent in the first case but present in the second. If schwa deletes in CC*C, it also does in C*CC, since this context is generally less favorable to schwa.

First, Charette (1991) notes a stronger tendency to pronounce a schwa in the initial syllable of polysyllabic morphemes when it is followed by a consonant cluster /C\CCV/ (45), as opposed to only a consonant /C\CV/ (46).

- a. secré'taire | 'secretary' /s\kret´r/
- b. secret | 'secret' /s\kr´/
- c. regret | 'regret' /r\gr´/
- d. degré | 'degree' /d\gre/
- e. chevreuil | 'roe deer' /ß\vrœj/
- f. depuis | 'since' /d\p¥i/
- g. besoin | 'need' /b\zw´~/

This tendency is confirmed in Hansen's (1994) study on the frequency of schwa in morpheme-initial syllables. Among the 25 most frequent words containing a schwa in their initial syllable in Hansen's study on the frequency of schwa in French (1991), the rate of schwa retention is 59% for /C\CCV/ words like those in (45), as opposed to only 34% for /C\CV/ ones (46). Unfortunately, I know of no comparable numbers in contexts other than morpheme-internally where schwa is always at least optional.

Second, a schwa is more likely to appear at a clitic boundary in the context /...V C1=C2C3V.../ than in the context /...V C1=C2V.../, that is preceding two rather than one consonant, at least with most combinations of C2 and C3. Consider the following data. In all cases schwa can be omitted, but speakers' intuitions indicate that omission is much more likely in (48), where the clitic is followed by only one consonant, than in (47), where the clitic is followed by only one consonant.

Interestingly the words in (45), except for depuis, have all been reanalyzed with a stable vowel in Que'bec French, at least in my own idiolect, so that the initial vowel never deletes.
Chapter 2: The French schwa

The same effect can be found at word boundaries, with the difference that a schwa in the segmental context /VC-CV/ is marked, except under strong emphasis.

(49) SCHWA AT WORD BOUNDARIES IN /VC*CCV/ VS. /VC*CV/ CONTEXTS:

a. lutte psychologique /lyt psikøløΩik/ [lyt(??)psikøløΩik]
   'psychological battle'

b. truc mnемotechnique /tryk mnemot´knik/ [tryk(??)mnemot´knik]
   'mnemotechnic trick'

c. lutte sensationnelle /lyt så~sasjøn´l/ [lyt(??)så~sasjøn´l]
   'sensational battle'

d. truc mirobolant /tryk mirøbølå~/ [tryk(??)mirøbølå~]
   'wonderful trick'

As the reader has probably already noticed, I have not used in (47) and (49) word-initial stop+liquid or /f/+liquid clusters. These indeed appear to behave more like single consonants at clitic and... transitions, and contrast. The favored sequences, those that do not need the presence of schwa, tend to show a big contrast in manner of articulation and avoid... The SSP appears to be a major factor in the distribution of schwa, a consonant.

Sonority Sequencing Principle:

Sonority maxima correspond to sonority peaks.

2.3.2. THE SONORITY SEQUENCING PRINCIPLE

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I have shown in this section that the behavior of schwa is driven by the desirability for consonants to be adjacent to a vowel. Schwa is generally omitted when it is not required to meet this...
Chapter 2: The French schwa

distinction between prevocalic positions and elsewhere. This includes in particular three contexts: postvocically (e.g. *partir* 'leave' [parti]), word-finally after an obstruent (e.g. *mettre* 'put' [metre]), and word-initially before a glide /j, ɥ, w/ (e.g. *roi* 'king' [roi]). Prevocalic /r/ behaves like an obstruent, specified as [-sonorant]; /r/ in the other contexts is more variable but preferably acts like an approximant, more precisely a glide, which I specify as [+vocoid] (see (32) in chapter 1).

