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Link to this article: http://journals.cambridge.org/abstract_S0959269513000173

How to cite this article:
JULIEN EYCHENNE (2014). Schwa and the *loi de position* in Southern French .
Journal of French Language Studies, 24, pp 223-253 doi:10.1017/
S0959269513000173

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Schwa and the loi de position *in Southern French*

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ABSTRACT

This paper investigates the alternation of mid-open and mid-close vowels in southern French, a pattern known as the *loi de position*, and its relation to schwa. I offer a critical survey of the main analyses that have been put forward in the literature, showing how different conceptions of schwa influence the interpretation of the *loi de position*. I demonstrate that even in varieties where the pattern is considered fully productive, there are a number of exceptional cases that lend themselves to a usage-based approach. I develop an analysis of the phenomenon in the framework of Cognitive Grammar: the *loi de position* is formalized as the result of the interplay between substantive and symbolic constructions which emerge through usage.

1 INTRODUCTION

This article investigates the alternation of mid-open and mid-close vowels in southern French, a pattern known as the *loi de position*, and its relation to schwa.[1] I offer a critical survey of the main analyses that have been put forward in the literature, showing how different conceptions of schwa influence the interpretation of the *loi de position*. I demonstrate that even in varieties where the pattern is considered fully productive, there exist a number of exceptional cases that call for a usage-based analysis. I develop an analysis of the phenomenon in the framework of Cognitive Grammar, based on work by Ronald Langacker (1987a, b) and George Lakoff (1993): the *loi de position* is formalized as the result of the interplay between substantive and symbolic constructions which emerge through usage.

The article is organized as follows: section 2 gives an overview of the *loi de position*; section 3 discusses the most important analyses that have been put forward; section 4 describes a number of genuine exceptions to the pattern and shows that they call for a usage-based approach; section 5 introduces the framework of Cognitive Grammar; section 6 provides an analysis in this framework.

2 OVERVIEW OF THE *LOI DE POSITION*

2.1 The vowel system of southern French

The vocalic system of southern French contains 11 surface oral vowels and four nasal vowels.[2] Temporarily leaving aside schwa, the surface oral vowels are [i y u e ø o ɛ œ ɔ a]. While standard French has phonological oppositions among the mid vowels /e, ɛ, o, ɔ, ø, œ/ (see for instance Tranel 1987 and Walker 2001) we find no such contrast in southern French. The pairs in (1), which are minimal in standard French, are thus homophonous in southern French:

(1)   Lack of contrast among mid vowels in southern French

épée	'sword'	∼	*épais*	'thick'	[epe]
jeûne	'fasting'	∼	*jeune*	'young'	[ʒœnə]
beauté	'beauty'	∼	*botter*	'to kick'	[bote]

The vowel referred to as 'schwa', which is usually written *e* (e.g. *salle* 'room'), is usually transcribed as a central vowel [ə]. As we shall see, this is indeed one common realization but by no means the only one. Because not all authors agree on the nature of this segment, my definition will rest on two phonological criteria which I consider fairly uncontroversial, and which I shall refer to as the narrow definition of schwa:

(2)   Narrow definition of schwa in southern French:

   a.   deletion condition: schwa is systematically deleted when it precedes a vowel.
   b.   stresslessness condition: schwa never bears stress.

These two criteria are necessary conditions that have to be met whenever they are applicable. For instance, the final vowel of *bête* 'stupid' is deleted in *bête et méchant* [bɛtemeʃaᴺ] 'stupid and mean', according to (2a), but is (usually) realized in other contexts, in which case it is stressless (['bɛ.tə]), as required by (2b). We will discuss the status of schwa in more detail in section 3.

The status of nasal vowels is somewhat controversial. These vowels are realized as a vowel with varying degrees of nasalization followed by a nasal appendix which is more or less prominent and typically realized in the velar region.[3] At the phonological level, there is evidence that they should be analyzed as /VN/

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[2]   The data discussed in this article, except where indicated otherwise, comes from field notes taken between 2003 and 2008 (mostly in Midi-Pyrénées, but also in the surroundings of Nîmes and Marseilles). I have also made use of the database of the project 'Phonologie du français contemporain: usages, variétés, structure' (PFC, see Durand *et al.* 2002, 2005 and www.projet-pfc.net), which offers transcribed and aligned recordings of contemporary French. Specifically, I used four survey points: one in Aquitaine (Biarritz/Bayonne), one in Languedoc (Douzens, a rural village), one in Haute-Garonne (Toulouse) and one in Provence (Marseilles). All these varieties share the core pattern of the *loi de position* that is discussed here, which is also that of the author.

[3]   Throughout this article, I use a superscript ᴺ to represent the nasal appendix in southern French. The precise realization of nasal vowels is not important for our purposes.

and not as /Ṽ/ (Durand 1988, Eychenne 2006: 115–119). Their distribution is as follows: /ɛᴺ œᴺ ɔᴺ aᴺ/. The front unrounded mid vowel is usually pronounced [ɛᴺ], but it is realized [eᴺ] by some speakers, especially older ones.

2.2 *Mid vowel alternations*

The distribution of mid (oral) vowels is governed by the *loi de position*, which can be stated as follows:

(3)   The *loi de position* (southern French): a mid vowel is

   a.   close in an open syllable
   b.   open in a closed syllable or in an open syllable followed by a schwa-headed syllable (after Rizzolo, 2002: 11, translation mine)

Examples in (4) illustrate this pattern in open syllables (4a), closed syllables (4b), and open syllables followed by schwa (4c) respectively.

(4)   Illustration of the *loi de position*

a.	*sait*	[se]	'knows'
	ceux	[sø]	'those' (pronoun)
	saut	[so]	'jump' (noun)
b.	*sel*	[sɛl]	'salt'
	sol	[sɔl]	'ground'
	seul	[sœl]	'alone' (masc.)
c.	*selle*	[sɛlə]	'saddle'
	seule	[sœlə]	'alone' (fem.)
	sole	[sɔlə]	'sole' (fish)

Since there is no contrast between mid vowel pairs, it is common practice to represent them as /E, Œ, O/ at the phonological level for [e] ∼ [ɛ], [ø] ∼ [œ] and [o] ∼ [ɔ] respectively. These phonological vowels can be understood as underspecified vowels (Durand 1995, Watbled 1995). For instance, the word *net* 'neat', which is pronounced [nɛt], will be represented as /nEt/ at the phonological level.

Within the generative tradition, most work on the *loi de position* has focused on reducing and explaining the disjunctive context of (3b) (see Durand, 1976; 1995 in Dependency Phonology, Rizzolo, 2002 in Government Phonology, Turcsan, 2005 in Head-Driven Phonology and Eychenne, 2006 in Optimality Theory (OT) for different theoretical proposals).

2.3 *Domain of application of the* loi de position *in southern French*

Since Durand (1976), it is generally accepted that the domain of mid vowel adjustment is the foot. According to Durand's analysis, which was framed in Dependency Phonology (Anderson and Ewen, 1987), all vowels but schwa project a foot, whereas a schwa-headed syllable is adjoined to a syllable on its left to form

a trochee[4]. This approach captures the fact that stress always falls on the last syllable except if it is schwa-headed: it suffices to say that stress falls on the head syllable of the last foot.

Importantly, foot formation in French is limited to the domain of the prosodic word (see the discussion of the lexical foot in Durand, 1986a). As a result, the *loi de position* cannot apply across prosodic words. The French prosodic word corresponds to a base + suffix(es) or to a prefix. By way of example, consider the examples in (5), where vowel-initial suffixes cause the final consonant of the base to be syllabified as the onset of the suffix, yielding a mid-close vowel in the base.

(5)   Vowel adjustment in derived words (base + suffix)

bête	[bɛ.tə]	'silly'	∼	*bêtise*	[be.ti.zə]	'silliness'
meule	[mœ.lə]	'grindstone'	∼	*meulage*	[mø.la.ʒə]	'grinding'
botte	[bɔ.tə]	'boot'	∼	*botter*	[bo.te]	'to kick'

Sequences formed by a prefix + base, however, do not display this behaviour. This can be clearly seen in tautomorphemic /sC/ clusters, where /s/ is usually syllabified as a coda and triggers mid-vowel lowering (e.g. *despote* [dɛspɔtə] 'despot' or *hospice* [ɔspisə] 'almshouse'). Yet, when /s/ and the preceding vowel are heteromorphemic, as in (6), mid vowel lowering does not apply:

(6)   Lack of mid vowel adjustment in prefixes (after Durand 1990: 26)

déstabiliser	[destabilize]	'to destabilize'
préscolaire	[preskolɛrə]	'preschool'
prostalinien	[prostalinjɛ^N]	'pro-Stalinist'

This pattern suggests that the prefix constitutes an independent prosodic domain, which is independently supported by other phonological processes such as glide formation: in most varieties of French, morpheme-final high vowels become a glide after a vowel if they are followed by a suffix (*mendie* [mɑ̃di] ∼ *mendier* [mɑ̃dje] 'to beg'), but not if they are followed by a word (*parti avant* *[partjavɑ̃] 'left before') or belong to a late-attaching prefix (*anti-atomique* *[ɑ̃tjatomikə] 'anti-atomic') (see Basbøll 1978; Hannahs 1995: 28–32).

