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## 21 Catalan<sup>\*</sup>

**Abstract:** This chapter presents a general overview of the phonetics and phonology of Catalan, taking into consideration both segmental and suprasegmental phenomena. The chapter provides an updated state-of-the-art report of the most recent investigations in this area. Though the report concentrates on the standard variety, Central Catalan, we also highlight the rich dialectal variation that affects both segmental and prosodic properties. After a brief introduction to the dialectal distribution of the language, the first part of the chapter is devoted to segmental phonology. In this part, we first present the basic segmental inventories of the language, as well as syllable structure types; we then describe the phonological processes that affect both vocalic and consonantal systems. The prosodic part of the chapter covers the main prosodic characteristics of the language, followed by a description of the intonational variation found for a variety of sentence types.

**Keywords:** Catalan, vocalic system, consonantal system, prosodic system, phonological processes.

### 1 Introduction

Catalan is a medium-sized European language with around 5.6 million native speakers. This number rises to 10.5 million for people claiming to speak and read Catalan and to 13 million for understanding it (Vila to appear). The Catalan language is traditionally divided into two main dialect groups, depending on the vowel reduction systems they present in unstressed position: Eastern Catalan, with full vowel reduction, and Western Catalan, with partial vowel reduction (cf. 3.1). The Eastern group includes Central Catalan (in the northern and eastern

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areas of Catalonia), Balearic, Northern Catalan (in the Roussillon region of southern France), and Algherese (in the city of Alghero in Sardinia). The Western group includes Northwestern Catalan (in the western and southern areas of Catalonia, eastern Aragon, and Andorra) and Valencian.

INSERT MAP HERE

**Geographical distribution of the dialects of Catalan.**

The present chapter focuses on the characteristics of Central Catalan, which is considered the standard variety, though we will also provide some information about the more distinctive features of other dialects. Hence, unless otherwise indicated, the transcriptions correspond to Central Catalan. The description is based on the general surveys of the phonology of Catalan depicted in Mascaró (1978), Wheeler (1979; 2005), Recasens (1991; 1993), Bonet/Lloret (1998), Prieto (2004), Lloret (2011), and the chapters on phonetics and phonology in the *Gramàtica del català contemporani* (Solà et al. 2002, 35–462) and the *Gramàtica de la llengua catalana* (IEC 2016, 1–115). Additional data for Balearic Catalan are taken from Bibiloni (1983; 2016), Dols (1993a; 2000), and Pons-Moll (2007a), and for Valencian from Colomina (1985a) and Jiménez (1999). Further references will be given in the text for more specialized issues. The chapter is organized as follows. Section 2 presents the basic segmental inventories and syllable structure. Sections 3 and 4 are devoted to the main phonological processes that affect vowels and consonants respectively. Section 5 deals with the prosodic properties. Section 6 addresses some final remarks.

## 2 The organization of sounds in Catalan

### 2.1 Vowel and consonant inventories

The vowel system of Catalan is shown in table 1. There are several points to be noted about this inventory. First, /ə/ in stressed position only appears in part of the Balearic variety. Second, /ə/ in unstressed position only appears in the Eastern varieties (with the exception of Algherese). Third, the contrast between close-mid and open-mid vowels only appears in stressed position (with the exception of Northern Catalan, which has a single mid front vowel and a single mid back vowel, shown in parentheses in the table). The difference in the number and distribution of the vowels is mainly due to the different vowel reduction processes they undergo in unstressed position, which will be examined in Section 3.1. Another important dialectal difference is the incidence of vowels in stressed position: broadly speaking, words that show /ə/ in Balearic have /ɛ/ in Central Catalan and

/e/ in Western Catalan (*ceba* ‘onion’: [ˈsəβə] in Balearic, [ˈseβə] in Central Cat., and [ˈseβa] in Western Cat.).

	Front	Central	Back
Close	i		u
Close-mid	e		o
Mid	(ə)	ə	(o)
Open-mid	ɛ		ɔ
Open		a	

**Table 1.** Vowel system of Catalan.

Pre-stressed suffixes (e.g. *-i*, *-ic*, *-im*) impose the opening of the preceding mid vowel (c[ˈe]nt ‘hundred’ – c[ˈɛ]ntim ‘penny’; carb[ˈo] ‘carbon’ – carb[ˈɔ]nic ‘carbonic’) and may reveal the underlying character of the unstressed vowel of the stem (e.g. púr[p[u]ra ‘purple’ – purp[ˈu]ri ‘of purple quality’, derived from /u/; but àt[u]m ‘atom’ – at[ˈɔ]mic ‘atomic’, derived from /o/ or from an unspecified mid back vowel /O/) (Mascaró 1984a).

The consonant system of Catalan is shown in table 2 (parentheses indicate segments which occur only in some varieties or in loans). Some comments are in order. First, /v/ occurs only in Balearic, Algherese, and some Valencian varieties (though [v] may arise due to voicing processes in all varieties; cf. 4.2.1). Second, most Valencian varieties do not contrast /ʒ/ and /dʒ/, but only show /dʒ/. Third, the lexical incidence of /j/ and /ɣ/ varies dialectally: items derived from the Latin groups C’L, G’L and LY evolved as /j/ in Balearic and in part of Central Catalan (FILIU > fill [ˈfiɰ] ‘son’), whereas elsewhere they became /ɣ/ ([ˈfiɣ]); there is also a recent urban non-standard tendency to replace all instances of /ɣ/ by /j/, probably due to the influence of Spanish. Additionally, part of the Balearic variety of Mallorca has the palatal plosives /c/ and /ɟ/ in singleton onsets (except before back vowels) and word-final position, where other varieties show the velar plosives /k/ and /g/ (cuc [ˈkuc] ‘worm’, gas [ˈɟas] ‘gas’), and northwestern areas near Aragon have /θ/, derived from Latin C’, TY and CY (CAPTIARE > caçar [kaˈθa] ‘to hunter’). /θ/, as well as /x/, also appear in loan adaptations (thriller [ˈθrilɐr], khi [ˈxi] ‘Greek letter χ’, Rioja [riˈoxə] ‘Sp. toponym’). Some Valencian and North-western varieties devoice the sibilants, but this pronunciation is not considered standard.

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Palatal	Velar
Plosive	p b		t d			(c) (ɟ)	k g
Fricative		f (v)	(θ)	s z	ʃ ʒ		(x)
Affricate				ts dz	tʃ dʒ		
Nasal	m			n		ɲ	

Lateral				l		ʎ	
Rhotic				r r			
Approximant						j	w

**Table 2.** Consonant system of Catalan.

The phonemic status of the glide approximants, the affricates, and the trill is controversial. The glides [j] and [w] are often derivable from /i/ and /u/ through default syllabification and additional metrical requirements governing their realization; but there are lexical exceptions for which underlying glides or the syllabic nuclear status of the vowels have to be marked (cf. 3.2).

The debate on the phonemic status of the affricates and the trill arises from their defective distribution. The question of the unit (monophonemic) or sequence (biphonemic) interpretation of affricates has been discussed at length. In favor of the biphonemic interpretation it is argued that [t͡s] and [d͡ʒ] do not occur word-initially (learned words and loans are pronounced with a fricative: *tsar* ['sar] 'tsar', *tsunami* [su'namɪ]), and the fact that lexical intervocalic [t͡s] is very rare (*lletsó* [ʎə'tso] 'dandelion', *tutsi* ['tutsi] 'Tutsi'). Moreover, in Eastern Catalan, [d͡ʒ] does not occur word-initially either (except as a free variant of /ʒ/: *joc* ['ʒok] ~ ['d͡ʒok] 'game'), and, unlike other unit phonemes, none of the affricates occur after a consonant (except as free variants of their fricative counterparts: *panxa* ['panʃə] ~ ['pant͡ʃə] 'belly'). In favor of the monophonemic interpretation, the following arguments are given: the voiced postalveolar fricative does not contrast with the postalveolar affricate word-finally, where only the affricate occurs (devoiced as [t͡ʃ] due to word-final devoicing, as in *fuig* ['füt͡ʃ] 's/he flees' – *fugia* [fu'ʒia] 's/he fled'; cf. 4.2.1); [t͡ʃ] and [d͡ʒ] appear word-initially and in postconsonantal position in Western Catalan (*joc* ['d͡ʒok], *panxa* ['pant͡ʃa]) where other varieties show their fricatives counterparts; additionally, /ʒ/ is totally absent from most of Valencian, for which the affricate counterpart is found (*fugia* [fu'd͡ʒia]). All in all, the data seem to reflect dialectal differences on the phonological status of affricates.

The two rhotic sounds pose problems for their phonemic interpretation because they only contrast in intervocalic position. In pregenerative accounts the existence of minimal pairs such as *cera* ['serə] 'wax' and *serra* ['serə] 'saw' was taken as sufficient evidence to posit two phonemes: the tap /ɾ/ and the trill /r/. Within the generative tradition, most authors derive them from one phoneme (whether specified as a tap /ɾ/ or as an unspecified rhotic segment /R/), usually drawing the intervocalic contrast from the presence of a single or a geminate rhotic. This interpretation is consistent with the fact that languages which systematically contrast single and geminate consonants realize the intervocalic geminate tap as a trill, since indeed the articulatory repetition of a tap generates a trill (cf. *dirree* 'necklace' vs. *dirree* 'hill' in the Cushitic language Oromo). The main advantage of the geminate view is that the distribution of the two rhotics arises

straightforwardly from syllabification: strengthening (i.e. the trill) occurs obligatorily word-initially (*ram* ['ram] 'bouquet'), in postconsonantal onsets (*honrat* [un'rat] 'honest'), and with variation in preconsonantal codas (*carn* ['karn] ~ ['karn] 'meat') and in phrase-final position (*És el* ['mar] ~ ['mar] 'It's the sea'); the tap appears in complex onsets (*tren* ['tren] 'train') and when word-final /r/ resyllabifies with a vowel-initial word (*Ma[r] Egeu* 'Aegean Sea'). Wheeler (2005, 27–29) points out several advantages of the geminate approach, based on three facts: stress restrictions (the presence of a coda in the penultimate syllable blocks the proparoxytone pattern: *còlera* 'cholera', \**còlerra*); word-final consonant restrictions (like other geminate sonorants, the presence of a final geminate rhotic requires the presence of a final vowel: *cor* 'heart' vs. *corre* 's/he runs', cf. *ball* ['baʎ] 'dance' vs. *batlle* ['baʎʎə] 'mayor'), and the similar distribution of [r] and its strengthened counterpart [ɾ] and that of [ʒ] and its strengthened counterpart [dʒ] (in both sets, the contrast may only arise in intervocalic position: *cera* ['sɛrə] vs. *serra* ['sɛrə], *assajar* [əsə'ʒa] 'to rehearse' vs. *assetjar* [əsə'dʒa] 'to besiege').

