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The international handbook series *Manuals of Romance Linguistics* (*MRL*) offers an extensive, systematic and state-of-the-art overview of linguistic research in the entire field of present-day Romance Studies.

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Diana Passino, Joaquim Brandão de Carvalho, and Tobias Scheer

2 Syllable structure and (re)syllabification

Abstract: This chapter provides a survey of syllable structure and resyllabification in Romance languages. On the one hand, onsets, nuclei, and codas are described according to their content and behavior across the main Romance areas. On the other hand, some specific issues are given special attention as they appear to be relevant for current discussion in phonological theory.

Keywords: syllable structure, syllable complexity, open vs. closed syllables, word-final consonants, tautosyllabic clusters vs. heterosyllabic sequences

1 Introduction

Providing a brief overview of syllable structure and resyllabification in Romance languages is a difficult task, not just because there is a myriad of dialectal varieties. Two main questions arise. First, which criteria provide the best guideline for examining the subject matter? Second, should the study tend towards an exhaustive description of data and literature, or should it give place to topics and case studies that to date have not ranked highly on the agenda but appear to be relevant for phonological theory?

Regarding the first question, it is shown in Section 2 why we have not pursued the idea of analyzing syllable structure in Romance in the light of increasing or decreasing "complexity" insofar as the latter refers to the number of segments putatively contained by the syllable. As to the second question, in the sections below we will try to offer a balance of the two approaches: on the one hand we will survey views on onsets (Section 3), nuclei (Section 4), and codas (Section 5), but we will also draw attention to specific issues that may challenge current views of syllable structure.

2 Syllabic complexity

2.1 Coexistence of contradictory trends

A widespread typological viewpoint from which the Romance syllable has been observed consists in assessing its complexity with respect to that of the Latin syllable. In this perspective, complexity mainly concerns syllable margins: hence it is evaluated by considering the number of consonants and the type of cluster in the onset and the coda (Lehmann 2005, 138; Heinz 2014, 88). The literature diagnoses

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complexity reduction when the number of onset and coda consonants decreases (Kiss 1971; Lehmann 2005, 138; Heinz 2014, 88–89), or when the constraints increase on the combination of consonants permitted in onsets and codas (Lehmann 2005, 138–139). In this sense, Romance is said to have undergone decomplexification of onsets and codas with respect to Latin (Lehmann 2005, 138–139). Another indicator is the percentage of simple CV syllables in the lexicon, as compared to other, more complex syllabic configurations (CVC, CCV etc.). On the basis of the evidence provided by a number of phonological processes that have characterized Late Latin and that result in open syllables and/or less complex margins, including simplification of clusters, degemination, and the loss of word-final consonants, some scholars conclude that a simplification trend characterized Late Latin and persisted in individual Romance languages (cf. Kiss 1971, 23–102, for a complete list of processes and the study of corpus of inscriptions; Lehmann 2005, 145–146; Heinz 2014).

Within this approach it has been widely noticed, however, that an increase in syllabic complexity may also be observed in Romance. Late Latin syncope, which was strengthened in Western Romance (Kiss 1971, 99–102; Mayerthaler 1996; Schmid 2014; Heinz 2014, among others), increases syllable complexity. Thus, Loporcaro (2011, 105), as opposed to the general trend, argues in favor of a tendency towards closed syllables operating in Late Latin stressed syllables.

Both tendencies, one towards decreased complexity and another towards increased complexity, are attested in the Ibero-Romance dialect continuum where coda weakening is gradually undermined by syncope as one moves to the East, from Galician-Portuguese to Catalan, through the Astur-Leonese, Castilian, and Navarro-Aragonese areas (Carvalho 1989a, 173–176). The two opposite trends are often related in the literature to rhythmic properties of the languages such as stress or syllable timing. Mayerthaler (1996) identifies a number of processes that increase syllable structure complexity in Italo-Romance dialects common to Western Romance, and that are induced by stress-timing, whereby the inter-stress intervals tend to be equal (isochrony). Also, Schmid (2014) and Heinz (2014) respectively analyze Italo-Romance varieties and standard languages such as Spanish and French, in terms of rhythmic properties, expressing the isochronic/isosyllabic typology using the distinction known as word vs. syllable languages (Auer 1993; Caro Reina/Szczepaniak 2014). In this perspective, they identify syllabic complexity as one of the properties that characterize word languages and conclude that there was indeed a decomplexification in the evolution from Old French (word language) to Modern French (syllable language). The complexification tendency, on the other hand, is identified for the evolution from Latin (syllable language) to Old French and other Gallo-Romance languages (word languages; cf. Noske 2015, 65–68).

2.2 Phonological and typological settings are constant

Genetically related languages certainly build on a common pool of properties that guide their evolution, but each sub-group or individual language will also implement innovations of its own. A uniform trend is hardly expected across the many varieties spoken in the Romance dialect continuum. As illustrated below, there is significant variation across Romance regarding, for example, the set of syllabic positions that can affect the quality of segments. Also, typologically speaking, a number of rare syllabic and syllabification patterns have emerged in the evolution of Romance languages, which may contribute to our understanding of syllable structure as such. These issues are further debated in this chapter.

The discussion regarding a putative complexity/simplicity drift in syllable structure that is found in the literature merely counts surface consonants, from the left edge of the word to the first vowel (onset complexity) and from the right edge of the word until the last vowel (coda complexity). Hence CCCVC and CCVC syllables will be said to be different, as will CCVC and CCVCC syllables. This widespread perspective is instantiated for example by Maddieson (2013) in the World Atlas of Language Structures (WALS, cf. Dryer/Haspelmath 2013) database where CVC and CCV syllables are said to be moderately complex, whereas syllables allowing three or more consonants in the position preceding the vowel, and/or two or more consonants in the position after the vowel (CCCVC and CVCC) are classified as being highly complex. It is a discussion that is helpful in characterizing the differences in the overall phonotactic shape of Romance languages. The complexity debate, however, is perhaps less fruitful to describe a deeper level, that of syllable *structure*.

Counting consonants before the first and after the last vowel may reflect pronunciation. However, it does not determine syllable structure, which follows from phonological behavior and principles that restrict constituent membership. Phonologists broadly agree that merely counting consonants at word margins does not reveal constituent membership. For instance, all theories converge in saying that /s/+C sequences at the beginning of the word are not tautosyllabic (although there is no agreement on their actual status: appendix, extrasyllabic, separated by an empty nucleus etc., cf. the overview in Scheer 2015, 67–75).

An alternative perspective is that of Government Phonology (Kaye/Lowenstamm/Vergnaud 1990; Lowenstamm 1996; Scheer 2004), where the branching of onsets and rhymes is only binary, i.e. where the constituents at hand can host two segments at most.[1] In this perspective no complexity difference as to constituent membership

1 Although Lowenstamm's (1996) and Scheer's (2004) theory, which is a later version of Government Phonology, is based on 'flat' CVCV representations, and involves lateral relations instead of branching hierarchies, constituency-based terms such as 'branching onset', 'rhyme', and 'coda' will be used in this chapter as they are widespread in the phonological *lingua franca*.

exists between #C2C1VC and #C3C2C1VC "syllables", since both strings contain a branching onset, C2C1, in both Latin and Romance. The latter string features an initial /s-/ that does not belong to the following syllable and hence does not affect its complexity (in #C3C2C1VC, C3 is always /s/).

When looking at the evolution from the perspective of available syllabic constituents (the syllabic template), there is no difference between Latin and Romance languages: Latin has a maximal template allowing for codas and branching onsets, as have the Romance languages. Some variation exists concerning the tolerance of word-initial preconsonantal /s/, however, which lies outside of the syllable onset. Accordingly, no evolution of the formal structure of the syllable has taken place from Latin to Romance, since, to the best of our knowledge, no Romance language is on record where codas or complex onsets are banned from the syllabic inventory.[2] An evolution disallowing codas or branching onsets would indeed reduce syllabic complexity when compared to Latin – but no development of this kind appears to have occurred.

The constant presence of codas and branching onsets from Latin through intermediate evolutionary stages down to present-day Romance varieties is certainly remarkable, since codas and branching onsets are cross-linguistically marked (Kaye/Lowenstamm 1981, among others). Notwithstanding the documented lenition processes that have targeted codas and branching onsets across Romance, no system among the many of Romance varieties of the dialect continuum seems to have altered the formal structure of the syllable template that held in Latin. This does not mean, however, that nothing happened over the relevant time span. As was mentioned above, interesting evolutions took place regarding syllable constituents and syllabification. Some specific cases are studied in the sections below.

2 A counterexample to this statement is provided by the Acadian variety of Quebec French in which, if one accepts Charette's (2018) analysis, surface word-initial and word-internal obstruent+liquid sequences like in [plas] 'site' or [sakre] 'swear$_{INF}$' are in fact bogus clusters, i.e. enclosing an empty nucleus. The evidence on which Charette's analysis is based comes from the fact that such clusters are never followed by schwa. While this is the case in most dialects of French, the realization in Acadian French (AFr.) is obstruent+ə+sonorant (e.g. *brebis* [brəbi], AFr. [bərbi] 'sheep'). Obstruent+sonorant+vowel clusters are bogus in Acadian French, i.e. the obstruent and the sonorant are syllabified in distinct onsets and the nucleus between them can be properly governed only by a following lexically filled nucleus. The Acadian French schwa in this analysis is not a lexical nucleus, but the expression of an ungoverned empty nucleus surfacing when the empty nucleus in between the obstruent+sonorant sequence is followed by another empty nucleus and not by a lexical vowel, as in /børøbi/ > [bərbi]. Gallo-Romance dialects such as Walloon (Francard 1981) and Picard (Auger/Steele 1999), which display a similar situation, deserve further investigation on the subject, which we leave for future research.

3 Onsets

3.1 Empty onsets

Latin syllables allowed empty, simplex, and branching onsets. Romance languages also generally allow all three kinds of onsets although some languages consistently repair empty onsets of stressed syllables through epenthesis. In eastern Abruzzese dialects, as in many southern Italo-Romance dialects, empty onsets of syllables are filled by the voiced glottal fricative [ɦ] or the velar fricative [ɣ] (['ɦannə] (proper name), ['ɦɔttə] 'eight'). Before non-low vowels homorganic glides appear in free variation with [ɦ] (['ɦuːnə]/['wuːnə] 'one') (Hastings 1997, 323).

The same process appears to characterize many Sicilian dialects like the one spoken in Messina (Sampson 2010), Dalmatian (Schürr 1980, 85; Maiden 2016, 127), and some Daco-Romanian dialects (Sala 1976, 42–43; Loporcaro 2011, 97). In the latter, homorganic glides are inserted (['ji]*nimă* 'heart', ['i̯a]*rc* 'bow'), while in Sicilian and Dalmatian the epenthetic glide is palatal (Dalm. ['jualb] 'white', Dalm. ['jalara] 'ivy').

