Eulàlia Bonet and Maria-Rosa Lloret

4 Phonology and morphology in Optimality Theory

Abstract: One major research question in Optimality Theory (OT) that directly tackles phenomena at the interface of phonology and morphology is whether or not the model should allow intermediate levels of representation. This chapter addresses this discussion by presenting phenomena from Romance languages that challenge the parallel version of OT in order to contrast the additional mechanisms proposed to maintain parallelism (especially, several kinds of output-to-output constraints and alignment constraints) with the analyses provided within different serial (stratal, derivational or cyclic) versions of OT. A further issue discussed in the light of parallel and serial versions of OT is the mechanism for phonologically conditioned allomorph selection. The data include, among other things, French adjectival liaison, definite article allomorphy in Galician and Italian, Spanish diphthongization, vowel reduction and epenthesis in Catalan, and palatalization in Romanian.

Keywords: allomorphy, Optimality Theory, paradigms, parallelism, serialism

1 Introduction

One of the areas in which Optimality Theory (OT) offers novel insights concerns the interface of phonology and morphology. Pre-OT studies mainly addressed their attention to phenomena in which morphology conditions phonology through models that allow intermediate levels of representation on the basis of morphological structure. Contrariwise, the original version of OT (Prince/Smolensky 1993/2004) was mostly explored as a parallel and globalist model, without intermediate levels. The model was soon implemented with 'correspondence' relations (McCarthy/Prince 1994; 1995; Benua 1995; 1997), which capture the identity relations between elements in two representations (as in input-output pairs) and are further used to account for the role that morphologically 'derived environments' play in phonology. In this monostratal or parallel version of OT, in addition to standard input-output (IO) faithfulness constraints that check the identity relations between the input (underlying form) and its possible outputs (surface forms), there are constraints imposing

Acknowledgement: The first author gratefully acknowledges the Government of Catalonia (Generalitat de Catalunya, research group 2014SGR1013) and the Spanish Ministry of Economy and Competitiveness (Ministerio de Economía y Competitividad, grant FFI2013-46987-C3-2-P). The second author gratefully acknowledges the Government of Catalonia (Generalitat de Catalunya, research group 2014SGR918) and the Spanish Ministry of Economy and Competitiveness (Ministerio de Economía y Competitividad, grant FFI2013-46987-C3-1-P).

output-output (OO) faithfulness, that is a set of constraints whose role is to check the identity relations within the network of morphologically related output forms. OO relations can be used, for example, to justify the presence of a diphthong in the unstressed position of Spanish words like *c*[we]*ntecito* 'tale (diminutive)' (instead of **c*[o]*ntecito*), on the basis of the shape of its corresponding underived word *c*[ˈwe]*nto* 'tale', where the diphthong appears in stressed position (cf. section 3.1). Derived environment effects are simply those to which the notion of output-to-output correspondence is applicable. There is also a set of alignment constraints that capture edge-based effects found at the prosody-morphology interface as well as edge effects found between categories of other components (Prince/Smolensky 1993/2004; McCarthy/Prince 1993). Such constraints can explain, for instance, the tendency that languages show to maximally respect morphological constituents, and hence to prefer epenthesis at the edges of morphs (as in Catalan [ə]*scola*, *s[ə]*cola* 'school'; cf. section 3.2). Much recent work, though, objects to OO correspondence relations and claims that intermediate levels of representation are needed anyway to account for certain cases of opacity in phonology and allomorph selection; hence, under this view a serial (stratal, derivational or cyclic) version of OT is advocated (e.g. Kiparsky 2000; Bermúdez-Otero to appear).

Another effect of the phonology-morphology interface concerns the phonological conditioning on morphology, which has especially been investigated in the realm of allomorphy.[1] Pre-OT approaches had notorious difficulties in capturing the choice between allomorphs that make sense phonologically, whereas OT has succeeded, in many cases, in obtaining the selection through the emergence of universal constraints ('The Emergence of The Unmarked' or TETU effect; McCarthy/Prince 1994; 1995). Such effects are seen, for instance, in French with the selection of adjective forms like *beau* before consonants (*beau mari* [bo.ma.ʁi] 'beautiful husband') but *bel* before vowels (*bel abbé* [bɛ.la.be] 'beautiful abbot') to provide an onset to the following syllable (cf. section 2.1).

In this work, we address the aforementioned issues through the examination of examples drawn from Romance languages. The chapter is organized as follows. We first introduce the issue of phonologically conditioned allomorphy ('PCA'), which is cases in which a phonological requirement conditions the selection of a given allomorph (cf. section 2). We next focus on the impossibility of making reference to intermediate forms in parallel models of OT, and show how the introduction of paradigmatic relations (relations between outputs) as well as the use of alignment constraints can solve such problems; these models are compared with serial accounts of the same facts (cf. sections 3 and 4). Finally, we explore, from both parallel and serial points of view, more complex relations between lexical elements and phonological conditionings that give rise to new morphological forms (cf. section 5).

1 'Allomorphy' will be used to refer to both phonetic and phonological alternants of the same lexical unit; the former is also referred to as 'surface allomorphy', the latter as 'lexical or suppletive allomorphy'.

2 Phonologically conditioned allomorphy

In the classic generative approach, superficial allomorphy is accounted for, as much as possible, in terms of a single abstract underlying representation which turns into different surface allomorphs in specific contexts due to the action of phonological rules. In OT, rules have been abandoned, but the notion of underlying representation has persisted in the standard view, in the sense that all candidate outputs are considered as much as possible to be deviations from a single input, which, with the action of EVAL, maps onto different output forms that are phonotactically conditioned.[2] Hence, some of the traditional discussions on the limits on the abstractness of the underlying representations and the regularity of certain alternations to stem from unique inputs are replicated in OT terms. In this section, we illustrate this point with the well-known cases of French liaison (cf. section 2.1) and *il/lo* article allomorphy in Italian (cf. section 2.2). In section 3 we further address this issue intermingled with the discussion on parallelism vs. serialism.

Surface allomorphs that cannot be derived from a single underlying form are accounted for by listing each of the allomorphs in the lexicon ('lexical or suppletive allomorphy').[3] In most cases, the distribution of allomorphs is not free, but each allomorph appears in a specific grammatical context ('controlled or contextual allomorphy'). The context can be of different sorts, but there are many cases in which the selection of a particular allomorph appears to have a phonological motivation (i.e. phonologically conditioned allomorphy, PCA). Carstairs (1987; 1988) highlighted the importance of distinguishing between phonologically conditioned surface allomorphy and phonologically conditioned lexical allomorphy (or suppletion), but did not propose a mechanism to capture such phonology-morphology dependences. In fact, phonology-morphology interactions in the case of lexical allomorphy are difficult to capture in rule-based derivational theories, but encounter a perfect set-up in OT, especially when the selection is done on the basis of markedness ('regular or natural PCA'). Predictable PCA is normally treated as an instance of multiple inputs (i.e. different underlying forms) that compete for the same morphemic realization, whose selection is driven by phonological well-formedness. A central insight of this view is that allomorph choice turns out to be a TETU effect. Classic examples of markedness-driven allomorph selection include the *bel/beau* French case (cf. section

2 Alternative developments of OT eliminate the underlying representations and instead advocate inputs that are always output forms (cf. e.g. Burzio 1996; 2002; 2005) or, less radically, inputs that can be output forms as well as standard underlying-representation-like inputs. We examine the latter view in sections 3–5.

3 The term "suppletion" is alternatively restricted to cases of allomorphy where the allomorphs are completely different, as in the English auxiliary verbal forms *be/is/was/are*.

2.1) and article allomorphy in different Romance languages (cf. sections 2.2, 2.3).[4] Cases that additionally raise other questions on the architecture of OT are presented in sections 3–5.

Although OT sheds light on regular PCA, the analysis of cases in which the allomorph choice is not phonologically optimizing but the allomorphs are still contextually distributed according to a given phonological context ('arbitrary PCA') is more controversial. If this type of allomorphy is treated in the phonological component, additional mechanisms and constraints are needed to fix preferences which are arbitrary from the phonological point of view. Alternatively, they can be considered part of the morphology, in which case the distribution of allomorphs is accomplished via arbitrary subcategorization. The definite article in Italian (cf. section 2.2) and Galician (cf. section 2.3) illustrates this point.

2.1 *Bel/beau* allomorphy in French

French adjectival liaison (cf. e.g. Tranel 1981; 1990) illustrates an instance of phonologically driven allomorphy conditioned by syllable structure which has received different treatments in the OT literature due to alternative views on the shape and origin of the inputs. The facts are as follows. Adjectives have one form for the masculine (1a, 2a) and another one for the feminine (1b, 2b); however, in prenominal vowel-initial position a form identical to the feminine adjective is found in masculine singular contexts to prevent hiatus (1c, 2c). As noted by Tranel (1990), the taxonomy includes clear lexical (suppletive) cases (1) as well as cases where the alternation can be viewed as lexical or as derived from a single underlying representation (2) on the assumption that, as in typical instances of liaison (e.g. plural liaison in *de*[z] *abbés* '(some) abbots' vs. *de*[Ø] *maris* '(some) husbands'), the presence or absence of the final consonant of the adjective follows from the preference for unmarked CV syllables.