This is in accordance with Simon (1967), cited in Rialland (1994), who suggests that postvocalic /r/ is a glide. Context-dependent specification of segments is also proposed for the American English /l/ by Espy-Wilson (1992), who considers it to be [+consonantal] prevocically but [-consonantal] postvocically. The phonetic facts (which, however, need to be investigated further) are certainly consistent with this dual nature of /r/. This phoneme is standardly classified as a liquid, but its articulation ... in modern Parisian French, one can at least distinguish, based on Tranel's (1987b) description, a pharyngeal approximant, a uvular trill, a uvular fricative, and a uvular approximant. Lodge (1987), looking at the different realizations of /r/ ... Brittany, distinguishes the fricatives [≈, θ], the approximant [θ], a vocalized [‘], and even a null realization [′]. The chosen realization in a given context depends in part on the surrounding segments, but it seems that one major ... (more fricated) in prevocalic position, and weaker elsewhere (see for example the spectrograms in Rialland 1986).

The phonetic factors that determine the exact realization of /r/ in non-prevocalic contexts are not entirely clear, but the SSP is certainly one of them. In certain contexts, /r/ can be strengthened to an obstruent to avoid SSP violations, in particular phrase-initially and -finally, e.g. *repasser* 'pass again' [rεpase], *la poutre* 'the beam' [laput] (compare [laput]=). I will only be concerned with domain-internal contexts in this section, but a more detailed analysis of the behavior of French /r/ is necessary.

It has also frequently been proposed that American English /r/ is a glide, e.g. by Harris (1994), Reynolds (1994), and Guenter (2000).

This is a non-standard variant; "it is almost always voiced and does not generally include any friction noise" (Tranel 1987b: 142).

I make the hypothesis that this reflects the degree of constriction of /r/: a narrower constriction prevocically, a wider one in other contexts. This is consistent with the general tendency for consonants to involve a lower level of consonantality in postvocalic position than in prevocalic position. The choice of the SSP is more consonantal in American English in different contexts, and a comparison between nasals and liquids on pages 745-746.

The variable nature of /r/ explains its behavior with respect to sonority.

The factors that determine the exact realization of /r/ in non-prevocalic contexts are not entirely clear, but the SSP is certainly one of them. In certain contexts, /r/ can be strengthened to an obstruent to avoid SSP violations, in particular phrase-initially and -finally, e.g. *repasser* 'pass again' [rεpase], *la poutre* 'the beam' [laput≈]. I will only be concerned with domain-internal contexts in this section, but a more detailed analysis of the behavior of French /r/ is necessary.

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Chapter 2: The French schwa

We have seen that the pronunciation of the French schwa is influenced by the sonority of the surrounding consonants. The schwa tends to persist when the sonority of the vowels on either side is higher than that of the schwa. This is particularly evident in clusters where the schwa is preceded by a more sonorous consonant, as in (51a) and (51b), where we have clusters like [smß] and [plm].

In contrast, when the schwa is followed by a more sonorous consonant, as in (51c), the schwa tends to be lost. This is because the schwa in French is not strongly associated with the onset of a word, and thus loses its distinctive quality when followed by a more sonorous consonant. For example, in (51c), the schwa is lost because the [m] is followed by a more sonorous consonant, [r].

Similarly, when the schwa is followed by a more sonorous consonant, as in (52a) and (52b), the schwa is lost. In (52a), the schwa is followed by the more sonorous consonant [m], and in (52b), the schwa is followed by the more sonorous consonant [l].

In clusters where the schwa is followed by a more sonorous consonant, as in (53a) and (53b), the schwa is also lost. In (53a), the schwa is followed by the more sonorous consonant [j], and in (53b), the schwa is followed by the more sonorous consonant [l].

In clusters where the schwa is followed by a more sonorous consonant, as in (54a) and (54b), the schwa is also lost. In (54a), the schwa is followed by the more sonorous consonant [s], and in (54b), the schwa is followed by the more sonorous consonant [z].