Although word-initial empty onsets may be allowed, word-internally glides are epenthesized in order to resolve hiatus in Romanian (Chitoran 2002, 95–124). The strategies of hiatus resolution in 14th-century Portuguese also reveal an interesting sonority scale of the form openness (A) > roundness (U) > frontness (I) whereby the disyllabicity of $'V_1V_2$ sequences is preserved if and only if V_1 has lower sonority than V_2 (Pimenta 2019, 193–195). Thus, IA, UA > IjA, UwA with glide epenthesis (TELA > *tea* > *teia* 'web', BONA > *bõa* > *boa* 'good$_F$') vs. AI, AU > Aj, Aw (SALES > *sais* 'salt$_{PL}$', MALU > *mau* 'bad'), but also IU > IjU (PLENU > *chẽo* > *cheio* 'full') vs. UI > Uj (PONES > *põ*[j]*s* 'put$_{2SG}$'). Identical sonority (AA, UU, II) causes reduction to a monophthong (MALA > *maa* > *má* 'bad$_F$', SOLU > *soo* > *só* 'only, alone', PEDE > *pee* > *pé* 'foot'). Modern Portuguese still avoids the creation of stable glides as onsets of stressed syllables, as ['jV], ['wV] sequences alternate with dissyllabic [i'V], [u'V] (Mateus/d'Andrade 2000, 49–50), e.g. in *piar* 'chirp', *suar* 'sweat', *moeda* 'coin'.

3.2 Segmental restrictions

In Latin simplex onsets, a vast array of consonants was allowed (Marotta 1999; Cser 1999). Likewise, Romance languages generally apply few restrictions on the consonants that may appear in simplex onsets. However, consonants produced by palatalization that are absent from Latin such as [ʎ], [ɲ] are infrequent or completely inexistent in word-initial position (e.g. It. [ʎi]$_{3SG.M.DAT}$, It. [ɲɔmo] 'dwarf', cf. Marotta 1993). In Cotentin Norman [ʎ] is excluded from word-initial position but unlike in other Romance varieties that feature this segment in their inventory, it can appear as the second member of a branching onset (Montreuil 2000, 88): ['bʎe] 'wheat',

[ˈkʎok] 'bell'. The Francoprovençal dialect spoken in Hauteville among other Francoprovençal varieties displays a complementary distribution of [l] and [ʎ] in branching onsets, whereby the first surfaces after labial plosive and the second after velars (Martinet 1956, 64–65): [kʎar] 'clear', [gʎas] 'ice' vs. [blat] 'wheat', [plana] 'plain' (Stich 2001). The labiodental fricative patterns with velars [fʎɑma] 'flame'. In Romansh, word-initial [ɲ] may trigger vowel epenthesis, e.g. NIDU(M) > [əˈɲif] 'nest' (Montreuil 1999, 528). The same applies in Brazilian Portuguese: [iˈɲɔki] 'gnocchi' (Wetzels 1997, 219). More generally, Portuguese [ɲ] and [ʎ] have been argued to derive from underlying geminates (Wetzels 1997, 220) or, as regards [ɲ], from nasal diphthongs (Pimenta 2019, 220–222).

The only cases of frequent word-initial palatal sonorants are found in Astur-Leonese, where L-, N- gave [ʎ-], [ɲ-], as in LATU(M) > *llado* 'side', NOCTE(M) > *ñueite* 'night' (cf. Zamora Vicente 1979, 122–124, 130–131), in Catalan, where L- gave [ʎ-] (LATRO > *lladre* 'thief'), and in (conservative varieties of) Castilian, whose initial [ʎ-] comes from CL- clusters (PLUVIA(M) > *lluvia* 'rain', CLAVE(M) > *llave* 'key', FLAMMA(M) > *llama* 'flame').

Word-initial /z/ is also rare, for example in French and Portuguese, or absent, as in the rest of Ibero-Romance and in Italian (Bertinetto/Loporcaro 2005, 133). The same goes for approximants, whose appearance in simple onsets is generally more restricted than that of other consonants. For example, Galician-Portuguese historically showed a strong tendency to avoid glides as simple onsets, cf. E(G)O > Por. *eu*, as opposed to Sp. *yo*. However, as glides in Spanish underwent fortition ([j] > [ʝ] (> [ʒ]), [w] > [gʷ]) at later stages in many varieties, the modern language does not always allow glides as simple onsets (Colina 2012, 138).

Latin palatal glides (also called *yod*) underwent fortition to [dʒ] in Italian, but glides as simple onsets can be found in word-initial or intervocalic position in loanwords and Latinisms. As opposed to ordinary singleton consonants, however, the palatal glide in word-initial position selects the masculine definite article allomorph dedicated to heterosyllabic sequences and geminates (*lo* [j]*ogurt* 'the yogurt', *lo specchio* 'the mirror', *lo* [ddz]*ero* 'the zero' vs. *il cane* 'the dog', *il treno* 'the train', Marotta 1988; Bertinetto/Loporcaro 2005, 141–142). In addition, the palatal glide does not participate in the length contrast that characterizes the majority of Italian consonants and does not lengthen under *raddoppiamento sintattico*, a *sandhi* lengthening phenomenon triggered by word-final stressed vowels or by a handful of lexical items (↗18 Italian). This has led Passino (2015a) to analyze this segment as underlyingly long but short on the surface, a so-called virtual geminate (Ségéral/Scheer 2001b). The palatal glide behaves as a virtual geminate also in the upper southern Italo-Romance dialect of Teramo spoken in the Abruzzi. As in Italian, in this variety *yod*-initial words do not undergo *raddoppiamento sintattico* or other lengthening phenomena concerning consonants. In addition, as shown in Table 2.1, *yod*-initial words pattern with words displaying initial geminates and heterosyllabic sequences in triggering vowel-zero alternations in the negative adverb [nən] (cf. Passino 2009).

Table 2.1: Allomorphs of [nən] following Passino (2009).

	Single consonants and tautosyllabic clusters	Heterosyllabic sequences and geminates	yod
Allomorphs of [nən]	**nən** va:kə 'I don't go' nən drɔ:və 'I don't find'	**nnə** ʃʃɑ:mə 'we don't go out' nnə mbru:jə 'I don't cheat'	**nnə** jɔ:kə 'I don't play'

3.3 Complex onsets

3.3.1 Typology of complex onset sequences

Complex onsets in Latin could be composed of *muta cum liquida* (plosive+liquid). In addition, the labiodental fricative [f] could also be the first member of a branching onset. The situation is similar in Romance. In French for example, [vr] is marginal (only four roots with word-initial [vr] occur: *vrai* 'true', *vriller* 'twist$_{INF}$', *vrac* 'bulk' and *vrombir* 'buzz$_{INF}$', the latter being of onomatopoetic origin) and [vl] is absent except for onomatopoeic words (*vlan!* 'bang!') or borrowed proper names (*Vladimir*). That French disallows word-initial [vl] is also evident from its diachronic evolution: labial plosives engaged in intervocalic branching onsets are reduced to [v], except when [vl] would be created, in which case the lenition P > [b] > [v] is blocked at the [b] stage: PR > [vr] (ˈCAPRA(M) > OFr. *chievre* (ModFr. *chèvre*)), [br] > [vr] (ˈLĀBRA > OFr. *levre* (ModFr. *lèvre*)), but PL > [bl] (ˈDUPLU(M) > OFr. *doble* (ModFr. *double*)) and BL > [bl] (ˈTAB(U)LA(M) > OFr., ModFr. *table*).

Romanian is rather permissive: [v] and [h] qualify as first members of branching onsets (*vlagă* 'vigor', *vreme* 'weather', *hrană* 'food', *hlamidă* 'gown'), and a few nasal+liquid clusters exist in words of Slavic origin such as *mlădios* 'slender' (Chitoran 2002, 14). The branching onsets [hr]/[hl] may be also found in Gascon (Sampson 2010, 198).

As in other (Indo-European) languages that restrict word-initial clusters to branching onsets (i.e. of rising sonority, such as Germanic), [tl] and [dl] are rare word-initially. They can be found in dialects characterized by pretonic syncope (on which more below), e.g. Gallo-Italic Bolognese *tlar*, Ussegliese *tle* 'weaving loom' or other Francoprovençal dialects where Latin CL > [tl] (i.e. Chablais, Cluses, cf. Stich 2001). Word-internally [tl], [dl] are also avoided: ˈvĕtŭlu > **vetlu* 'old' led to two different complex onsets: (i) *veclu*, attested in the *Appendix Probi*, whence It. *vecchio*, Por. *velho*, Fr. *vieil* 'old' etc., and (ii) **vetru* > *vedro*, which is found in Galician-Portuguese toponyms like *Pontevedra*, *Torres Vedras* etc. As can be seen, either the place feature of the obstruent undergoes backing if the lateral is preserved, or the lateral is replaced with a rhotic if the coronal is maintained. There is also a third solution: [tl] > [ll] as in ROT(U)LU(M) > OFr. *rolle* (ModFr. *rôle*).

The reason why [tl], [dl] are avoided word-initially is subject to debate. A number of hypotheses have been formulated, including homorganicity avoidance (but then why are homorganic [tr], [dr] unproblematic?) and perceptual indistinctness (especially with velar-lateral clusters, Michaels 2011). Perceptual indistinctness may be a factor but does not explain why avoidance of [tl], [dl] occurs particularly in word-initial position, or why there are languages such as many Slavic idioms where initial [tl], [dl] are perfectly regular. A more promising approach to the question is syllable-based: [tl], [dl] do not qualify as branching onsets in any language. Hence, they are excluded from the initial position in languages like English, German, Italian, or French where initial clusters are restricted to branching onsets (plus /s/+C clusters). Those Slavic languages that feature initial [tl], [dl] (Czech, Polish) also allow for items of falling sonority [#rt], [#lp] etc. The correlation that languages allowing for initial clusters with plateau of falling sonority also allow for initial [tl], [dl] appears to also hold true within Romance: the cases of Gallo-Italic and Francoprovençal mentioned above, where initial [tl], [dl] are found, occur in dialect groups where pretonic syncope has created initial clusters of non-rising sonority that appear unrepaired in word-initial position.

Among liquids, rhotics in particular have different phonetic realizations across Romance varieties. In branching onsets this can lead to the surfacing of intrusive vowels in the transition between obstruents and rhotics, most noteworthy in French and Spanish. However, according to Colantoni/Steele (2005), who have studied the subject in depth and with whom we agree, epenthesis here is a phonetic phenomenon and as such has no impact on syllable structure.