## 2.2 Syllable structure and (re)syllabification

In Catalan, syllables obligatorily contain a vowel; onsets and codas are optional. Onsets contain a maximum of two segments; codas have a maximum of two segments word internally and three word finally. Hence, the maximum permitted syllable is CCVCCC, as in *frescs* ['fresks] 'fresh.M.PL'. Any consonant (or glide) can be a singleton onset or a singleton coda. Complex onsets consist of a plosive or /f/ followed by a liquid /l, r/ or a glide (*clau* ['klaw] 'key', *braç* ['bras] 'arm', *flor* ['flɔ] 'flower', *quan* ['kwan] 'when'), except for the non-existing combinations /tl, dl/. Though glides do not usually occur after a biconsonantal onset, these sequences arise in oral speech as a result of diphthongization (*bíblia* ['biβliə] ~ ['biβlijə] 'bible'; cf. 3.2). In a small area of Northwestern Catalan, clusters with lateral present /ʎ/ instead of /l/ ([ 'kʎaw], [ 'fʎo]). Algherese has changed /l/ into /r/ in all complex onsets ([ 'kraw], [ 'frɔ]) (cf. 4.1.2). All onset clusters, thus, respect the sonority sequencing principle since sonority falls from the nucleus towards the onset margin.

Complex codas in word internal position consist of either the labial-velar glide followed by a velar plosive (*auxili* [əwk'sili] 'help', *augment* [əwg'men] 'augmentation'), or /w/, /n/ or plosive plus *s* (*auscultar* [əwskul'ta] 'to auscultate', *monstre* ['monstrə] 'monster', *extrem* [əks'trem] 'extreme.M.SG'); they tend to reduce in less formal pronunciations, by deleting the plosive in the first context ([əw'sili]), reducing the diphthong in /Vws/ combinations ([uskul'ta]), and deleting the nasal or the plosive in the other combinations with *s* ([ 'mostɾə], [əs'trem]). Plosive plus *s* clusters do not comply with the sonority sequencing principle,

since sonority rises from the plosive towards the fricative. In word-final position, biconsonantal codas present more combinations, which can be divided into two groups. First, except for sibilants, *s* can add to all existing simple codas (*dijous* [di'ʒɔws] 'Thursday', *dolç* ['dɔls] 'sweet.M.SG'), to the extent of infringing the sonority fall (*biceps* ['bisəps] 'biceps'); in most cases *s* stands for the plural morph (*ou-s* ['ɔws] 'egg-PL', *pal-s* ['mals] 'stick-PL') or the second person singular verbal morph (*beu-s* ['bɛws] 'drink[PRS]-2SG', *sap-s* ['saps] 'know[PRS]-2SG'). Additionally, the following clusters are found: glide plus consonant (*caic* ['kajk] 'I fall', *caut* ['kawt] 'cautious.M.SG'), though combinations with another sonorant were traditionally banned (*gasoil* [gə'zɔjl], traditionally pronounced as [gə'zɔj] ~ [gə'zɔɿ], but cf. recent loans such as *e-mail* [i'mejl] or *clown* ['klawn]); liquid plus consonant (*dorm* ['dɔrm] 's/he sleeps', *turc* ['turk] 'Turkish.M.SG', *golf* ['gɔlf] 'gulf'); nasal plus consonant (*triomf* [tri'ɔmf] 'triumph', *ponx* ['ponʃ] 'punch'), and *s* plus plosive (*bosc* ['bɔsk] 'forest'). Triconsonantal word-final codas end in the morph *s* (*triomf-s* [tri'ɔmfs] 'triumph-PL', *dorm-s* ['dɔrms] 'sleep[PRS]-2SG'); hence, *s* appears after all existing biconsonantal final codas and may infringe falling sonority (*turc-s* ['turks], *golf-s* ['golfs], *bosc-s* ['bɔks]). There are also a few words with the final combinations /-wst/ and /-kst/, which also break the sonority fall (*faust* ['fawst] 'fortunate.M.SG', *text* ['tekst]) and which may show plural forms ending in [-wsts], [-ksts] (*faust-s*, *text-s*).

Unlike other varieties of Catalan, Balearic and Algherese do not show any overt inflectional affix in the first person singular present indicative forms (*mat* ['mat] 'kill[PRS.1SG]'). Stems with final clusters that do not comply with the sonority sequencing principle are tolerated in this context (*obr* ['ɔpr] 'open[PRS.1SG]', *filtr* ['filtr] 'filter[PRS.1SG]', *umpl* ['umpl] 'fill[PRS.1SG]' in Balearic), whereas elsewhere they appear with a final vowel (*batre* 'to beat', *filtre* 'filter'; cf. 3.3 for discussion on the epenthetic nature of such vowels). Algherese further shows the nominal forms *alegr* [a'lekr] 'cheerful.M.SG', *alegr-s* [a'lets] 'cheerful[M]-PL'; *llestr* ['lestr] 'clever.M.SG', *llestr-s* ['lests] 'clever[M]-PL'. Prior accounts alleged that these endings occur in onset position; hence they do not violate the sonority sequencing but are licensed by a special 'zero' inflectional morph (Dols 1993b; Serra 1996). The main problem with the onset approach is that the endings behave as codas with respect to other phonological processes (e.g. they undergo word-final devoicing; cf. 4.2.1). Alternatively, Dols/Wheeler (1996) analyze all final consonants as onsets that are specially licensed at the end of the phonological phrase. This view is incompatible with the epenthetic interpretation of final *-e* as a means to repair syllable structure. Recent accounts treat these problematic endings as true codas and relate the underapplication of epenthesis in this context to paradigmatic effects (Lloret 2004; Pons-Moll 2007b).

Resyllabification occurs between words to provide onsets to vowel-initial words (*mal any* [ma'laɲ] 'bad year', *dorm ara* [dɔr'marə] 's/he sleeps now'; in Balearic and Algherese, *n'obr un* [nɔ'prun] 'I open one'). Resyllabification can be

interpreted as a reflex of the same universal tendency that triggers syllabification of onsets prior to syllabification of codas within words, to its maximal extension at word level in Catalan; for example, in a word like *suplim* ‘we supply’ syllabification at word level yields [suˈplim] while across words the same sequence in *cap limit* ‘no limit’, [kabˈlimit], does not alter the initial word syllabification (*cap* [ˈkap], *limit* [ˈlimit]), because the first syllable of the second word already has a lexical onset (on voice regressive assimilation, cf. 4.2.1).

### 3 Phonological processes affecting vowels

#### 3.1 Vowel reduction

In all dialects of Catalan, the vowel system reduces in unstressed position (cf. table 3). Dialects with full vowel reduction (Central Cat., part of Balearic, Northern Cat., and Algherese) shrink to three elements. Dialects with partial vowel reduction shrink to four (part of Balearic) or five (Western Cat.) elements. Lexical words are stressed and may display vowel reduction effects in morphologically related words due to the position of word stress (e.g. Central Cat. *gas* [ˈgas] ‘stick’ – *gasós* [gəˈzós] ‘gaseous’, *beus* [ˈbews] ‘you drink’ – *beuràs* [bəwˈras] ‘you will drink’, *dent* [ˈden] ‘tooth’ – *dental* [dɛnˈtal] ‘dental’, *mor* [ˈmɔr] ‘s/he dies’ – *morim* [muˈrim] ‘we die’, *tot* [ˈtot] ‘all.M.SG’ – *total* [tuˈtal] ‘total’). Vowels that never appear in a stressed position in lexical words, as well as functional words that are unstressed, display a vowel of the unstressed series (e.g. Central Cat. *c[ə]mell* ‘camel’, *b[u]txaca* ‘pocket’; *en* [ən] ‘in’, *nos* [nus] ‘to us’).

		STRESSED POSITION	UNSTRESSED POSITION	VOWEL REDUCTION
EASTERN CAT.	Central Cat. and part of Balearic (Minorca and Ibiza)	i e ε a ɔ o u	i ə u	e ε a → ə ɔ o → u
	Northern Cat.	i ɛ a ɔ u	i ə u	ɛ a → ə ɔ → u
	Algherese	i e ε a ɔ o u	i a u	e ε → a ɔ o → u
	Part of Balearic (Majorca)	i e ε ə a ɔ o u	i ɔ o u	e ε a → ə ɔ → o
WESTERN CAT.		i e ε a ɔ o u	i e a o u	ε → e ɔ → o

**Table 3.** Vowel reduction patterns.



In most varieties of Eastern Catalan (including Central Cat.), there are lexical and contextual exceptions to mid vowel reduction. Lexical exceptionality is a variable (idiolectal and inter-dialectal) phenomenon that may affect mid vowels of learned words, old and recent loans, proper names, and acronyms. In many of these words, unstressed mid vowels appear as [e] and [o] variably coexisting with full reduced [ə] and [u], respectively. Most cases involve word-final syllables (*bas*[e] ‘base’, *dolm*[e]*n* ‘dolmen’, *UNESC*[o], *espòns*[o]*r* ‘sponsor’), though there are also instances in posttonic non-final position (*òp*[e]*ra* ‘opera’, *catàstr*[o]*fe* ‘catastrophe’) and pretonic position ([e]*v*[e]*rest* ‘Everest’, *d*[o]*ssier* ‘dossier’). In the morphologically derived environments, full reduction applies straightforwardly (*op*[ə]*ristic* ‘operatic’, *espons*[u]*ritzar* ‘to sponsor’) (Mascaró 1978, 73–75).