2.4 Clitics

It is a well-known fact of French phonology that the CV words *je, me, te, ce, que, le* and *ne* are prosodic clitics: they are prosodically bound to the following word and cannot ordinarily bear stress,[5] and cannot be left-dislocated (cf. *ça, c'est bien* and not **ce, c'est bien* 'THAT is good'). In southern French, the vowel in these clitics,

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[4] Selkirk (1978) independently developed a similar analysis of footing in standard French.
[5] There are a few exceptions such as postclitic *le* in imperatives (e.g. *fais-le !* [fe.ˈlø] 'do it!') and conventionalized expressions (e.g. *sur ce* [syχ.ˈsø] 'that being said', *je, soussigné* [ˈʒø//susinje] 'I, the undersigned').
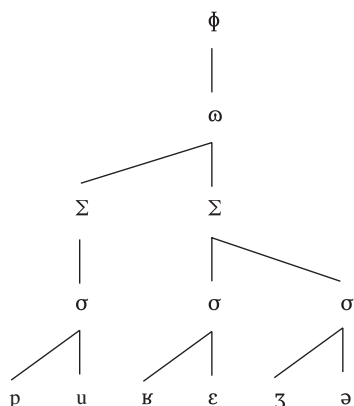
Figure 1. *Prosodic representation of* pourrais–je

which corresponds to *e* in the spelling, is realized phonetically as [ø] in proclitic position (e.g. *je crois* [ʒøkχwa] 'I believe').[6] There is nevertheless evidence that these vowels are bona fide schwas from a phonological point of view. First, their vowel is categorically deleted before another vowel, as reflected by the apostrophe in the spelling (*j'attends* [ʒataᴺ] 'I am waiting'). Secondly, they do not attract stress in postclitic position: *suis-je* [ˈsɥi.ʒə] 'am I', *vais-je* [ˈvɛ.ʒə] 'am I going (to)'. The latter example also shows that the postclitic triggers the lowering of the preceding vowel (Durand 1995: 42), which indicates that it is integrated into the verb's prosodic word, like a regular suffix. In postclitics, too, the vowel is deleted if another vowel follows (*puis-je avoir* [pɥiʒavwaχ] 'may I have'). Since they satisfy both the deletion and stresslessness criteria, these vowels correspond to the narrow definition of schwa given in (2).

Figure 1 shows the prosodic structure of *pourrais-je* ('may I') where schwa is in a foot dependent (postclitic) position, while Figure 2 illustrates *je pourrais* ('I could') where schwa is the head of a unary foot (proclitic). The realization [ø] is compulsory in the latter position in all southern accents I am familiar with. I cannot offer a full account of CV clitics in southern French, but these have been discussed in some detail in Eychenne (2006: 255–259). What is important for the present discussion is that their behaviour illustrates the fact that schwa in southern French is not solely a phonetic central vowel (that is [ə]) but a phonological construct that is involved in complex patterns. This fact must be born in mind as we move on to discussing the *loi de position* in more depth.

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[6] Pairs such as *ce ∼ ceux, je ∼ jeu, ne ∼ nœud, que ∼ queue* are therefore homophonous in southern French.

$$\phi$$

(tree diagram with nodes:)

ω

Σ   Σ   Σ
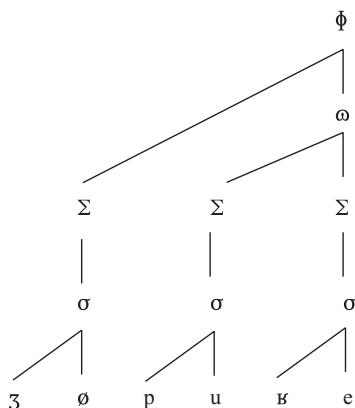
σ   σ   σ

ʒ   ø   p   u   ʁ   e

Figure 2. *Prosodic representation of* je pourrais

3 PREVIOUS ANALYSES

In this section, I discuss three accounts of the *loi de position* which can be considered representative and authoritative. We will see that these authors differ in the properties they attribute to schwa and in its relation to mid-vowel adjustment.

3.1 Durand's Analysis

The first approach that needs to be discussed has been advocated by Durand and his colleagues (see in particular Durand *et al.* 1987; Durand 1995). This line of thinking I shall call the prosodic view for it assumes a straightforward correlation between the melodic content of vowels and prosodic structure, as summarized in (7). This pattern is assumed to be fully productive in synchrony; as a consequence, the *loi de position* is considered exceptionless.

(7)   The Prosodic Hypothesis:

Full vowels access prosodically strong positions (i.e. head of a foot), whereas weak vowels (schwas) are limited to prosodically weak positions (i.e. dependent position in a trochee).

Let us flesh out this approach in more detail. The narrow definition of schwa given in (2) is only relevant when schwa is morpheme-final, since the deletion condition requires that schwa delete when it precedes a vowel, which only happens in sandhi contexts. Besides the criteria in (2), Durand (1995) recognizes two additional criteria that according to him identify a schwa in southern French. First of all, schwa is phonetically variable: while it can be realized as a genuine central vowel (e.g. *pâte* [ˈpa.tə] 'pasta'), it displays a range of phonetic values. In word-final position, it is often realized as an Œ-like vowel (e.g. [ˈpa.tø] or [ˈpa.tœ]), and it is not uncommon to hear realizations like [e] or [ʌ], especially among

older speakers (Séguy 1951: 28; Durand 1995: 41); in word-internal position, it is frequently realized [ø],[7] as in *bêtement* [bɛtømaᴺ] 'stupidly' (see Rochet 1980: 92). Secondly, as we have seen, schwa triggers the lowering of a preceding mid-vowel. I shall refer to this criterion set as the extended definition of schwa:

(8) Extended definition of schwa in southern French:
   a. deletion condition: schwa is deleted before a vowel.
   b. stresslessness condition: schwa is stressless.
   c. realization condition: schwa is phonetically variable.
   d. mid-vowel lowering condition: schwa triggers the lowering of a preceding mid vowel within its domain.
   (adapted from Durand 1995: 40–42)

In a morphologically complex word like *salement* 'dirtily', a schwa can be postulated even though it may not be realized as [ə], because it is present in the non-derived form (*sale* ['salə] ∼ ['salœ] 'dirty') where it can be deleted (*salir* [salir] 'to sully') and does not attract stress. In the medial syllable of monomorphemic words (e.g. *céleri* 'celery', *médecin* 'doctor'), however, the narrow definition of schwa cannot be appealed to. In such cases, the other two criteria can help determine whether a vowel is a schwa or not. Let us consider the word *écrevisse*, which some speakers pronounce [ɛkrəvisə]: according to Durand *et al.* (1987), the *e* in the spelling corresponds to a schwa since it triggers the lowering of the preceding vowel. By contrast, in the word *céleri*, when pronounced as [seløri], the vowel corresponding to *e* in the spelling does not trigger the lowering of the preceding vowel and is realized as a stable [ø]: the authors argue that in this case, the phonological vowel is not a schwa but a stable /Œ/. According to this analysis, mid-vowel lowering plays a critical role in identifying a schwa, and while it is not a necessary condition, it is a sufficient one in environments where it applies.

As we can see, the prosodic approach adopts a definition of schwa which is purely phonological and that is not based on the orthography. There is, however, an apparent circularity: the definition of schwa crucially relies on the definition of the *loi de position* (as given in (3)), which in turn relies on that of schwa (as given in (8)). In fact, this analysis relies on an assumption which, to the best of my knowledge, has never been made explicit: schwa is assumed to display 'free' variation (e.g. *écrevisse* can equally be realized [ɛkχəvisə] or [ɛkχøvisə]), whereas /Œ/ is not: the distribution of its allophones [ø] and [œ] is strictly governed by the *loi de position*. As we have seen, schwa is syllabified in the weak position of a trochee while full vowels project their own foot. This means that [ɛkχəvisə] is actually pronounced [ˌɛ.kχə.ˈvi.sə] (or [ˌɛ.kχø.ˈvi.sə]), where the first vowel bears a secondary stress, whereas [seløʁi] is [se.lø.ˈʁi] with no secondary prominence. I will refer to this putative asymmetric behaviour as the Asymmetry Hypothesis:

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[7] This is also the realization of *e* in the initial syllable of polysyllabic words, as in *menu* [mØny] 'menu'. Durand *et al.* (1987) argue that the vowel in this case is not a schwa but a stable /Œ/.

(9)   The Asymmetry Hypothesis:

/ə/ can be realized as an Œ-like vowel but /Œ/ cannot be realized as [ə].

This hypothesis makes a noteworthy prediction: forms like [seləʁi], where a phonetic central vowel follows a mid-close vowel, should not occur. Of course, nothing prevents a speaker from having a schwa in *céleri* (and indeed many do), but in that case the preceding vowel must be mid-open, yielding [sɛləʁi]. (Conversely, a speaker may have a stable /Œ/ in *écrevisse* and pronounce it [ekχøvisə].)