Not all obstruent+liquid sequences are parsed as branching onsets in Romance, though. In Chilean Spanish (Martínez Gil 1997, 170–172), all plosives undergo vocalization in coda position. Compare Standard and Chilean forms: [p] *apto* – *a*[w]*to* 'apt', [b] *observar* – *o*[w]*servar* 'observe$_{\text{INF}}$', [t] *étnico* – *é*[j]*nico* 'ethnic', [d] *admirar* – *a*[j]*mirar* 'admire$_{\text{INF}}$', [k] *doctor* – *do*[j]*tor*/*do*[w]*tor* 'doctor', [g] *dogma* – *do*[j]*ma*/*do*[w]*ma* 'dogma'. In addition, voiced plosives undergo the same vocalization in intervocalic *muta cum liquida* sequences: *pobre* – *po*[w]*re* 'poor', *madre* – *ma*[j]*re* 'mother', *regla* – *re*[j]*la*/*re*[w]*la* 'rule'. Vocalization evidently occurs in coda position and hence *muta cum liquida* is a heterosyllabic sequence in this variety of Spanish, since the former kind of vocalization-triggering cluster ([pt], [bs], [tn], [dm], [kt], [gm]) can only be a coda-onset sequence.[3]

The same goes for the evolution of French where velars reduce to *yod* before [r] ('LACRIMA(M) > OFr. *lairme* (ModFr. *larme*) 'tear', 'NIGRU(M) > OFr. *neir* (ModFr. *noir*) 'black') and [l] ('MAC(U)LA(M) > OFr., ModFr. *maille* 'spot', VIG(I)'LĀRE > OFr. *veillier* (ModFr. *veiller*) 'watch$_{\text{INF}}$'), just as they do before obstruents ('FACTA > OFr., ModFr. *faite* 'make$_{\text{PST.PTCP.F}}$', LA'XĀRE > OFr. *laissier* (ModFr. *laisser*) 'loosen, leave$_{\text{INF}}$'). The same

3 Note that vocalization cannot be said to simply occur before any consonant since word-initial plosive+consonant sequences never vocalize. This is because vocalization would produce a coda-onset sequence, which is prohibited in word-initial position.

occurred in Ibero-Romance for the evolution of velar+[l] sequences: 'OC(U)LU(M) > Por. *olho* 'eye', *VECLU > Por. *velho* 'old', whose [ʎ] comes from the same stage [jl] that was maintained before plosive ('FACTU(M) > Por. *feito*). This [ʎ] later evolved into [ʒ] in Old Castilian and eventually gave [x] in Modern Spanish (*ojo*, *viejo*).

In the same way, there is a large upper southern Italo-Romance area going from southern Abruzzi to non-Salentine Apulia stretching over to northern Calabria and Basilicata (more on this in 4.1), where intervocalic obstruent+liquid sequences display a heterosyllabic parse, as shown by the evolution of preceding vowels that is different in open and closed syllables (von Wartburg 1950; Weinrich 1958; Loporcaro 2005; Passino 2015b; Passino/Pescarini 2018).

In addition to *muta cum liquida*, other kinds of sequences may show a tautosyllabic parse in Romance (Loporcaro 1998; Passino 2013). This is the case in some Gallo-Italic (Emilian, Piemontese, Garfagnana, and Lunigiana), Romansh (most noteworthy the ones spoken in Upper Engadina), and Gallo-Romance dialects (mainly Picard, Norman, Walloon, and Francoprovençal dialects, like the dialect of Hauteville, Vaux, and the ones spoken in the Vosges and in Piedmont). Such sequences arose from syncope that targeted mainly pretonic mid-vowels in open syllables (PE'DICULU(M) > Bol. [bdoʧ] 'louse'), but also postonic vowels ('PORTICU(M) > Bol. [pordg] 'portico'). As discussed next, at least in Emilian dialects such as Bolognese, these clusters behave phonologically like complex onsets (Loporcaro 1998; Passino 2013).

It is shown in (1a) that word-initial obstruent clusters originating from syncope were not repaired by epenthesis, while sonorant+obstruent sequences underwent repair.[4] Also, in contrast to sonorant+obstruent sequences but following *muta cum liquida*, word-internally and word-finally obstruent clusters may appear after sonorant codas, thus showing tautosyllabic behavior, as in (1b, c). Finally, synchronically, like obstruent+liquid clusters, they do not trigger epenthesis when preceded by a monoconsonantal clitic yielding a triconsonantal sequence, as shown in (1d), where ˈˈ indicates sentence stress:

(1) Tautosyllabic parse of obstruent clusters

Bol. a. *VES'SĪCA > [ˈpsiga] 'bladder' vs. LAE'TĀMEN > [al'dam] 'manure'
b. [ˈpaŋdg] 'mouse'
c. [ˈmandga] 'sleeve'
d. [na'moʧadˈˈpke] 'a lot of sins'

4 The epenthetic segments that repaired sonorant+obstruent sequences are now lexicalized and no such sequences exist synchronically (i.e. *aldam* 'manure' < LAETAMEN).

Among Emilian, Piedmontese, Lombard (Gallo-Italic), and Ladin dialects, another noteworthy feature concerning the parse of consonant sequences is documented. Before sonorant+obstruent sequences (whose crosslinguistically stable parse is heterosyllabic), vowels behave as if in open syllables. This suggests a tautosyllabic parse of the sonorant+obstruent cluster, as shown in (2):

(2) Outcomes of Ă, Ā in Bolognese (cf. Coco 1970, 3–5)

Open syllable	Closed Syllable
Ă, Ā > ɛ	Ă, Ā > a
ˈLACU(M) > [lɛːg] 'lake'	ˈGALLU(M) > [gaːl] 'cock'
ˈCAPRA(M) > [ˈkɛːvra] 'goat'	ˈCATTU(M) > [gaːt] 'cat'
ˈALTU(M) > [ɛːlt] 'tall'	
ˈBARCA(M) > [bɛːrk] 'ship'	

Word-internally, the diachronic evolution of these dialects also shows that nasal+consonant sequences were parsed differently according to the voicing value of the obstruent following the nasal. That is, vowels followed by sequences of nasals and voiceless consonants occur in an open syllable. By contrast vowels followed by sequences of nasals and voiced consonants occur in a closed syllable, as shown in (3) with data from the Lombard dialect of Villa di Chiavenna (Savoia 2015):

(3) Evolution of Ă, Ā in Lombard (Villa di Chiavenna, cf. Savoia 2015, 177)

Open syllable	Closed Syllable
Ă, Ā > ɛ	Ă, Ā > a
ˈLANA(M) > [ˈlɛnɛ] 'wool'	ˈCATTU(M) > [gat] 'cat'
ˈCANTO > [ˈkɛnti] 'sing$_{1SG}$'	ˈGAMBA(M) > [ˈgambɛ] 'leg'

Word-initial sonorant+obstruent sequences, on the other hand, are generally not allowed in Romance. As shown in (1a), sequences produced by syncope in Emilian (and Piedmontese) were repaired by prosthesis after a reconstructed stage of syllabicity of the initial liquid (Bertoni 1925, 18). In other such dialects (Norman; Wallon; Picard, i.e. Vimeu in Auger 2001; Francoprovençal, i.e. Hauteville in Martinet 1956, 92), prosthesis is not always lexicalized but takes place in sandhi when no vowel-final word can provide a syllable nucleus for the initial liquid. For the Francoprovençal dialect of Usseglio, spoken in Piedmont, Terracini (1919, 354) reports differences between rhotic+obstruent and lateral+obstruent sequences, where prosthesis is respectively lexicalized ([arkyˈla] < RECUˈLARE 'draw$_{INF}$ back') or takes place in sandhi ([uˈsastalˈva] 'he got up', [ˈfalulˈˈva] 'let him get up' < LEˈVARE 'get up$_{INF}$'). Word-initial sonorant+obstruent sequences originating from syncope of pretonic vowels in all Romance languages cited are often described as having involved a transitional stage where the sonorant was syllabic before developing prosthesis (Meyer-Lübke 1890, 317; Sampson 2010, 217–218).

Moreover, rhotic+obstruent sequences that arose from the loss of an initial vowel were repaired by anaptyxis in Abruzzese ((U)RˈTICA(M) > [rətˈtoːkə]/[rətˈtɪːkə] 'nettle'). However, like many other southern dialects, Abruzzese allows for word-initial sequences of nasal+consonant, where the consonant is homorganic with the nasal ([mbaˈpiːtə] 'idiot'), as well as initial geminates ([ˈtʧiːtə] 'kill$_{INF}$'). In southern dialects, word-initial obstruent+obstruent sequences are unknown or repaired in loanwords. Under the influence of these dialects, for instance, Slavic dialects spoken in Molise known as *nanas*, simplify word-initial obstruent+obstruent sequences by deleting the first member (e.g. [ptiʧ] > [tiʧ] 'bird'; de Giovanni 2003, 152).

Even though initial rhotic+obstruent sequences are disallowed across Romance, they may arise through syncope in French and Portuguese. In the former language, *retraite* 'retirement' may be pronounced [ʁət]*raite* or [χt]*raite* (note the voice assimilation). While it is certainly true that the rhotic+obstruent sequence is more likely observed after a vowel (*la retraite* 'the retirement') than after a consonant (*ce*[t] *retraite* 'this retirement'), it does also occur utterance-initially ([χp]*rends du gâteau !* 'take some more cake!'). Likewise, European Portuguese has [χt]*ira a tampa!* 'remove the cover!'.

3.3.2 Obstruent+glide

Beyond the variation encountered in obstruent+liquid clusters, the main Romance innovation regarding branching onsets is the introduction of glides as second members. Examples are Fr. *p*[jɛ]*rre* 'stone', It. *p*[jɔ]*ggia* 'rain' and Rm. *m*[je]*re* 'honey'.

Glides have generally arisen from diphthongization of non-low vowels, but also from lenition of C+/l/ branching onsets in Italian. Independently of the etymological origin, distributional evidence in Italian indicates that the palatal glide occupies the dependent position in complex onsets (it freely combines with any following vowel and any preceding consonant). On the other hand, the velar glide is part of the nucleus of following mid-back vowels and the second member of a contour segment where the first member is a velar plosive: its appearance is restricted to these two contexts (Marotta 1988). Branching onsets with a palatal glide coming from C+/l/ are also found in Spanish (Malmberg 1961). Palatal glides are also shown to be part of the onset in Romanian (Chitoran 2002, 25) and French (Tranel 1987a, 115–118). However, C+[j] sequences are not characteristic of all Romance languages. In the Francoprovençal dialect of Hauteville (Martinet 1956, 67), dental plosives followed by *yod* are palatalized, while schwa anaptyxis occurs when other consonants precede *yod* ([ləjõ] 'lion').

3.3.3 Obstruent+liquid+glide

In (Standard) French, obstruent+liquid+glide (OLG) sequences are only possible in monomorphemic strings when the glide can be argued to belong to the nucleus. In this configuration OL+[w] (as in *trois* 'three') and OL+[ɥ] (as in *bruit* 'noise') occur, while OL+[j] is absent (Kaye/Lowenstamm 1984) (but OL+[j] does occur in Midi French, as witnessed by Durand/Lyche 1999). These facts may be illustrated by a process called syneresis whereby high vowels are pronounced as glides. Hence *li-er* 'join$_{INF}$', *lou-er* 'rent$_{INF}$', *su-er* 'sweat$_{INF}$' may be pronounced [lje], [lwe], [sɥe]. This gliding is impossible after obstruent+liquid clusters, though: *tri-er* 'sort$_{INF}$', *trou-er* 'make$_{INF}$ a hole', *influ-er* 'influence$_{INF}$' may only be pronounced [tχije], [tχuwe], *in*[flyɥe], *[tχje], *[tχwe], **in*[flɥe] being impossible. The reason for their ungrammaticality is the fact that syneresis produces consonantal glides, not vocalic first members of diphthongs. Hence [tχwa] is the pronunciation of *trois* 'three' (with a lexical diphthong [wa]) but cannot be the realization of *il troua* [tχuwa] 'make$_{3SG.PRET}$ a hole', as the onset cannot contain three segments.

Interestingly, OL+/ie/ sequences were monosyllabic (i.e. the result of syneresis) until the mid-17th century: *meurtrier* 'killer' and *sanglier* 'wild boar' were bisyllabic (*meu*[χtχje], *san*[glje]). In 1636, the French Academy condemned the innovative trisyllabic pronunciation *meu*[χtχije], *san*[glije] (Fouché 1952–1961, 740–742; Pope 1952, 192–193), which has nevertheless gained ground since then and is the only one possible today in standard French.