In summary, the schwa tends to persist when the sonority of the vowels on either side is higher than that of the schwa. However, when the schwa is followed by a more sonorous consonant, the schwa tends to be lost. This is because the schwa in French is not strongly associated with the onset of a word, and thus loses its distinctive quality when followed by a more sonorous consonant.
Chapter 2: The French schwa

(56) OPTIONAL SCHWA IN /C1C2/C3/ SEQUENCES OF DECREASING SONORITY:

a. ?>[rmz]
   ['la derni`re mesure'
   'the last measure' ]

b. ?>[rls]
   ['la pire leçon'
   'the worst lesson' ]

(57) OPTIONAL SCHWA IN /C1C2/C3/ WHERE C2 IS AN OBSTRUENT:

a. ?>[spl]
   ['la douce pelouse'
   'the sweet lawn' ]

b. ?>[ksm]
   ['a` chaque semaine'
   'at each week' ]

Let us now look at the contexts other than at clitic boundaries and morpheme-internally. Two of them are immune to the effect of the SSP. At derivational suffix boundaries, three-consonant sequences are considered to be schwaless. As for forms involving the 1st/2nd plural conditional endings /-rjø~, rje/, they never violate the SSP because /r/ is not more sonorous than /j/.

We are left with two contexts: before future and conditional endings other than /-rjø~, rje/ and at word boundaries. In both of them the SSP plays an active role in eliminating schwaless outputs that violate it. The sequences that violate the SSP are all of the form C1C2-C3, where C1C2 is a morpheme- or word-final cluster in which C2 is more sonorous than C1. Clusters of this form are composed of obstruent+/m/, obstruent+/l/, and obstruent+/r/ sequences.

In the future/conditional endings /-rV/, the prevocalic /r/ behaves like an obstruent. When these suffixes attach to stems ending in a obstruent+sonorant clusters, the SSP is violated because the middle sonorant is surrounded by two less sonorous obstruents. Schwa insertion is therefore obligatory (58).

(58) OBLIGATORY SCHWA BEFORE FUTURE AND CONDITIONAL ENDINGS WITH OBSTRUENT+SONORANT STEMS:

a. *[blr]
   ['doublerai'
   'double+FUT.1SG' ]

b. *[smr]
   ['fantasmerai'
   'have fantasies+FUT.1SG' ]

At word boundaries, we have to look separately at obstruent+/m/ and obstruent+/l, r/ clusters. O+/m/+C sequences behave as expected. When the final consonant is less sonorous than /m/ (i.e. /sm-l/ in (60a) and /tm-j/ in (60b), the SSP is respected and schwa can be more freely omitted in these phrases.

(59) SCHWA IN /ON-O/ CLUSTERS AT WORD BOUNDARIES:

a. ??[smp]
   ['le tourisme parisien'
   'the Parisian tourism' ]

b. ??[tmk]
   ['le rythme colombien'
   'the Colombian rhythm' ]

(60) SCHWA IN /ON-L/ AND /ON-G/ CLUSTERS AT WORD BOUNDARIES:

a. [sml]
   ['le tourisme libanais'
   'the Lebanese tourism' ]

b. [tmj]
   ['le rythme yougoslave'
   'the Yugoslav rhythm' ]

With word-final O+/l,r/ clusters, the situation is less clear. In a /Or-C/ or /Ol-C/ cluster, the SSP is violated when the final C is less sonorous than /r/ or /l/. A couple of relevant examples are given in (61); the marginality of the schwaless output parallels that observed in (59). Now, if we replace the cluster-final consonant with a glide, we eliminate the SSP violation and schwa can now be eliminated. This holds for example in (62).

About the forms in (61), I have to mention that there is some uncertainty in the literature over whether schwa is obligatory in OL-C contexts at word boundaries. At least since Dell (1973/1980/1985), it is standard to consider that it is, but several authors claim otherwise: Bazylko (1981) contrasts ‘formerly’ [otr] and ‘other time’ [otrfwa], Zwanenburg (1968) opposes ‘humbly’ [œ~bl] and ‘humble mentality’ [œ~blmå~talite]. See also Grammont (1894: 76), Fouche’ (1959: 96), Malmberg (1975: 76). Corpus studies (Laks 1977; Chevrot, Beaud & Varga, to appear; Chevrot & Coflte’, in progress) also provide several examples of OL sequences in pre-consonantal position, without schwa insertion. I therefore take schwa to be...
Chapter 2: The French schwa