Under this hypothesis, the chicken-and-egg problem that has been mentioned above becomes less problematic provided that /ə/ is the actual representation of schwa. This is quite plausible since [ə] is one of the allophones of 'schwa' and it is well attested cross-linguistically that this vowel tends to be limited to prosodically weak positions (van Oostendorp 2000). It nevertheless raises an important challenge from a learnability perspective: since schwa can be 'coloured' (say as [ø]) at the surface level, as in /Ekʁavisə/ realized [ɛkχøvisə], the *loi de position* is fundamentally opaque.[8] From a derivational standpoint, we can say that foot formation must precede schwa colouration. Were schwa colouration to apply before footing (creating an intermediate representation /EkʁŒvisə/), the output of the derivation would be *[ekχøvisə], meaning that the opposition between /ə/ and /Œ/ would be in absolute neutralization.[9] Schwa colouration counterbleeds trochee formation: trochee formation is not surface-apparent and seems to have over-applied. At the same time, schwa colouration counterfeeds unary foot formation: unary foot formation is not surface-true because there are instances of a full vowel that do not project a foot, for instance the [œ] in ['bɛ.tœ] (unary foot formation seems to have under-applied). The reason why the *loi de position* displays features of both counterbleeding and counterfeeding opacity is because, in derivational theory, it involves footing which is an iterative process that needs several rules to be expressed (see for instance Selkirk's 1978 analysis), each of which can interact with other rules. In section 6.2, we will see that this opacity can be formalized as a mismatch between levels of schematicity.

One challenge faced by the prosodic analysis is that criterion (8d) cannot be appealed to in the medial position of monomorphemic polysyllables where a putative schwa is not preceded by a mid vowel, e.g. *patelin* 'village (familiar)' and *matelot* 'sailor'. In such words, the only criteria that can be used are stresslessness (if the vowel is a schwa, it must be able to surface as the weak position of a trochee) and realization (the vowel must be able to surface as a genuine central vowel). In my own system, which is very close to that described by Durand and his colleagues, *patelin* is always realized [patøleN] and cannot be pronounced *[patəleN] with a central vowel, in accordance with the Asymmetry Hypothesis. In any case, the vowel is

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[8] See McCarthy (2007) for a thorough discussion of phonological opacity.

[9] For example, pâte 'dough' /patə/ and pâteux /patŒ/ 'doughy' would both be realized as [pa.ˈtø].

no different from that of *pharmaceutique* [faʁmasøtikə] 'pharmaceutical'.[10] It is an empirical question to determine whether, and to what extent, the Asymmetry Hypothesis holds across southern French varieties. It is to be hoped that further studies exploring both the phonological and fine-grained phonetic properties of schwa will shed some light on this problem, but I shall leave this issue open here.

3.2 Watbled's analysis

Watbled (1995) has put forward an analysis of schwa and of the *loi de position* which, in several respects, builds upon the prosodic analysis developed by Durand. Watbled observes, in the variety of French spoken in Marseilles and its surroundings, that borrowings from Provençal (a local/regional language) are typically pronounced with a paroxytonic stress pattern, as in (10). In that case, the vowel is mid-open.

(10)   Borrowings from Provençal

aiòli	'garlic mayonnaise'	[a.ˈjɔ.li]
fadòli	'crazy person'	[fa.ˈdɔ.li]
gòbi	'a species of fish'	[ˈgɔ.bi]
mèfi	'beware'	[ˈmɛ.fi]

This fact provides an insight about the *loi de position* that is independent of schwa and suggests that mid-vowel lowering is not triggered by schwa, but rather by prosodic structure. A mid vowel is low when it is the head of a trochee, whatever the dependent vowel is.

Since the quality of mid vowels can be read off prosodic structure, Watbled argues that one needs not postulate a schwa in southern French. We have seen that schwa is often realized as an Œ-like vowel (e.g. *bêtement* [bɛtømaᴺ]). Since /Œ/ is a vowel of the inventory of this variety, and since one needs to encode prosodic structure lexically to account for forms like [a.ˈjɔ.li] anyway, it is possible to rid the phonological inventory of schwa and to account for it by a difference in prosodic structure: 'schwas' would actually be instances of /Œ/ that appear in the dependent position of a trochee[11]. This difference is illustrated in Figure 3,[12] with the 'minimal pair' *heureux* [ø.ˈrø] 'happy' vs *heure* [ˈœ.rœ] 'hour'. In the case of *heureux*, both vowels are the head of a unary foot, and are thus pronounced as mid-close vowels, as predicted by the *loi de position* (as defined in (3)). In *heure*, however, the first vowel is mid-open because it is in the head of a trochee, whereas the final vowel's quality is due to the fact that it is in the dependent position of a trochee. Watbled furthermore argues that whenever /Œ/ is realized as a central

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[10] Interestingly, Martinet (1969: 216) reports that some southerners living in Paris over-apply the process of 'schwa' deletion to stable vowels in forms like *pharmace͟utique* and *à de͟ux mains*.

[11] See also Martinet (1969: 211) for a suggestion similar in spirit.

[12] For the sake of clarity, I have recast Watbled's analysis, which uses an X-bar-like prosodic structure, into the more familiar framework of prosodic phonology.
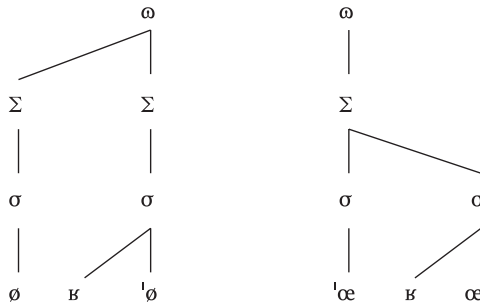
Figure 3. *Prosodic representation of* heureux *vs* heure *according to Watbled's analysis*

vowel (as in *heure* [ˈœ.rə]), the phenomenon should be understood as the reduction of a full vowel in a prosodically weak position, a phenomenon which is well attested cross-linguistically.

Although Watbled does not discuss explicitly why such an analysis is preferable to an analysis that recognizes an underlying schwa (*à la* Durand), one must acknowledge that it removes a lot of opacity from the phonology of southern French. As we have seen, very little distinguishes schwa and /Œ/ in medial position of monomorphemic polysyllables such as *céleri*. Watbled's analysis makes the system overall more transparent by positing only one vowel, whose prosodic structure is lexically encoded. A plausible scenario would be that if there ever were a genuine schwa in this variety, the vowel was too opaque and eventually got merged with /Œ/.

This analysis nevertheless faces a number of challenges. First of all, it must be noted that the stressed vowel in Provençal borrowings is already mid-open: the vowel [o] is absent in Provençal, which only has /u/ and /ɔ/, and even though there is a contrast between /e/ and /ɛ/ (e.g. *metre* /metre/ 'to put' vs *mètre* /mɛtre/ 'metre', *peu* /peu/ 'hair' vs *pèu* /pɛu/ 'skin', see Martin *et al.*, 1998: 18), the few paroxytonic borrowings with a front mid vowel that I am aware of (*mèfi*, *balèti* 'village dance') already have an [ɛ] in Provençal. This shows that the argument from Provençal is somewhat inconclusive as it might well be the case that speakers simply adopted these borrowings as unassimilated forms, in which case the mid-open vowel would not be caused by an active process of French.

More importantly, even though it could be the case that paroxytonic borrowings are subject to mid-vowel lowering, there is a clear asymmetry between native and borrowed paroxytons: while the latter tend to be regularized as oxytons, or at least have an oxytonic variant (*aïoli* [a.jo.ˈli], *gòbi* [go.ˈbi]), the former never do so: *[ba.ˈlø] is not a grammatical variant of *balle* 'ball', because stress *must* fall on the penultimate syllable. This fact is difficult to explain since in both classes there is, according to this view, a full vowel whose prosodic structure is lexically determined. It is not clear whether the few minimal pairs such *heure* ~ *heureux*, *houle* ~ *houleux*

could explain this resistance to regularization. If the final vowel of words like *heure* is a schwa, however, the fact that it cannot be stressed is hardly surprising, as we have already seen. Another difference between native and borrowed paroxytons is that in the former the final vowel is obligatorily deleted before another vowel (e.g. *ce globe est gros* [sØglɔbegʁo] 'this globe is big') whereas in the latter it cannot (e.g. *ce gòbi est gros* [sØgɔbiegʁo] 'this gòbi is big'). Everything being equal elsewhere, we would expect exactly the opposite pattern since high vowels are phonetically less marked than front rounded mid vowels (the assumed underlying representation of schwa) and are more easily subject to weakening (e.g. gliding). Here again, if the final vowel of words like *heure* is a schwa, this asymmetry poses no problem at all since schwa is usually considered the weakest vowel and is usually assumed to be featureless (Crosswhite 2001: 22) or articulatorily 'targetless' (Browman and Goldstein 1992).

Another problem that this approach faces is the variety of realizations of schwa (see 8c). It is not the case that the only phonetic qualities of this vowel are [Ø], [œ] and [ə]. As mentioned above, other qualities such as [e] and [ʌ] have been reported. The key point here is that variation is not limited to inter-speaker variation, but is also found within individual speakers' systems. For instance, in my own system, schwa in word-final position can harmonize in casual speech with a preceding low vowel: *pâte* ['pa.ɐ] 'pasta', *chasse* ['ʃasɐ] 'flush'. Yet this low realization of schwa is not found with high vowels: *mite* *['mi.ɐ] 'clothes moth', *flûte* *['fly.ɐ] 'flute', *soute* *['su.ɐ] 'boat hold'. It is not clear why an underlying /Œ/ would harmonize in such a way with a preceding low vowel. However, phonetic research has shown that [ə] is often the target of such coarticulatory effects (Flemming 2010).