Just as in French, in Romanian [w] can be preceded by obstruent+liquid clusters, while *yod* cannot. Chitoran (2002, 25–26) therefore argues that non-palatal glides are part of the nucleus whereas *yod* is part of the onset. Similarly, in Italian OLG clusters with palatal glides are attested (*dipietriano* 'follower of the politician Antonio Di Pietro') but avoided by speakers who prefer using a different suffix to form a lexeme with the same meaning, i.e. *dipietrista*, in order to avoid the OLG sequence arising in word-formation (Thornton 2001). Finally, another reaction against OLG clusters is documented in a number of dialects in northern France (*oïl*): as in earlier stages of the standard language (Fouché 1952–1961, 740), obstruent+liquid sequences trigger anaptyxis when followed by a glide (e.g. *ouv*[ə]*rier*) in Guernsey Norman (Brasseur 1978), while *brouette* is documented as *b*[ə]*rouette* in western varieties (Anjou, Vendée, Poitou) (Duguet 1978).

3.4 Strong and weak onsets

As in many other languages (Ségéral/Scheer 2001a; 2008), onsets in Romance are split into two distinct groups according to their behavior in lenition and fortition: word-initial and post-coda onsets {#,C}__ are strong, while intervocalic onsets V__V are weak. To be complete, the weakness of intervocalic onsets is different from the weakness of coda consonants, which occur word-finally and before heterosyllabic consonants __{#,C}. Hence coda consonants __{#,C} are the exact reverse (mirror image) of strong onsets {#,C}__.

This situation is depicted under (4). Since the 19th century the two strong onsets have been referred to as the Strong Position, which contrasts with weak positions. The insight embodied by the Strong Position is especially pervasive and deeply rooted in Romance where it constitutes a major observation: its effects are visible in all Romance languages (Meyer-Lübke 1890, 418–419; Lausberg 1967, 44; Zauner 1944, 98).

(4) The five basic syllabic positions and their grouping

position	usual name		
a. #__V	word-initial	strong positions	
b. VC.__V	post-coda	strong positions	
c. V__.CV	internal coda	coda	weak positions
d. V__#	final coda	coda	weak positions
e. V__V	intervocalic		weak positions

This distribution is illustrated in Table 2.2 below by the evolution of Latin obstruents in French.[5]

Table 2.2: Evolution of Latin obstruents in French.

	a. #__		b. post-coda		c. coda		d. V__V	
p	'PORTA(M)	porte	'TALPA(M)	taupe	'RUPTA(M)	route	'RIPA(M)	rive
b	'BENE	bien	'HERBA(M)	herbe	'CUB(I)TU(M)	coude	'FABA(M)	fève
t	'TELA(M)	toile	CAN'TARE	chanter	'PLAT(A)NU(M)	plane	'VITA(M)	vie
d	'DENTE(M)	dent	AR'DORE(M)	ardeur	ADVE'NIRE	avenir	'CODA(M)	queue
k	'COR	cœur	RAN'CORE(M)	rancœur	'FACTA(M)	faite	LAC'TUCA(M)	laitue
g	'GULA(M)	gueule	AN'GUSTIA(M)	angoisse	'RIG(I)DU(M)	raide	*A'GUSTU(M)	août
f	'FAME(M)	faim	IN'FERNU(M)	enfer	'STEPH(A)NU(M)	Etienne	DE'FORIS	dehors
s	SER'PENTE(M)	serpent	VER'SARE	verser	'MUSCA(M)	mouche	'CAUSA(M)	chose [z]

Before a (heterosyllabic) consonant (Table 2.2, column c), i.e. in coda position, Latin obstruents are lost altogether. They are also weakened in intervocalic position (Table 2.2, column d), but do not always disappear: labial plosives spirantize, dental and velar plosives (the latter only if adjacent to a back vowel) as well as [f] are lost,

5 The Strong Position in French is described by, among others, Bourciez/Bourciez (1967, 122), Nyrop (1914, 303), Pope (1952, 96), Rheinfelder (1953, 151, 187). For the sake of exposition, final consonants are missing. The analysis is exposed at greater length in Ségéral/Scheer (2001a) and Scheer (2004, 122–124).

while [s] voices. By contrast, word-initially (Table 2.2, column a) and after codas (column b), all consonants show the exact same behavior: they appear unmodified in Modern French and have thus sailed through 2000 years of evolution without experiencing any damage.

The cross-linguistically pervasive split of consonants that ought to be onsets into strong and weak items cannot be captured by regular syllabic theory (the onset-rhyme-nucleus-coda model, e.g. Blevins 1995) where all consonants at hand are onsets and have no further syllabic identity. This model is unable to make a difference between the two onsets that are strong ({#,C}__) and one that is weak (V__V), except listing the former in the disjunctive statement {#,C}__. Just as the coda disjunction __{#,C} was reduced to a single and unique phonological object (the coda), the strong position disjunction {#,C}__ calls for a reduction to a single and unique phonological object.

But a non-disjunctive description of the Strong Position is not all that needs to be done: whatever this description looks like, it should be somehow the mirror image of the coda: it can hardly be accidental that the two disjunctions are mirror images of each other, and that they also produce opposite effects (strength vs. weakness).

Ségéral/Scheer (2001a; 2008) show that under the assumptions of the CVCV framework (or Strict CV, Lowenstamm 1996; Scheer 2004) both requirements have a straightforward solution. That is, consonants in strong position occur after an empty nucleus 0__ (where 0 represents the empty nucleus), while coda consonants are found before an empty nucleus __0. Intervocalic consonants on the other hand are not adjacent to any empty nucleus. Given its mirror properties with respect to the coda, Ségéral/Scheer (2001a; 2008) refer to the strong position, 0__, as the Coda Mirror.

3.5 Word-initial /s/+C sequences

Since the 2nd century CE, Latin word-initial /s/+C sequences of different etymological origin are known to have triggered prosthesis (Väänänen 1981, 47–48). The phenomenon is first documented in Pompei, i.e. before 79 CE. It seems that the prosthetic vowel first occurred only when the preceding word ended in a consonant and after a pause: Old French Alexis writes *la spuse* 'the wife' (< SPONSA(M)), but *ad espus*. Prosthesis was then lexicalized and occurred in all items of words that began with /s/+C in Latin (Bourciez 1946, 48). The prosthetic vowel only survived in Western Romance and Sardinian (Bourciez 1946, 156).

Prosthesis was typical of Proto-Romance and older stages of Romance languages, but progressively disappeared from the synchronic grammar in many varieties (Sampson 2010, 53–145, offers a detailed survey). For instance, French lexicalized prosthetic vowels and no longer repairs word-initial /s/+C clusters in loanwords (among recent loans are *sport* 'sport', *scander* 'chant$_{INF}$' etc.). In child language and in low registers, however, prosthesis may still appear (Plénat 1993, 160). Walloon on the other hand still synchronically carries out sandhi-driven repair of /s/+C sequences, interestingly by anaptyxis instead of prosthesis (Francard 1981; Burov 2013, 237): compare the word *école* after C-final and V-final words in [ɛnsiˈkɔl] (cf. Fr. *une école* 'a school') vs. [lisˈkɔl] (cf. Fr. *l'école* 'the school'). The anaptyctic vowel, [i] or [y] according to the variety, is inserted only when /s/ cannot be syllabified in sandhi.[6] In addition to Gallo-Romance, Gallo-Italic dialects spoken in Emilia-Romagna and Piedmont also still carry out a sandhi-driven repair of /s/+C and other heterosyllabic word-initial sequences by regular prosthesis: [spetʃ] 'mirror', [kwatraspetʃ] 'four mirrors' (Zörner 1989; Repetti 1997).

Ibero-Romance varieties are characterized by the impossibility of /s/+C clusters in initial position, independently of sandhi, although they show inconsistent patterns under the influence of the standard language. In Spanish *un*[a]*strella* 'a star' is a quite common pronunciation, but it competes with the less colloquial *un*[ae]*strella*. Note that a lexical /e/ cannot undergo deletion: we have *un*[ae]*tapa* 'a step', not **un*[a]*tapa*.[7] This restriction also holds for most Occitan varieties, although some Occitan and Ligurian dialects spoken in the Alpes-Maritimes display unrepaired /s/+C clusters at the beginning of the word (Dalbera 1994, 69).

Finally, Italian and Romanian allow for word-initial /s/+C clusters. Romanian features two types of sibilants in such clusters, alveolar /s/ and palatal /ʃ/. They agree in voicing with following plosives, while both voiced and voiceless sibilants are attested before sonorants (Chitoran 2002, 13). In Italian only the alveolar sibilant is attested, which also agrees in voicing with the following obstruent and is voiced before sonorants (Lepschy/Lepschy 1981, 83, among others). /s/ palatalizes before selected obstruents in some Italo-Romance varieties but a consistent pattern cannot be identified. In some dialects, e.g. in Campanian, coronals are excluded from palatalization, while in others, e.g. in Abruzzese, /s/ palatalizes only before coronals (eastern) or before all consonants (Aquilano).

4 Nuclei

4.1 Length and syllable structure

Notwithstanding the loss of vowel quantity that occurred in Vulgar Latin and thus affected all Romance languages without exception, in stressed nuclei phonologically

6 French words of recent introduction like *scarlatine* do not trigger anaptyxis (Francard 1980, 197, fn. 49, quoted from Sampson 2010, 130). The Walloon pattern may thus be better described as an alternation of lexically affiliated floating vowels with zero, rather than as an insertion of vowels that are absent underlyingly.

7 This may seem less clear in European Portuguese where [#ʃC-] has almost replaced the conservative variant [#iʃC-] preserved in Brazilian Portuguese. The liaison realization of *s* in *a*[zəʃ]*colas* 'the schools', however, attests that there is still a schwa-like vowel in word-initial /s/+C clusters.

long vowels may be found in many northern Italo-Romance dialects (PANE(M) > [paːn] 'bread', PANNU(M) > [pan] 'cloth') as an effect of Open Syllable Lengthening (OSL) and degemination. The process of OSL induced phonetic length on vowels in open syllables (PANE(M) > [paːne]) which is absent from syllables containing the first part of a geminate (PANNU(M)). After degemination that occurred in all Romance languages, except for the Italian peninsula below the La Spezia–Rimini line, this length was phonologized in northern Italo-Romance dialects. It distinguishes an important number of words, in particular after final vowel loss (Loporcaro 2015, 61).

Beyond vowel length in northern Italo-Romance dialects, the OSL-induced contrast between nuclei in open and closed syllables has a number of other consequences in different systems, where it yielded a differentiation of vowel quality in open and closed syllables. Vowel differentiation concerned French, Vegliote Dalmatian, and many Italo-Romance dialects in particular in the northern area (von Wartburg 1950). One case in point is a subgroup of the upper southern dialects that includes southern Abruzzi, non-Salentine Apulia, northern and central Lucania and northern Calabria through Molise (Rohlfs 1966, 30; Savoia 2015; Passino/Pescarini 2018; Loporcaro 1988; Carosella 2005, among others). In these dialects, tonic open syllables display a richer inventory of vowels, in particular tense vowels undergoing lengthening or breaking under sentence stress, while closed syllables are only able to host a smaller inventory of vowels that do not undergo lengthening, typically lax vowels or light diphthongs. The phenomenon, known as differentiation by position, arose in diachrony but also characterizes synchronic inventories. Most noteworthy, in this area, open syllables of proparoxytonic words pattern with closed syllables (cf. references quoted above). An example taken from the dialect of San Valentino (Passino/Pescarini 2018) is shown in Table 2.3.