1. SCHWA IN /OL-O/ AND /OL-N/ CLUSTERS AT WORD BOUNDARIES:

a. *[klp]
   mon oncle paternel
   /mø~=ø~kl pat´rn´l/
   'my paternal uncle' [mø~nø~kl pat´rn´l]

b. *[trm]
   les quatre muse'es
   /l´=katr myze/
   'the four museums' [l´katr myze]

2. SCHWA IN /OL-G/ CLUSTERS AT WORD BOUNDARIES:

a. *[klj]
   mon oncle yougoslave
   /mø~=ø~kl jugøslav/
   'my Yugoslav uncle' [mø~nø~kl jugøslav]

b. *[tr¥]
   les quatre huissiers
   /l´=katr ¥isje/
   'the four ushers' [l´katr ¥isje]

I have shown in this section that the SSP is an inviolable constraint in French, except marginally at word boundaries. It motivates the insertion or retention of schwa in contexts where its omission would yield an unacceptably low output. Specifically, schwa is inserted before a vowel, and before a glide or a liquid. This is motivated by the SSP, which states that stops want to be adjacent to a vowel, and preferably followed by a vowel. As in all the deletion patterns described in the preceding chapter, stops must be distinguished from other consonants in that they show a greater propensity to trigger schwa insertion or block schwa...
Chapter 2: The French schwa

At word boundaries, schwa is never obligatory and less likely in any segmental context than at other boundaries. The contrast between stops and fricatives is less apparent but can probably be observed in the relative frequency of schwa in contexts /C1C2-C3/ where C2 is a stop vs. a fricative. For example, the intuition is undoubtedly that schwa is more likely to appear in casque noir 'black helmet' /kask nwar/ than in taxe noire 'black tax' /taks nwar/.

Interestingly, the conjunction of the SSP, the greater resistance of stops to surface between consonants and the tendency to avoid sequences of sonorant consonants (see below) results in fricatives having a privileged status in cluster-median position, and generally in positions with no adjacent vowels. In a C1C2C3 sequence, only with fricatives in C2 will the sequence necessarily escape major constraints. Stops are disfavored in this position because they want, more than other consonants, to appear next to a vowel; sonorants are banned if surrounded by less sonorous consonants because this would violate the SSP; in addition, as we will see below, certain sequences of sonorant consonants tend to be avoided. In contrast, having fricatives in C2 cannot result in a violation of the SSP nor in undesirable sonorant clusters.

The marked preference for fricatives within clusters has been noticed several times in the context of the behavior of schwa, especially by phoneticians (Grammont 1894, 1914/1961; Leray 1930; Fouche' 1959; Rialland 1986). Male'écot (1976: 99) confirms this tendency in his statistical analysis of a corpus of natural speech. He counted the percentage of schwa omission in clitics in utterance-initial position, that is in the context /C1=CnV.../. He obtained the numbers in (67). When the clitic corresponds to a fricative, schwa was not pronounced approximately half of the time, e.g. in je vais 'I go' /Ω=v´/.

By contrast stops and liquids in C1 triggered schwa insertion quite systematically, e.g. que ça 'only that' /k=sa/ or le bus 'the bus' /l=bys/.

I believe this explanation for the special status of fricatives in the distribution of schwa carries over to their privileged position cross-linguistically at word edges and cluster-externally. It applies most particularly to strident fricatives, which carry the strongest internal cues.
## 2.3.5 Similarity to Adjacent Consonants

### Generalization 4

Consonants that are relatively similar to a neighboring segment want to be adjacent to a vowel, and preferably followed by a vowel. The distribution of schwa is affected by contrast between adjacent consonants.

In a C₁C₂C₃ sequence, the presence of shared features between C₂ and its neighboring segments favors schwa insertion/retention. Alternatively, the presence of a contrast between a consonant and its neighboring segments favors schwa deletion/omission. This can be extended to contrast/similarity in manner of articulation, while place seems to play a marginal role, which I will not discuss.