Last but not least, it is worth mentioning that the status of clitics (*je, me*, etc.) is not entirely clear in this framework. According to Watbled, 'some occurrences of /Œ/ are "strong" (within the domain of [the foot]); that is, they are not governed by the preceding nucleus. . . Other occurrences of /Œ/, in non-initial syllables, are "weak", that is, they are governed by the preceding nucleus' (1995: 194). In other words, all /Œ/'s that appear in the head position of foot (whether it is a trochee or a unary foot) are 'strong' (e.g. *pleurer* 'to cry', *seule* 'alone (fem.)'), whereas /Œ/'s that appear in the dependent syllable of a trochee are weak (e.g. *seule*). The behaviour of clitics, as discussed in 2.4, thus seems difficult to explain. When they are proclitic, they cannot be weak in Watbled's sense because they would trigger the lowering of a preceding vowel (e.g. *mais je dis* *[mɛʒədi] 'but I say'). When they are postclitic, however, they do behave as weak since they trigger mid vowel lowering and do not attract stress (cf. *pourrais-je* [puʁɛʒə]). Such differences cannot be accounted for if prosodic structure is purely lexical, as we would expect clitics to behave consistently in both positions, being either strong or weak. One could of course postulate a stronger domain boundary in *mais#je dis* than in *pourrais+je*, but it is not clear that this would be sufficient: if proclitics are stray syllables, one would expect them to be able to reduce to a phonetic schwa (e.g. *je dis* [ʒØdi], not *[ʒədi]); if, on the other hand, the asymmetry between proclitics and postclitics is caused by prosody alone, it is not clear why clitics other than *je* and *ce* fail to

attach to the previous syllable (compare *serait-ce* 'would it be' [sø.ˈrɛ.sə] *vs serais-tu* 'would you be' [sø.re.ˈty]). In addition, as far as I can tell, it is difficult to explain the asymmetry between pairs such as *je* 'I' (a clitic) and *jeu* 'game' (a lexical word). Both words are pronounced [ʒø] before a consonant, but *jeu* always retains its vowel before another vowel whereas *je* loses it in the same context[13], as shown in (11):

(11) *le jeu arrive demain* [løʒøarivədømɛ^N] 'the game will be delivered tomorrow'
        j'arrive demain   [ʒarivədømɛ^N]   'I'll arrive tomorrow'

All the problems we have discussed vanish if one recognizes that there exists a schwa that is different from /Œ/. Except in the very specific case of prosodically unassimilated Provençal borrowings, the suprasegmental structure of southern French can be fully predicted from segmental information alone. It is however critical that schwa be properly defined, as will be shown in the next subsection.

3.3 Moreux' Analysis

Durand's and Watbled's approaches, despite their differences, have in common that they are strictly phonological and do not resort to orthography. The properties of schwa are determined solely on the basis of the sound patterns in which it is involved. But not all authors adopt such an attitude, and schwa is often understood by implicit reference to standard French (where its core property is that it can be deleted, see Dell 1985[14]), and ultimately to the spelling.

In his study of the *loi de position* in Béarn, Moreux (1985a: 65–66) offers a detailed discussion of the underlying status of schwa and of mid vowels. It must first be emphasized that there are significant differences between the Béarn variety he describes and the Languedoc variety analysed by Durand; as a matter of fact, the *loi de position* is much less absolute in the former. For instance, some speakers have an opposition between /e/ and /ɛ/ word-finally (*été* [ete] 'been' vs *était* [etɛ] 'was' (3rd sing.)). This indicates that at least for [e] and [ɛ], there cannot be a common underlying vowel for those speakers. Moreux proposes that the *loi de position* is actually a process which raises a mid-open vowel in a light foot (or open foot in his terminology). For instance, the underlying form of *bêtise* would be /bɛtizə/ and the /ɛ/ would be raised to a mid-closed vowel in the initial light foot, giving the surface form [be.ti.zə]. Diachronically, this can also explain the ongoing merger of the opposition /e/ vs /ɛ/ in this accent, since the final vowel of /etɛ/ matches the structural description of the *loi de position*. Interestingly, this

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[13] A reviewer points out that that such asymmetries can be found in a pair like *tu* and *tutu*: /y/ can be deleted in *tu* in popular French (e.g. *t'avais*) but cannot in *tutu* (e.g. *le tutu avait*). One could plausibly posit a similar idiosyncratic behaviour for *jeu*. I believe that the two phenomena are distinct. *Je* is not an isolated case (see footnote 5), so this alternation with zero is a generalization that holds true of all clitics that end in *e*.

[14] Dell's classical analysis assumes that schwa is underlying. For an alternative analysis, see Côté (2000), Côté and Morrison (2007).

approach straightforwardly accounts for words like *écrevisse* and *céleri*. In his survey, *écrevisse* has an initial [e] whereas *céleri* has [ɛ] (note that this is the mirror image of what is found in Durand *et al.* 1987). He suggests that *écrevisse* has the underlying representation /ekrəvisə/: since the *loi de position* is a rule closing a mid-open vowel in a light foot, /ekrəvisə/ is not subject to this rule and is realized [ekrəvisə]. In other words, we can say that what appears to be an exception to the *loi de position* (a closed vowel in an open syllable followed by a schwa-headed syllable) is not an exception at all because the *loi de position* is only a rule of vowel raising.

This analysis relies on the implicit assumption that the second vowel in *écrevisse* or *céleri* is indeed a schwa. While Moreux does mention that the realization of schwa is variable (1985a: 55), all his transcriptions use the phonetic symbol [ə] and he does not address the problem of the phonetic quality of this vowel. If the *e* in *écrevisse* corresponds to a genuine central vowel, this is evidence that the Asymmetry Hypothesis does not hold in this accent, which in itself would be an important finding. However, Moreux does not spell out explicitly the properties of schwa, and instead relies on the spelling. By way of example, he states that word-internal /ə/ is shorter in duration than other vowels in this position in measurements he made for three young speakers, but he does not distinguish morpheme-final (as in *bêtement*) from morpheme-internal (as in *céleri*) 'schwas'. Interestingly, the difference he measured is not significant for one of the three speakers (1985a: 131, note 4). It is thus difficult to draw any clear-cut conclusion from those measurements. In addition, Moreux (1985b: 105) cites the variety described by Durand (1976) as displaying a categorical *loi de position* except in words like *céleri*, where /E/ is closed, but Durand's position is precisely that such cases are not exceptions to the *loi de position* but rather involve a stable underlying /Œ/.

It may be possible that there is a genuine schwa in words like *céleri* (realized with an [e]) and that the Asymmetry Hypothesis does not hold in the accent described by Moreux, at least for some speakers. It is however crucial not to rely solely on the spelling in assessing the behaviour of this vowel. Morpheme-final schwas (e.g. *bêtement*) are an order of magnitude more frequent than morpheme-internal (putative) schwas (e.g. *céleri*), so results can easily be blurred if the morphological structure of the lexicon is not taken into account and the two categories are not distinguished.

Having discussed the interrelation between schwa and mid vowel alternations in some detail, let us now consider facts that must be considered exceptional under any account of the *loi de position*.

4 EXCEPTIONS TO THE *LOI DE POSITION*

Whether or not one considers the *loi de position* as a categorical phenomenon, there are genuine exceptions to this pattern that need to be taken into account in any adequate treatment of mid vowel alternations.

4.1 Sporadic exceptions

First of all, let us mention a few problematic words that I have observed in my own accent. The words *autochtone* 'native' and *spectacle* 'spectacle' are realized [otoktɔnə] and [spektaklə] respectively. The vowel before /kt/ should be mid low, as evidenced by forms like *nocturne* [nɔktyʁnə]. One could argue that *autochtone* is actually felt like a Greek scientific word and is analysed like a compound formed of the prefix *auto* and the non-autonomous base *-chtone* (see *autostop* [otostɔp]). But this argument is void in the case of *spectacle*, which is clearly monomorphemic.

Nouns and proper names ending in *-et* form another series of exceptions: while this ending is generally pronounced [e], some (older) speakers pronounce it as [et] in numerous words.[15] I have observed forms like *pet* [pet] 'stroke', *Bousquet* [busket], *Périset* [perizet] (PFC, speaker 11ald1, guided interview) and even *le Fouquet's* [løfukets], which is the name of a restaurant made infamous by Nicolas Sarkozy. The fact that the pattern can be generalized to forms like *Fouquet's* suggests that it is somewhat productive, but not a fully-fledged regular process, in which case one would expect forms like *internet* *[ɛᴺtɛʁnet]. As we will see in (6.3), such a phenomenon can be straightforwardly captured in a usage-based framework.