Table 2.3: Vowel differentiation by position in Sanvalentinese.

Open syllable		Closed syllable
Paroxytones	Proparoxytones	
pe̯ite < PĔDE(M)	ˈmɛtərə < MĔTERE	ˈpɛttə < PĔCTU(M)
nou̯və < NŎVU(M)	ˈrɔtələ < RŎTULU(M)	ˈkɔllə < CŎLLU(M)

This pattern is very rare, as is vowel-breaking under sentence stress (which is attested under different conditions in Gallo-Italic, cf. Carpitelli 1995 for the dialect of Antona, and Gallo-Romance, cf. Léonard 2000 for the Maraîchin dialect). The area featuring vowel differentiation by position and vowel-breaking under stress coincides with the area described in 3.3.1 where word-internal *muta cum liquida* display a heterosyllabic parse. This can hardly be a coincidence and a possible interpretation sees the processes as driven by the action of a metrical template consisting of a stressed syllable followed by two CV slots, the same template yielded by the Latin stress

algorithm[8] (Passino 2015b). The argument runs as follows: diachronically, the different vocalic qualities depend on vowel-length differences induced by the application of vowel lengthening in stressed open syllables (OSL). Instead of the open/closed syllable dichotomy relevant in other areas, in this area the application of this process was regulated by the template mentioned, which acted as a minimal and maximal target. As shown in (5) with data from the dialect of Bisceglie (de Gregorio 1939), where the stressed CV is indicated in bold, paroxytonic words are the only subminimal words with respect to the template. Since this was the only case in which the template was not respected, OSL applied eventually yielding a differently colored vowel in the evolution of the dialect. The reason why the vowel quality of open syllables of paroxytones stands out with respect to the vowel quality of open stressed syllables in proparoxytonic words and in closed stressed syllables is clearer in this perspective. It also becomes clear why vowels preceding *muta cum liquida* pattern with these latter cases:

(5) Subminimal word Templatic application of OSL[9] Evolution of V length to quality

C	**V**	C	V	>	**C**	**V**	C	V	C	V	>	**C**	**V**	C	V
C	A	N	E		C	A		A	N	E		k	ɔ	n	ə

Words respecting the template No OSL application, no effects on V quality

C	**V**	C	V	C	V	>	**C**	**V**	C	V	C	V
B	A	R		B	A		v	a	r		v	ə
R	A	D	I	C	A		r	a	t	ə	k	ə
L	A	T		R	O		l	a	t		r	ə

Synchronically, the effect of the same template may be posited (cf. Passino 2015b for further evidence) to explain why vowel breaking (or tonic lengthening) applies only to open syllables in paroxytonic words under sentence stress, which in these dialects is final. Length has been transformed into a distinct vowel quality, so paroxytonic words are still subminimal but phrase-internally they satisfy the template in *sandhi* as shown in (6a), where the paroxytonic word [ˈkoʧə] is followed by the clitic *lu*. Proparoxytonic words, words with internal *muta cum liquida* or other clusters satisfy the

8 In the CVCV syllabic framework some of the positions may remain empty.

9 The analysis of open syllable lengthening according to which the melody of the stressed vowel spreads onto an empty slot has been first proposed from the perspective of standard syllable theory, where stress is said to project an empty skeletal slot (Chierchia 1986) or mora (Repetti 1991). In CVCV theory a minimal empty slot is a CV unit, since according to the tenets of the theory a V position always entails a C position and vice-versa. The idea underlying this proposal is the same in both the CVCV and standard perspectives.

template lexically. Only paroxytonic sentence-final words are subminimal. By vowel breaking (or in some dialects tonic lengthening) they satisfy the template, as in (6b), where [ˈkoʧə] has undergone diphthongization to [ˈkeuʧə], so vowel breaking under sentence stress as well as *muta cum liquida* heterosyllabicity are epiphenomena of a metrical template requirement, as exemplified with data from the dialect of Vasto (Rohlfs 1966, 30), where ˈˈ indicates sentence stress:

(6) a. me ˈkoʧə lu ˈˈstuoməkə
DAT.1SG burn$_{3SG.PRS}$ DEF.ART.M.SG stomach
'It burns, my stomach.'
b. lu ˈstuoməkə me ˈˈkeu̯ʧə
DEF.ART.M.SG stomach DAT.1SG burn$_{3SG.PRS}$
'My stomach burns.'

4.2 Diphthongs

The widespread monophthongization of Latin diphthongs has not precluded the emergence of new diphthongs all over the Romance territory, which originate in a number of distinct phonological processes (cf. Sánchez Miret 1998, 77–80, for a survey of Romance diphthongization).

As was mentioned in 3.3.2, in many Romance languages the first member of opening diphthongs was reanalyzed as part of the onset (ŏvu(m) > Sp. *huevo* > [gw] *evo* 'egg'). In some cases – most noteworthy Romansh and Francoprovençal – glides in closing diphthongs also hardened to plosives (TELA > *tejla* > *tegla* 'cloth', Kamprath 1987; Krier 1985; Montreuil 1999).

Some other interesting aspects concerning diphthongs are on record in Romance. In Romanian, for instance, alongside diphthongs with close vowel onset glides, there are also mid-vowel onsets ([o̯a], [e̯a]). Romance diphthongs may be rising, falling, and in some cases also centering. Rising and falling diphthongs may be found in the same language (Vegliote Dalmatian, upper southern Italo-Romance dialects, Romansh). The peculiar phenomenon of surface diphthongization in open syllables under sentence stress in an upper southern Italo-Romance area has been discussed in 4.1 and exemplified in (6).

Falling diphthongs in closed syllables are not allowed in Ibero-Romance, except when the coda is weightless /-s/ (Spanish *seis* 'six', Portuguese *mais* 'more', *sais* 'salt$_{PL}$'), but they are not rare elsewhere, Romansh, Francoprovençal, and Vegliote Dalmatian being cases in point. Diphthongs in closed syllables can be rising, falling, or both, metaphonic, non-metaphonic, or both. Rising and falling diphthongs can be distributed according to the type of syllable (i.e. the metaphonic diphthongs in Casalincontrada: TRAVE(M) > [ˈtraːvə] 'beam', metaphonic [ˈtreivə], PASSU(M) > [ˈpassə] 'step', metaphonic [ˈpjessə], cf. De Lollis 1890–1892) but diphthongs in closed

syllables are not restricted to rising diphthongs (i.e. Lombard [tɛi̯mp] 'weather', Apulian [ˈvuu̯kkə] 'mouth'; Romansh [dai̯nt] 'tooth', cf. Savoia 2015).

5 Codas

5.1 Word-internal codas

5.1.1 The situation across Romance

Unlike simplex onsets, where few or no segmental restrictions are observed, the coda frequently imposes restrictions on sonority and place of articulation. Latin, however, did not impose any restrictions of this kind: both obstruents and sonorants of different place of articulation could be a coda in this language (Marotta 1999, 302; Cser 1999).

A very general evolution is found in all of Western Romance where Latin geminates (whose left member stands in coda position) degeminate: cf. CUPPA(M), GUTTA(M), VACCA(M), OSSU(M) > Por. *copa* 'goblet', *gota* 'drop', *vaca* 'cow', *o*[s]*o* 'bone'.

In a number of Romance languages like Spanish, Portuguese, and Italian obstruent codas are either not permitted or marginal: they appear only in formal registers, learned words, or loans, are neutralized or suffer from other restrictions, and undergo a number of different repairs, like obstruent voicing neutralization in Spanish (Alonso 1945; Hualde 1989; Colina 2012, 143–145), vowel epenthesis in Portuguese (BPor. *enig*[i]*ma*, EPor. *enig*[ə]*ma*), loss of the coda consonant and compensatory lengthening of the following consonant (often referred to as assimilation) (*pragmatica* > *prammatica* 'pragmatics'), or epenthesis (*stricnina* > *stricchinina* 'strichnine') in Italian (Porru 1939).

If we leave aside those marginal cases, Romance languages show a strong general tendency to impose conditions on codas, restricting the segments licensed in this position to the three sonorants /N/, /l/, and /r/ plus the fricative /s/ (cf., e.g., Baroni 1993 and Marotta 1995 for Italian). Obstruent codas are licensed only if they form the first part of geminates (Itô 1986): cf. Italian where plosives in coda are lost, driving compensatory lengthening of the following consonant (often referred to as assimilation) (LACTE(M) > *latte* 'milk', ADRIPARE > *arrivare* 'arrive$_{INF}$', OBTURARE > *otturare* 'block$_{INF}$', SCRIPSI > *scrissi* 'write$_{1SG.PRET}$'.

Within this common pattern, each system shows more specific realizations and additional phonemes in coda position. Thus, Castilian Spanish also admits /θ/ and /d/, even though the latter has a large array of variants comprising [d], [t], [ð], [θ] and zero (Hualde/Eager 2016). Also, liquids lenited to *yod* and neutralized in some Spanish dialects. The lateral is velarized in Catalan and Portuguese and many northern and southern Italo-Romance dialects. A number of southern and American Spanish varieties have debuccalized /s/ (*pasta* > *pa*[h]*ta*), the result of which may trigger tense/lax contrasts

(along with vowel harmony) as in Eastern Andalusian (e.g. [poko]/[pɔkɔh] *poco/pocos* 'little$_{SG}$/few$_{PL}$'; Zamora Vicente 1979, 290–296).

Another rather general characteristic of Romance is the homorganicity of nasal-obstruent sequences (Bolognese being a noteworthy exception, i.e. [paŋdg] 'rat'). Further assimilations of the type [mb] > [mm], [nd] > [nn] also took place in Italo-Romance, Catalan, Aragonese, and (as regards [mb]) Castilian.

In French, broadly speaking all consonants in internal codas save /r/ have been eliminated in the evolution from Latin to Middle French. More specifically, when internal codas were eliminated, their segmental properties were typically transferred to their (left-hand) environment. Hence coda nasals disappeared but their nasality was shifted to the preceding vowel (GAMBA(M) > *jambe* [ʒãb] 'leg'). Coda velars were reduced to *yod*, which then combined with the preceding vowel (FACTU(M) > *fait* [fɛ] 'fact'). Laterals in internal coda position were velarized and vocalized to [w], and eventually combined with the preceding vowel (TALPA(M) > *taupe* [top] 'mole'). Only labial and dental obstruents disappeared without a trace (RUPTA(M) > *route* 'road', PLAT(A)NU(M) > *plane* 'plane'), /s/ producing a compensatory lengthening on the preceding vowel (TESTA(M) > *tête* 'head', cf. Gess 2006 for the status of this length, which did not catch on). The modern language, however, allows coda consonants introduced by loans (from Latin or other sources): *fa*[kt]*eur* 'postman', *Stali*[ng]*rad* (Metro station in Paris), *fa*[ls]*ifier* 'falsify$_{INF}$', *re*[st]*er* 'stay$_{INF}$' etc.