Contextual exceptionality affects mid front vowels in contact with mid and low vowels. The sequences /ea/ and /ɛa/ do not reduce the mid vowel to [ə] when it appears in unstressed position, but it is realized as [e] in the following contexts: when the second vowel is [‘a] (*ideal* [iðe‘al] ‘ideal’ – *idea* [i‘ðeə] ‘idea’, *real* [re‘al] ‘real’) or an unstressed [ə] in morphophonemic alternations with /‘a/ (*id*[eə]*lisme* ‘idealism’, *r*[eə]*lisme* ‘realism’), or when the second vowel is the last vowel corresponding to a non-alternating unstressed [ə] (*àrea* [‘areə] ‘area’, *pàncrees* [‘paŋkreəs] ‘pancreas’). Exceptionality cannot be attributed to a surface dissimilatory restriction prohibiting [əə] or [ə‘a] sequences, because there exist such strings in a few words (*n*[əə]*rlandès* ‘Dutch’, *Abr*[ə‘a]*m*). In the reverse sequences /ae/ and /æ/, most cases show variation (*p*[əe]*lleta* ~ *p*[əə]*lleta* ‘pan.DIM’, cf. *p*[ə‘e]*lla* ‘pan’; *isr*[əe]*lita* ~ *isr*[əə]*lita* ‘Israelite’, cf. *Isr*[ə‘e]*l*), but a few words show categorical exceptionality (*M*[əe]*strat* ‘Cat. toponym’, *tetr*[‘ae]*dre* ‘tetrahedron’). In sequences of adjacent mid front and mid back vowels (i.e. /eo/ and /eɔ/), there also exists variation in the realization of the front vowel in unstressed position, with variable unstressed [e] cases (*peó* [pe‘o] ~ [pə‘o] ‘pawn’) together with categorical [ə] cases (*lleó* [lə‘o] ‘lion’, though with variation in the proper name *Lleó* [lə‘o] ~ [lə‘e‘o]). The few words that contain the reverse sequences /oe/ and /ɔe/ also show variation, with cases of variable unstressed [e] (*bòer* [‘bɔer] ~ [‘bɔər] ‘Boer’) and cases of categorical [e] (*Cloe* [‘kloe] ‘Chloe’, *oct*[‘əe]*dre* ‘octohedron’).

The Balearic variety of Majorca shows additional exceptions to [e]-reduction (Bibiloni 1998; Pons-Moll 2011a). To a large extent, underapplication of reduction affects the initial syllable of stems in the three following contexts. First, words paradigmatically related to [‘e] or [‘ɛ] through productive derivation (*peix* [‘peɟ] ‘fish’ – *p*[e]*ixet* ‘fish.DIM’ but *p*[ə]*ixater* ‘fish seller’, *cel* [‘sɛl] ‘sky’ – *c*[e]*let* ‘sky.DIM’ but *c*[ə]*l·lestial* ‘celestial’ vs. *pap*[‘e]*r* ‘paper’ – *pap*[ə]*ret* ‘paper.DIM’). Second, words paradigmatically related to [‘e] through inflection (*crem* [‘krem] ‘I burn’ – *cr*[e]*mam* ‘we burn’ vs. *xerr* [‘ɟɛr] ‘I talk’ – *x*[e]*rram* ‘we talk’, *cont*[e]*st* ‘I answer’ – *cont*[ə]*stam* ‘we answer’). Third, learned words and loans generally preceded by a labial consonant (*f*[e]*minisme* ‘feminism’ vs. *am*[ə]*nitzar*

‘to liven up’). Additionally, the posttonic word ending [-ec] is systematically maintained unreduced (*màn*[e]c ‘handle’).

All in all, lexical, contextual, and paradigmatic exceptions broaden the unstressed system of the Eastern varieties to [i, e, ə, o, u]; but [ɛ, ɔ] never appear in unstressed position, unless they result from vowel harmony (cf. 3.3).

### 3.2 Vowel contact

Vowel contacts are solved through the rise of a diphthong (if a close vowel is involved), hiatus maintenance or vowel loss. At word level, close vowels after another vowel result in a falling diphthong (*p*[ʼaw] ‘peace’, *n*[ʼɔj] ‘boy’, *n*[ʼew] ‘snow’, *c*[əw]ré ‘I will fall down’, *v*[uj]tè ‘eighth’), though paradigmatic relations, prosodic requirements, and lexical exceptions compel hiatus resolutions. For close back vowels, there are words that superficially contrast in the presence of a diphthong or a hiatus in the same phonetic context (*esqu*[ʼiw] ‘elusive.M.SG’ vs. *esqu*[ʼiu] ‘I ski’), which is attributed to different underlying representations: either the former contains an underlying diphthong and the latter an underlying vowel sequence where close vowels are protected from gliding due to prosodic effects or lexical marking (/skiw/ ‘elusive[M.SG]’ vs. /ski-u/ ‘ski-PRS.1SG’), or the former is derived from a close vowel, which in the right context becomes a glide, and the latter from an underlying close-mid vowel, which can only reduce to [u] (/skiu/ vs. /ski-o/). Paradigmatic hiatus occurs in verbal inflection due to syllabic-uniformity effects with the stem (*cre-i* [ʼkrei] ‘create-PRS.SBJV[3SG]’, as well as *esqui-o* [əsʼkiu] ‘ski-PRS.1SG’) and in nominal derivation due to syllabic-uniformity effects with the suffix when the stress is one or two syllables distant from the stem (*flu-ïd-esa* [fluɪʼðɛzə] ‘fluidity’ vs. *flu-id* [ʼfluɪt] ‘fluid.M.SG’). There are also uniformity effects between a vowel-final prefix and a vowel-initial stem (*re-incidir* [rəɪnsiʼði] ‘to relapse’) and between a pretonic vowel of a stem and the correspondent stressed vowel in a morphologically derived word (*v*[əi]natge ‘neighborhood’, *v*[əʼi] ‘neighbor’), though diphthongs are also common in more frequent words (*v*[əj]natge). Additionally, falling diphthongs can be blocked in specific lexical items (*pl*[əu]nasme ‘pleonasm’, *n*[ii]lism ‘nihilism’).

Raising diphthongs at word level are more variable. The contact of a close vowel and another vowel is resolved as a raising diphthong when the close vowel appears as a singleton onset, both word-initially and between vowels (*iot* [ʼjɔt] ‘yatch’, *cauen* [ʼkawən] ‘they fall down’). However, in word-initial position some words maintain the hiatus, whether categorically (*ió* [iʼo] ‘ion’) or in variation with a diphthong (*UAB* [ʼwap] ~ [uʼap] ‘acronym for *Universitat Autònoma de Barcelona*’), presumably favored by the tendency to avoid monosyllabic words. Close back vowels followed by another vowel and preceded by a velar consonant are also pronounced as a glide in most words ([ʼkwə]ta ‘quota’, *ai*[ʼyʷə] ‘water’),

though there are cases of hiatus, generally due to the aforementioned paradigmatic syllabic-uniformity effects (*cu-a* [ˈkuə] ‘tail-FEM’, *cu-ota* [kuˈota] ‘tail-AUG.FEM’, but also [ˈkwota] in less formal pronunciations); invariant [kw] cases are represented orthographically by *qu* (or *qü*) while the other cases are represented by *cu*. In all other postconsonantal contexts, close vowels followed by another vowel were traditionally pronounced with hiatus, but there has long been a strong tendency to produce diphthongs in posttonic position (*fami*[ljə] ‘family’, *vi*[ðwə] ‘widow’) and in the ending *-ió* (*condi*[ˈsjə] ‘condition’) (Fabra 1982, 15–16). Cabré/Prieto (2004) point out several morphological and prosodic conditions that constrain the emergence of rising diphthongs, such as the fact that gliding tends to be blocked in word-initial position (e.g. *p*[iˈa]no ‘piano’, *d*[iə]lecte ‘dialect’) or that gliding tends to increase when the distance of the target high vowels from the stressed syllable is greater (*d*[iə]lecte ‘dialect’ vs. *d*[jə]lectologia ‘dialectology’).

Across words, vowels that are stressed at word level are always maintained, even if they are identical (*tindrà ànims* [aˈa] ‘s/he will have encouragement’, *violí íntim* [iˈi] ‘intimate violin’). Vowel contacts of identical unstressed vowels mostly come out as a single vowel (*casa antiga* ‘old house’ [a] in Western Cat. and Algherese, [ə] elsewhere; *diari idoni* [i] ‘eligible diary’). Vowel contacts of identical vowels in which one of the vowels is stressed and the other unstressed are typically solved with the loss of the unstressed vowel (*violí idoni* [i] ~ [ji] ‘eligible violin’; *tindrà amics* [a] ~ [aa] ‘s/he will have friends’ in Western Cat. and Algherese), though deletion is less frequent when the first vowel is not [ə] and the second vowel is stressed (*diari íntim* [iˈi] ~ [ˈi] ‘intimate diary’; *puma àgil* [aˈa] ~ [ˈa] ‘agile puma’ in Western Cat. and Algherese). Contacts involving an unstressed close vowel preceded by a close vowel give rise to falling diphthongs (*porta ulleres* ‘s/he wears glasses’ [aw] in Western Cat. and Algherese, [əw] elsewhere). Contacts involving an unstressed close vowel followed by another vowel give rise to hiatus (*diari antic* ‘old diary’ [ia] in Western Cat. and Algherese, [iə] elsewhere); but if they appear far from phrasal stress a rising diphthong can arise too (*diari antiquíssim* ‘very old diary’ [ja] ~ [ia], [jə] ~ [iə]). In the dialects with [ə] like Central Catalan, the contact of [ə] with a following unstressed vowel more frequently results in [ə]-loss (*adorable Everest* [e] ‘lovely Everest’), or, as said, with a diphthong if a close vowel is involved (*porta ulleres* [u] ~ [əw]); the contact of [ə] with a following stressed vowel more typically results in [ə]-maintenance (*porta ales* [əˈa] ~ [ˈa] ‘s/he wears wings’). In Western dialects, the contact of unstressed [a, e] with another vowel is realized with hiatus (*compra elefants* [ae] ‘s/he buys elephants’), though, as said, a diphthong emerges if an unstressed close vowel is involved and loss of the unstressed vowel is possible if they are identical. Cases of reduction of two identical vowels to one can be interpreted as an instance of vowel fusion.