(1) Fr. a. [bo] mari 'beautiful husband'
b. [bɛl] femme 'beautiful woman'
c. [bɛl] abbé 'beautiful abbot'

(2) Fr. a. [pœti] curé 'small priest'
b. [pœtit] femme 'small woman'
c. [pœtit] abbé 'small abbot'

4 Although for our purposes we illustrate the basics of PCA with the *bel/beau* French case and article allomorphy in Italian and Galician, there are many other such instances in Romance languages, for example, the personal article *en/l* in Catalan, the definite article *la/l* in French, and the preposition *di/d* in Italian and *de/d* in Occitan (cf., among others, Mascaró 1996).

Tranel (1990) provides a crucial piece of phono-syntactic evidence for treating adjectives like (2) as derived from a single underlying form ('non-suppletive adjectives', in his terminology). As in non-dislocated constructions (3a, 4a), the liaison context provided by right dislocation at the site of the intonation break (marked with '/' in the transcriptions below) yields resyllabification of the final consonant with the following vowel-initial word in regular liaison contexts (3b) as well as in masculine liaison contexts of non-suppletive adjectives (3c). Suppletive adjectives, instead, do not resyllabify in the dislocated context (4b), nor does any feminine form (3d, 4c). The examples in (3, 4) are adapted from Tranel (1990, 179–182); further arguments are given in Steriade (1999a; 2001) and Bermúdez-Otero (to appear); cf. section 5.1.

(3) Fr.

a.	J'ai de petits éléphants. 'I have some small elephants$_{M}$.'	[pœ.ti.ze.le.fɑ̃]
	J'ai un petit éléphant. 'I have a small elephant$_{M}$.'	[pœ.ti.te.le.fɑ̃]
b.	J'en ai des petits, éléphants.	[pœ.ti/.ze.le.fɑ̃]
c.	J'en ai un petit, éléphant.	[pœ.ti/.te.le.fɑ̃]
d.	J'en ai une petite, éléphante.	[pœ.tit/.e.le.fɑ̃t], *[pœ.ti/.te.le.fɑ̃t]
	cf. J'ai une petite éléphante. 'I have a small elephant$_{F}$.'	[pœ.ti.te.le.fɑ̃t]

(4) Fr.

a.	J'ai un bel éléphant. 'I have a nice elephant$_{M}$.'	[bɛ.le.le.fɑ̃]
b.	J'en ai un bel, éléphant.	[bɛl/.e.le.fɑ̃], *[bɛ/.le.le.fɑ̃]
c.	J'en ai une belle, éléphante.	[bɛl/.e.le.fɑ̃t], *[bɛ/.le.le.fɑ̃t]
	cf. J'ai une belle éléphante. 'I have a nice elephant$_{F}$.'	[bɛ.le.le.fɑ̃t]

For the non-suppletive cases, the classic autosegmental interpretation is to consider that these lexical items have a final latent or floating segment (parenthesized in the representations, as in /pœti(t)/), which in liaison environments surfaces to avoid onsetless syllables (i.e. to satisfy the markedness constraint ONSET). In OT, the docking of the floating segment is penalized by, for example, the faithfulness constraint M-X ("Every X-slot belongs to a morpheme"; Tranel 1996a, 278, on FILL-X in McCarthy 1993). M-X is violated whenever a floating segment is phonetically realized (cf. example 5). Alternative analyses are reviewed in Côté (2011).

(5)

/pœti(t)/ abbé	ONSET	M-X
☞ [pœ.ti.t]a.bbé		*
[pœ.ti].abbé	*!	

For the suppletive alternation in the masculine context there are two main views. Under one view, there is a single allomorph for masculines (/bo/) and a single allomorph for feminines (/bɛl/), but in the masculine liaison context the feminine is chosen to prevent hiatus (e.g. Tranel 1996b; 1999; Perlmutter 1998). A different view is to consider that feminines have a single allomorph (/bɛl/) but masculines have two allomorphs (/bo/ and /bɛl/), with the consonant-final allomorph limited to the masculine singular context (i.e. the one that triggers the liaison context) and the selection driven by the effects of ONSET and *CODA (e.g. Mascaró 1996; cf. 6).

(6)

	{bo,bɛl} mari	ONSET	*CODA
a.	☞ [bo].mari		
	[bɛl].mari		*!
b.	{bo,bɛl} abbé	ONSET	*CODA
	[bo].abbé	*!	
	☞ [bɛ.l]a.bbé		

Although in most cases the liaison forms in the masculine contexts completely coincide with the feminine forms and hence would favour the view according to which the form chosen in the masculine hiatus context is actually the feminine one, Steriade (1999a; 2001) focuses on the cases where there is no such coincidence. In fact, many French speakers often use a hybrid of the masculine and the feminine forms in this context, which favours the latter view, e.g. [so] *mari* 'silly husband', [sɔt] *femme* 'silly woman', [sɔt] *éléphante* 'silly elephant$_F$', [sɔt] *éléphant* 'silly elephant$_M$', but crucially also [sot] *éléphant* (with the vowel of the masculine form and the liaison consonant of the feminine; cf. section 5.1).

2.2 Masculine definite article allomorphy in Italian

The masculine definite article of Italian shows different kinds of phonologically driven allomorphs, some of which seek output optimization while others are not obviously conditioned by phonotactics. Additionally, some cases raise the issue of limiting the abstractness of the inputs. The descriptive facts are as follows. In the singular, the allomorph *l* /l/ is chosen in prevocalic position (7a), *il* /il/ preceding consonants that can be syllabified in the onset (7b), and *lo* /lo/ preceding words that begin with consonant clusters that are presumed to be heterosyllabic in internal

position (e.g. *sC*; cf. 7c).[5] In the plural, the allomorph *gli* /ʎi/ appears in prevocalic position and before heterosyllabic consonant clusters (8a), and *i* /i/ occurs in other preconsonantal contexts (8b).

(7) It. a. l'amico 'the friend'
b. il cane 'the dog' il flagello 'the whip'
c. lo specchio 'the mirror'

(8) It. a. gli amici 'the friends' gli specchi 'the mirrors'
b. i cani 'the dogs' i flagelli 'the whips'

For the singular cases, the most accepted interpretation is that the choice of *l* and *lo* is governed by syllable-based considerations: *l* avoids onsetless syllables and hiatus (7a); *lo*, which was the most common article form in Old Italian, avoids complex codas, on the assumption that the first consonant of the presumed heterosyllabic cluster resyllabifies as a coda of the preceding word (Chierchia 1986; Davis 1990; Marotta 1993; Morelli 1999); cf. (7c). However, the preference for *il* over *lo* before other consonant initial words, cf. (7b), seems unmotivated on syllabic grounds, since a VC syllable (*il cane*, *il flagello*) is worse than a CV one (**lo cane*, **lo flagello*). Under such circumstances, it is often assumed that *il* is selected via phonological subcategorization (cf. 11 for the plural counterpart) or through the use of an arbitrary language-specific constraint that penalizes the use of *lo* (*LO: "*il* is the default article"; McCrary 2004, 156, on Wiltshire/Maranzana 1999; Morelli 1999; illustrated in 10 with the plural).

Del Gobbo (2001), inspired by Tranel's (1996a) work on French liaison (cf. section 2.1), proposes an alternative analysis according to which *l* and *lo* derive from a single input with a floating vowel (*l(o)*), whose appearance is restricted by the faithfulness constraint DEP-X ("Every X-slot of the output has an identical correspondent in the input"). Under this view, there is a two-input unordered allomorph set for the masculine singular, i.e. {il,l(o)}, cf. (9), and the floating vowel only surfaces if required by the need to avoid complex codas, cf. (9c).

5 Bertinetto/Loporcaro (2005, 140–141) suggest the possibility that the syllabification of *sC* clusters is underdetermined for contemporary speakers, based, for example, on the fact that a strictly heterosyllabic analysis must consider the codas in sequences like *con sforzo* [kons'fɔr͡tso] biconsonantal, which is a marked option in Italian. They agree, though, that "[t]he actual probability of the hetero- vs. tautosyllabic solution varies according to the context and the idiosyncratic behaviour of the speakers" (141).

(9)

			*ComplexCoda	Dep-X	Onset
a.	{il,l(o)}	flagello			
	☞	[il].flagello			*
		[lo].flagello		*!	
b.	{il,l(o)}	amico	*ComplexCoda	Dep-X	Onset
	☞	[la].mico			
		[i.la].mico			*!
		[lo].amico		*!	*
c.	{il,l(o)}	specchio	*ComplexCoda	Dep-X	Onset
		[ils].pecchio	*!		*
	☞	[los].pecchio		*	

As said, the aforementioned analyses are based on the assumption that consonant cluster syllabification is governed by language-specific constraints on sonority distances, which bear on *il/lo* definite article selection as well as on two other central phenomena of Italian phonology: vowel lengthening and *raddoppiamento (fono)sintattico* (e.g. Vogel 1977; Chierchia 1986; Repetti 1991; ↗1 Surface sound and underlying structure: The phonetics-phonology interface). However, since experimental work indicates that the conditioning factors of these processes are more variable than anticipated with regard to certain clusters (as in the case of *sC*, for instance), McCrary (2004) moves to an analysis which is not based on syllable structure but on the perceptibility of contrasts according to the context and position in which the segments appear in the string (following Steriade 1999b; 2009 [2001]). In her analysis, McCrary resorts to string-based segmental constraints, such as "Lex-C/in V__ or __V/L: In the native Italian lexicon, a consonant may only occur if it is after a vowel or followed by a vowel or liquid" (McCrary 2004, 64). These constraints capture the fact that in certain positions the perceptual cues for consonants are more salient. However, despite this alternative view of consonantal phonotactics, the analysis still has to resort to the use of the specific constraint *lo ordered below the string-based segmental constraints to account for contrasts such as *il flagello* (7b) vs. *lo specchio* (7c) (cf. McCrary 2004, 159–164).