Recall from the discussion of Hungarian that I adopt Clements’s (1990) major class features to classify consonants: [sonorant], [approximant], [vocoid]. We obtain the following feature matrix:

<table>
<thead>
<tr>
<th>Obstruents</th>
<th>Nasals</th>
<th>Liquids</th>
<th>Glides</th>
<th>Sonorant</th>
<th>Approximant</th>
<th>Vocoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>+</td>
</tr>
</tbody>
</table>

It appears that the major part of the work is accomplished by the feature [vocoid]. On the one hand, the presence of a contrast in this feature clearly facilitates the omission of schwa. On the other hand, schwa insertion/retention tends to occur when a consonant contrasts in the feature [vocoid] with the preceding segment.

**Contrast in [vocoid] and the Behavior of Schwa:**

A consonant that contrasts in the feature [vocoid] with the preceding segment is less likely to trigger schwa epenthesis/retention.

### Example (71)

**Contrast in [vocoid] and the Behavior of Schwa:**

A consonant that contrasts in the feature [vocoid] with the preceding segment is less likely to trigger schwa epenthesis/retention.

### Example (72)

**Contrast in [vocoid] and the Behavior of Schwa:**

A consonant that contrasts in the feature [vocoid] with the preceding segment is less likely to trigger schwa epenthesis/retention.

The data in (63) above and repeated here showed that in the context /CV₁C₂C₃V/, schwa is obligatorily retained if C₂ is preceded by a stop preceeded by a glide, and optionally retained if C₂ is preceded by a consonant.

### Example (73)

**Contrast in [vocoid] and the Behavior of Schwa:**

A consonant that contrasts in the feature [vocoid] with the preceding segment is less likely to trigger schwa epenthesis/retention.

### Example (74)

**Contrast in [vocoid] and the Behavior of Schwa:**

A consonant that contrasts in the feature [vocoid] with the preceding segment is less likely to trigger schwa epenthesis/retention.
Chapter 2: The French schwa

The French schwa is a vowel that appears in certain word positions. It is often the result of a consonant-vowel-consonant combination where the schwa is inserted between the consonants. This schwa is known as the schwa of the French language, and it is a critical aspect of pronunciation and intonation.

(73) STOPS PRECEDED BY A GLIDE IN /C1C2/C3/:

- **a.** [rdm] la pire demie /la=pir d œm/ [lapidœm] 'the worst half'
- **b.** [rdm] pour demander /pur d œmd/ [puridœmd] 'to request'

(63) STOPS PRECEDED BY A NON-GLIDE IN /C1C2/C3/:

- **a.** *[sdm] la douce demie /la=dus d œm/ [ladusdœm] 'the sweet half'
- **b.** *[mdm] la meme demande /la=m ma d œmd/ [lamಮdœmd] 'the same request'
- **c.** *[ldm] la seule demeure /la=sole d œsr/ [lasœldœsr] 'the only residence'

As is usually the case, the point is more difficult to illustrate at word boundaries, because schwa can be more freely omitted in this position than in any other. Yet one can feel that schwa is less likely to be inserted in the context if C1 is a glide. Compare the two examples in (74) which differ in the quality of C1: a glide in (74a) vs. a fricative in (74b). Schwa can be considered optional in both cases but the intuition is that it is more likely to appear in (74b).

(74) STOP PRECEDED BY A CONSONANT AT WORD BOUNDARIES

- **a.** [rdm] le garde mentait /l=gard må tœ/ [l gard(œ)m] 'the guard lied'
- **b.** [skm] le masque mentait /l=mask må tœ/ [l masœk(œ)m] 'the mask lied'

This intuition is supported by a study conducted by Dell (1977). Dell constructed a series of sentences containing sequences of the type /...C1C2/C3.../, with different combinations of C1 and C2 and in three different syntactic structures: adjective+noun (ex. modeste vendeur 'modest seller'), noun+adjective (ex. cordes vole es 'stolen ropes'), and subject+verb, as in (74). These sentences were presented to 11 speakers in a real dialogue so that the relevant portion of the sentences was uttered /r/ where they speak. The percentage of schwa omission was recorded. In all the sentences /C1=/r/ and /C2=/r/, as in (74), schwa omission was more acceptable, especially if C1 is a glide, however, schwa omission was less acceptable if C1 is an obstruent.