5.1.2 Codas that look like onsets

In (southern) varieties of mainland French, ATR values of mid vowels are in (strict) complementary distribution (Durand/Slater/Wise 1987; Durand 1990, 24–27, cf. also Dell 1973, 209; Morin 1986; Tranel 1987b, the phenomenon is called *Loi de position* or Closed Syllable Adjustment): +ATR in open syllables *b*[e]*tise* 'stupidity', *f*[o]*lie* 'madness', *g*[ø]*ler* 'bawl$_{INF}$'), -ATR in closed syllables (*b*[ɛ]*te* 'stupid', *f*[ɔ]*lle* 'mad$_F$', *g*[œ]*le* 'gob'). This also extends to the position before consonant clusters: *m*[e]*trique* 'metric' vs. *al*[ɛ]*rte* 'alert', *se v*[o]*trer* 'sprawl$_{INF}$' vs. *div*[ɔ]*rcer* 'get$_{INF}$ divorced', *p*[ø]*pler* 'inhabit$_{INF}$' vs. *s*[œ]*rfer* 'surf$_{INF}$'. ATRness of mid vowels is thus a diagnostic of syllable structure: -ATR before final consonants shows that these are codas, and sequences behave as expected according to their sonority slope: -ATR before sonorant+obstruent, obstruent+obstruent and sonorant+sonorant sequences confirms that these are coda-onset interludes, while +ATR before obstruent+sonorant clusters show that they are branching onsets.

Interestingly, schwa misbehaves: in open syllables when the following vowel is a schwa, -ATR items occur to its left: *b*[ɛ]*tt*[ə]*rave* 'beetroot', *p*[ɔ]*t*[ə]*rie* 'pottery'. Schwa thus behaves as if it were not there. Even more interesting is the fact that whether schwa is actually pronounced or not is irrelevant: forms without pronounced schwa also show -ATR vowels: *b*[ɛtʁ]*ave*, *p*[ɔtʁ]*ie*.

Its -ATR value shows that the first vowel of these items is checked despite the apparently well-formed branching onset [tr] to its right. The only possible conclusion is that the sequences at hand are coda-onset sequences. There is thus a contrast between secondary obstruent+sonorant sequences (which are created by the non-pronunciation of a schwa) and primary obstruent+sonorant clusters (which cannot be pronounced with a schwa in their midst): the latter are branching onsets, while the former are coda-onset interludes.

One may think of an analysis whereby the two consonants have failed to resyllabify in absence of the schwa: [tr] is a good branching onset but, when created by schwa loss, does not engage in this close relationship. This cannot be true, though, since we know that the [t] *did* resyllabify: it closes the preceding syllable and hence creates a coda-onset sequence. Its first consonant, [t], was thus an onset in the presence of the schwa and has become a coda in its absence. In a language where regular syllabification of obstruent+sonorant clusters produces branching onsets there is no way to achieve a coda-onset syllabification of the same clusters when resyllabification occurs. Therefore, the clusters in *b*[ɛtʁ]*ave*, *p*[ɔtʁ]*ie* cannot be coda-onset sequences. If they were, they would violate the sonority specification of this type of cluster anyway: only clusters of falling or plateau sonority slope qualify.

It must thus be concluded that the sequences in question are neither branching onsets nor coda-onset interludes. The only logical possibility that is left, then, is to consider them as two independent onsets – exactly what they were before schwa was dropped. That is, resyllabification fails indeed when schwa is left unpronounced: its non-pronunciation is the only event that occurs, which leaves an empty nucleus. This is shown under (7).

(7) *p*[ɔ]*terie*

a. pronounced with schwa

```
  σ   σ   σ
 /|  /|  /|
O N O N O N
| | | | | |
x x x x x x
| | | | | |
p ɔ t ə ʁ i
```

b. pronounced without schwa

```
  σ   σ   σ
 /|  /|  /|
O N O N O N
| | | | | |
x x x x x x
| | |   | |
p ɔ t   ʁ i
```

Relevant in this context may be the experimental literature that has tested the phonetic properties of sequences of sounds that belong to the same morpheme and are lexically adjacent, as opposed to the same sequence when it is heteromorphemic. Spinelli/McQueen/Cutler (2003) examine liaison consonants as opposed to word-initial consonants (/r/ in *dernier oignon* 'last onion' vs. *dernier rognon* 'last kidney'), while Fougeron/Steriade (1997) contrast word-initial /dr/ with /d#r/ produced by schwa deletion at the end of the first word (*pas drôle* 'not funny' vs. *pas d'rôle* 'no role'). Both studies find that although the respective sequences could/should be homophones, they are actually not: the phonetic signal systematically carries information

that distinguishes monomorphemic and heteromorphemic items (schwa was completely absent, but [d] had greater linguopalatal contact and a longer occlusion in *pas d'rôle* than in *pas drôle*, liaison consonants are shorter than word-initial consonants).

Regarding the liaison case, however, Shoemaker (2009) and Shoemaker/Birdsong (2008) show that Spinelli/McQueen/Cutler (2003) are wrong in concluding that the presence of a systematic difference in the phonetic signal is used by speakers in order to disambiguate the two sequences. Shoemaker's experimental results demonstrate that speakers are unable to correctly recognize homophonous-looking but in fact phonetically distinct sequences like *un air* 'a song' and *un nerf* 'a nerve'. They ignore the phonetic information present in the signal in spite of the pragmatic pressure to tell the two sequences apart. Shoemaker thus shows that the phonetic signal is irrelevant for phonological analysis since it does not tell us anything about what is actually perceived. Do Carmo-Blanco et al. (2019) show that the situation may be even worse: their EEG-based study documents that potential homophones like *l'allocution* 'the allocution' and *la locution* 'the locution' are actually treated differently by the brain, but not told apart by speakers.

Finally, the situation regarding correct discrimination of alleged homophones in Fougeron/Steriade's (1997) study is unclear: stimuli come from two speakers (both Parisian) and participants were able to tell apart *pas d'rôle* and *pas drôle* when exposed to the recording of one speaker, but not when listening to the recording of the other speaker.

What does this experimental evidence suggest in the case of Fr. *p*[ɔtʁ]*ie* 'pottery'? The question here is not related to any allegedly homophonous sequences that are either mono- or heteromorphemic. As in Fougeron/Steriade's case, schwa is completely deleted and it may well be the case that the phonetic signal contains information identifying the [t-ʁ] cluster as being different from a [tʁ] cluster that is not the result of schwa deletion (like in Fr. *motrice* 'railcar' or *votre* 'your'). This phonetic information may well be the reason for the ensuing syllabification of [t-ʁ] as a sequence distinct from a branching onset, which in turn causes the effect on the preceding vowel. But the syllabification in question is then precisely the one shown in the conclusion that was reached under (7) in absence of experimental evidence: the phonetic absence of schwa does not lead to resyllabification and the only thing that happens is, precisely, the phonetic absence of schwa, with syllable structure remaining untouched. That is, when schwa is deleted its nucleus remains and is empty. It is this empty nucleus that causes the preceding vowel to be -ATR.

This state of affairs raises the question of what it means for a vowel to be in a closed syllable. There seem to be two "closed syllables" in the relevant southern varieties of French: a vowel is checked when followed by a true coda-onset interlude (in primary sequences: *div*[ɔ]*r.cer*), but also when followed by an empty nucleus (in secondary sequences: *p*[ɔ]*t∅rie*). This disjunction seems awkward since it fails to express the generalization, i.e. to provide a single reason for the occurrence of all -ATR vowels. The only alternative is to generalize the empty nucleus definition: in

these systems -ATR vowels occur in closed syllables and a closed syllable is one whose vowel is followed by an empty nucleus. Hence sonorant+obstruent sequences also host an empty nucleus: they identify as sonorant+∅+obstruent (*divorcer* is thus *divor∅cer*).[10]

5.2 Word-final consonants

5.2.1 Syllabic status

Cross-linguistically, word-final consonants either behave as codas (i.e. pattern with internal codas) or they do not (Côté 2011a; Scheer 2004, 417–418, 625–664; 2012). Diagnostics for their codahood are their own behavior (they do or do not show coda effects) and the behavior of the preceding vowel (which does or does not show closed syllable effects). The codahood of word-final consonants is a parametric property and hence needs to be established for every language in its own right.

The traditional way of implementing the variable syllabic status of word-final consonants is through extrasyllabicity: word-final consonants are said to be extrasyllabic when they do not behave as codas. In case they do, they are not extrasyllabic and hence undergo regular syllabification, which parses them as codas. When extrasyllabic, they remain unparsed upon syllabification and are later adjoined to some constituent after coda-based processes have applied: cf. e.g. Kenstowicz (1994, 274–275) and Jacobs (1995) for Old French.[11]

An alternative to the extrasyllabic analysis, where in syllabic terms word-final consonants are either codas or nothing, holds that they are either codas or onsets. Literal implementations of this view are found in Piggott (1991; 1999; 2003) and Rice (2003): in languages where word-final consonants pattern with codas, they are syllabified as codas (which are the final syllabic constituent of the word), while in languages where they do not follow the behavior of codas they are onsets of an empty nucleus.

A non-literal implementation of this insight is found in Strict CV Phonology where syllable structure boils down to a sequence of strictly alternating non-branching

10 The argument based on southern French ATR alternations is made at greater length in Scheer (2004, 527–530; 2015, 44–48, 109–113). Space limitations preclude further exploration of Strict CV Phonology (Lowenstamm 1996; Scheer 2004) where the closed syllable is a function of the emptiness/contentfulness of the following nucleus: a vowel is located in a closed syllable iff it is followed by a (governed) empty nucleus (e.g. Scheer 2015, 122–125).

11 The older literature also features the appendix (Fudge 1969; Halle/Vergnaud 1980; Kenstowicz 1994, 260–261), a syllabic constituent designed to host consonants at word edges that must not (final consonants that do not behave as codas) or cannot (initial consonants of unsyllabifiable clusters such as /#rt/) be regular onsets or codas. The appendix is essentially a version of extrasyllabicity, except that there is no adjunction of extrasyllabic consonants to some constituent after the application of coda processes since they already belong to a constituent.

onsets and non-branching nuclei: here all word-final consonants are onsets of a (final) empty nucleus. What makes the difference between the traditional notions of onset and coda is the lateral relationship that consonants entertain with their nucleus: they are onsets if this nucleus is filled, but codas when it is empty. Word-final empty nuclei may parametrically have either status. That is, the coda- or onsethood of word-final consonants depends on the parametric status of the final empty nucleus (Scheer 2004, 625–664; 2012; Scheer/Ziková 2010).

Following the coda vs. onset view, we illustrate the parametric variation at hand in Romance, where some languages fall on the coda side, while others treat final consonants as onsets.

5.2.2 Final consonants are codas

In the Italian native lexicon, final consonants are not allowed (cf. Devoto 1961, among others). A number of function words allow coronal sonorants in final position (*per* 'for', *con* 'with', *il* 'the') and final consonants of all kinds occur in loanwords (cf. Devoto 1961; Passino 2008, among others). This indicates that they sit in a closed syllable and hence word-final consonants are codas. Final consonants show a pattern of lengthening before vowels in derivation and phrasal domain indicating that they are treated as codas. Gemination can be interpreted like a strategy that avoids resyllabification of codas and provides them with a following onset that licenses them. Bafile (2003) offers detailed evidence, and focuses on central and southern Italo-Romance varieties where word-final consonants also behave as codas.