### 3.3 Other phenomena

Other important phenomena affecting vowels include epenthesis, opening of mid vowels, and vowel harmony. Lexical vowel epenthesis has often been invoked to explain the presence of the default vowel *e* ([ə], [e] or [a] according to the vowel reduction pattern of each dialect) when its absence would entail the occurrence of a structure defying syllable well-formedness. There is conclusive evidence for vowel epenthesis in word-internal position, because there are fully transparent morphophonemic alternations between ‘zero’ and *e*, both within the paradigm of the same words and with respect to parallel inflected forms of words that belong to the same class but whose forms do not give rise to potential syllabic problems. The contexts for word-internal epenthesis include the three following situations. First, sibilant contacts: *vences* /bens-z/: [ˈbensəs] ‘defeat[PRS]-2SG’ (cf. *venç* /bens/: [ˈbens] ‘defeat[PRS.3SG]’, *bats* /bat-z/: [ˈbats] ‘beat[PRS]-2SG’); *felices* /fəlis-z/: [fəˈlisəs] ‘happy[F]-PL’ (cf. *feliç* /fəlis/: [fəˈlis] ‘happy[F.SG]’, *pals* /pal-z/: [ˈpals] ‘stick-PL’). Second, verbal forms of conjugations II and III that do not conform the admissible coda clusters: *obres* /obr-z/: [ˈɔβrəs] ‘fill[PRS]-2SG’ (cf. *obrim* /obr-im/: [uˈβrim] ‘open-PR.1PL’, *dorms* /dorm-z/: [ˈdorms] ‘sleep[PRS]-2SG’). And finally, verbal forms of conjugation II to avoid a bad syllable contact between a stem ending in nasal, lateral or sibilant and an /r/-initial morph: *venceré* /bens-re/: [bensəˈre] ‘fear-FUT.1SG’ (cf. *batré* /bat-re/ [baˈtre] ‘beat-FUT.1SG’). In contrast, the arguments that support word-edge epenthesis are weaker, especially word-finally. In word-initial position, there are no surface words beginning with [sC-] but they all show an initial *e*:- [ə] *sperar* ‘to wait’, and recent loans like [ə] *Skype*. The only morphophonemic alternations that surface involve words whose synchronic morphological complexity is doubtful ([ə] *sperar* ‘to expect’ – *prosperar* ‘to prosper’), which contrast with more recent constructs that retain the vowel (*in*[ə] *sperat* ‘unexpected’, [ə] *spai* ‘space’ – *ciber*[ə] *spai* ‘cyberspace’). Replicating Harris’s (1979) argument for Spanish, Wheeler (2005, 287) points out that the oxytone stress pattern of the verb *estar* ‘to stay’ in the second and third person singular and third person plural present indicative forms (i.e. [əsˈtas], [əsˈta], and [əsˈtan] respectively) supports the epenthetic nature of the initial vowel, because the unstressed character of the inflectional suffixes of these forms regularly causes the stem to bear the stress (e.g. [ˈentrə], from /entr-a/ ‘enter-PRS[3SG]’), but not in *estar* ([əsˈta], from /st-a/ ‘stay-PRS[3SG]’). Lloret/Pons-Moll (2016) provide further evidence drawn from Majorcan Catalan: as said above, underapplication of mid vowel reduction applies to the initial syllable of stems; however, underapplication applies to the second syllable of stems with the shape [əsCe-] ([ə] *sp[e]rar* ‘to wait’, [ə] *st[e]ve* ‘Steve’), plausibly revealing the epenthetic nature of the initial vowel. In word-final position, the arguments for the epenthetic nature of *-e* (in words such as *filtre* ‘filter’, *corre* ‘s/he runs’, *obres* ‘you open’, *batre* ‘to beat’) faints, especially in nominal forms since there already

exists the inflectional nominal ending *-e* not required by syllabification (*cotx-e* ['kɔtʃə] 'car' vs. *despatx* [dəspatʃ] 'office'; *mar-e* ['marə] 'mother' vs. *mar* ['mar] 'sea'; cf. *cotx-às* 'car-AUG[M.SG]', *mar-ona* 'mother-AUG.F[SG]'). The same argumentation holds for the corresponding plural forms (*filtre-s* 'filter-PL'). In verbs, the epenthetic nature of *-e* satisfactorily avoids allomorphy, since, in forms without syllabification problems, the second and third person singular present indicative forms do not show *e* in conjugations II and III verbs (*corre-s* 'run[PRS]-2SG', *obre* 'open[PRS]-3SG' vs. *tem-s* 'fear[PRS]-2SG', *dorm* 'sleep[PRS.3SG]'), and the infinitive morph appears as /r/ elsewhere (cf. *bat-re* 'beat.INF' vs. *entra-r* 'enter.INF', *dormi-r* 'sleep.INF').

Algherese additionally shows [i] vowel insertion across words to avoid internal complex codas (*cent voltes* [senti'vɔltas] 'a hundred times', cf. *cent* ['sɛnt]; *compr molt* [kompr'i'mɔlt] 'I buy a lot', cf. *compr* ['kompr]), except for glide plus *s* clusters (*cous bé* [kɔwz'be] 'you cook well') and glide plus nasal clusters (*diun coses* [diwɲ'kɔzas] 'they say things'). It is also inserted to avoid *f*, stops, and affricates as internal singleton codas (*viv bé* [vifi'be] 'I live well', cf. *viv* ['vif]; *bec whisky* [beki'wiski] 'drink whiskey', cf. *bec* ['bek]; *desig feo* [da'ziðʒi'feu] 'bad desire', cf. *desig* [da'zitʃ]) (Loporcaro 1977). Epenthesis does not occur when the first word ends in any other single consonant, whatever the resulting sonority profile (*És tot* [es'tot] 'It's all', *És whisky* [ez'wiski] 'It's whiskey'). Hence, epenthesis across words is not triggered by sonority syllable-contact reasons, but is exclusively related to the nature of the consonants that appear in coda position. Lloret/Jiménez (2010) point out that less perceptible codas (i.e. complex codas without a glide and singleton codas with non-sibilant obstruents) are accepted in the prominent phrase-final position but avoided in the least prominent position (i.e. preconsonantal codas).

In most Western varieties, the initial vowel of words beginning with *em-*, *en-*, *es-*, and *eix-* generally open the initial vowel to [a] when they appear in a closed syllable: [a]mbolic 'mess', [a]ncant 'charm', [a]sperar 'to expect', [aj]xam 'swarm' (though with a close-mid vowel in: [e]mpresa 'company', [e]ntrar 'to enter', [e]spanyol 'Spanish', [ej]xida 'way out'). Sporadically, the opening affects open initial syllables ([a]legant 'elegant') and internal syllables (cal[a]ndari 'calendar', forr[a]llat 'bolt').

Valencian Catalan displays a vowel harmony process that affects final unstressed /-a/, which harmonizes with the previous adjacent /'ɛ/ and /'ɔ/: *terra* ['tɛrɛ] 'earth', *cosa* ['kɔzɔ] 'thing' (vs. *pècora* ['pɛkɔrɔ] 'sheep'). In some varieties, harmony can affect the whole word: *afecta* [ɛ'fɛktɛ] 'it affects', *tovallola* [tɔvɔ'ɔɔɔ] 'towel' in southern Valencian, but [a'fɛktɛ], [tova'ɔɔɔ] in other Valencian varieties (Colomina 1985b; Jiménez 1998). In Central Catalan, learned and loan words with stressed mid vowels tend to be adapted with an open-mid vowel (Badia i Margarit 1970; Pi-Mallarach 1997). In this context, final unstressed mid vowels generally undergo full reduction (*euro* ['ɛwru]); but if they present a

stressed close-mid vowel, final unstressed mid vowels harmonize in degree of aperture with the stressed vowel ([<sup>h</sup>ewro]).

## 4 Phonological processes affecting consonants

### 4.1 Onset position

Segments in onset position remain quite stable, due to the relatively prominent margin-syllabic position in which they appear. They show two weakening effects (spirantization and rhotacism) and a strengthening process (gemination).

#### 4.1.1 Spirantization and gemination

Spirantization applies to voiced plosives, both word-internally and across words: /b/, /d/, /g/ (/ɣ/ in Majorcan Balearic) become spirant approximants [β], [ð], [ɣ] ([j] in Majorcan Balearic) in onset position when the preceding sound does not interrupt the air flow in the oral cavity, i.e. after a vowel, a glide, a liquid or a fricative (*cada ceba groga* [kaðəseβə'ɣrəɣə] ‘every yellow onion’, *cor[ð]a* ‘rope’, *es[β]rinar* ‘to find out’). The groups [ld], [ʎd], and [vb] (*caldo* ['kaldu] ‘broth’, *pell dura* [peʎ'durə] ‘hard skin’, *puf baix* [puv'baʃ] ‘low pouf’) do not spirantize, presumably due to the coincidence in the occlusive point of articulation (Mascaró 1991). Varieties with /v/ tend to maintain the plosive realization of /b/ (*ce[b]a*), plausibly to maximize the contrast between /v/ and /b/ (Recasens 1991, 196).

In Eastern Catalan (except in Algherese), the postvocalic clusters /bl/ and /gl/ geminate after an adjacent stressed syllable (*poble* ['pɔbblə] ‘village’, *regla* ['regglə] ‘rule’ vs. *problema* [pru'βləmə] ‘problem’, *aglà* [ə'ɣlə] ‘acorn’), as well as in words morphologically derived from the previous context (*població* [pub-βla'sjo] ‘population’, *reglament* [rəgglə'men] ‘regulation’). In Central Catalan these groups tend to further devoice ([<sup>h</sup>pɔpplə], [<sup>h</sup>rekklə]), without gemination in some areas ([<sup>h</sup>pɔplə], [<sup>h</sup>reklə]). The very few exceptions are all learned words (*bí[βl]ia* ‘bible’, *si[ɣl]a* ‘initial’). Except in Valencian (excluding the southern area), part of Balearic (Ibiza), and Algherese, there is also a general tendency to geminate intervocalic affricates after an adjacent stressed syllable (*tutsi* ['tuʦsi], *dotze* ['dodðzə] ‘twelve’, *cotxe* ['kottʃə] ‘car’, *metge* ['meddʒə] ‘doctor’); gemination applies across words too (*set sabates* [settsə'βatəs] ‘seven shoes’). In Central Catalan, gemination after a stressed syllable is quite systematic in the case of voiceless affricates and regularly spreads to all intervocalic positions in the case of voiced monomorphemic affricates: *dotzena* [dud'dʒenə] ‘dozen’, *metgessa*

[məd'dʒɛsə] ‘doctor.F’ (vs. *cotxet* [ku'tʃet] ‘car.DIM’, *compra't cireres* [komprətsi'rerəs] ‘buy yourself some cherries’) (see Mascaró 1984b, Lloret 1992, and Bonet/Lloret to appear for more details). In Valencian, intervocalic alveolar affricates appear as geminate straightforwardly while postalveolar affricates do not, presumably revealing the biphonemic character of /ts/ and /dz/ but the monophonemic character of /tʃ/ and /dʒ/ (Jiménez 1996).

#### 4.1.2 Rhotacism

Algherese shows the peculiarity of changing /d/ and /l/ into [r] in singleton onsets between vowels (*vida* ['vira] ‘life’, *enfadar* [amfa'ra] ‘to anger’; *meló* [ma'ro] ‘melon’, *tremolam* [tramu'ram] ‘we tremble’). The fact that first person singular present indicative forms, with no overt inflectional marker (cf. 2.2), do not rhotacize stem final /-d/ and /-l/ but show morphophonemic alternations (*enfa*[t] ‘I anger’, *tremo*[l] ‘I tremble’) is taken as evidence of its coda status, especially in the case of the plosive, which surfaces as voiceless due to word-final devoicing (cf. 4.2.1) (Lloret 2004). The lateral has further changed into /r/ in all complex onsets (*clau* ['kraw] ‘key’, *flor* ['fro] ‘flower’); first person singular present indicative forms of stems ending in such clusters maintain the rhotic, strengthened as is usual in word-final position in Algherese (*umpl* ['umpr] ‘I fill’ – *um*[pr]im ‘we fill’).