The frequency of schwa in various syntactic and segmental contexts is provided below:

<table>
<thead>
<tr>
<th>C1C2</th>
<th>Conjunctive</th>
<th>Non-Conjunctive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nom+Adj</td>
<td>Adj+Noun</td>
<td>Noun+Adj</td>
</tr>
<tr>
<td>0</td>
<td>31</td>
<td>15</td>
</tr>
<tr>
<td>1</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>6</td>
</tr>
</tbody>
</table>

The preceding section has shown that a consonant that contrasts in the feature [+vocoid] with a neighboring segment can more easily surface in this position without the support of an affix. This section is devoted to the position where the preceding segment can more easily surface in the word-final position. The preceding section has shown that a consonant that contrasts in the feature [+vocoid] with a neighboring segment is more likely to trigger schwa deletion.

(76) AGREEMENT IN [+VOCOID] AND THE BEHAVIOR OF SCHWA:

A consonant that agrees in the feature [+vocoid] with a neighboring segment wants to be adjacent to a vowel and is therefore more likely to trigger schwa deletion. This is expressed in (76), which follows from the generalization 4 given at the outset of this section.

(76) AGREEMENT IN [+VOCOID] AND THE BEHAVIOR OF SCHWA:

- **a.** [sdm] la douce demie /la=dus d œm/ [ladusdœm] 'the sweet half'
- **b.** [skm] le masque mentait /l=mask må tœ/ [l masœk(œ)m] 'the mask lied'

The preceding section has shown that a consonant that contrasts in the feature [+vocoid] with a neighboring segment is more likely to trigger schwa deletion.

(77) AGREEMENT IN [+VOCOID] AND THE BEHAVIOR OF SCHWA:

- **a.** [skm] le masque mentait /l=mask må tœ/ [l masœk(œ)m] 'the mask lied'
- **b.** [skm] le masque mentait /l=mask må tœ/ [l masœk(œ)m] 'the mask lied'

The preceding section has shown that a consonant that contrasts in the feature [+vocoid] with a neighboring segment is more likely to trigger schwa deletion.
Chapter 2: The French schwa

(27) SCHWA OBLIGATORY BEFORE 1ST/2ND PLURAL CONDITIONAL ENDINGS:

a. gaflterions 'spoil+COND.1PL' /gat+rjø~/ [gat rjø~]

b. fumeriez 'smoke+COND.2PL' /fym+rje/ [fym rje]

c. garderiez 'keep+COND.2PL' /gard+rje/ [gard rje]

The /r/ of the suffix is not prevocalic and is specified as [+vocoid]. So is the glide /j/.

Both consonants agree in [+vocoid] and therefore need to be adjacent to a vowel. /j/ necessarily meets this condition since it is followed by /e/ or /ø~/, but /r/ is the potentially offending segment. When the suffix comes after a consonant-final stem, /r/ is trapped between two consonants.

The constraint in (76) is also active at word boundaries, although in this context agreement in [+vocoid] only triggers schwa insertion optionally. The relevant context arises when a word starts with a sequence of consonants that agree in the feature [+approximant] rather than [+vocoid]. That is, it targeted not only glides but also liquids, namely /l/.

43 Historically, it seems that the constraint in (76) was more general and applied to sequences of consonants that agreed in the feature [+approximant] rather than [+vocoid]. That is, it targeted not only glides but also liquids, namely /l/.