Spanish word-final consonants, like internal codas, are restricted to sonorants – /-l/, /-n/, and /-ɾ/ (*papel* 'paper', *camión* 'truck', *amor* 'love') – as well as to the obstruents /-s/, /-θ/ (*mes* 'month', *pez* 'fish'), /-x/ (*reloj* 'watch') and /-d/ (*virtud* 'virtue'), which can be realized as [ð], [θ], [t] or be deleted (Colina 2012, 145; Hualde/Eager 2016). Hualde (1999) describes the behavior of word-final consonants in non-assimilated recent loans. Debuccalization of /s/ and liquid gliding in internal codas which occur in a number of Spanish dialects spoken in southern Spain and Latin America also apply to word-final consonants (cf. Núñez-Cedeño 1997, among others). Likewise, among the varieties of Occitan, the segments allowed in final position in Provençal obey the same distributional restrictions as internal codas, allowing only [j w r s] and nasals homorganic to the following consonants (Sauzet 2004, 35; ↗22 Occitan). Italian, Spanish, and Occitan thus feature processes that target true codas, i.e. both internal codas and word-final consonants that have coda status.

These word-final codas, however, exhibit specific properties, among them metrical weight. Occitan final sonorants count for weight and may undergo a number of lenition processes typical of codas, while obstruents may be considered onsets of an empty nucleus (Sauzet 2004). Although this remains a subject of debate (cf. Piñeros 2016), it has also been argued since Harris (1983) that Spanish is a quantity-sensitive language, final codas, except /-s/, generally attracting stress. The same holds for Portuguese (Carvalho 1989b; Wetzels 2007). European Portuguese, in particular, adds to metrical weight two other phenomena – vowel reduction and resyllabification – that support a finer analysis of the syllabic status of post-vocalic segments, and challenges the commonly assumed representations of complex rhymes. Leaving aside binding-based models like Levin's (1985) X-bar theory of the syllable, these allow for two possibilities only: VV vs. VC (or VcV vs. VCv in Strict CV, c and v being empty positions). However, Portuguese exhibits four types of rhymes according to the criteria in Table 2.4 (cf. Carvalho 2011).

Table 2.4: Portuguese rhymes.

	I /V/(+/s/)	II /V/+/I U N/	III /V/+/l/	IV /V/+/ɾ/
a. Word-final stress	–	+	+	+
b. Vowel reduction	+	–	–	+
c. Resyllabification	+	–	–	+
d. ± /s/	+	+	–	+

Paroxytones ending in [V(s)] (e.g. *mata*, *matas* 'forest$_{SG/PL}$') and oxytones ending in [Vj], [Vw], [Vl], [VN] and [Vr] (*matai* 'kill$_{IMP.PL}$', *calhau* 'pebble', *casal* 'couple', *maçã* 'apple', *matar* 'kill$_{INF}$') are the unmarked stress patterns. Pretonic [V], [Vs] and [Vr] undergo vowel reduction (*m*[u]*rar* 'inhabit$_{INF}$', *g*[u]*star* 'like$_{INF}$', *c*[u]*rtar* 'cut$_{INF}$'), as opposed to [Vl], [VU] (*c*[o]*itado* 'poor guy', *l*[o]*uvar* 'praise$_{INF}$') and [Vl/N] (*v*[o]*ltar* 'go$_{INF}$ back', *c*[õ]*ntar* 'relate$_{INF}$'). Final /s/ and /ɾ/ are resyllabified (*nó*[z]*amamos* 'love$_{1PL}$', *ma*[ɾ]*alto* 'high sea', but not so for [I], [U] (*v*[aɪ̯^{j}] *agora* 'go now', *m*[aʊ̯^{w}] *amigo* 'bad friend') or /l/, /N/ (*s*[ɑɫ] *amargo* 'bitter salt', *l*[ẽ] *azul* 'blue wool'). All those rhymes except /Vl/ ([Vɫ] with a strongly velarized vowel) can be closed by /s/ (which is often the plural or the 2nd person singular suffix): *matas* 'forest$_{PL}$, kill$_{2SG}$', *vais* 'go$_{2SG}$', *maus* 'bad$_{PL}$', *lãs* 'wool$_{PL}$', *mãos* 'hand$_{PL}$', *mares* 'sea$_{PL}$'.

If only two main types of complex rhymes are assumed to exist, the above differences should be seen as an effect of the intrinsic content of features, that is of mere stipulations, as the same segments do not behave alike from language to language: in Spanish, for example, types II and III can be argued to be non-existent, /I U l N ɾ/ (plus /θ~d/) all belonging to type IV. The reasons for the behavior of European Portuguese post-vocalic segments are thus to be searched for within syllable structure.

The autosegmental formalism opens a perspective for a straightforward solution. Let us assume that the four types of syllables follow from how the O(nset)R(hyme)-tier and the feature tier interact through a skeleton of pure timing units (x):

(8)
```
a. R1      b. R1          c. R1  O  R2      d. R1  O  R2
   |          |\              |\|              |  |  |
   x          x   x           x  x              x  x  x
   |          |   |           |  |              |  |
   V          V  I/U/N        V  ł              V  r
```

(9)
```
a. R              b. R     O  R ...
   |                 |   ..  |
   x     x           x  x     x
   |     |           |  |     |
   V    s>ʃ          V s>z    V
```

These configurations permit four generalizations which account for the data in Table 2.4. First, if only rhymes anchored to x-slots count for quantity, unmarked stress is arguably triggered by the penultimate R-x association; stress thus falls on R_1 in (8b–d). Second, only "light", i.e. non-branching, rhymes are likely to undergo vowel reduction, which therefore does not apply to (8b, c).[12] Third, segments unassociated with R remain or are syllabified as onsets before /V/, as in (8d) and (9b) respectively. Finally, /s/, which can occur after any anchored R, as in (8a, b, d), remains unsyllabified before a consonant and word-finally since its x-slot does not associate with any syllabic position, as shown in (9a); it does, however, associate with a following empty onset, i.e. before a vowel, as in (9b). ([ʃ] and [z] are the two respective allophonic realizations of /s/.)

Thus, only (8d) represents "true" onsets. In fact, among the commonly accepted codas of European Portuguese, /r/, and only /r/, behaves like any consonant followed by a schwa: cf. *bate* 'beat$_{3SG}$', *pague* 'pay$_{3SG}$', *passe* 'pass$_{3SG}$', *come* 'eat$_{3SG}$', *vale* 'valley' etc. Furthermore, unlike (8c) and (9a), (8d) generally involves vowel epenthesis: *mar*[ᵊ], *bat*[ᵊ], *pagu*[ᵊ], *pass*[ᵊ]. It is worth noting that <-z> (= Sp. /θ/), albeit phonetically identical to <-s> in modern Portuguese, should be viewed as an instance of (8d), not of (9a). This dispenses with the need for a cyclic approach to pluralization (*paz* 'peace' → *pazes* 'peace$_{PL}$', along with *mar* 'sea' → *mares* 'sea$_{PL}$').

5.2.3 Final consonants are onsets

In Proto-French (the language spoken in the north of France that was already different from Late Latin but also from Occitan and Francoprovençal, before the onset of written testimony) and Old French (the same language a little later, now documented by written testimony), word-final consonants were onsets: preceding vowels freely

12 Final /Vr/ syllables escape vowel reduction as well. This is easily explained within Carvalho's (2017) account of sonority categories but will be left out due to lack of space.

diphthongized and word-final consonants did not participate in coda lenition (loss of /s/, vocalization of /l/).

In the evolution from Latin, tonic vowels in open syllables diphthongized in Proto-French. Unlike in other Romance languages, diphthongization affected all vowels (e.g. Lausberg 1969, 152; Zauner 1944, 49–50).[13] It also occurred before word-final consonants, even when they were already word-final in Latin (hence there is no way to set up an analysis whereby diphthongization was carried out before the loss of the final vowel). Items without final vowel in Latin include MEL > OFr. *miel* 'honey', FEL > OFr. *fiel* 'bile', QUID > OFr. *quei* (ModFr. *quoi*) 'what', APUD HOC > OFr. *avuec* (ModFr. *avec*) 'with' (e.g. Bourciez/Bourciez 1967, 65–84). At the time when the different waves of diphthongization occurred, word-final consonants were thus onsets.

The same conclusion is reached when looking at consonantal lenition that occurred later on in internal codas but left word-final consonants unaffected: the loss of /s/ (followed by compensatory lengthening of the preceding vowel) and /l/ vocalization which are observed in the Old French period. Examples are TESTA(M) > OFr. *teste* > ModFr. *tête* 'head' for the former, and TALPA(M) > OFr, ModFr. *taupe* 'mole' for the latter. Typical alternations in Old French (preserved with analogical leveling here and there in Modern French) triggered by the plural marker *-s* illustrate the syllabic status of word-final consonants: in *cheval/chevau-s* 'horse$_{SG/PL}$' the lateral remains unvocalized in word-final position but vocalizes in the plural because it comes to stand before the /-s/, i.e. in an internal coda (Gess 1998). Also, unlike in internal codas, the final /-s/ itself is not deleted.

It is worth noting that the opposite path is also attested: in Catalan lenition affected final /n/ and /r/ (VINU(M) > *vi* 'wine', DURU(M) > *dur* [du] 'hard') but left their internal counterparts unchanged (PUNCTA > *punta* 'tip', PORTA > *porta* 'door'). /s/ and /l/, however, behave alike in the two positions.

Finally, it needs to be mentioned that since the late 12th century, phonological processes applied across word boundaries in Old French, giving rise to external sandhi. The behavior of word-final consonants provides further illustration of their onset status: they were pronounced before a pause and before a vowel (*apres*, *petit*, *vif*, *avec*; in the latter context fricatives were also voiced: *vi*[v], *apre*[z]), but were lost when the following word was consonant-initial (*apre*, *peti*, *vi*, *ave*) (Nyrop 1914, 308–309). The crucial diagnostic here is their behavior before a pause (pronounced), as opposed to when they are followed by a consonant (eliminated). In true word-final position before a pause, i.e. when uninfluenced by following words, word-final consonants remain unaffected by coda lenition. Elsewhere, their syllabic status depends on the following word (resyllabification): onset before vowel-initial words, coda before consonant-initial words.

13 Only Ī and Ū appear not to participate in diphthongization, but in fact they may also have undergone this process, producing [ij], [uw] which remained invisible in writing (Straka 1979, 233).

5.2.4 Word-final devoicing

In a number of past and present Romance languages, word-final obstruent devoicing is active: Catalan, Occitan, Old French, Friulian, Romansh, Walloon, and other Gallo-Romance and Gallo-Italic varieties (Mascaró 1987; Recasens 1993; Sauzet 2004; Rheinfelder 1953, 290; Francard/Morin 1986; Baroni/Vanelli 2000, among others). Final devoicing generates paradigmatic alternations between voiceless and voiced consonants in nominal and verbal paradigms (Cat. [gɾis] 'grey$_{M.SG}$' / [ˈgɾizə] 'grey$_{F.SG}$', Oc. [sap] 'know$_{3SG}$' / [ˈsabi] 'know$_{1SG}$') and interacts with other processes in interesting ways. In Catalan, final devoicing interacts with regressive voice assimilation, so that voiced consonants block the devoicing of final voiced obstruents ([ʎob.gɾan] 'big wolf', cf. [ʎop] 'wolf', [ˈʎoβa] 'wolf$_F$', [ˈʎop.ˈtrist] 'sad wolf', Bermúdez-Otero 2001). In Friulian, only vowels preceding devoiced obstruents are long ([laːt] 'gone$_M$' cf. *lade* 'gone$_F$' and [lat] 'milk', Baroni/Vanelli 2000), whereas in Nissart paragoge does not block final devoicing (*Niçar*[te] 'inhabitant of Nice$_{M.SG}$' *Niçar*[da] 'inhabitant of Nice$_{F.SG}$' (Dalbera 1994, 171–172). In the Badioto variety of Ladin, final devoicing generally applies in the language, but it is blocked in first person singular present, thus distinguishing it from the third person (*perd*, *perdes*, *pert* 'lose$_{1/2/3SG}$', Laura Vanelli, p.c.).