### 4.2 Coda position

Segments in coda position are more prone to change and to neutralize, due to the less prominent margin-syllabic position in which they occur, especially preconsonantly. The main general processes involve voice neutralization, place and manner assimilations, and cluster reduction.

#### 4.2.1 Voicing processes and [tʃ] – [ʒ] alternation

There are three processes that affect the voicing of obstruents. First, obstruents devoice in word-final position: /b/ *sa*[p] ‘s/he knows’ – *sa*[β]em ‘we know’ (cf. /p/ *escu*[p] ‘s/he spits’ – *escu*[p]im ‘we spit’); /d/ *po*[t] ‘s/he can’ – *po*[ð]em ‘we can’ (cf. /t/ *po*[t] ‘pot’ – *po*[t]et ‘pot.DIM’); /g/ *amar*[k] ‘sour.M.SG’ – *amar*[χ]a ‘sour.F.SG’ (cf. *tur*[k] ‘Turkish.M.SG’ – *tur*[k]a ‘Turkish.F.SG’); /z/ *pe*[s] ‘weight’ – *pe*[z]ar ‘to weigh’ (cf. /s/ *pa*[s] ‘step’ – *pa*[s]ar ‘to pass’); /dʒ/ *enu*[tʃ] ‘annoyance’ – *enu*[dʒ]os ‘annoyances’ (cf. /tʃ/ *despa*[tʃ] ‘office’ – *despa*[tʃ]os ‘offices’), and /v/ in dialects with such phoneme *ser*[f] ‘servant.M’ – *ser*[v]a ‘servant.F’ (cf.

*amor*[f] ‘amorphous.M.SG’ – *amor*[f]a ‘amorphous.F.SG’). In Central Catalan, some lexical items morphophonemically alternate word-final [t̪] with intervocalic [ʒ]: *bo*[t̪] ‘fool.M.SG’ – *bo*[ʒ]a ‘fool.F.SG’ (vs. /f/ *ba*[f] ‘low.M.SG’ – *ba*[f]a ‘low.F.SG’, /t̪/ *despa*[t̪] – *despa*[t̪]os, /d̪/ *enu*[t̪] – *enu*[d̪]os). In the classical generative view, the [t̪] – [ʒ] alternation was seen as a strengthening process affecting /ʒ/ in word-final position, followed by word-final devoicing of obstruents (i.e. /-ʒ/ turning to ‘d̪’ and later to [-t̪]). However, it seems more plausible to interpret it as a weakening process affecting /d̪/ intervocalically, which thus adds to the onset weakening phenomena. In this interpretation, affricate /d̪/ instances contrast with cases of biphonemic stop plus fricative sequences (/d̪/ and, for coherence, /t̪/) when no such alternation is found (as in *enu*[t̪] – *enu*[d̪]os); the weakening interpretation is in line with the diachronic development of Catalan and with other intervocalic spirantization processes found in Catalan (cf. 4.1.1) and other Romance varieties (see Bonet/Lloret to appear for more details).

Second, coda obstruents assimilate in voice to the following consonant, both word-internally and across words: *re*[p]te ‘challenge’, *sú*[b]dit ‘subject’; *sa*[ps] *cantar* ‘you know how to sing’, *sa*[bz] *dir* ‘you know how to say’; *despa*[t̪] *petit* ‘small office’, *despa*[d̪] *gran* ‘big office’.

Third, sibilants voice across words in prevocalic position: *pe*[z] *elevat* ‘high weight’, *pa*[z] *elevat* ‘high step’; *enu*[d̪] *anterior* ‘former annoyance’, *despa*[d̪] *anterior* ‘former office’; *Bai*[ʒ] *Empordà* (Cat. toponym), *bo*[d̪] *i estúpid* ‘fool and dumb’; *po*[d̪] *ajudar* ‘you can help’, *po*[d̪] *hermètics* ‘airtight pots’. It also occurs between a prefix and the stem (*e*[g.z] *amant* ‘ex-lover’). There is variable voicing of prevocalic /f/ across words, especially when it occurs far from the phrase accent: *foto*gra[v] *alemany* ‘German photographer’ vs. *xef*[f] *indi* ‘Indian chef’. Only voicing across words presents some dialectal differences: in the southern areas of Valencian and Northwestern Catalan, voicing extends to all obstruents: *po*[ð] *ajudar* ‘s/he can help’, *po*[t̪] *ajudar* elsewhere. Llach (1998, 65), replicating Lipski’s (1989) argument for Ecuadorian Spanish, suggests that voicing across words may be due to morphological reasons, i.e. to facilitate word recognition.

Table 4 summarizes the basic results according to the contexts in which obstruents occur, without taking into account the aforementioned dialectal differences. (‘O’ stands for obstruents; ‘S’ stands for sibilants; ‘T’ stands for stops; ‘#’ indicates the limits of words.)

WITHIN WORDS			ACROSS WORDS		
ONSET	CODA		ONSET		CODA
Contrast	Neutralization		Contrast	Neutralization	Neutralization
.O	O.C	O.#	#.O	.S#V   .T#V (variably .f#V)	O#.C



	Voice assimilation	Voiceless		Voiced	Voiceless	Voice assimilation
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**Table 1.** Distribution of voiced and voiceless obstruents.

#### 4.2.2 Place and manner processes

In word-internal position, the nasals /m, n, ɲ/ and the laterals /l, ʎ/ appear in on-set-initial and intervocalic position ([m]ora ‘Moorish.F.SG’, [n]ora ‘daughter in law’, [ɲ]ora ‘chilli’; ca[m]a ‘leg’, ca[n]a ‘white hair’, ca[ɲ]a ‘cane’; [l]ama ‘lama’, [ʎ]ama ‘llama’, ca[l]a ‘creek’, ca[ʎ]a ‘s/he shuts up’). They also appear word-finally (ha[m] ‘fish hook’, ha[n] ‘they have.AUX’, a[ɲ] ‘year’; fi[l] ‘thread’, fi[ʎ] ‘son’), except in Algherese, where the palatals centralize to [n] and [l], respectively (any [‘an], anys [‘ans] – a[ɲ]ada ‘vintage’; fill [‘fil], fills [‘fils] – fi[ʎ]a ‘daughter’, and in the first person singular present indicative forms, as a reflex of their coda status: ba[n] ‘I bathe’ – ba[ɲ]ar ‘to bathe’, ba[l] ‘I dance’ – ba[ʎ]ar ‘to dance’). In preconsonantal word-internal position, /ɲ/ and /ʎ/ do not occur in Catalan; in this context, /m, n/ (or an unspecified /N/) always agrees in place with the following consonant (ð[ɲf]ora ‘amphora’, to[mb]ar ‘turn over’, de[nt]al ‘dental’, pa[ɲf]a ‘belly’, sa[ɲg]ada ‘bleeding’) and /l/ agrees with a following dento-alveolar (sa[lʎ]ar ‘to jump’, ca[lz]e ‘chalice’). Across words, /n/ optionally assimilates the place of articulation of the following consonant (só[n] ‘they are’ – só[ɲ] feliços ‘they are happy’, só[m p]etits ‘they are little’, so[ɲ] ʃais ‘they are lambs’, só[ɲ ɲ]ores ‘they are chillies’, só[ɲ g]rans ‘they are big’); but /m/ only assimilates within the labial series (so[m] ‘we are’ – so[ɲ] feliços ‘we are happy’ vs. so[m g]rans ‘we are big’). Some dialects (e.g. part of Balearic; cf. below) extend the assimilatory context to /m/. In preconsonantal word-final position, /n/ and /l/ do not dentalize in the dialects that delete the final plosive (dent [‘den] ‘tooth’, salt [‘sal] ‘jump’; cf. 4.2.2). According to the data, nasal and lateral place assimilation is traditionally split into two processes: major place assimilation, which changes /n/ and /l/ to [m, n, ɲ, ɲ] and [l, ʎ] respectively, and minor place assimilation, which introduces the bilabial–labiodental distinction, within the labial series ([m]–[ɲ]); the dental–alveolar distinction, within the dento-alveolar series ([n]–[ɲ], [l]–[ʎ]), and the postalveolar–palatal distinction, within the palatal series ([ɲ]–[ɲ], [ʎ]–[ʎ]). Broadly following Recasens (1993, 194–196) and Recasens/Pallarès (2001), minor place assimilation adds a coarticulatory gesture while major assimilation implies the loss of a characteristic gesture (they further distinguish gestural blending, leading to assimilation or coarticulation; cf. Wheeler 2005, 186–206 for a full discussion of minor place assimilations in line with Recasens et al.’s studies). Other minor place assimilations appear, e.g. in the context of /ɲ/ and /ʎ/ followed by s (anys [‘aɲf] ~ [‘aɲs] ‘years’); /ʃ/ followed by s (mateix so [mɐtɐs‘so] ‘same sound’), which may reduce to [s] (cf. 4.2.4), and /t, d/ followed by an alve-

olar sonorant (*set nois* [set'nɔjs] ‘seven boys’), which may undergo manner assimilation, as we will see next.

The dental plosives /t/ and /d/ assimilate the articulatory place of a following plosive (*set pomes* [sep'poməs] ‘seven apples’, *set cases* [sek'kazəs] ‘seven houses’). Some dialects (e.g. part of Balearic; cf. below) extend the assimilatory context to all plosives in preconsonantal position.

Manner assimilation mainly affects plosives followed by a nasal or a lateral consonant. The assimilation systematically applies to /t/ and /d/ within words (*setmana* [səm'manə] ‘week’, *ètnic* ['ennik] ‘ethnic.M.SG’, *atles* ['alləs] ‘atlas’, *batlle* ['baʎʎə] ‘mayor’), and is optional across words (e.g. *set nois* [set'nɔjs] ~ [sen'nɔjs]). Within words, /kn/ and /gn/ may also assimilate nasality, but they maintain the velar character of the original plosive (*cognom* [kug'nɔm] ~ [kuŋ'nɔm] ‘last name’). Manner assimilation of /p/ and /b/ is limited to a following /m/; this context only appears in prefixed words and compounds, where the assimilation is quite systematic (*submarí* [summə'ri] ‘submarine’), and across words, where the assimilation is optional (*cap mare* [kab'marə] ~ [kam'marə] ‘no mother’). The previous data show that nasal and lateral assimilations are constrained by homorganicity, either underlying or derived from place assimilation. Some dialects (e.g. part of Balearic; cf. below) extend the manner assimilatory context to non-homorganic contacts. Additionally, sibilants tend to assimilate to the rhotic character of a following [r], typically resulting in an approximant (*Israel* [iz'rəel] ~ [i'rəel], *mateix riu* [məteʒ'riw] ~ [məteɪ'riw] ‘same river’); these groups may reduce to [r] too (cf. 4.2.4).