Another interesting exception is the pair of antonyms *heureusement* 'fortunately' and *malheureusement* 'unfortunately', which are realized [œʁœzəmaᴺ] and [malœʁœzəmaᴺ] respectively, with an initial mid-open vowel in an open syllable. The adjectives from which these adverbs are derived, however, are well-behaved (cf. *heureuse* [øʁœzə] 'happy (fem.)' and *malheureuse* [maløʁœzə] 'unhappy' (fem.)). Here, it should be noted that the adverbs have drifted semantically from their base (as shown by the English glosses) and more often than not, they are (left-) dislocated and function as evaluative attitudinal satellites, in the terminology of Dik (1997: 297). Searching the PFC database, I found 8 occurrences of *malheureusement* and 15 of *heureusement* (15 tokens). Of these 23 tokens, only two occurrences of *heureusement* are pronounced with an [ø], one realized [øʁœzmaᴺ] (31asb1, junior female from Toulouse), the other [ʔøʁœzəˈmaᴺ] (11ajp1, senior male from Languedoc), with a noticeable prominence (accompanied by an emphatic glottal stop) on the first syllable. The latter speaker pronounces two other occurrences with [œ]. The exceptional behaviour of these adverbs may be the result of a local height harmony, the first /Œ/ harmonizing with the second in these frequent words.[16] This behaviour may have been facilitated by the fact that in both adverbs, the target vowel is further away (and hence weaker) from the main stress than it is in the non-derived forms. Whatever the cause of these exceptions, it is clear that these words are not constructed online and that they must be stored and retrieved as single units in/from the mental lexicon, possibly with competing forms for speakers who display variation.

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[15] Jacques Durand (p.c.) observes that this pattern most likely comes from the Occitan substrate, where /e/ occurs in closed syllables.

[16] A reviewer suggests that this height harmony may have been reinforced by the suffix *–ment*, which contains a low vowel.

4.2 Constructions

Yet another interesting set of exceptions has been documented by Rochet (1980) in his study of the *loi de position* in Bordeaux. It concerns collocations where the *loi de position* seems to have applied across prosodic words, as in (12). As the author puts it, 'there are numerous examples in which two items are actually fused together semantically and syntactically and must be viewed as one single word (as in *bonhomme*) in spite of the fact that this fusion is obscured by conventional spelling' (1980: 82).

(12) Application of the *loi de position* across prosodic words

bonne heure	[bɔnœʁə]	'early'
bonne amie	[bɔnami]	'sweetheart'
comme il faut	[kɔmifo]	'properly'
jeune homme	[ʒ∅nɔmə]	'young man'
Cours Victor Hugo	[kuʁviktoryɡo]	street name in Bordeaux

Rochet argues that the over-application of the *loi de position* only takes place when the construction is lexicalized. For instance, in *c'est une bonne heure pour travailler* 'it's a good time to work', *bonne heure* is realized regularly as [bɔnœʁə]. All these constructions are fairly frequent, although they may be geographically circumscribed like *Cours Victor Hugo* in Bordeaux, and they appear to have a non-compositional meaning. As the unit becomes more entrenched, it becomes semantically opaque and starts behaving as a synthetic (e.g. [*bonne heure*]), as opposed to an analytic (e.g. [*bonne*][*heure*]) prosodic domain. Such facts naturally lend themselves to a usage-based account (Bybee 2001). Of course, one could argue that these constructions are simply listed in the lexicon and coexist with analytical forms. But there are cases which suggest that such formulaic units may be used in compositional structures. Let us first consider the examples in (13)[17]:

(13) Mid-vowel adjustment in *neuf* + N

a.	*neuf heures*	[n∅vœʁə]	'nine hours' or 'nine o'clock'
	neuf ans	[n∅vaᴺ]	'nine years' or 'nine-year-old'
b.	*neuf enfants*	[nœfaᴺfaᴺ]	'nine children'
	neuf années	[nœfane]	'nine years'

We see a clear asymmetry between (13a) and (13b): in the former, the structure *neuf* + N constitutes a single phonological domain, where the final /f/ is realized as a voiced fricative[18] (which happens before a vowel-initial word in this item) and the *loi de position* applies across words, whereas in the latter, the two words constitute autonomous domains: /f/ is realized faithfully and is syllabified as the

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[17] See also Rochet (1980: 91), who mentions a similar pattern for *sept* and *seize* followed by *ans* or *heures*.

[18] The realization of /f/ as [v] in this context is a general feature of French and is not specific to southern French.

coda of the first syllable, yielding the expected mid-open vowel. (13a) is similar to what is observed in derivation (cf. *neuvième* [nøvjɛmə]). At first sight, one might be tempted to attribute the difference between (13a) and (13b) to the voicing of the fricative: the mid vowel would be realized as a 'tense' [ø] before a voiced obstruent and as a 'lax' [œ] before a voiceless vowel. Even though tenseness is relevant in some varieties of French (for instance in Canada, where tense mid vowels tend to diphthongize), there is no phonetic nor independent phonological argument to analyze mid close vowels as tense in southern French; the difference between mid close and mid open vowels is fundamentally a difference in aperture. More importantly, as noted in footnote 16, the asymmetry that we observed is not limited to *neuf*, but is also found with *sept*, as in *sept heures* [setœʁə] *vs sept enfants* [sɛtaᴺfaᴺ], where the consonant is a voiceless obstruent in both cases. The difference between (13a) and (13b) can only be explained in terms of degree of lexicalization: *neuf ans* and *neuf heures* are particularly frequent and are therefore stored as units in the lexicon. In support of this claim I have looked for all occurrences of *neuf* followed by a noun in the PFC database, which provides samples of spontaneous speech. The raw frequencies are given in (14):

(14)   Token frequency of (NUM-)*neuf* + N from three surveys in the PFC database

neuf ans	26
neuf heures	11
neuf mois	5
neuf travers	2
neuf francs	1
neuf kilos	1
neuf frères	1
neuf mètres	1
neuf jours	1
neuf août	1
neuf fois sur dix	1

These figures confirm that *neuf* is much more likely to co-occur with *ans* (51%) and *heures* (21.6%), totalling 72.6% of occurrences, than with any other noun. Interestingly, the fact that *neuf* + {*heures,ans*} constitute synthetic phonological domains shows that semantic opacity is not a necessary condition. Indeed, while it may be argued that *neuf heures*, used as a time reference ('nine o'clock'), is semantically non-compositional, it is always realized (in my speech) as a synthetic domain even when the meaning is compositional, as in *la traversée prendra neuf* [nøv] *heures* 'the journey will take nine hours'.[19]

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[19] Chantal Lyche (p.c.) observes that this is unlike Cajun French: in this variety, the time reference *cinq heures* is a lexicalized construction whereas a productive liaison appears when *heures* is a timing unit (e.g. *cinq* [z] *heures de temps*).

Let us now consider the case where *neuf* is the last element of a complex numeral, as in (15):[20]

(15)   Mid-vowel adjustment in *trente-neuf* + N

a.	*trente-neuf heures*	[tχaᴺtənøvœʁə]
	trente-neuf ans	[tχaᴺtənøvaᴺ]
b.	*trente-neuf enfants*	[tχaᴺtənœfaᴺfaᴺ]
	trente-neuf amis	[tχaᴺtənœfami]

We can see that mid vowel adjustment behaves just as in (13), but this is quite unexpected: from a morpho–syntactic point of view, these constructions are analysed as NUM+N, for instance [*trente-neuf*][*heures*], whereas the over–application of the *loi de position* suggests on the contrary that there is no morphological boundary between *neuf* and *heures*. In fact, it can be demonstrated that *neuf* must be parsed both with the numeral and with the following noun. Consider the form *dix-neuf heures*, which is realized [diznøvœʁə]: *neuf heures* constitutes one domain from the point of view of the *loi de position*, suggesting the structure [*dix*][*neuf heures*], whereas the presence of [z] in *dix-neuf* points to the structure [*dix-neuf*][*heures*], since the final consonant of *dix* would otherwise be truncated,[21] as in *dix navets* [dinave] 'ten turnips'[22]. This kind of constituent mismatch is reminiscent of 'bracketing paradoxes' (see Spencer 1988 for an overview), which were studied extensively in the 80's in morphology.[23] Such cases would be difficult to analyse in a theory in which the phonology is conceived of as a purely interpretative component that is fed morpho–syntactic information. Since the pattern described in (15) is displayed in all numerals ending in *neuf*, even those created online (e.g. *l'expérience a duré 239* [nøv] *heures* 'the experiment lasted for 239 hours'), one would need to postulate an *ad hoc* rule (or process) that prosodifies the sequences *neuf heures* and *neuf ans* into the same prosodic word. But such an approach would fail to explain why these patterns are observed, in precisely those frequent constructions.

The exceptions discussed in this section call for an analysis that is able to directly incorporate the effect of usage frequency into the model. The rest of this article develops such an approach in the framework of Cognitive Grammar.

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[20] The PFC database contains many such examples: *soixante-neuf ans, quand il est mort* [swasaᴺtənøvaᴺ] (11aml1); *je crois qu'il avait // dix-huit ou dix-neuf ans* [diznøvaᴺ] (13aas1); *de sept heures à dix-neuf heures* [diznøvœʁə] (13aas1). Compare to *le vingt-huit ou vingt-neuf août là* [veᴺtənœvut] (11aal1).

[21] On the behaviour of final consonants in numerals, see Tranel (1976).

[22] A flat structure, as in [*dix neuf heures*], does not seem to solve the problem since the pattern can be extended to other numerals, e.g. *cent quatre-vingt-dix-n*[øv] *heures*.