The plural definite article shows a regular phonological distribution that looks arbitrary too, because the choice of *i* or *gli* does not improve hiatus resolution in prevocalic position nor does it improve the consonantal contacts (8). Del Gobbo (2001) proposes an optimizing analysis by resorting to the constraint Brevity ("The phonologically shortest allomorph is preferred"; Hargus 1998), which can be seen as an instance of the general constraint *Struc(ture) (Prince/Smolensky 1993/2004, 30 n. 13, 230), a constraint that penalizes any and all structure and hence favours the absence (or the smallest expression) of underlying material (Wolf 2008).[6] Such

6 Each underlying expression is a violation of the constraint *Struc, but, since the underlying forms are fixed, it does not influence the result unless there are multiple inputs: among equivalent inputs, *Struc favours the one with the fewest featural and segmental specifications.

a constraint will benefit *i cani*, *i flagelli* to the detriment of **gli cani*, **gli flagelli* (because *i* has less phonological material than *gli*) with the ranking BREVITY » ONSET (cf. 10a). The preference for *gli* in prevocalic position (*gli amici*) is captured by ordering BREVITY below the Empty Onset OCP constraint *[Ø~Ø]$_{Onset}$, which penalizes sequences of two onsetless adjacent syllables (as in candidate *[i.a]*mici* vs. [ʎi.a]*mici* in 10b). As for the selection of *gli* before heterosyllabic clusters (*gli specchi*), Del Gobbo (2001) observes that the choice of *i* in *[is].*pecchi* would give rise to the worst possible syllable (i.e. VC), whose emergence can be penalized in one action by appealing to the constraint conjunction ONSET&*CODA, which is violated whenever the candidate violates both constraints (as in the candidate *[is].*pecchi* in (10c), with an initial syllable without an onset but with a coda), ordered before BREVITY.[7] The ranking of *COMPLEXCODA and DEP-X above ONSET&*CODA upholds the analysis presented in (9) for the singular. In (10), we only indicate the violations of the relevant transcribed parts.

(10)

		*[Ø~Ø]$_{Onset}$	ONSET&*CODA	BREVITY	ONSET	*CODA
a.	{i,ʎi} flagelli					
☞	[i].flagelli				*	
	[ʎi].flagelli			*!		
b.	{i,ʎi} amici	*[Ø~Ø]$_{Onset}$	ONSET&*CODA	BREVITY	ONSET	*CODA
	[i.a]mici	*!			**	
☞	[ʎi.a]mici			*	*	
c.	{i,ʎi} specchi	*[Ø~Ø]$_{Onset}$	ONSET&*CODA	BREVITY	ONSET	*CODA
	[is].pecchi		*!		*	*
☞	[ʎis].pecchi			*		*

Some authors claim that such optimizing analyses resort to excessively powerful devices that do not depict automatic grammatical choices based on well-formedness (Nevins 2011, 2371). They instead propose analyzing the previous cases as instances of arbitrary subcategorization (cf. e.g. Piera 1985), as in (11), built on Paster (2006), where the subcategorization frames determine that the *gli* /ʎi/ allomorph is selected when the definite article is followed by vowel-initial words or heterosyllabic clusters, the *i* /i/ allomorph being the elsewhere form.

(11) DEF ↔ /ʎi/ followed by words beginning with V or heterosyllabic clusters
DEF ↔ /i/

7 By definition, conjoined constraints are ranked above the single constraints that constitute them (otherwise the conjunction will not be effective).

2.3 Definite article allomorphy in Galician

In Galician, the definite article surfaces as lateral forms (masculine singular/plural *lo/los*, feminine singular/plural *la/las*) or as onsetless forms (*o/os*, *a/as*), and their distribution is conditioned by the shape of the preceding word and the prosodification of the article. The phonological context for allomorph selection illustrates a case of opacity: the lateral allomorph is chosen when the article follows a word ending in *-r* or *-s*, but these are deleted on the surface (12a–b); the onsetless allomorph appears elsewhere (12c–e). The prosodification of the article poses a syllabification problem, because the onsetless allomorphs end up surfacing in marked onsetless syllables; cf. (12c–d).

(12)	Gal.	a.	ve-lo neno 'to see the boy'	/ber lo neno/:	[ˈbe.lo.ˈne.no]
		b.	vímo-lo neno 'we saw the boy'	/bimos lo neno/:	[ˈbi.mo.lo.ˈne.no]
		c.	para o neno 'for the boy'	/para o neno/:	[ˈpa.ɾa.o.ˈne.no]
		d.	o neno 'the boy'	/o neno/:	[o.ˈne.no]
		e.	comen o caldo 'they eat the broth'	/komen o kaldo/:	[ˈko.me.no.ˈkal.do]

In Galician, the realization of word-final nasals provides an argument for prosodic constituency, since the alveolar -/n/ is realized as a velar at the end of a prosodic word (PW) (e.g. *pan* [ˈpaŋ] 'bread', *comen* [ˈko.meŋ] 'they eat'), but as an alveolar (or assimilated to the following consonant) elsewhere (e.g. *neno* [ˈne.no] 'boy'). As shown by the behaviour of the masculine singular indefinite article *un*, articles encliticize to the preceding word if there is one available, although they are not members of the same syntactic constituent, e.g. *tivo un neno* [ˈti.βo.uŋ]$_{PW}$ [ˈne.no]$_{PW}$'s/he had a child' vs. [un.ˈne.no]$_{PW}$ 'a child', *un oso* [u.ˈno.so]$_{PW}$ 'a bear' (cf. Kikuchi 2006 for an analysis in terms of alignment constraints to handle this mismatch between morphosyntactic and prosodic constituency).

Based on work by Bonet/Lloret/Mascaró (2003; 2007) and Mascaró (2007), Kikuchi (2006) proposes that the choice of the definite article allomorphs is conditioned by the presence of lexically ordered allomorphs. According to this view, there are cases of lexical precedence relations among listed inputs ({A>B}), in this case {o>lo}. The faithfulness constraint Priority ("Respect lexical priority (ordering) of allomorphs"; Bonet/Lloret/Mascaró 2007, 906; Mascaró 2007, 726) penalizes the insertion of the

second allomorph (as in 13) unless markedness conditions force its appearance, which then surfaces as a TETU effect; cf. (14), below.[8] The high ranking of the markedness sonority constraint penalizing heterosyllabic contacts between consonants and vowels (*C.V) ensures that, even though Galician admits onsetless syllables in certain contexts, cf. (13), intersyllabically they must be syllabified with a following vowel, cf. (14). The alignment constraint enforcing that morphological word edges coincide with syllable boundaries (ALIGN-L(MW,σ) ("The left edge of a morphological word (MW) must coincide with the left edge of a syllable (σ)"; Kikuchi 2006, 44) penalizes resyllabification between words; cf. its effects for allomorph selection in (14).

(13)

para {o>lo} neno	*C.V	ALIGN-L(MW,σ)	PRIOR	ONSET
☞ [ˈpa.ɾa.o]$_{PW}$ [ˈne.no]$_{PW}$				*
[ˈpa.ɾa.lo]$_{PW}$ [ˈne.no]$_{PW}$			*!	

Based on the fact that sequences of a continuant and a stop that arise from pronominal encliticization are maintained (e.g. *visita*[ɾ.m]*e* 'to visit me', *vémo*[s.t]*e* 'we see you'), Kikuchi proposes that the deletion of *-r* and *-s* is due to the ranking of the markedness OCP constraint penalizing adjacent continuant consonants in prosodically close domains (OCP[+cont]) above the anti-deletion faithfulness constraint MAX-C (14b); deletion in morpheme internal position (*merlo* [ˈmeɾ.lo], *[ˈme.lo] 'blackbird') is banned by ranking the OCP constraint below I-CONTIGUITY, which is the constraint that "rules out deletion of elements *internal* to the input string" – or "No Skipping" (McCarthy/Prince 1995, 371; cf. also Kenstowicz 1994). However, as noticed by Nevins (2011, 2365, 2373), in order to handle opacity the lateral allomorph has to be chosen at an intermediate stage before OCP[+cont] is decisive during the evaluation, with OCP[+cont] crucially ranked below MAX-C (14a). As shown in (15), a single step evaluation with the ranking proposed in Kikuchi (2006, 47) will lead to an ungrammatical result.