In the Balearic variety of Majorca (and to a lesser extent in Minorca), assimilation is more radical. Plosives assimilate to the articulatory place of a following sibilant, resulting in an affricate (*rics* ['rits] ‘rich.PL’, *cap ceba* [caɪtsəβə] ‘no onion’, *puc jugar* [puddʒu'ja] ‘I can play’). All other non-sibilant obstruents assimilate place and manner of a following onset consonant, giving rise to geminates (*cap dia* [cad'diə] ‘no day’, *cap flor* [caɪ'flɔ] ‘no flower’, *cap limit* [cal'limit] ‘no limit’; *agaf coses* [əʒak'kɔzəs] ‘I take things’, *agaf mores* [əʒam'mores] ‘I collect blackberries’). Just like /n/, /m/ assimilates place in all preconsonantal positions too (*so*[m] ‘we are’ – *so*[ŋ g]rans ‘we are big’); /m/ as well as /n/ optionally assimilate manner when they are followed by a lateral consonant (*so*[m] ‘we are’ – *só*[n l]egals ~ *só*[l l]egals ‘we are legal’; *só*[n] ‘they are’ – *só*[ŋ ʎ]iures ~ *só*[ʎ ʎ]iures ‘they are free’).

### 4.2.3 Word-final cluster reduction

In Central Catalan, Northern Catalan, the Balearic variety of Ibiza, Northwestern Catalan, and part of Valencian, nasals and laterals followed by homorganic plosives delete the plosive, i.e. major place assimilation applies prior to deletion (cf.

4.2.2): *camp* ['kam] 'field' – *ca*[mp]erol 'peasant', *tomb* ['tom] 'overturn' – *to*[mb]ar 'to turn over'; *dent* ['den] 'tooth' – *de*[nt]al 'dental', *profund* [pru'fun] 'deep.M.SG' – *profu*[nd]a 'deep.F.SG'; *banc* ['ban] 'bank' – *ba*[ŋk]a 'banking', *sang* ['saŋ] 'blood' – *sa*[ŋg]ada 'bleeding'; *salt* ['sal] 'jump' – *sa*[lt]ar 'to jump', *herald* [ə'ral] 'herald' – *herà*[ld]ic 'heraldic'. Nasal cluster reduction is categorical except for velar groups, which can retain the plosive in phrase-final and prevocalic position (*Dona sa*[ŋ(k)] 'S/he donates blood', *sa*[ŋ(k)] *i fetge* 'blood and liver'). Lateral cluster reduction is categorical, especially in words of high-frequency use, but presents variation when the plosive stands for the participial morph (*resol-t* [rə'zɔl(t)] 'solve-PTCP'). Words ending in /-rt/, /-rd/, and /-st/ (there are not /-sd/ native words in Catalan) present variable deletion (deletion is more common in less formal pronunciations, extending to prevocalic contexts): *cu*[r(t)] 'short.M.SG' – *cu*[rt]íssim 'very short.M.SG', *pe*[r(t)] 's/he loses' – *pe*[rð]ia 's/he lost', *robu*[s(t)] 'robust.M.SG' – *robu*[st]a 'robust.F.SG'. All other word-final clusters are maintained: *A*[lp] 'Cat. toponym', *bo*[sk] 'forest', *ca*[rn] 'meat'. Therefore, clusters that show final consonant deletion share not only the major point of articulation (labial, dento-alveolar or velar) but also the non-continuant character of the consonants involved (nasals, laterals, and plosives). In the Balearic varieties of Majorca and Minorca, Algherese, and most part of Valencian, the aforementioned clusters are retained in phrase-final position and prevocalically across words (*És una de*[nt] 'It's a tooth', *de*[nt] *incisiva* 'incisor tooth'); but delete the plosive in preconsonantal position (*de*[m] *molar* 'molar tooth') (cf. 3.3 for epenthesis across words in Algherese). Variable contexts in dialects with cluster reduction, categorically delete the plosive in preconsonantal position (*Pe*[r] *pes* 'S/he loses weight' vs. *Pe*[r(t)] 'S/he loses', *Pe*[rt] *un botó* ~ *Pe*[r] *un botó* 'S/he loses a button').

In preconsonantal position across words, other clusters may reduce, especially in less formal styles; deletion typically affects plosives and *f* (*parcs temàtics* [ˌparztə'matiks] 'theme parks', *triomf global* [triˌomglu'βal] 'global triumph'). In the Balearic variety of Majorca, internal complex codas that do not contain a glide end up reducing to a singleton coda (*parc temàtic* [ˌpartə'matik], *parcs temàtics* [ˌpartə'matits], *ou petit* [ˌɔwpə'tit] 'small egg', *ous petits* [ˌɔwpə'tits] 'small eggs', *vuit nins* [vuj'nins] 'eight boys').

#### 4.2.4 Other processes

Other general processes of Catalan include consonant epenthesis, simplification of sibilants and rhotics in contact, and irregular morphophonemic alternations. Catalan shows a few cases of consonant insertion to repair bad syllable contacts. The most general case involves [d] insertion between a verbal stem ending in nasal or lateral and an /r/-initial morph (*vend-re* [ˈbɛndrə] 'sell.INF' – *ven-ia*

[bə'niə] ‘sell-PST[3SG]’; *vold-ré* [bu'l'dre] ‘want-FUT.1SG’ – *vol-ia* [bu'liə] ‘want-PST[3SG]’). Some varieties (Northern Cat., northern areas of Northwestern Cat., and in recession among younger generations in northern Central Cat., Majorcan Balearic, and Algherese) tolerate these contacts by strengthening the rhotic (*ve[nr]e*, *vo[lr]é*).

Sibilant contacts are avoided word-internally. Morpheme-internally they reduce to a single segment (*piscina* [pi'sinə] ‘piscine’), but across morphs they trigger vowel addition (*mateix-o-s* ‘same-M-PL’, *fuge-s* ‘flea[PRS]-2SG’). Across words, they also generally reduce (*les sis* [lə'sis] ‘six o’clock’, *més jove* [me'ʒəβə] ‘younger’). In Majorcan Balearic, though, dissimilation applies in the contexts where other varieties show reduction ([pit'sina], [let'sis], [med'dʒəvə]). Rhotic contacts tend to simplify (*Mar Roig* [ma'rɔtʃ] ‘Red Sea’), as well as the assimilated result of a sibilant plus rhotic sequence (*Israel* [i'ræɪ], *mateix riu* [mate'riw]; cf. 4.2.2).

Other patterns of morphophonemic alternations involve *n* – ‘zero’, *r* – ‘zero’, and *v* – *u* alternations. The alternations with ‘zero’ occur in posttonic word-final position; there are, though, many exceptions and further constraints that regulate the outcomes. The *n* – ‘zero’ alternation is limited to postvocalic word-final position (*mà* [ma] ‘hand’ – *ma[n]s* ‘hands’, *so* [sɔ] ‘sound’ – *so[n]ar* ‘to sound’, cf. *carn* [karn] ‘meat’) and appears in nominals mainly (cf. *ven* [ben] ‘s/he sells’, *estan* [əs'tan] ‘they are’); but even within nominals there are lexical exceptions (*nen* [nen] ‘boy’, *son* [sɔn] ‘sleep’). Northern Catalan has extended the ‘zero’ pattern to plurals (*mà* [ma] – *mans* [mas] – *ma[n]eta* ‘hand.DIM’). On the other hand, the *r* – ‘zero’ alternation extends to plurals (*flor* [flɔ] ‘flower’, *flors* [flɔs] ‘flowers’ – *flo[r]a* ‘flora’; *dur* [du] ‘hard.M.SG’, *durs* [dus] ‘hard.M.PL’ – *du[r]a* ‘hard.F.SG’), but the phenomenon has many lexical exceptions too (*mar* [mar] ‘sea’, *mars* [mars] ‘seas’; *car* [kar] ‘expensive.M.SG’, *cars* [kars] ‘expensive.M.PL’) and is subject to a large dialectal variation (e.g. Valencian does not generally delete final /-r/, while Majorcan Balearic almost systematically deletes it). The unpredictable extension of the two patterns suggests that they are better treated as instances of underlying allomorphy. As for the *v* – *u* pattern, only dialects with /v/ can be treated as displaying a general phonological process of /v/ weakening to [w] in postvocalic word-final codas (*bla[w]* ‘blue.M.SG’ – *bla[v]a* ‘blue.F.SG’), which overruns the general word-final devoicing process that affects obstruents (cf. 4.2.1) (see Jiménez/Lloret/Pons-Moll to appear for a more detailed description and analysis of the *v* – *u* alternation in Majorcan). Dialects that have merged /v/ to /b/ show [w] – [β] alternations instead (*bla[w]* – *bla[β]a*), which coexist with [p] – [β] and [w] – [w] patterns in the same contexts (*sa[p]* ‘s/he knows’ – *sa[β]em* ‘we know’; *garne[w]* ‘cunning.M.SG’ – *garne[w]a* ‘cunning.F.SG’). Coexisting patterns indicate that [w] – [β] alternations are also better treated as instances of underlying allomorphy, phonologically conditioned by the context: /w/ in codas, /b/ in onsets.

Other peculiar dialectal processes worth mentioning involve gliding effects, *s*-rhotacism, and *r*-lateralization. In Western Catalan, postalveolar fricatives give rise to a preceding [j] in intervocalic position (*caixa* [ˈkajʃa] ‘box’; *roja* [ˈrɔjʒa] ‘red.F.SG’, though [ˈrɔdʒa] in many Valencian varieties; cf. 2.1); in the case of /ʃ/, gliding extends to word-final position (*mateix* [maˈtejʃ] ‘same.M.SG’). In Majorcan Balearic and Northern Catalan, postalveolar sibilants reduce to [j] in preconsonantal position (*mateix* [məˈtejʃ] – *mateix dia* [mətejˈðiə] ‘same day’, *raig* [ˈratʃ] ‘ray of a liquid’ – *raig seguit* [ˌrajsəˈvit] ‘straight ray’); gliding also occurs in the contact of a stem and the plural morph (*mateix-s* [məˈtejs] ‘same[M]-PL’, cf. *mateix-o-s* elsewhere) and, to a lesser extent, in the contact of a stem and the second person singular morph in Majorcan Balearic (*fuig* [ˈfutʃ] ‘flea[PRS.3SG]’ – *fug-s* [ˈfujs] ‘flea[PRS]-2SG’, cf. *fuge-s* elsewhere) (Palmada 1994, 89–90). In Northern Catalan sibilant gliding extends to phrase-final position (*És el mateix* [j] ‘It’s the same’). In the Balearic varieties of Majorca and Minorca, palatal nasals followed by a consonant split into [j] and a depalatalized nasal, which undergoes place assimilation (*any* [ˈaɲ] ‘year’ – *anys* [ˈajns] ‘years’ – *any passat* [ˌajmpəˈsat] ‘last year’; *banc* [ˈbaɲç] ‘bank’ – *bancs* [ˈbajns] ‘banks’ – *banc tancat* [ˌbajntənˈcat] ‘closed bank’) (Mascaró 1986; Palmada 1994: 91–92). Majorcan Balearic tends to rhotacize *s* before a voiced consonant (*bisbe* [ˈbiɪbə] ‘bishop’; *És meu* [əɪˈmew] ‘It’s mine’ vs. *És teu* [əsˈtew] ‘It’s yours’) and in some localities also before *f* (*es focs* [əɪˈfɔts] ‘the fires’) (Pons-Moll 2011b). Finally, at word level Algherese has changed /r/ into /l/ in preconsonantal position (*fort* [ˈfɔlt] ‘strong.M.SG’, *forta* [ˈfɔlta] ‘strong.F.SG’).