[23] A classical example of this is found in British English: someone who plays the flute is called a *flautist* (not a **flutist*), and someone who plays the baroque flute is called a *baroque flautist*. The syntactic analysis suggests the structure [baroque+flute][ist], which should be realized as *baroque flutist*; yet, the form *baroque flautist* suggest morphological structure [baroque][flute+ist], for the irregular form *flautist* to be able to be selected.

5 COGNITIVE GRAMMAR

5.1 Overview

Cognitive Grammar (Langacker 1987a, 1987b, 2008; Taylor 2002), henceforth CG, is a usage-based theory of language that can be situated in the broad trend of cognitive linguistics (see Croft and Cruse 2004 for an overview). CG rejects the nativist hypothesis according to which language acquisition is driven and constrained by formal universals that are innately available to the learner. In contrast, it claims that language emerges from usage (see also Barlow and Kemmer 2000; Bybee 2001 *inter alia*) and that grammar is the by-product of general cognitive abilities such as categorization, inference and figure-ground organization, which are not language-specific. The most central claim in CG is that language is fundamentally symbolic: it consists of pairings of sounds and meanings linked by a symbolic relation:

'A symbolic structure ($\sum$) consists in the pairing of a semantic structure (S) and a phonological structure (P): $[[S]/[P]]_{\sum}$. It is thus bipolar, S being its semantic pole and P its phonological pole... symbolic structures combine with one another to form more elaborate symbolic structures: $[\sum_1] + [\sum_2] = [\sum_3]$. These three structures constitute a symbolic assembly. At a higher level of organization, $[\sum_3]$ may itself combine with another symbolic structure to form one that is still more elaborate: $[\sum_3] + [\sum_4] = [\sum_5]$. And so on indefinitely.' Langacker (2008: 161)

A language can be described as a (very large) set of such symbols. Symbols can be maximally simple ('morphemes') but can correspond to large and complex assemblies such as idioms. Note that although all symbolic structures are bipolar (i.e. they have a semantic and a phonological pole), an assembly need not necessarily be bipolar: it can be unipolar, that is be either purely semantic or purely phonological.

In CG, a structure which has become conventionalized is said to be entrenched. For practical purposes, an entrenched structure (or unit) is enclosed between square brackets, for instance [*kick the bucket*], whereas a structure which is not conventionalized is enclosed between parentheses, as in (*kick the blue ball*).

The process of categorization consists in abstracting schemas (i.e. shared commonalities) from similar instances. As Langacker (2008: 170) puts it, 'if [an expression] fully conforms to [a] schema's specifications, so that it fully **instantiates** the schema, the relationship is one of **elaboration**: [SCHEMA] → [EXPRESSION]. If there is some conflict in their specifications, the relationship is one of **extension**: [SCHEMA] → [EXPRESSION]' (emphasis in the original). Extension has been widely studied in cognitive semantics for such phenomena as metaphor and polysemy but, as we shall see, it also plays an important role in phonology.

5.2 *Cognitive Phonology*

The phonological side of linguistic structure has not received much attention within CG (but see Taylor 2002: chapters 5, 8, 13 and references therein). In my view, the most articulate proposal is the framework of Cognitive Phonology (Lakoff 1993), which is closely related to Harmonic Phonology (Goldsmith 1993a). Lakoff explicitly situates Cognitive Phonology within the general framework of CG, although the details of the integration have not been worked out. The model, as it is outlined in Lakoff's seminal paper, recognizes three levels of interest for phonology:

- the M-level: the morphemic level, the level at which morphemes are phonologically specified;
- the W-level: the word level, the level at which constraints on word-level phonology are stated.
- the P-level: the phonetic level, a level of broad phonetic description that is the interface with the articulatory and acoustic devices.

Generalizations are expressed in terms of schemas (constructions) which 'state well-formedness constraints within levels and correlations across levels' (Lakoff 1993: 118). Cognitive Phonology recognizes intra-level schemas, which are well-formedness conditions on forms stated at one level, and cross-level constructions, which operate across levels; cross-level constructions are direction-neutral and can be used either in production or recognition. It is important to emphasize that Cognitive Phonology is not a derivational theory: the three levels are three parallel levels of description which are simultaneously satisfied; they should not be thought of as feeding one another.

Wheeler and Toureztky (1993), who developed a connectionist implementation of Lakoff's model, have shown that intra-level schemas are problematic: it is not always clear whether a generalization should be stated as a cross-level or intra-level construction, nor at exactly which level intra-level constructions should be formulated. I follow them in adopting a more stringent version of the theory where only cross-level constructions are recognized.

Lastly, while Lakoff does not explicitly address the issue, it must be stressed that for Cognitive Phonology to fit in the general framework of CG, levels should not be conceived of as distinct ontologies, but rather as emerging strata resulting from the self-organization of grammatical structure.[24] More specifically, I consider (P-W) and (W-M) cross-level mappings as instances of what Langacker calls unipolar constructions whereas M-level constructions are treated as signs, that is conventionalized pairings of a (schematic) phonological expression and a meaning. In other words, (P-W) and (W-M) schemas are instrumental in mapping a specific instance to its semantic interpretation.

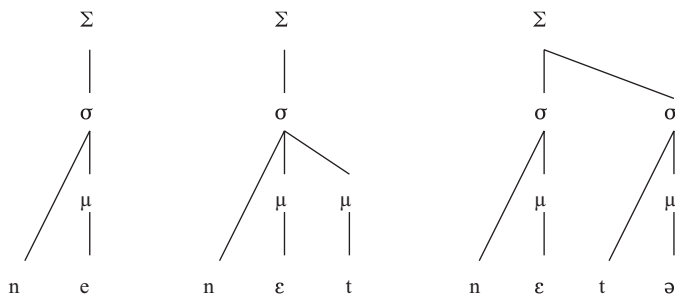[24] The task of modelling how these levels emerge clearly falls outside of the scope of this article.

Figure 4. *Moraic representation of* nez, net *and* nette

For the sake of simplicity, I will from now on refer to the whole theoretical enterprise of Cognitive Grammar/Cognitive Phonology simply as Cognitive Grammar. Let us now examine how this framework can shed some light on the pattern of the *loi de position*.

6 ANALYSIS

6.1 *Emergence of the* loi de position

While the diachronic motivation of the *loi de position* is unclear, one way in which the synchronic pattern can be captured is in terms of moraic weight. Assuming that all vowels (including schwa) and coda consonants are associated with a mora, the generalization can be stated as follows:[25]

(16) Moraic interpretation of the *loi de position*
    a. mid vowels that head a light (i.e. monomoraic) foot are mid-close
    b. mid vowels that head a heavy (two moras or more) foot are mid-open

An illustration is given in Figure 4. The intuition that this analysis captures is that in order to withstand the structural complexity of a heavy foot, a mid vowel needs to be open. I believe that this analysis is fully in line with Durand's prosodic approach.

Let us now examine how the *loi de position* affects the vocalic system. Although the analysis does not crucially dependent on a particular featural framework, I adopt a traditional binary feature for the sake of familiarity. Since, as stated earlier, there is no compelling evidence to analyse mid close vowels as [+tense] or [+ATR], I adopt the binary feature [±OPEN][26] put forth by Clements (1993) (note that schwa is featureless):

[25] See Eychenne (2006: 158–177) for a detailed account, including empirical arguments for the moraicity of schwa and of codas.
[26] From now on, square brackets represent schematic representations and no longer phonetic forms.

(17) Emergent feature specification of oral vowels

<div style="text-align:center">

i
[+HI][−BCK]
[−RND][−LOW]

y
[+HI][−BCK]
[+RND][−LOW]

u
[+HI][+BCK]
[+RND][−LOW]

e
[−HI][−BCK]
[−RND][−LOW][−OPEN]

ø
[−HI][−BCK]
[+RND][−LOW][−OPEN]

o
[−HI][+BCK]
[+RND][−LOW][−OPEN]

ə
[ ]

ɛ
[−HI][−BCK]
[−RND][−LOW][+OPEN]

œ
[−HI][−BCK]
[+RND][−LOW][+OPEN]

ɔ
[−HI][+BCK]
[+RND][−LOW][+OPEN]

a
[−HI][+BCK]
[−RND][+LOW]

</div>

These features, however, should not be interpreted as innate but as emerging from the patterns in which they are involved.[27] Specifically, the feature [±OPEN] emerges from the mid vowel alternation governed by the *loi de position*. The emergence of these features at the P-level constitutes a first level of schematization over specific instances. By way of example, we have seen that schwa can be realized on the surface in a variety of ways. Let us assume that a given speaker has the following variants in word final position: [œ], [e] and [ə], which may have become entrenched schemas emerging from specific instances such as ('pate), ('patœ), ('bɔnœ), ('nɛtə), and so forth. In CG, we will consider that these vowels emerge at the P-level as free variants, the realization of which may be controlled by phonetic and/or sociolinguistic factors.