8 The classic example that illustrates the role of PRIORITY in unnatural allomorph choice is the definite article distribution displayed by Haitian creole, where the *a* allomorph appears after a stem ending in a vowel (*papa-a* 'father-the'), but *la* appears after a stem ending in a consonant (*liv-la* 'book-the'). This anti-markedness allomorph distribution is accounted for with the ordered set {a>la} and PRIORITY, benefitting *a* (as in [pa.pa.a]) unless right alignment of the stem with the syllable or *C.V causes the selection of *la* (as in [liv.la] vs. *[li.va], *[liv.a]) (Bonet/Lloret/Mascaró 2007, section 2). In our view, the role of the constraint BREVITY in *i/gli* and *il/lo* selection in Italian (cf. section 2.2) to benefit *i* and *il*, respectively, can be handled with the use of the ordered sets {i>ʎi} and {il>lo} and PRIORITY replacing BREVITY in the ranking.

(14) Two-step derivation for /ber {o>lo} neno/: [ˈbe.lo.ˈne.no]

a. *Step 1:*

ˈber {o>lo} ...	*C.V	ALIGN-L(MW,σ)	MAX-C	OCP[+cont]	PRIOR	ONSET
[ˈbe.ro]$_{PW}$		*!				
[ˈber.o]$_{PW}$	*!					*
☞ [ˈber.lo]$_{PW}$				*	*	
[ˈbe.o]$_{PW}$			*!			*
[ˈbe.lo]$_{PW}$			*!			

b. *Step 2:*

ˈber lo ...	*C.V	OCP[+cont]	ALIGN-L(MW,σ)	MAX-C	PRIOR	ONSET
[ˈbe.ro]$_{PW}$			*!	*		
[ˈber.o]$_{PW}$	*!			*		*
[ˈber.lo]$_{PW}$		*!				
[ˈbe.o]$_{PW}$				**!		*
☞ [ˈbe.lo]$_{PW}$				*		

(15) A parallel derivation for /ber {o>lo} neno/: [ˈbe.lo.ˈne.no]

ˈber {o>lo}...	*C.V	OCP[+cont]	ALIGN-L(MW,σ)	MAX-C	PRIOR	ONSET
[ˈbe.ro]$_{PW}$			*!			
[ˈber.o]$_{PW}$	*!					*
[ˈber.lo]$_{PW}$		*!			*	
👉 [ˈbe.o]$_{PW}$				*		*
[ˈbe.lo]$_{PW}$				*	*!	

The problem raised by Galician can also not be handled in serial OT models based on morphologically determined levels, like Stratal OT (cf. e.g. Bermúdez-Otero 2013), because the opacity issue arises within the same level or stratum; serial models like Harmonic Serialism (cf. e.g. McCarthy 2000), which allow only one change at a time in each evaluation step, would handle them adequately only if a different constraint ranking were allowed at different steps, an option usually not assumed in Harmonic Serialism. Note, however, that even with the concurrent use of serialism, alignment constraints and lexically ordered allomorphs, the analysis would fail to capture the following fact: the onsetless article allomorph is chosen after a word ending in -/n/, which resyllabifies as an (alveolar) onset with the article (e.g. *comen o caldo* /komen o kaldo/: [[ˈko.me.no]$_{PW}$ [ˈkal.do]$_{PW}$] 'they eat the broth'). Under the presumed ranking, ALIGN-L(MW,σ) will always promote the second allomorph (*[[ˈko.men.lo]$_{PW}$

[ˈkal.do]$_{PW}$]). Following work by Álvarez Blanco (1983), Kikuchi (2006, 47) suggests the possibility that a third set of nasal allomorphs come into play (i.e. *no(s)*, *na(s)*), which will induce coalescence of the adjacent nasals (/komen$_1$n$_2$o kaldo/: [[ˈko.me.n$_{12}$o]$_{PW}$ [ˈkal.do]$_{PW}$], where the subscript digits in [n$_{12}$] indicate coalescence of the sequence /n$_1$n$_2$/).

3 Asymmetric surface relations and constraints on alignment

In this section, in addition to further exemplifying PCA and discussing the limits of abstractness when positing inputs as well as the apparent need for serialism, we introduce alternative parallel ways to deal with these phenomena focusing on which elements can stand in correspondence. We first present the phenomenon of diphthongization in Spanish, which illustrates a case of opaque interaction that can be handled in serial terms as well as within the tenets of parallelism (section 3.1). We then draw attention to a case of overapplication of epenthesis in Catalan cliticization, where some effects derived from the phonology-morphology interaction are explained in the parallel model, with the use of alignment constraints, but cannot be captured in serial terms (section 3.2).

3.1 Diphthongization in Spanish

The stress-driven alternation that affects mid-vowels in Spanish illustrates a well-known paradox of cyclicity. Generally, pure vowels appear in unstressed position while diphthongs appear in stressed position (e.g. *c*[o]*ntar* 'to tell' – *c*[ˈwe]*nto* 'tale/I tell', *n*[e]*gó* 's/he denied' – *n*[ˈje]*go* 'I deny'), and it seems that diphthongization depends on stress position, but stress in turn is sensitive to diphthongization (i.e. syllable weight). The phenomenon is lexically idiosyncratic because the alternation coexists with non-alternating pure vowels (cf. *m*[o]*ntó* 's/he mounted' – *m*[ˈo]*nto* 'I mount', *p*[e]*gó* 's/he hit (past)' – *p*[ˈe]*ga* 's/he hits') and non-alternating diphthongs (cf. *frec*[we]*ntó* 's/he frequented' – *frec*[ˈwe]*nta* 's/he frequents', *v*[je]*nés* 'Viennese' – *V*[ˈje]*na* 'Vienna'). In the alternating cases, the presence of diphthongs in unstressed positions of certain derived words but not in others (*c*[we]*ntecito* 'tale (diminutive)' vs. *c*[o]*ntable* 'tellable') also raises the issue of locality in cyclic application.

Traditional generative analyses derive the alternation from a unique underlying representation with the use of diacritic marks, empty skeletal slots and specific cyclic rule application (e.g. Harris 1969; 1985; Halle/Harris/Vergnaud 1991). Harris (1985), and along the same lines Halle/Harris/Vergnaud (1991), proposes an abstract

representation containing single segmental units followed by an empty skeletal position (/oX/, /eX/). In stressed position, the skeletal slot is filled through the derivation by means of word-level ordered rules: /oX/, /eX/ turn into 'oV̲', 'eV̲' through diphthongization in stressed syllables, which then become 'oe̲', 'ee̲' by *e*-default insertion; 'oe̲', 'ee̲' are later adapted as 'o̲e', 'e̲e' due to adjustment in nuclearity (on the assumption that sonority prefers rising complex nuclei), and they finally surface as [we], [je] via glide formation. In unstressed position, the diphthongization rule does not apply; the skeletal slot remains empty and hence is eliminated at the end of the derivation. The presence of unexpected unstressed diphthongs in certain derived forms is captured through a different underlying morphological composition of words (⟦⟦*c*[o]*nt-a-ble*⟧ vs. ⟦⟦*c*[we]*nt*⟧-*ecito*⟧) in Harris (1969), which Halle/Harris/Vergnaud (1991) reanalyze as a difference in the kind of affixes the words contain:[9] cyclic stem-level affixes (such as denominal *-ble*) or non-cyclic word-level affixes (such as evaluative *-(ec)ito*). Under this view, stem-level affixed words do not display diphthongization effects of first-cycle stress assignment because the diphthongization rule applies at the word level, after stress has shifted to the stem-level suffix (⟦⟦⟦*c*[o]*nt*-[ˈa]⟧$_{SL}$-*bl-e*⟧$_{SL}$⟧$_{WL}$). At the word level, though, diphthongization is extrinsically ordered before stress reassignment; hence, the diphthongization effect of first-cycle stress assignment surfaces (⟦⟦*c*[we]*nt*⟧$_{SL}$-*ec*[ˈi]*to*⟧$_{WL}$).

Bermúdez-Otero (2006; 2013), in line with the observations made by, for example, Eddington (1996) and Albright/Andrade/Hayes (2001), argues that this cyclic approach, as well as its recasting in Distributed Morphology (Embick 2013), requires excessively powerful phonological devices that crucially subvert the concept of cyclic domain. He proposes instead a phonologically driven allomorphic approach within Stratal OT, with the use of allomorphy and presuming a specific morphological structure of words. Under his view, nominals and verbs have a stem formative meaningless morph added to the root to satisfy a morphomic constraint on stem well-formedness (a 'morphome' in terms of Aronoff 1994). Stem formatives (SF) include nominal word-markers (i.e. *o*-stems, *a*-stems, *e/{e,Ø}*-stems: *cuent*[o] 'tale', *mes*[a] 'table', *immun*[e] – *immun*[e]*s* 'immune (singular – plural)' / *panØ* – *pan*[e]*s* 'bread(s)'), as well as verbal theme vowels (as in *cont*[ˈa]*r* 'to tell', *cont*[ˈa]*ble* 'tellable', *respond*[ˈe]*r* 'to answer', *respond*[ˈi]*a* 's/he answered'). The root plus the stem formative forms the inner stem; verbal inflected forms and most derivation are built at the stem level (16a), while evaluative derivation (e.g. *cuentecit*[o] 'tale (diminutive)') is formed at the word level (16b).