## 5 Prosody

### 5.1 Word prosody

Catalan words are typically stressed. Word stress (also called primary stress) can be lexically contrastive, differentiating words that are otherwise phonologically identical or similar: *fàbrica* ‘company’ vs. *fabrica* ‘s/he produces’ vs. *fabricà* ‘s/he produced’. Depending on its position within the word or the sentence, syllables carrying word stress are acoustically realized through changes in tone, duration, and intensity. Following a demarcative tendency for word prominence (as well as phrasal prominence) to mark the final edge of prosodic domains, word stress tends to fall on one of the last three syllables of the word (enclitics excluded). Regarding frequency, in contrast with other Romance languages, final stress can be considered the dominant pattern in Catalan. A quantitative analysis on the most frequent metrical patterns found in this language reported that words with

stress-final patterns (e.g. monosyllabic stressed words and bisyllabic iambs such as *sol* ‘sun’ or *sabó* ‘soap’) constituted 53% of the data and words with penultimate stress patterns (e.g. bisyllabic trochaic words such as *taula* ‘table’ and trisyllabic amphibrachs such as *pilota* ‘ball’) constituted 40% of the data (see Prieto 2006 for more details).

Stress systems tend to show a tendency for alternation of prominences in sequences of lexically unstressed syllables, triggering patterns of secondary stresses. In contrast with word stress, secondary stresses in Catalan are not an inherent property of certain syllables. Even though some traditional work on Catalan has reported a systematic binary pattern of secondary stresses to the left of the primary stress (*màrató* ‘marathon’, *fàtalitat* ‘fate’; Coromines 1983; Oliva 1992), experimental work has not found clear empirical evidence of the presence of binary secondary stress patterns in casually read speech (Prieto 2003). However, in public speech style (e.g. university lectures, radio and television speech, etc.) speakers typically perform a rhetorical phenomenon which consists of assigning emphatic stresses to one of the syllables preceding the primary stress within the word. Regarding the distribution of these emphatic stresses, the most common pattern is the one occurring two syllables before the primary stress (see Nadeu/Hualde 2012 for more details).

With respect to phrasal rhythm, Catalan has been described as an “intermediate language” between syllable-timed languages like Italian or Spanish and stress-timed languages like English or Dutch (Nespor 1990; Ramus et al. 1999). The main difference between the two rhythmic classes consists in the perception and realization of rhythmic patterns, with more even durations between stressed and unstressed syllables in syllable-timed languages than in stress-timed languages. Even though Catalan displays phonological properties that are typically associated with stress-timed languages such as greater complexity of syllable structure and systematic vowel reduction phenomena (cf. 3.1), recent studies have shown that timing or durational patterns for Catalan are very similar to those reported for syllable-timed languages such as Spanish (Prieto et al. 2012). Thus, Catalan shows that the phonological properties of a language (e.g. systematic vowel reduction and more complex syllable structures) do not necessarily have a one-to-one correspondence with prosodic durational reductions leading to stress timing patterns.

## 5.2 Phrasal prosody: prosodic prominence, prosodic phrasing, and intonation

One of the fundamental pillars of phrasal prosodic structure is the realization of prosodic prominence above the level of the word. At the phrasal level, Catalan is a stress-accent language in which lexically stressed syllables generally serve as

the main landing site for phrasal pitch accents. Pitch accents are phrase-level prominences that are typically realized through pitch changes in the corresponding stressed syllables. Pitch accents can be rising, falling, or have more complex pitch movements. Figure 1 shows two examples of a rising pitch accent (associated with the first two stressed syllables of the sentence) and one example of a falling pitch accent (associated with the last stressed syllable). As we will see below, these pitch accents directly affect the intonational structure of the utterance. Given the demarcative properties of prominence, phrasal prominences strongly mark the ends of prosodic domains in Catalan. Typically, the last content word in the prosodic constituent receives a nuclear pitch accent (or main phrasal stress). This is the most perceptively salient stress within the constituent, and it is called *nuclear pitch accent* (or main phrasal stress). Pitch accents which appear before the nuclear pitch accent are called *prenuclear pitch accents* and are not as salient as nuclear pitch accents. Catalan is not very flexible with regard to allowing focused constituents *in situ*; that is, it does not easily allow for a leftward shift of nuclear pitch accents within prosodic constituents, as other languages do in cases of prosodic focus (cf. 5.3.1). Even though pitch accents typically associate with stressed syllables, unstressed syllables can also receive emphatic stresses, which are typically realized through a rising pitch accent (Nadeu/Hualde 2012).

The second fundamental aspect of phrasal prosody is prosodic phrasing. The way a sequence of words is organized into constituents (or phrases) strongly affects the prosodic structure of the discourse. In Catalan, two intonationally defined prosodic constituents have been described, namely the intonational phrase (IP) and the intermediate phrase (ip) (Prieto 2014; Prieto et al. 2015). Both levels of prosodic constituency are characterized by at least two prosodic markers, e.g. duration and pitch. First, constituent-final syllables are lengthened (with stronger final lengthening at the IP level than at the ip level). Second, the IP and ip constituents are tonally marked through a nuclear pitch configuration which appears at the end of the prosodic constituents. This configuration includes the nuclear pitch accent and a set of boundary tones which appear right at the edge of the prosodic boundary. The difference between the ip and IP tonal structures is that they are typically more reduced in the ip position. Figure 1 illustrates the two types of prosodic phrases that are relevant to intonation in Catalan.

Intonational patterns can be described on the basis of prominence and phrasing patterns. The minimal intonational tune is circumscribed to a prosodic constituent and consists of at least one pitch accent plus a boundary tone or a set of boundary tones. Overall, intonational patterns can be described as sequences of prenuclear and nuclear pitch accents followed by phrase-final boundary tones. In the section below, we describe the tonal structure of the most common tunes found in Catalan.

### 5.3 Main intonational patterns in Catalan

This section describes the main intonational patterns used in Central Catalan, with some references to dialectal variation. For a more extensive description of intonational variation in Catalan, see Prieto (2014) and Prieto et al. (2015). The section has been organized according to sentence types (statements, yes-no questions, wh-questions, commands, and vocatives), and within each section both biased and non-biased tunes are described.

#### 5.3.1 Statements

Broad-focus statements in Catalan are characterized by a melodic pattern that ends in a falling nuclear accent followed by a low boundary tone. Phrase-internal stressed positions are realized through prenuclear rising pitch accents. Figure 1 shows the intonational pattern of the broad-focus statement [*La nena de la Marina*]ip [*vol amanida*]IP ‘Marina’s daughter wants some salad’ produced with two prosodic phrases. The first prosodic constituent is an intermediate phrase (ip) ending with a rising pitch accent and followed by a boundary tone, and the second prosodic constituent is the sentence-final intonational phrase (IP).

INSERT FIGURE 1 HERE

**Figure 1.** Intonational pitch contour of the broad focus statement [*La nena de la Marina*]ip [*vol amanida*]IP ‘Marina’s daughter wants some salad’.

In narrow-focus statements (that is, statements which informationally highlight a given constituent), phrasing and prominence patterns can change substantially. Catalan is quite restrictive with respect to the location of nuclear prominence, which is systematically located in final position. Instead of allowing the shift of the nuclear accent to a non-final constituent, as other languages do, Catalan tends to resort to syntactic strategies such as focus fronting, which triggers the right-dislocation of the non-focal material (e.g. *L’he posat [a dins l’armari]F, el paquet*), clefting (e.g. *És [a dins l’armari]F, que he posat el paquet*). These syntactic strategies guarantee the location of the phrasal prominence at the end of the constituent. One specific type of narrow-focus statement is the so-called contrastive-focus, which specifically refers to the highlighting of information that directly reject the potential alternatives presupposed by the interlocutor (i.e. “It is B, and not A”). Figure 2 illustrates the intonation of the contrastively focused utterance [*La Marina*]F *vol amanida* ‘It is Marina (and not Maria) who wants some salad’. The intonation contour is composed of two prosodic constituents. First, the focused constituent [*La Marina*]F is produced with an emphatic rising pitch accent followed by a low boundary tone. By contrast, the postfocal constituent dis-



plays a very compressed pitch range. For recent studies of the melodic realization of contrastive- and broad-focus sentences in Catalan, Spanish, and Italian, see Vanrell et al. (2013b) and Vanrell/Fernández-Soriano (2013).

INSERT FIGURE 2 HERE

**Figure 2.** Intonational pitch contour of the contrastive focused utterance [La Marina]F vol amanida ‘It is Marina (and not Maria) who wants some salad’.

Statements can be epistemically biased and express a variety of belief states, such as the speaker’s degree of certainty and uncertainty with respect to the content of the utterance, as well as obviousness or contradiction. In Catalan, prosodic and intonational patterns strongly reflect specific epistemic biases. For example, uncertainty statements are characterized by lengthened syllables, and also by a suspended pitch movement at the end of the utterance. Similarly, statements of the obvious are characterized by a complex falling-rising-falling nuclear configuration (see Prieto et al 2015 for a more detailed description of epistemically-biased statement intonation).