5.2.5 Final clusters

Not all Romance languages allow clusters in word-final position. Ibero-Romance, eastern Occitan, Middle French, middle and southern Italo-Romance dialects impose restrictions on final consonants and disallow consonant clusters. Italian does not feature word-final consonants and clusters in its native lexicon. Recently, however, the once systematic repairs by deletion and epenthesis only take place in less formal and more regionally marked registers. Among the Romance languages that allow word-final clusters, namely French, Romanian, western Occitan, Romansh and northern Italo-Romance, sonorant+obstruent clusters are generally accepted (Fr. *porte* 'door', Rm. *colb* 'dust', Dalm. [ˈjualb] 'white', Bol. [kaːɾg] 'loaded', western Lengadocian [sɛɾp] 'snake', Aquitano-Pyrenean [pɔɾk] 'pork'). In some Italo-Romance dialects, sonorant+obstruent clusters are broken up by a vowel if the obstruent is voiced and non-homorganic with the preceding sonorant: ORBU(M) > Reggiano of Novellara [oɾ**o**b] 'blind' vs. VIR(I)DE(M) > [verd] 'green' (cf. Bol. [orb], [vaird], Malagoli 1910).

Sonorant+sonorant clusters occur in French, Romanian, and Romansh (Fr. [bɔʁn] *borne* 'milestone', Rm. [lemn] *lemn* 'wood', Rom. [viəɾm] *vearm* 'worm') but are repaired by anaptyxis in other varieties (FORNU(M) > Bol. [ˈfauren] 'oven'). A less usual repair strategy is found in eastern Occitan, where the various Alpine dialects spoken in the High and Maritime Alps (Nice, Barcelonette, Puget-Rostang), resort to fortition of the final sonorant: (IBERNU(M) > [ˈivert] 'winter'), VERME(M) > [verp] 'worm') to repair sonorant+sonorant clusters. Bolognese also repairs sonorant+[v] (NERVU(M) > [ˈneɾ**o**v] 'nerve' / CARNE(M) > [ˈkɛːren] 'meat', cf. ORBU(M) > [orb] 'blind'). In these dialects [v] seems to behave like a sonorant, a pattern documented elsewhere, e.g. by Cyran/Nilsson (1998) for Slavic and Butskhrikidze (2002) for Georgian. There is also phonetic evidence suggesting that Italian [v] is in fact an approximant (Rispoli/Savy 1995).

Obstruent+obstruent clusters occur in French (*contact* 'contact'), Romanian (*copt* 'ripe'), but in Romansh and Francoprovençal varieties only when deriving from hardened glides (NIVE(M) > Sur. [nejf] > [nekf] 'snow', CRUCE(M) > Sur. [kroʊ̯ʧ] > [krokʃ] 'cross'). The phonological status of these hardened glides in Romansh is debated (Kamprath 1987; Montreuil 1999; Savoia 2015, 187–201). Northern Italo-Romance usually repairs word-final obstruent+obstruent clusters, but some exceptions are on record (Bol. *tavd* 'lukewarm', [paŋdg] 'rat'; cf. neighboring dialects *taved*, *pandeg*).

Final obstruent+sonorant clusters are generally avoided in Romance and repaired by paragoge or anaptyxis MACRU(M) > Bol. [ˈmɛːger] 'slim', Rom. [metr] > [ˈmet**e**r] 'meter'. They are found in French (*quatre* [katχ] 'four', *livre* [livʁ] 'book'), where the liquid, however, may be dropped ([kat], [liv]). These clusters also occur in some varieties spoken in the Maritime Alps that belong to the Ligurian group ([aagʀ] 'sour', [awtʀ] 'other', Dalbera 1994, 67). Notwithstanding the pattern of anaptyxis described for Romansh, some unrepaired final obstruent+sonorant clusters may also be found in this language, as discussed by Anderson (2016, 172), among others.

Finally, /s/+C clusters are generally admitted, and this is also true in case C is an obstruent in languages that otherwise do not allow for obstruent+obstruent clusters. /s/+C clusters where C is a sonorant are treated as obstruent+sonorant and repaired in northern Italo-Romance and Romansh (Imolese [ˈæzən] 'donkey', cf. Bottiglioni 1919).

On a more general note, Romance thus complies with the implicational hierarchy proposed by Cyran (2010, 288) whereby final obstruent+sonorant implies final sonorant+obstruent. In addition, it is interesting to note the place of clusters with a flat sonority slope (obstruent+obstruent, sonorant+sonorant), which are less problematic than obstruent+sonorant and do not necessarily pattern together (e.g. Bolognese repairs final sonorant+sonorant while accepting final obstruent+obstruent).

5.2.6 Resyllabification

Romance varieties are characterized by a number of sandhi processes (an exhaustive overview is provided in Sampson 2016), many of which affect syllabification.

We have previously described epenthesis (relevant segments henceforth in bold) taking place when clusters are not syllabifiable in sandhi in Romance varieties such as Piacentino (Gallo-Italic) [kwæːt**a**r] 'four', [ˈkwæːtra**ˈ**speʧ] 'four mirrors', Usse-

gliese (Francoprovençal) [u'sastal''va] 'he got up', ['falul''va] 'let him get up' < LEVARE 'get up$_{INF}$', Teraman (upper-southern Italo-Romance) [nən'vu:jə] 'I don't want', [nnə''mbru:jə] 'I don't cheat', Walloon (Gallo-Romance) [ɛnsi'kɔl], Fr. *une école* 'a school' vs. [lis'kɔl], Fr. *l'école* 'the school'. In these varieties, the vowel/zero alternation pattern at hand results in a different syllabic affiliation of the unsyllabifiable segment after epenthesis.

Another type of resyllabification occurs when a word-final consonant is pronounced in the onset of the following vowel-initial word. This pattern was illustrated in Portuguese (cf. 5.2.2) and Old French (cf. 5.2.3). The latter describes the genesis of Modern French liaison, which is discussed in a massive body of literature (Encrevé 1988; Durand et al. 2011; Côté 2011b): the word-final <-t> of *petit* 'small' is pronounced before vowel-initial words as in *petit enfant* 'small child', but not before consonant-initial words as in *petit café* 'small coffee' or before a pause *il est petit* 'he is small'.

As for sigmatic dialects of Occitan, Sauzet (2012) assumes resyllabification on the basis of sigmatic plurals that surface as voiced, regardless of word-final devoicing applying in the language (*los autres òmes* [lu,zawtre'zɔmes] 'the other men'). Also, word-final plosives resyllabify: *trauc escur* [,traw.kes'ky] 'dark hole', Oliviéri/Sauzet 2016). Spanish word-final consonants are commonly assumed to undergo resyllabification across a word boundary before a following vowel, (/los#otros/ 'the others' is realized as [lo.'so.tros], Harris 1969, 59, among others). In many varieties of Spanish segmental processes that apply to codas interact in interesting ways with resyllabification (an exhaustive recapitulation is proposed by Strycharczuk/Kohlberger 2016). As these authors observe, the behavior of Spanish resyllabified codas, so-called "derived onsets", has been at the heart of a theoretical debate concerning the question how resyllabification and segmental processes may interact to produce distinct outputs for lexical and derived onsets.

In Italian, as mentioned in 5.2.2, autochthonous word-final consonants are limited to sonorants in function words and undergo resyllabification (Nespor/Vogel 1986). By contrast, other coda consonants present in borrowed lexical words undergo gemination before vowel-initial words (*tram elettrico* [tram.me'let.tri.ko] 'cable car') (Chierchia 1986; Passino 2006, among others). That is, an onset is generated without the consonant losing its original syllabic affiliation.

5.3 Final remarks

Although diachronic change from Latin to Romance did not modify the maximal syllable template, it resulted in dramatic diatopic differences in both surface phonotactics and possible syllabification at the phonological level across Romance-speaking areas.

The extreme variety of syllable-related phenomena found in Romance has fed phonological thinking and contributed greatly to building and refining phonological theory. As a matter of fact, the wealth of the phenomena, the richness of the data, some of which are still waiting to be brought to light, make it a good laboratory for testing phonological theories and contributing to phonological typology. Given space restrictions, it is therefore illusionary to do justice to all scholars who have worked on syllable structure in Romance and to all the theoretically relevant Romance data. We have thus made a selection that we hope succeeds both in illustrating the basics of syllabification in Romance and in giving a taste of the many pieces of data that do not fit well within standard assumptions. It is our contention that seriously addressing these data, within any phonological framework, is bound to greatly contribute to our understanding of the syllable as a phonological object.

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Daniel Recasens

3 Processes affecting vowels

Abstract: The chapter deals with several processes affecting vowels in Romance. Some of these processes operate on stressed vowels, i.e. metaphony and vowel harmony, diphthongization, lengthening, changes in quality and merging. Others involve unstressed vowels, namely, vowel reduction as well as syncope, and epenthesis, which are touched on very briefly. The chapter closes with changes which may occur in two-vowel sequences within the word domain and across a word boundary such as the gliding of high vowels and the deletion of central vowels. Not only synchronic processes but also diachronic developments (i.e. sound changes) are subject to investigation depending on their relevance, and their theoretical implications are emphasized.

Keywords: vowel harmony, vowel diphthongization, vowel lengthening, vowel reduction, vowel sandhi

1 Introduction

The present chapter deals with several major processes affecting vowels, which depict a very rich scenario in Romance, i.e. vowel harmony (Section 2), vowel diphthongization (Section 3), vowel reduction, syncope and epenthesis (Section 4), and vowel lengthening (Section 5). Most of these processes are related to each other in many respects. Thus, as pointed out later on in the chapter, stressed vowel diphthongization depends on vowel duration and therefore may operate exclusively in open syllables where vowels are longer than when appearing before coda consonants in closed syllables. On the other hand, shorter unstressed vowels may reduce (i.e. shorten even more and undergo articulatory undershoot) and delete. Likewise strict vowel metaphony (i.e. stressed vowel raising induced by an unstressed close vowel) and vowel diphthongization may also be related, as revealed by data for the dialects of Italy showing that stressed open-mid vowels may either raise or diphthongize in this metaphonic contextual scenario. Somewhat tangentially we also touch upon changes in vowel quality which have taken place in Romance, and upon vowel merging and the problem of unstable vowel contrasts (Section 6), as well as upon the conversion of hiatuses into diphthongs or a single vowel whether word internally or across a word boundary (Section 7). Other relevant issues will not be dealt with since they are covered in much detail in other work: vowel nasalization

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