So not only were sequences C+/r/+glide actively avoided by schwa insertion/retention, as in contemporary French, but also sequences C+/l/+glide. The constraint against such clusters prevented schwa deletion morpheme-internally in words like Richelieu (proper name) [riß ljØ] * [riß ljØ]. Since these internal schwas have stabilized and are obligatorily pronounced in modern French, I assume that they have been reanalyzed as stable vowels: /rißœljØ/. This is relevant in derivational paradigms (see note 4). For example, the word bourrelier 'harness-maker' [burœlje] * [burlje], with a stable [œ] which is the contemporary reflex of a historic schwa that did not delete to prevent a violation of the constraint against C+/l/+glide sequences.

Such sequences are no longer synchronically avoided in modern French. In contrast, with a stable [œ] which is the contemporary reflex of a historic schwa that did not delete to prevent a violation of the constraint against C+/l/+glide sequences.

In the discussion on the role of the SSF, I provided data on the dual of a word that the boundary is a diphthong or a vowel.

There is no suffix that starts with the sequence /l/+glide, so no direct comparison can be made with the data in (27). But C+/l/+glide sequences arise in 1st/2nd plural imperfect or subjunctive forms of verbs with a stem ending in a /rl/ sequence, e.g. parliez 'speak+'IMP/SUBJ.2PL' /parl+je/ [parlje]. Such forms freely surface with a C+/l/+glide sequence, which is not repaired by schwa insertion or glide vocalization, as the 1st/2nd plural conditional forms in (27) (see note 13 on glide vocalization in these forms).

Segments that agree in [+approximant] but not in [+vocoid] (e.g. /l/ and glides) are necessarily less similar than segments that share the specification [+vocoid]. There is no suffix that starts with the sequence /l/+glide+/, so no direct comparison can be made with the data in (27).

Inspection under (77) shows that words with a sequence of consonants that agree in [+approximant] and are not prevocalic are no longer synchronically avoided in contrast. Such sequences are no longer synchronically avoided.

Chapter 2: The French schwa
Chapter 2: The French schwa

2.3.6. PROSODIC BOUNDARIES

Generalization 5: Consonants that are not at the edge of a prosodic domain want to be adjacent to a vowel, and preferably followed by a vowel.

The distribution of schwa is sensitive to the strength of the prosodic boundary, if any, that is adjacent to the consonants that lack a flanking vowel. The higher the prosodic boundary, the higher the likelihood of schwa omission. This is summarized in (79).

(79) 

We have already seen several illustrations of the effect of the prosodic boundary on the behavior of schwa.

The prosodic hierarchy is summarized in (90).

We start with a small and a maximal phonological phrase (SPP, MPP). This is illustrated below with the sequence [mrj] in a 2nd plural conditional form (81a) and verb+object sequence (81b).

(81) 

Likewise, we have just seen in the previous section that C+/r/+glide sequences are banned across a PW-internal morpheme boundary (27b) but permitted in the phrasal domain (36a). That is, a phonological phrase can split between a Small and a Maximal Phonological Phrase (SPP, MPP). This is illustrated with the sequence [slj] in a 2nd plural conditional form (80a) and verb+object sequence (80b).

(80) 

Effect of a following PW boundary on the behavior of schwa:

a. [stm] 

justement

le justement

b. [rdr] 

la garderie

le garde rier

The phrase-initial position has been presented as a privileged one for the licencing of consonants. See the data in (24) and the discussion of phrase-initial extrasyllabicity in section 2.2.2.2.

(82) 

Effect of a preceding IP vs. PW boundary on the behavior of schwa:

a. [stm] 

une demande

b. [rdr] 

Anne, demande-la

The phrase-final position is less prone to the emergence of schwa.

Effect of a preceding PW boundary on the behavior of schwa:

a. [stm] 

justement

b. [rdr] 

la garderie
The three cases just presented involve a two-way contrast between internal and peripheral positions of some prosodic domain. This appears to be a simplification or an idealization of the facts. The details of the interaction between prosody and phonology can be found in Dell (1977) study on the frequency of schwa insertion in different segmental and syntactic contexts, cited in section 2.3.5.1. Recall that Dell (1977) compares the frequency of schwa insertion in adjective+noun, noun+adjective, and subject+verb sequences of the form /C1C2C3/. He found that, for any given cluster, vowel insertion is most frequent in adjective+noun sequences, less frequent in noun+adjective ones, and least likely in subject+verb structures.