### 5.3.2 Yes-no questions

Non-biased yes-no questions are non-expectational or non-presuppositional queries. In Catalan, the intonation of non-biased questions is characterized by the use of two types of intonation patterns, namely the rising pitch contour and the falling pitch contour. While the rising pitch pattern is characterized by a falling-rising nuclear pitch configuration (and also a prenuclear falling-rising pattern), the falling pitch pattern is characterized by a falling nuclear pitch configuration preceded by a prenuclear high sustained pitch. The difference between the falling intonation pattern of the *que*-interrogatives and the falling pattern of the broad focus statements lies in the tonal specification of the prenuclear syllables, which is high throughout the sentence up until the last stressed syllable in the sentence. The upper panel of Figure 3 illustrates the yes-no question *Vols amanida?* ‘Do you want some salad?’ produced with a rising nuclear pitch configuration, while the bottom panel illustrates the yes-no question (*Que*) *vols amanida?* ‘Do you want some salad?’ produced with a falling pitch configuration (see the comparison with the intonation pattern in Figure 1). The sentence-initial interrogative particle *que* ‘that’ can be optionally associated with the falling pattern.

INSERT FIGURE 3 HERE

**Figure 3.** Intonational pitch contours of the yes-no question (*Que*) *vols amanida?* ‘Do you want some salad?’ produced with a rising intonation pattern (top panel) and a falling intonation pattern (bottom panel).

The use of the falling or rising intonational patterns, as well as the use of the sentence-initial particle *que* ‘that’, depends greatly on the dialectal area. While in standard Central Catalan the two types of patterns coexist and both express information-seeking questions, the falling pattern is the predominant pattern in Balearic, Northwestern, and Algherese Catalan. By contrast, in Valencian and Northern Catalan there is a strong tendency to use the rising intonation pattern.

From an information standpoint, the focus of the question is typically placed at the end of the utterance and receives a nuclear accent. Yes-no questions with a narrow or contrastive focus on a non-final constituent (such as the subject) trigger changes in phrasing and prominence patterns. For example, a sentence like [*En Joan*]F *vol amanida?* ‘Is it John that wants some salad?’, with information focus on the subject, is produced with two prosodic phrases and two nuclear pitch accents.

As in the case of statements, Catalan questions can use specific intonation patterns to express belief states though epistemically-biased questions. In contrast with information-seeking questions, confirmation-seeking questions express the speaker’s previous knowledge about the propositional content of the utterance. Catalan dialects display a great variety of confirmatory lexical markers such as *oi/no/eh* ‘right’, which can be placed both sentence-initially or sentence-finally (*oi/no/eh que vols amanida?* / *vols amanida, oi/no/eh?* ‘You want some salad, right?’). Confirmation-seeking questions can also be produced without the initial lexical marker and with an intonation pattern which is similar to the falling pitch contour illustrated in Figure 3 (bottom panel). The difference between the two intonational contours lies in the amplitude of the falling pitch movement of the nuclear pitch accent (see Vanrell et al. 2013a for Majorcan Catalan).

Echo questions typically express the failure to understand the previous move in a conversation. This is why these questions tend to repeat (or ‘echo’) the information just mentioned in the discourse (e.g. Speaker A: *Vull amanida*; Speaker B: (*Dius que*) *vols amanida?* ‘(You say that) you want some salad?’). Figure 4 illustrates the prominent rising-falling nuclear pitch configuration that characterizes echo questions in Catalan.

INSERT FIGURE 4 HERE

**Figure 4.** Intonational pitch contour of the echo question (*Dius que*) *vols amanida?* ‘(You say that) you want some salad?’

In conversation, echo questions can also encode some type of counter-expectational meaning, such as surprise, incredulity, disapproval, and even anger. In this case, intonational patterns can indicate the degree with which the situation contradicts the speaker’s expectations (see Prieto et al. 2015 for a more detailed description of epistemically-biased interrogative intonation).

### 5.3.3 Wh-questions

Information-seeking wh-questions enquire about a specific piece of information from the hearer. In Catalan, wh-questions are headed by wh-words such as *què* ‘what’, or *qui* ‘who’. The most common intonation pattern of wh-questions in Catalan is characterized by a rising-falling nuclear configuration. An example of this type of pitch contour is illustrated in Figure 5. This i intonation pattern is commonly found in Central Catalan, Northwestern Catalan, Northern Catalan, and part of Balearic Catalan. By contrast, in Valencian, Algherese, and some parts of Balearic Catalan a falling pattern is documented (see Prieto et al. 2015 for more details).

INSERT FIGURE 5 HERE

**Figure 5.** Intonational pitch contour of the echo question *Qui en vol?* ‘Who wants some?’

As in the case of yes-no questions, changes in the focus structure of the sentence lead to the reorganization of prosodic phrasing. Constituents which are not in focus are typically located prefocally or postfocally (e.g. *Qui en vol, d’amanida?* or *D’amanida, qui en vol?* ‘Who wants some salad?’). Similarly, epistemic and volitional pragmatic effects can lead to melodic changes, such as the fact that imperative wh-questions are produced with an emphatic falling nuclear pitch accent.

### 5.3.4 Commands and requests

This section describes the intonation patterns of the main directive speech acts in Catalan: that is, speech acts that intend to persuade the hearer to perform the action described by the proposition. Depending on their illocutionary strength, directive speech acts range from strong and assertive commands to gentle requests. Prosodic patterns, as well as intonation, play an important role in the conveyance of the illocutionary force of imperative acts. On the one hand, assertive commands are characterized by a fast speech tempo and a substantial increase in intensity and pitch range (with either higher or lower values than the ones normally used by the speaker). The most common intonation pattern found in commands has a rising falling melody. Figure 6 shows the intonation pattern of the command *Vine!* ‘Come here!’. From a melodic point of view, imperative intonation patterns are very similar to broad focus intonation, the main difference being the increased pitch range found in the former.

INSERT FIGURE 6 HERE

**Figure 6.** Intonational pitch contour of the strong command *Vine!* ‘Come here!’.

From a prosodic point of view, gentle requests are characterized by a set of prosodic mitigation strategies (Hübscher/Borràs/Prieto 2017), such as low intensity, a softer voice quality, as well as slow tempo, and even extreme lengthening of the stressed and final syllables. An increase of these features tends to be linked to an increase of the pragmatic effect of persuasion. One of the most common intonation patterns found in soft requests is the one exemplified in Figure 7 by the request *Vine!* ‘Come here!’. It is characterized by low tone aligned with the nuclear accented syllable followed by a complex rising-falling movement associated with the posttonic.

INSERT FIGURE 7 HERE

**Figure 7.** Intonational pitch contour of the soft request *Vine!* ‘Come here!’.

### 5.3.5 Vocatives

Vocatives in Catalan can be produced a set of intonational melodies which vary according to a set of sociopragmatic factors (see Borràs-Comes/Sichel-Bazin/Prieto 2015 for a phonetic and pragmatic analysis of vocative melodies in Central Catalan; see a summary in Prieto et al. 2015). Three main intonational contours have been described. First, perhaps the most frequent first call in many Catalan dialects is the one exemplified in Figure 8 (left). It is produced with a rising pitch accent associated with the stressed syllable on the proper name followed by a long final syllable produced with a rising-falling boundary tone. This constitutes a non-insistent vocative. Second, the so-called *vocative chant*, is typically used for insistent calls across dialects. This is a tune that is widely used in many Romance and Germanic languages. Figure 8 (central figure) illustrates its melodic realization. It consists of a rising pitch accent associated with the stressed syllable followed by a long and sustained mid boundary tone. The third intonational pattern is the falling-rising melody, which is used when the interlocutor is not present and the speaker is wondering whether s/he can hear the call (see Figure 8, right).

INSERT FIGURE 8 HERE

**Figure 8.** The proper name *Marina!* produced with the three most common intonational pitch contours used for vocatives, from left to right: non-insistent vocative, insistent vocative, question vocative.

Catalan also shows two interesting dialectal features in the expression of vocatives, namely the use of sentence particles and also some truncation phenomena (Prieto et al. 2015). In Majorcan and Minorcan Catalan, emphatic vocatives are typically produced with the sentence-initial particle *o* (for example, *O Margali-*

*da!)* and pronounced with rising pitch accent over the vocative particle followed by a falling intonation. In Algherese Catalan, as in other Romance languages such as Sardinian, Corsican, and Southern varieties of Italian, vocatives are typically truncated. The truncated pattern is obtained by deleting the segmental material after the stressed vowel of the proper name (i.e. *Bàrbara* > *Ba*, *Teresa* > *Teré*, *Pasqual* > *Pasquà*). As for the intonation of truncated vocatives, two main patterns have been documented. While the non-insistent call is realized with a rising pitch accent on the stressed syllable, the emphatic call is realized with a pitch-accent shift to the first syllable of the truncated word. For example, the two possible melodic realizations of the vocative *Teré* (truncated form of *Teresa*) can be either [ta.ré], with a rising pitch accent over the last syllable of the word (non-insistent call) or [té.re], with a rising pitch accent over the first syllable of the word (emphatic call).

## 6 Summary and conclusions

This chapter has offered an overview of segmental and suprasegmental phenomena in Catalan. The presentation is based on the characteristics of the Central (Eastern) variety, though we have also included information about the more distinctive features of other dialects. The sections on vowels and consonants have shown the rich dialectal variation that Catalan offers, with common processes shared by many other Romance languages, such as resyllabification across words, vowel reduction, word-epenthesis, spirantization, voice neutralization, place and manner assimilations, and word-final cluster reduction. The rich dialectal variation of Catalan has also made it possible to identify more idiosyncratic processes, shared by fewer Romance varieties, such as vowel insertion across words, vowel harmony, sibilant voicing across words, rhotacism, *r*-lateralization, gliding effects, sibilant dissimilation, severe assimilations and cluster reductions, *n* – zero and *r* – zero alternations, as well as the unique [tʃ] – [ʒ] alternation and, in addition to the common exceptional syllabification of *s* in clusters (limited to codas in Catalan), the tolerance of other word-final codas that do not comply with the sonority requirements.

The section on prosody has offered a description of the main features of word prosody, phrasal prosody, rhythm, as well as the most common intonational patterns found in Catalan. We have seen that the Catalan prosodic system has many features in common with those of other Romance languages. Word stress is used to characterize the majority of words in this language, and is typically placed in one of the three last syllables of the word. Secondary stresses tend to be realized as emphatic prominences over certain unstressed syllables in specific speech styles, such as public speech. This strategy is shared by other Romance languages

but it differs from French or Occitan (see a discussion in Frota/Prieto 2015). The rhythmic pattern of Catalan is syllable-timed, like most other Romance languages (but unlike languages such as Friulian, and some dialects of Portuguese and Italian, which can be considered more stress-timed). Finally, Catalan uses a variety of postlexical prominence patterns, as well as postlexical intonational patterns, to mark phrasing structure and also to express modality and other pragmatic meanings, such as focus. From an intonational point of view, Catalan can be regarded as a very rich language which uses intonation to express a wide variety of pragmatic meanings, such as epistemic positioning or focus in statements and questions.

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