9 In these examples, hollow brackets notate morphological constituents and cyclic domains and, as usual, for phonetic transcriptions ordinary square brackets are used.

(16) a. Stem level (SL):

Underived noun	⟦Root – SF⟧$_{SL}$
	⟦*cuent-o*⟧$_{SL}$
Verb inflection	⟦⟦Root – SF⟧$_{SL}$ X⟧$_{SL}$
	⟦⟦*cont-a*⟧$_{SL}$-*r*⟧$_{SL}$
Most derivation	⟦⟦Root – SF⟧$_{SL}$ X – SF⟧$_{SL}$
	⟦⟦*cont-a*⟧$_{SL}$-*bl-e*⟧$_{SL}$

b. Word level (WL):

Evaluative	⟦⟦Root – SF⟧$_{SL}$ X – SF⟧$_{WL}$
	⟦⟦*cuent-o*⟧$_{SL}$-*ecit-o*⟧$_{WL}$

The key feature of Bermúdez-Otero's analysis for diphthongization is that diphthongal allomorphy is a property of stems rather than of roots, which is a language-particular fact that must be encoded in the lexical entries of stems (Bermúdez-Otero 2013, 72). This implies that all root allomorphs are present at the stem level, whereas at the word level the only allomorph available is the stem-level output, which functions as the input of the word level. Additionally, the analysis requires (non-iterative) vowel deletion of unstressed stem-final vowels before suffixes beginning with another vowel, regardless of its morphological affiliation (cf. ⟦*cuent-o*⟧ 'tale' – ⟦⟦*cuent-o*⟧-*ist-a*⟧ 'tale-teller', ⟦⟦*respond-e*⟧-*r*⟧ 'to answer' – ⟦⟦*respond-e*⟧-*ón*⟧ 'cheeky' – ⟦⟦*respond-í*⟧-*a*⟧ 's/he answered') (Bermúdez-Otero 2006, 280, section 2.1; 2013, 38–39).

With these premises in mind, diphthongization turns out to be an instance of phonologically driven allomorph selection by output optimization. The lexicon supplies two listed allomorphs for alternating items (one containing a pure vowel and the other containing a diphthong). Both allomorphs are inserted at the stem level, insofar as this instruction is encoded for the lexical entries of stems. Hence, the outputs satisfy the faithfulness IDENTITY constraint whether they contain a diphthong (from the diphthongal input allomorph) or a pure vowel (from the pure vowel input allomorph; cf. examples 18–20). During evaluation, the diphthongs are preferred in stressed syllables (as a sonority effect of the constraint *PEAK$_{Foot}$/e,o, which penalizes the pure vowels [e, o] in the peak node, i.e. the head, of a foot) on the assumption that diphthongs are more sonorous than pure vowels and hence are better suited as the head of a foot, i.e. the stressed syllable (Kenstowicz 1997, 162) (18), while pure mid-vowels occur elsewhere (driven by a context-free markedness constraint against complex nuclei: *COMPLEXNUC; cf. examples 19–20). For word-level affixes, however, the only input available is the nominal diphthong stem allomorph; therefore, IDENTITY discards the candidate without a diphthong (21). Bermúdez-Otero insightfully illustrates the analysis with the pair *enc*[o]*ntrón* 'abrupt meeting' (20) (stem-level derivation from the inner verbal stem ⟦{enkwentɾ, enkontɾ}-a⟧; cf. *enc*[ˈwe]*ntra* 's/he meets' in (18b) and *enc*[o]*ntrar* 'to meet' in 19) and

enc[we]*ntrón* 'meeting (augmentative)' (21) (word-level derivation from the nominal stem ⟦enˈkwentr-o⟧; cf. *enc*[ˈwe]*ntro* 'meeting' in 18a). For our purposes, we omit the analysis of stem-final vowel deletion and {e,Ø} stem-formative selection.

(17) Stem level (SL):

Underived noun	⟦{enkwentr,enkontr}-o⟧$_{SL}$ [enˈkwentro]	(cf. 18a)
Inflected verb	⟦{enkwentr,enkontr}-a⟧$_{SL}$ [enˈkwentra]	(cf. 18b)
	⟦⟦{enˈkwentra,enˈkontra}⟧$_{SL}$-r⟧$_{SL}$ [enkonˈtrar]	(cf. 19)
Deverbal	⟦⟦{enˈkwentra,enˈkontra}⟧$_{SL}$-on-{e,Ø}⟧$_{SL}$ [enkonˈtron]	(cf. 20)
Word level (WL):		
Evaluative	⟦⟦enˈkwentr-o⟧$_{SL}$ -on-{e,Ø}⟧$_{WL}$ [enkwenˈtron]	(cf. 21)

(18) a. *encuentro* 'meeting (noun)'

{enkwentr,enkontr}-o	IDENT	*PEAK$_{Foot}$/e,o	*COMPLEXNUC
☞ enˈkwentro			*
enˈkontro		*!	

b. *encuentra* 's/he meets'

{enkwentr,enkontr}-a	IDENT	*PEAK$_{Foot}$/e,o	*COMPLEXNUC
☞ enˈkwentra			*
enˈkontra		*!	

(19) *encontrar* 'to meet'

{enˈkwentra,enˈkontra}-r	IDENT	*PEAK$_{Foot}$/e,o	*COMPLEXNUC
enkwenˈtrar			*!
☞ enkonˈtrar			

(20) *encontrón* 'abrupt meeting (deverbal)'[10]

{enˈkwentra,enˈkontra}-on-{e,Ø}	IDENT	*PEAK$_{Foot}$/e,o	*COMPLEXNUC
enkwenˈtron		*	*!
☞ enkonˈtron		*	

10 In (20) *COMPLEXNUC is the decisive constraint because the two candidates fair evenly with respect to *PEAK$_{Foot}$/e,o. The ranking *PEAK$_{Foot}$/e,o » COMPLEXNUC is proven in the tableaux in (18).

(21) *encuentrón* 'meeting (augmentative)'

eŋˈkwentr-o-on-{e,Ø}	IDENT	*PEAK$_{Foot}$/e,o	*COMPLEXNUC
☞ eŋkwenˈtron		*	*
eŋkonˈtron	*!	*	

The apparent dual behaviour of some denominal (non-evaluative) suffixes (e.g. *-ista* in *c*[we]*ntista* 'taleteller' – *c*[ˈwe]*nto* 'tale' vs. *conc*[e]*rtista* 'concertist' – *conc*[ˈje]*rto* 'concert') is accounted for by admitting that, although historically descended from the same root, some nominals have ended up having a single stem (with a diphthong) rather than two as verbal stems have (Bermúdez-Otero 2013, 78, 84).

An alternative parallel analysis of diphthongization in Spanish is possible with output-output (OO) asymmetric correspondences (cf. e.g. McCarthy/Prince 1994; 1995; Benua 1995; 1997) and Kager's (1999b, 282) specific notion of 'base' (cf. 22), based on Kager (1999a). We replicate Lloret/Mascaró's (2006) analysis of the phenomenon of depalatalization in Spanish.[11]

(22) Definition of 'base'
  a. The base is a free-standing output form – a word.
  b. The base contains a subset of the grammatical features of the derived form.

According to (22a), the base must always be an output itself, an existing word. According to (22b), the base must be compositionally related to the affixed word in a morphological and semantic sense, and must be in a proper subset relation

11 Depalatalization in Spanish (i.e. the non-occurrence of palatal nasals and laterals in word-final position) provided a classic argument for cyclic application within derivational phonology, as exemplified by the famous triplet *desdé*[n] 'disdain' – *desde*[n]*es* 'disdains' – *desde*[ɲ]*es* 'you disdain (subjunctive)' (Harris 1983). For historical reasons there are few cases with alternations in traditional words that provide evidence for a synchronic phenomenon of depalatalization. For this reason, some scholars claim that they are lexical remnants that should be treated in terms of allomorphy (e.g. Pensado 1997; Harris 1999; Eddington 2012), while others, from data drawn from old and recent loan adaptation, provide evidence for maintaining productive depalatalization (e.g. Lloret/Mascaró 2006). Within the former view, Bermúdez-Otero (2006) considers there not to be a synchronic relation between the nominal and the verbal stem of such items and hence assumes that nominal stems have a root ending in a coronal (/desden-{e,Ø}/$_{SL}$ in *desdé*[n], *desde*[n]*es*) whereas verbal stems contain a palatal-final root (/desdeɲ-a/$_{SL}$ in *desde*[ɲ]*es*). Alternatively, on the assumption that all forms derive from single palatal inputs, the alternation has been captured, in the parallel view, through OO correspondence relations, based on asymmetric (base-dependent) OO relations (cf. Lloret/Mascaró 2006, who refine Baković's 1998; 2001 analysis) or symmetric OO relations (cf. Pons-Moll 2012, section 3.1.2, within the Optimal Paradigms model developed in McCarthy 2005). Kikuchi (1999) proposes instead a parallel OT analysis based on the Sympathy model proposed in McCarthy (1999), which uses additional machinery to enable the use of certain candidate outputs as inputs to mimic the reference to intermediate forms.

with it. The morphological relations of a plural with respect to its singular base form and a diminutive with respect to its non-diminutive base form satisfy this subset relation. First, the number category does not change features but just adds the feature [PLURAL] in plurals and the plural is always formed over the shape of its singular base. The situation is different in masculine/feminine pairs, since even with the use of a single privative feature [FEMININE] the masculine form is never a proper subset of the semantic features of the feminine form and the feminine is not always formed over the shape of its masculine counterpart (*sol-o/a* 'alone$_{M/F}$'). Evidence for the asymmetry between number and gender is found, for instance, in Greenberg (1963) and in Harris (1992); cf. Lloret/Mascaró (2006, 88) and Bermúdez-Otero (2013, section 2.4.2) for the specific case of Spanish. Furthermore, diminutives contain all morphosemantic features of their corresponding non-diminutive forms and have as base the free-standing non-diminutive word, as proven, among other facts, by allomorph selection: in general, *-ecit* in monosyllabic words but *-(c)it* in polysyllabic words, as in *sol* 'sun' – *solecito* (diminutive) vs. *solo* 'alone (masculine singular)' – *solito* (diminutive) (cf. e.g. Jaeggli 1980).