At the W-level, these vowels are schematized even further on the basis of their distributional properties, which yields more abstract schemas. Since [ə] = {}, [œ] = {[−HI][−BCK][+RND][−LOW][+OPEN]} and [e] = {[−HI][−BCK][−RND][−LOW][−OPEN]}, the variants get categorized as a [{}] (a vowel devoid of features), which is the most general schema that generalizes over the P-level vowels. The mapping between the P-level and W-level representations is captured by the following (cross-level) schemas (using phonetic symbols for clarity):

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[27] Mielke (2008) surveyed the phonological patterns found in a sample of nearly 600 languages and showed that 'unnatural' classes are far more common than what is usually assumed by phonologists. For instance, in Evenki (an Altaic language spoken in China), suffix-initial /v/, /s/ and /g/ nasalize when they follow a nasal consonant, whereas other consonants do not (2008: 120–121). Such a class would be impossible to specify in any of the available feature theories. The relative abundance of such unnatural classes speaks in favour of a reinterpretation of features as emerging from the patterns in which they are involved rather than them constraining a priori the space of possible classes.

(18) (W–P) mapping for the realization of schwa

$$
\begin{array}{cccc}
\text{W:} & \text{ə} & \text{ə} & \text{ə} \\
 & \updownarrow & \updownarrow & \updownarrow \\
\text{P:} & \text{œ} & \text{ə} & \text{e}
\end{array}
$$

Mid vowels need to be fully specified at the W-level since, as we have seen, their realization is bounded to the domain of the (prosodic) word. As a result, they are identical across the P– and W-levels. However, they are further schematized at the M-level, where the feature [±OPEN] is abstracted away, yielding the 'underspecified' schematic vowels [E] = {[-HI][-BCK][-RND][-LOW]} [Œ] = {[-HI][-BCK][+RND][-LOW]} and [O] = {[-HI][+BCK][+RND][-LOW]}, as is illustrated in (19) for the pair [e] ∼ [ɛ].

(19) (M–W) mapping for the pair [e] ∼ [ɛ]

$$
\begin{array}{ccc}
\text{M:} & \text{E} & \text{E} \\
 & \updownarrow & \updownarrow \\
\text{W:} & [\ldots e]_{\Sigma\mu} & [\ldots \varepsilon \ldots]_{\Sigma\mu\mu}
\end{array}
$$

At the M-level, which is the level at which morphemes get recognized in perception, only distinctive features are present, and morphemes are represented in their most schematic form. Generalization over mid vowels occurs on the basis of their shared phonetic properties (i.e. the feature [+LOW] and either of (or both) the features [-BCK] and [+RND]) and of the fact that they follow the same pattern with respect to the *loi de position*.

Let us now consider the case where schwa is categorically deleted when it precedes a vowel, which corresponds to the schema given in (20):

(20) W–P schema for schwa deletion before a vowel

$$
\begin{array}{cccc}
\text{W:} & \text{ə} & + & \text{V} \\
 & \updownarrow & & \updownarrow \\
\text{P:} & \text{Ø} & & \text{V}
\end{array}
$$

In this schema, a W-level schwa has no correspondent at the P-level, which is formally expressed by a correspondence with the null symbol.[28] This schema is responsible for schwa deletion in production, but it is also active in perception to recover a lexical schwa in instances that elaborate this schema (e.g. *elle a* [ɛlØa] → /Elə a/).

---

[28] Correspondence with the null symbol has been studied in detail by Wolf and McCarthy(2009) within the framework of Optimality Theory.

6.2 *Opacity of the loi de position*

The opacity of the *loi de position* can be insightfully captured in the three-level model of CG. Let us first consider the example in (21), where opacity results from the fact that a full vowel appears in the dependent position of a foot.

(21)   Cross–level mapping for *bête* /bEtə/

$$
\begin{array}{llllll}
\text{M:} & & \text{b} & \text{E} & \text{t} & \text{ə} \\
& & \updownarrow & \updownarrow & \updownarrow & \updownarrow \\
\text{W:} & [& \text{b} & \varepsilon & \text{t} & \text{ə} &]_{\Sigma\mu\mu} \\
\\
& & \updownarrow & \updownarrow & \updownarrow & \updownarrow \\
\text{P:} & [& \text{b} & \varepsilon & \text{t} & \text{œ} &]_{\Sigma\mu\mu}
\end{array}
$$

The P-level form *bête* is schematic for a given instance (bɛtœ), either in production or perception. The word is sanctioned by the (P-M) schema (19) whereby [E] is realized mid-open in the head of a heavy foot. The dependent vowel is in turn sanctioned as a schwa following the (W-P) schema (18). The opacity of this form arises because the crucial generalizations involved in the *loi de position* are not stated at the same level: prosodification is an (M-W) (roughly, 'lexical') schema whereas schwa colouring is a (W-P) (roughly, 'post-lexical') one. However, it is important to emphasize that in this approach, the three forms are not representations in the generative sense: there is no notion of precedence or symbolic computation involved. They are schemas of different degrees of abstractness that are immanent in their instantiations and they emerge as a result of the (dynamic) activity of categorization of the cognitive system.

   Let us now consider the case where opacity results from external sandhi as in (22).

(22)   Cross–level mapping for *bête et (méchant)*

$$
\begin{array}{lllllllllll}
\text{M:} & & \text{b} & \text{E} & \text{t} & \text{ə} & & & & \text{E} \\
& & \updownarrow & \updownarrow & \updownarrow & \updownarrow & & & & \updownarrow \\
\text{W:} & [\,[& \text{b} & \varepsilon\,]_\sigma & [\,\text{t} & \text{ə}\,]_\sigma &]_\Sigma & & [\,[& \text{e}\,]_\sigma &]_\Sigma \\
& & \updownarrow & \updownarrow & & \updownarrow & & & & \updownarrow \\
\text{P:} & [\,[& \text{b} & \varepsilon\,]_\sigma\,]_\Sigma & & \varnothing & & [\,[& \text{t} & \text{e}\,]_\sigma &]_\Sigma
\end{array}
$$

First of all, it must be noted that *bête et méchant* is a socially conventionalized construction and as such it is an entrenched unit in the lexicon of most speakers. This form is nevertheless licensed by the schemas that shape the *loi de position*. The P-level form [bɛt] is sanctioned as [bɛtə] at the W-level by virtue of the (W-P) schema (20). However, the final consonant of *bête* is syllabified as the onset of the following syllable, according to the phenomenon of *enchaînement* that pervades the phonology of French (Encrevé 1988). This 'resyllabification' renders W-level footing opaque since the mid–open vowel [ɛ] is the head of a light foot. This type

of opacity has been discussed in a similar three-level framework by Turcsan (2005: 156–163), who calls it a 'structural paradox'. In the case at hand, opacity arises from the fact that a P-level form violates a W-level generalization.

6.3 Exceptions and sub-regular patterns

In a usage-based framework, exceptional forms do not raise any problem at all since they are stored as such in the mental lexicon. Forms like *autochtone* [otoktɔnə], *spectacle* [spektaklə] or *heureusement* [œʁœzəmaᴺ] simply do not participate in the general pattern of mid vowel alternation and do not instantiate the schemas that shape it. Such forms are hapax legomena and may even undergo regularization, especially if they are weakly entrenched.

On the other hand, when similar exceptional forms are numerous enough, they reinforce one another and may give rise to a new schema, thus becoming (partially) productive. Such is the case for words ending in [et] for some southern French speakers, for whom the pattern is strong enough to get entrenched and to apply productively to new forms, as in *le Fouquet's* [fukets].[29] It is possible that this pattern originated in Occitan native speakers, who already had a schema allowing [e] in closed syllables, and that the pattern spread to French through borrowings and proper names, the latter being shared by both languages.

A similar situation is observed with borrowings from Provençal, as discussed in 3.2. The importance of this phenomenon should not be under-estimated, as south eastern French contains many borrowings from Provençal, many of which are more or less assimilated: *aïgue* [ajgə] 'water' (< *aiga*), *néguer* [nege] 'to drown' (< *negar*), *péguer* [pege] 'to be sticky' (< *pegar*), etc. The paroxytonic pattern that Watbled described can also be observed in words from Italian, for instance *spaghetti* [spa.ˈgɛ.ti], *gnocchi* [ˈnjɔ.ki] (types of pasta). Interestingly, I have even observed the forms [tɔr.ti.ˈkɔ.li] for *torticolis* 'stiff neck' and [pa.ˈtʃu.li] for *patchouli* (used with the meaning 'nauseating perfume') for one speaker. This suggests that forms like *mèfi, balèti, aiòli, gòbi, fadòli*, which are all fairly frequent and must therefore be very entrenched for many speakers, give rise to a substantive schema, which may be represented informally as $[[...]_{\sigma'}[...i]_{\sigma}]_{\Sigma}$, that is in turn able to sanction new expressions. It is plausible that for some speakers, *torticolis* and *patchouli* are felt as 'foreign' (and indeed, they are both assimilated borrowings) and as such are sanctioned by this schema.

6.4 Synthetic phonological domains

We now move on to the discussion of synthetic phonological domains, where the *loi de position* seems to apply across prosodic words. Let us first consider the forms in (23).

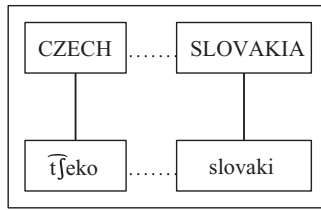[29] This form may also have been partly influenced by the proper name *Fouquet* [fuke].