Recall that schwa omission is optional in all these cases, but its likelihood correlates with the strength of the adjacent boundary. This generalization extends to both lower and higher prosodic boundaries. If C2 is followed by no (relevant) prosodic boundary, e.g. at a word-internal morpheme juncture, schwa epenthesis is more likely than in adj+noun sequences; it is even often obligatory. At the other end of the hierarchy, we can have C2 followed by a stronger IP boundary. IP boundaries are found, for example, between dislocated elements and the rest of the sentence. The effect of the following boundary on the behavior of schwa is shown in (84).

The same hierarchy can be established for preceding rather than following boundaries. Holding the segmental context to /ktf/, we can have /t/ preceded by an increasingly stronger prosodic boundary. The effect of the following boundary on the behavior of schwa is shown in (83).

### (83) Effect of the Following Boundary on the Behavior of Schwa:

<table>
<thead>
<tr>
<th>C2</th>
<th>Behavior</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>^</td>
<td>Required</td>
<td>tu fais que te moucher</td>
</tr>
<tr>
<td>PW</td>
<td>Easily tolerated</td>
<td>infecte manteau</td>
</tr>
<tr>
<td>SPP</td>
<td>More easily tolerated</td>
<td>insecte marron</td>
</tr>
<tr>
<td>MPP</td>
<td>Least likely</td>
<td>l'insecte mangeait</td>
</tr>
<tr>
<td>IP</td>
<td>Illegal</td>
<td>l'insecte, mets-le là</td>
</tr>
</tbody>
</table>

### (84) Effect of the Preceding Boundary on the Behavior of Schwa:

<table>
<thead>
<tr>
<th>C2</th>
<th>Behavior</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>^</td>
<td>Required</td>
<td>tu fais que te faire mal</td>
</tr>
<tr>
<td>PW</td>
<td>Easily tolerated</td>
<td>Jean-Luc te fait mal</td>
</tr>
<tr>
<td>SPP</td>
<td>More easily tolerated</td>
<td>Jean-Luc, te fais pas mal!</td>
</tr>
<tr>
<td>MPP</td>
<td>Least likely</td>
<td>l'insecte mangeait</td>
</tr>
<tr>
<td>IP</td>
<td>Illegal</td>
<td>l'insecte, mets-le là</td>
</tr>
</tbody>
</table>

Correlations with the strength of the adjacent boundary are searched and found in all these cases. The phenomenon occurs in various positions of the prosodic structure, and the results of the experiment. The frequency of schwa omission is affected by the following boundary, which is more likely to be omitted when the preceding consonant is adjacent to a stronger boundary.

Recall that DDL (1977) correlates the frequency of schwa insertion in different prosodic and syntactic contexts, cited in section 2.3.1. The main issue is whether or not schwa insertion is a two-way contrast between internal and peripheral positions of some prosodic domain.

The three cases just presented involve a two-way contrast between internal and peripheral positions of some prosodic domain.
Chapter 2: The French schwa

2.4 Conclusions

The French schwa illustrates forcefully the shortcomings of the syllabic approach. The distribution of schwa is subject to an extremely complex interaction of factors, and the syllable seems unable to provide meaningful explanations of phenomena such as the distribution of schwa. As for stops, the effect of the compensatory lengthening of the following vowel results in the补偿atory lengthening of the following vowel. In the case of schwa, as well as for the internal variability of the process, the compensatory lengthening of the following vowel results in the compensation of the lack of a complementary effect on the height of schwa. In the case of schwa, the more such phenomena are present, the less predictable schwa insertion/reduction is. The compensatory lengthening of the following vowel is subject to a complicated effect on the height of schwa, which is accounted for in the dissertation, so I do not undertake here a complete formal account of the French schwa, which I leave for future work.