The base identity constraint targeting the nuclei (IDENTBASE(NUC)) together with the markedness constraints mentioned above (*PEAK$_{Foot}$/e,o and *COMPLEXNUC) will do the job with the ranking given in (23). The tableaux in (24–27) illustrate the evaluation.

(23) IDENTBASE(NUC) » *PEAK$_{FOOT}$/e,o » *COMPLEXNUC

(24) Sp. *encuentro* 'meeting (noun)'

{enkontr,enkwentr}-o *Base*: ---	IDBA(NUC)	*PEAK$_{Foot}$/e,o	*COMPLNUC
eŋˈkontro		*!	
☞ eŋˈkwentro			*

(25) Sp. *encontrar* 'to meet'

{enkontr,enkwentr}-ar *Base*: ---	IDBA(NUC)	*PEAK$_{Foot}$/e,o	*COMPLNUC
☞ eŋkonˈtrar			
eŋkwenˈtrar			*!

(26) Sp. *encontrón* 'abrupt meeting (deverbal)'

{enkontr,enkwentr}-on *Base*: ---	IDBA(NUC)	*PEAK$_{Foot}$/e,o	*COMPLNUC
☞ eŋkonˈtron		*	
eŋkwenˈtron		*	*!

(27) Sp. *encuentrón* 'meeting (augmentative)'

{enkontr,enkwentr}-on *Base*: eŋˈkwentro	IDBA(NUC)	*PEAK$_{Foot}$/e,o	*COMPLNUC
eŋkonˈtron	*!	*	
☞ eŋkwenˈtron		*	*

Under Kager's (1999b) contained notion of 'base' presented in (22), the OO constraints only capture a restricted set of relations – as Stratal OT does – that adequately holds for plurals and evaluatives (including superlatives), and hence the criticism of cyclic views to OO approaches for the allowance of unrestricted access to the global environment (cf. e.g. Bermúdez-Otero 2006; 2013) does not hold true. A more intriguing presence of the diphthongal allomorph in unstressed position is the conjugation I verbs with the prefix *a-* ([a…ˈa-ɾ]), which are causatives derived from nouns and adjectives that Bermúdez-Otero (2013, 61) limits to change-of-state verbs, as in *av*[je]*jar* 'to make old' vs. *env*[e]*jecer* 'to become old' (cf. *v*[ˈje]*jo* 'old' – *v*[e]*jez* 'oldness'). There are not, however, many such cases and, in turn, other parallel denominal [a…ˈa-ɾ] derivations do not present diphthongal allomorphs in this unstressed position (e.g. *as*[e]*rrar* 'cut with a saw'), although they exhibit the regular alternating pattern elsewhere (cf. *s*[ˈje]*rra* 'saw', diminutive *s*[je]*rrecita* – *s*[e]*rrería* 'sawmill'). All in all, one cannot but conclude that the diphthongal [a…ˈa-ɾ] forms are better treated as instances of lexical idiosyncracy.

In fact, as demonstrated in Eddington (1996; 2012) and Albright/Andrade/Hayes (2001), diphthongization shows more variation than expected in traditional words as well as in loans and nonce words, depending on the morphological and the phonological environments. The relevant morphological context is the type of affix, especially, as seen, in more productive affixation, namely: (i) diminutives, augmentatives and superlatives as well as the causative [a…á-r] construction derived from nouns and adjectives are typically associated with diphthongs; (ii) the nominal affixes *-ero*, *-al* and *-(i)dad* are less likely to occur with diphthongs (*buñ*[ˈwe]*lo* 'fritter' – *buñ*[o]*lero* 'fritter maker', but *c*[ˈwe]*nto* 'tale' – *c*[we]*ntero* 'taleteller'); but (iii) the nominal affixes *-oso* and *-ista* do not show a significant preference for either diphthongs or pure vowels (*c*[ˈwe]*nto* – *c*[we]*ntista* 'taleteller' vs. *conc*[ˈje]*rto* 'concert' – *conc*[e]*rtista* 'concertist') (Eddington 1996). Albright/Andrade/Hayes (2001) suggest that in verbs conjugation class might have some influence too. As for the phonological environment, a decisive factor is the shape of the root in environments specific to front or back vowels (e.g. the [X__ɾr] context favours the presence of diphthongs in *e* roots but not in *o* roots: *c*[e]*rrar* 'to close' – *c*[ˈje]*rro* 'I close' vs. *b*[o]*rrar* 'to erase' – *b*[ˈo]*rro* 'I erase' and also in nonce words *d*[e]*rrar* – *d*[ˈje]*rro* vs. *n*[o]*rrar* – *n*[ˈo]*rro*) (Albright/Andrade/Hayes 2001). In order to capture the gradient productivity of diphthongization, Eddington (1996) proposes a treatment of the phenomenon within the tenets of the lexicon-based approach (e.g. Bybee 1985), while Albright/Andrade/Hayes (2001) model the data with a learning algorithm that

predicts stochastic behaviour by rule pattern association. As noted by Bermúdez-Otero (2013, 64), the observation that native speakers have statistically based intuitions on diphthongization is compatible with the aforementioned OT analyses. On the whole, both the serial stratal analysis and the parallel paradigmatic one manage to hold up well, though the two approaches are conceptually different with respect to whether or not they use intermediate levels of representation.

3.2 Overapplication of epenthesis in Catalan cliticization

The phonological behaviour of pronominal clitics in Catalan demonstrates that serial analyses cannot account for some apparent domain effects (Bonet/Lloret 2005). The facts are as follows. In the Catalan variety spoken in Barcelona, some pronominal clitics are underlyingly asyllabic (e.g. 1st person singular /m/, partitive /n/) while others have an underlying vowel (e.g. feminine /ə/ in 3rd person /l-ə/) (cf. e.g. Wheeler 1979; 2005; Viaplana 1980; Mascaró 1986; Bonet/Lloret 2003; 2005). In proclisis, asyllabic clitics surface with an initial epenthetic schwa (underlined in the examples) before a verb starting with a consonant for syllabic reasons (28a), but the epenthetic vowel appears after the clitic when the asyllabic clitic follows a verb ending in a consonant (28b). In combinations of more than one clitic, though, a schwa is always inserted between a clitic ending in a consonant and a clitic beginning with a consonant (29a), even when a licit consonantal contact would arise without epenthesis (29b) or when the surface form of the single clitic would solve the problem (29c).

(28) Cat. a. em tira /m#tirə/: [ə̲m.ˈtirə], *[mə̲.ˈtirə]
‘s/he throws (to) me’
cf. m’imita /m#imitə/: [mi.ˈmi.tə]
‘s/he imitates me’

b. tirem-ne /tirɛm#n/: [ti.ˈrɛm.nə̲], *[ti.ˈrɛ.mə̲n]
‘let’s throw some’
cf. tira’m tirə#m/: [ˈti.rəm]
‘throw (to) me’

(29) Cat. a. tira-me’n /tirə#m#n/: [ˈti.rə.mə̲n]
‘throw some to me’

b. tira-me-la /tirə#m#lə/: [ˈti.rə.mə̲.lə], *[ˈti.rəm.lə]
‘throw it$_F$ to me’
cf. fem-la /fɛm#lə/: [ˈfɛm.lə], *[ˈfɛ.mə̲.lə]
‘let us do it$_F$’

c. me la tira /m#lə#tirə/: [mə̲.lə.ˈti.rə], *[ə̲m.lə.ˈti.rə]
‘s/he throws it$_F$ to me’ (cf. 28a)

In parallel approaches to OT, alignment constraints have often been used to account for the position of clitics in the utterance. For our purposes, the constraint ALIGN(CL/VB) will ensure adjacency in the contact of the clitics and the verb in proclisis and enclisis (30) (cf. Colina 1995; Jiménez/Todolí 1995; Jiménez 1997; Bonet/Lloret 2002; 2003; 2005; Wheeler 2005).