Figure 5. *Analytic symbolic assembly for* Tchécoslovaquie *(dotted lines in an assembly indicate a relationship of symbolic composition)*

(23)   Synthetic vs analytic forms

   a.   *Rocamadour*   [ʁo.ˌka.ma.ˈduχ]   place name
        Tchécoslovaquie   [ˌtʃe.kɔs.ˌlo.va.ˈki]   'Czechoslovakia'
   b.   *Roc-Amadour*   [ˌʁɔ.ka.ma.ˈduχ]
        Tchécoslovaquie   [tʃe.ˌko.slo.va.ˈki]

From the point of view of the *loi de position*, forms in (23a) are phonological synthetic domains since the rule applies regularly. Rocamadour is a famous medieval city in the Lot *département* that was built clinging to a cliff, and the pronunciation given for *Tchécoslovaquie* is my own. The corresponding forms in (23b) are analytic: *Roc-Amadour* is a spelling variant that can be found on site and which is the etymon of the modern form. Interestingly, it triggers an analytic realization where [ʁɔk] and [amaduχ][30] form two distinct prosodic domains. In that case, the form is morphologically and semantically compositional and it can be understood as 'Rock Amadour'. The situation for *Tchécoslovaquie* in (23b) is comparable: since the /s/ does not close the previous syllable, like in (6), the fact that the vowel is realized as mid-close in this context provides a phonological cue that signals that it is domain-final: the form is therefore parsed as a compound word and is interpreted as made up of the two morphemes 'CZECH' and 'SLOVAKIA'. Figure 5 offers a symbolic representation of the word in its analytic interpretation: each phonological domain is coextensive with a semantic unit. The form (23a), on the other hand, has a non-compositional meaning ('CZECHOSLOVAKIA'), which is simply the result of it being learnt without the encyclopedic knowledge of the fact that Czechoslovakia was made up of two countries. Figure 6 gives a symbolic representation of this form; here again, there is a clear mapping between the semantics and the phonology, but both poles are unanalysable.

To finish this discussion, let us consider examples like *dix-neuf heures* realized [diznɸvœrə] instead of the expected [diznœvœrə], where there is a conflict between the phonology and the semantics. As we have seen, the fact that *dix* is realized [diz] is consistent with the analysis of *dix-neuf* as a single domain but the 'over-application' of the *loi de position* suggests that *neuf* and *heures* belong to the same domain. While

---

[30] The surface form [ʁo.ka.ma.ˈduχ] is the result of the *enchaînement* of /k/.

Figure 6. *Synthetic symbolic assembly for* Tchécoslovaquie

it cannot be ruled out that *dix-neuf heures* is a single domain (it is likely that this form is highly entrenched for many speakers), it is not possible to account for it in purely compositional terms. CG and related frameworks treat language as a large network of constructions that can sanction one another. In the case at hand, *neuf heures* becomes a construction because of its high entrenchment: the two component structures are integrated with each other and, as the whole assembly becomes more autonomous, its phonological pole is reanalyzed as a synthetic domain. This construction is in turn able to sanction other expressions. This analysis is in line with Spencer's 'Lexicalization Requirement', which states that '[bracketing] paradoxes can only be formed from members of the permanent lexicon, where this includes lexicalized phrases' (1988: 675). When *neuf heures* becomes lexicalized, it is able to take precedence with other schemas with which they conflict linearly.

Figure 7 offers an overview of this state of affairs:[31] plain arrows indicate a relationship of elaboration whereas dashed arrows indicate a relationship of extension. As we can see, the instance (diznøvœʁə) is involved in a complex multiple–inheritance network. The construction *neuf heures*, which is enclosed in a thick box, is highly entrenched and is therefore directly instantiated by the instance. As a result, the numeral *dix-neuf,* which is realized [diznøv] in the instance, diverges from the prototypical form [diznœf] and is therefore an extension, not an elaboration, of [diznœf]. Nevertheless, the forms are sufficiently similar to each other for the symbolic assembly *dix-neuf* to be activated whenever [diznøv] is realized. At a more abstract level, *dix-neuf heures* instantiates the NUM+*heures* schema, which is itself a sub-schema of the more general schema NUM+NOUN. However, *dix-neuf heures* is not simply the concatenation of a numeral and a noun: it is the result of the partial satisfaction of several (partially conflicting) schemas, all at once.

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[31] Some aspects have been omitted for the sake of readability. Arrows are double–headed to emphasize the fact that the relationship is bidirectional (see Taylor 2002: 125).
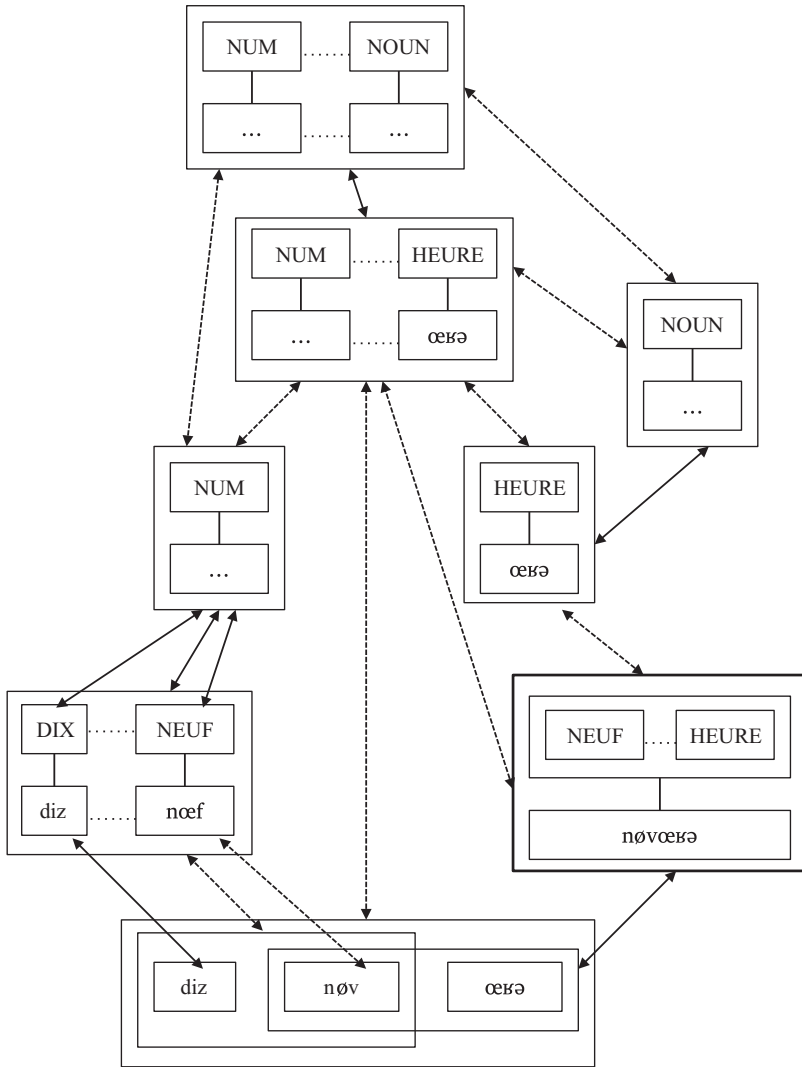
Figure 7. *Partial constructional network for* dix–neuf heures *realized as* [dizn∅vœʁə]

7 CONCLUSION

We have seen that mid-vowel alternations and schwa are both involved in complex phonological patterns and that they interact in several important respects. The status that one grants to schwa has far-reaching consequences on one's analysis of the *loi de position*. This discussion has demonstrated that there exists a schwa in southern French and that it must be defined on phonological, not orthoepic

grounds. A consequence of this fact is that the *loi de position* is an inherently opaque phenomenon. The superficial differences between /ə/ and /Œ/ are indeed subtle but nonetheless exist.

This article has put forward a number of exceptions to the *loi de position*, several of which have not been discussed before in the literature; these exceptions strongly support a usage-based approach to linguistic structure. CG, I believe, offers a compelling framework for phonological analysis since it is able to capture much of the essence of traditional generative phonology while taking into account frequency effects. The three-level architecture adopted here is able to capture the kind of phonological opacity that characterizes the *loi de position* by stating conflicting substantive generalizations at different levels. At the same time, the apparent over-application of the *loi de position* across prosodic words (as in *neuf heures, sept ans*) can be readily explained as the result of the entrenchment of these constructions: because of their relatively high usage frequency, these collocations become fossilized as one phonological synthetic domain. In addition, because CG constructions can combine semantic and phonological information into symbolic assemblies, the framework is able to explain why phonological and semantic opaqueness can sometimes influence (or reinforce) each other, as in the forms *Rocamadour and Tchécoslovaquie*: a non-compositional structure on one pole may influence the other pole.

The reader will have probably noticed that the representations that emerge at the W-level and M-level bear a lot of resemblance to underspecification theories. The key difference is that CG's schemas are immanent, i.e. they are not 'extracted' from the linguistic expressions from which they are drawn. But the fact that they are not autonomous does not mean that they are not cognitively relevant (they obviously are). I believe that the similarity between the two approaches is a welcome achievement and one can only hope that insights gained from underspecification theory be integrated into Cognitive Grammar.

Lastly, whether or not one agrees with the analyses that have been presented in this article, the empirical facts and the explicit set of hypotheses that have been discussed will hopefully provide a fertile ground for future investigations of the behaviour of schwa and mid vowels in southern French.

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