(30) ALIGN(CL/VB): Align the left/right edge of a pronominal clitic with the right/left edge of a verb. (Bonet/Lloret 2005, 1308)

With single clitics, the peripheral effect of epenthesis is captured by ranking ALIGN(CL/VB) below σ-STRUC (a cover constraint for syllable well-formedness) and above *CODA, ONSET and DEP-V (32); but for epenthesis not to overapply in the presence of licit codas, FINALC ("Every Prosodic Word is consonant-final"; McCarthy/Prince 1994, 357) has to be ranked between ALIGN(CL/VB) and *CODA (33).[12] The fact that epenthesis is inserted in contexts in which it is not needed shows that DEP-V must be ranked very low (34).

(31) σ-STRUC » ALIGN(CL/VB) » FINALC » *CODA, ONSET » DEP-V

(32)

	/m#tirə/	σ-STRUC	ALIGN(CL/VB)	FINALC	*CODA	ONSET	DEP-V
a.	ˈmti.rə	*!		*			
	☞ əm.ˈti.rə			*	*	*	*
	mə.ˈti.rə		*!	*			*
	/tirɛm#n/	σ-STRUC	ALIGN(CL/VB)	FINALC	*CODA	ONSET	DEP-V
b.	ti.ˈrɛmn	*!			*		
	ti.ˈrɛ.mən		*!		*		*
	☞ ti.ˈrɛm.nə			*	*		*

(33)

	/tirə#m/	σ-STRUC	ALIGN(CL/VB)	FINALC	*CODA	ONSET	DEP-V
a.	☞ ˈti.rəm				*		
	ˈti.rə.mə			*!			*
	/tirə#m#n/	σ-STRUC	ALIGN(CL/VB)	FINALC	*CODA	ONSET	DEP-V
b.	ˈti.rəmn	*!			*		
	☞ ˈti.rə.mən				*		*
	ˈti.rə.mə.nə			*!			**

12 In this variety of Catalan, the clitic (a function word) together with its host (a lexical word) constitute a prosodic word. Hence, FINALC is violated when the clitic group, as a whole, ends in a vowel, as in all output candidates in (32a) or as in (33a) in *[ˈti.rə.mə] but not in [ˈti.rəm].

(34)

/m#lə#tirə/	σ-Struc	Align(cl/vb)	FinalC	*Coda	Onset	Dep-V
mlə.ˈti.rə	*!		*			
ə̲m.lə.ˈti.rə			*	*!	*	*
☞ mə̲.lə.ˈti.rə			*			*

In serial OT approaches, the work done by morphological alignment constraints in parallel approaches should be captured by the organization in cycles or strata and the possibility of constraint re-ranking at different steps of the evaluation. In these approaches, the faithfulness constraint O-Contiguity (which is the constraint that rules out insertion of elements internal to the input string – or "No Intrusion"; McCarthy/Prince 1995, 371; cf. also Kenstowicz 1994) has scope over the domain of each stratum, regardless of the internal morphological composition of that domain. Therefore, in the step that includes both the clitic and the verb O-Contiguity does the job of Align(cl/vb) in parallel analyses, in so far as it penalizes the insertion of material between the adjacent string set up by this cycle or stratum.

Assuming a strata-based analysis, with the structure (Cl Cl (Verb)) and ((Verb) Cl Cl) at the clitic group stratum, the ranking that better accounts for the cases belonging to this stratum is the one given in (35), where O-Contiguity occupies a lower position than its parallel Align(cl/vb) counterpart in the ranking in (31). We now can account for some instances of overapplication (cf. 36a–b), but critically cannot explain peripherality of epenthesis with single proclitics as well (cf. 37a–b).

(35) Clitic group stratum:
σ-Struc » FinalC » *Coda, Onset » O-Cont, Dep-V

(36) a.

/m lə [ˈtirə/	σ-Struc	FinalC	*Coda	Onset	O-Cont	Dep-V
mlə.ˈti.rə	*!	*				
ə̲m.lə.ˈti.rə		*	*!	*		*
☞ mə̲.lə.ˈti.rə		*			*	*

b.

/ˈtirə] m n/	σ-Struc	FinalC	*Coda	Onset	O-Cont	Dep-V
ˈti.rəmn	*!		*			
☞ ˈti.rə.mə̲n			*		*	*
ˈti.rə.mə̲.nə̲		*!			*	**

(37)

	/ˈtirə] m/	σ-STRUC	FINALC	*CODA	ONSET	O-CONT	DEP-V
a.	☞ ˈti.rəm			*			
	ˈti.rə.mə̲		*!				*
	/m [ˈtirə/	σ-STRUC	FINALC	*CODA	ONSET	O-CONT	DEP-V
b.	ˈmti.rə	*!	*				
	ə̲m.ˈti.rə		*	*!	*		*
	💣 mə̲.ˈti.rə		*			*	*

In Bonet/Lloret (2005) other serial analyses in terms of strict cyclicity, (cl (cl (Verb))) and (((Verb) Cl) Cl), and adjacent independent domains, ((Cl Cl) (Verb)) and ((Verb) (Cl Cl)), are discussed and proved to also be unable to account for these data.

4 Symmetric surface relations

In this section we illustrate, with data from insular Catalan, output-to-output relations for which no specific base (i.e. no leading form) can be identified.

4.1 Underapplication of vowel epenthesis in insular Catalan

Insular Catalan, i.e. the varieties spoken on the Balearic Islands and in the city of Alghero on Sardinia, differs from all other varieties in having no inflectional affix for the 1st person singular present indicative (1PI): *pas* 'I pass', *cant* 'I sing'. Null affixation is also seen in regular masculine singular nominals in all Catalan varieties (*pas* 'step', *cant* 'song'). However, while 1PI tolerates final consonants that are not permitted elsewhere in the language (e.g. clusters violating the sonority sequencing principle: *filtr* 'I filter', *ensofr* 'I sulfurate'), parallel nominal forms always surface with the final default vowel, [ə] in Balearic Catalan, [a] in Alghero Catalan (*filtr*[ə] 'filter', *sofr*[ə] 'sulfur' in Balearic; *filtr*[a], *sofr*[a] in Alghero Catalan), which is considered to be epenthetic (/filtr/, /sofr/) (e.g. Mascaró 1978; Wheeler 1979; 2005; Lloret 2002; 2004a). Pre-OT approaches (Mascaró 1983; Dols 1993; Dols/Wheeler 1996) as well as some OT studies (Serra 1996; Dols 2000) base their analyses on the observation that the illicit consonantal endings of 1PI are possible onsets and hence relate their interpretation to this syllabic position. However, among other problems, onset-related analyses cannot offer a straightforward explanation for the overwhelming majority of coda phenomena that take place in these verbal forms, such as word-final obstruent devoicing (*aca*[p] 'I finish' vs. *aca*[b]*a* 's/he finishes'; *o*[pr] 'I open' vs. *o*[br]*ir* 'to open') (Lloret 2003; 2004b). Under the assumption that these endings are codas, underapplication of epenthesis in 1PI is explained in terms of OO

paradigmatic correspondences, either as a uniformity (analogical) effect (Lloret 2004a; Wheeler 2005, 269–275) or as a contrast (homophony-avoidance) effect (Pons-Moll 2007 and references therein).

The uniformity view put forward in Lloret (2004a) bases the analysis on the notion of "Optimal Paradigms" (OP, cf. McCarthy 2005), whose function is to control the correspondence relation between the output stems of the inflected forms of an inflectional paradigm, where no clear base can be identified as attractor. OP establishes an OO symmetrical correspondence relation between each potential stem allomorph (marked with ']' in the tableaux below), and a set of OP intra-paradigmatic faithfulness constraints governs stem allomorphy. In insular Catalan, the ranking of OP-DEP-V (penalizing members with inserted vowels) above the sonority sequencing principle (SSP) and (IO-)DEP-V rules out epenthesis in 1PI; in turn, the addition of the epenthetic vowel throughout the paradigm to satisfy uniformity in stems is penalized by the highly ranked *HIATUS (cf. 38, realizations are from Majorcan Catalan; epenthetic vowels appear underlined). (Arguments against treating the inserted schwa as part of the inflection are presented in Lloret 2004b). In the following tableaux, paradigms appear in angle brackets.

(38)

/filtr/ (present indicative)	*HIATUS	OP-DEP-V	SSP	(IO-)DEP-V
☞ <ˈfiltr], ˈfiltrəs, ˈfiltrə, filˈtrəm, filˈtrəw, ˈfiltrən>			*	
<ˈfiltrə], ˈfiltrəs, ˈfiltrə, fiˈltrəm, filˈtrəw, ˈfiltrən>		5*!		*
<ˈfiltrə], ˈfiltrəs, ˈfiltrə, filtrəˈam, filtrəˈaw, ˈfiltrən>	5*!			6*

Nouns, with a paradigm of two inflected forms (<singular, plural>), undergo epenthesis because it levels the paradigms in the other direction (39): the candidate with epenthesis in both forms wins because all members of the paradigm need a vowel to satisfy the sonority constraint. The OP approach, hence, is able to correlate the phonologically different behaviour of verbs and nouns to the fundamental difference in length in their respective paradigms.

(39)

/filtr/ (noun)	*HIATUS	OP-DEP-V	SSP	(IO-)DEP-V
<ˈfiltr], ˈfiltrəs>			**!	
☞ <ˈfiltrə], ˈfiltrəs>				**
<ˈfiltrə], ˈfiltrəs>		*!	*	*
<ˈfiltr], ˈfiltrəs>		*!	*	*

In turn, the contrast view builds the analysis upon the notion of 'paradigmatic contrast' (PC) (Kenstowicz 2002), whose function is to avoid identical phonetic forms in a paradigm. According to Pons-Moll's (2007) analysis of Balearic Catalan, PC blocks epenthesis to avoid homophony between the 1st and 3rd person singular present indicative of conjugation I verbs, because the 3rd person displays an unstressed inflectional *-a* (-[ə]) morph that would coincide with the epenthetic schwa in 1PI (cf. 40a), where we only include the 1st and 3rd person singular for illustration).[13] Notice, however, that homophony itself is not a fatal problem, since other tenses show identical 1st and 3rd person singular in their paradigms (e.g. *filtri* 'I, s/he filter (subjunctive)'). In these cases, though, the endings are input inflectional morphs in both forms (e.g. present subjunctive -/i/ suffix), which are preserved by high-ranked faithfulness constraints protecting input morphs – and especially single-segment affixes – such as the general constraint REALIZEM(ORPHEME), interpreted in the spirit of PARSEMORPH ("A morph must be realized in the output"; Akinlabi 1996, 247) in (40b). According to this analysis, epenthesis is required in both members of the <singular, plural> nominal paradigm because PC is not decisive here and hence SSP must be satisfied (40c).

(40) a.

/filtr/ (present indicative)	REALIZEM	PC	SSP	DEP-V
<ˈfiltr ... ˈfiltr ...>	*!		**	
☞ <ˈfiltr ... ˈfiltrə ...>			*	
<ˈfiltrə ... ˈfiltrə ...>		*!		*

b.

/filtr/ (present subjunctive)	REALIZEM	PC	SSP	DEP-V
☞ <ˈfiltri ... ˈfiltri ...>		*		
<ˈfiltr ... ˈfiltri ...>	*!		*	
<ˈfiltri ... ˈfiltr ...>	*!		*	

c.

/filtr/ (noun)	REALIZEM	PC	SSP	DEP-V
<ˈfiltr], ˈfiltr]s>			*!*	
☞ <ˈfiltrə], ˈfiltrə]s>				**
<ˈfiltrə], ˈfiltr]s>			*!	*
<ˈfiltr], ˈfiltrə]s>			*	*

All the examples given so far belong to conjugation I verbs. The few verbs of conjugations II and III that have illicit consonantal endings (*obr-* 'open', *umpl-* 'fill', *corr-* 'run') show variation. In this case, the facts from Alghero Catalan favour the

13 An anonymous reviewer mentions that analogy is assumed to have been the driving force for the levelling in Old French between 3PL, with a final schwa, and 1PL, which originally had no final schwa but became homophonous with 3PI. An important difference between the French case and the insular Catalan case is that the former involves morphological material (exponents of a given morpheme) while the latter involves a phonological phenomenon (insertion or not of an epenthetic vowel).

OP proposal: in conjugation III, PI exhibits regular inflectional *-i* morphs except in 1PI (e.g. <*obr*, *obris*, *obri* . . .>), yet epenthesis in 1PI is banned. The data from most varieties of Balearic Catalan, in which all three singular PI forms lack a vocalic suffix, favour the OP approach too (e.g. <*obr*, *obrs*, *obr* . . .>), although some varieties fit the contrast view better (i.e. <*obr*, *obres*, *obre*. . .>).

The different behaviour between verbal forms, which allow final clusters with increasing sonority, and nominal forms, which surface with an epenthetic vowel in the same phonological context, cannot be dealt with in serial models of OT, which do not resort to OO constraints. They must assume instead that nominals do not have final epenthesis and that insular Catalan allows codas with increasing sonority.

4.2 Vowel reduction in Majorcan Catalan

All dialects of Catalan have vowel reduction in unstressed position. In Majorcan Catalan (MC) /ɔ/ reduces to [o], and the non-high unrounded vowels /a/, /ɛ/, /e/ and /ə/ reduce to [ə] (cf. Mascaró 2002 for examples and discussion). However, in a complex set of cases [e] is found in unstressed position. Before addressing these exceptions to vowel reduction, let us see how vowel reduction can be accounted for within OT.

Most analyses of vowel reduction in Catalan (Wheeler 2005; Lloret/Jiménez 2008; Pons-Moll 2011) are based on Crosswhite (1999; 2004). Vowel reduction is the result of the competition between prominence-related constraints and faithfulness to input vowel features. The combination of an accentual prominence scale and a vocalic prominence scale gives rise to the constraint ranking in (41) (Crosswhite 2004, (17)), where *–Str is a shorthand for *Unstressed. Under this ranking the vowel [ə] is the optimal vowel in unstressed position.

(41) *–Str a » *–Str ɛ, ɔ » *–Str e, o » *–Str i, u » *–Str ə

As mentioned above, a fairly large number of words surface with unstressed [e]. Although it is not easy to find a systematic distribution for this exceptional presence of [e], some tendencies can be observed. As pointed out in Bibiloni (1998), the intervening factors are morphological relations, phonetic context, and Spanish L2 interference. An analysis of these factors is given in Pons-Moll (2011; cf. also references therein). Leaving aside the L2 interference, Pons-Moll (2011) proposes an OT account of the following two facts: (i) in nominal derivation (nouns and adjectives), [e] appears in the initial syllable of productive derivatives for which the base contains a syllable-initial stressed [ˈɛ] or [ˈe]; (ii) in verbal inflection, [e] appears in the initial syllable when the verbal paradigm contains, in the initial syllable, forms with [ˈe] (not with [ˈɛ], which always alternates with schwa). (42) provides examples

in which one of the derivationally or inflectionally related words has a stressed vowel in the initial syllable.

(42) a. Nominal derivatives:
p[ˈe]*ix* 'fish', *p*[e]*ixet* 'fish (dim.)', but: *p*[ə]*ixater* 'fisherman'
t[ˈɛ]*rra* 'earth', *t*[e]*rreta* 'earth (dim.)', but: *t*[ə]*rrestre* 'terrestrial'

b. Verbal inflection:
p[ˈe]*gues* '(you) hit', etc., *p*[e]*gam* '(we) hit', *p*[e]*garé* '(I) will hit', etc.
cf.: *x*[ˈɛ]*rres* '(you) talk', etc., but: *x*[ə]*rram* '(we) talk', etc.

When the stem contains a stressed vowel in non-initial position, vowel reduction applies, as expected, when the vowel is unstressed (cf. *pap*[ˈe]*r* 'paper' and *pap*[ə]*ret* 'small paper', or *cont*[ˈe]*sta* '(s/he) answers' and *cont*[ə]*stam* '(we) answer').

Pons-Moll (2011) resorts to McCarthy's symmetric OP model to account for underapplication of vowel reduction in verbal inflection. For a verb like *pegar* 'to hit' OP constraints force all forms to end up having the same vowel in the first syllable, and this vowel is [e] instead of [ə], in both stressed and unstressed syllables, because the ranking proposed favours displaying [e] even in unstressed positions over having [ˈə] in stressed positions. Nominal derivatives are subject to asymmetric (base-dependent) OO constraints: a derivative like *t*[e]*rreta* 'earth (dim.)' has a surface [e] because it resembles the stressed [ˈɛ] of the base noun *t*[ˈɛ]*rra* 'earth' for the relevant features. The OO constraints proposed by Pons-Moll (2011) incorporate three additional notions within the same constraint: (i) reference to the initial syllable of the stem (the position in which underapplication of vowel reduction is found), (ii) reference to either paradigms or subparadigms, where the term 'subparadigm' is applied to productive derivation, and (iii) reference to a particular feature. For example, a form like **t*[ə]*rreta*, with productive derivation, violates the constraint OO-SubparIdentInitialSyllStem(post) because the vowel in the initial syllable of the stem contains the feature [+posterior], while the base form *t*[ˈɛ]*rra* contains the feature [–posterior]; the grammatical form *t*[e]*rreta* does not violate this constraint. Contrariwise, a form like *pap*[ə]*ret* does not violate the constraint because the relevant vowel is not in the initial syllable of the stem. Turning to verbal forms, there are similar OP constraints, but in this case no reference to subparadigms is encoded. The fact that in verbal inflection underapplication is found only when the stressed vowel is [ˈe], while in derivation it is also found when the stressed vowel is [ˈɛ], is determined by the higher ranking of the constraint OP-IdentInitialSyllStem(ATR) ([ɛ] and [ə] being considered [–ATR]) and the lower ranking of OO-SubparIdentInitialSyllStem(ATR).

This proposal accounts for most of the data but it does raise some questions, mostly related to the notion of 'subparadigm' applied to derivational morphology. With respect to inflectional morphology, subparadigms can easily be defined by

referring to some inflectional feature or category (like [±plural]), but it is much more difficult to relate the concept to degrees of productivity (cf. also sections 3.1 and 4.1). Ohannesian/Pons (2009) compare and discuss the two types of subparadigmatic relations (i.e. inflectional and derivational) and propose, for the derivational type, a set of universally ranked Paradigm Cohesion constraints, but it is difficult to foresee how these constraints would interact with the ones proposed in Pons-Moll (2011). Another question is what can count as a productive suffix, independently of regular vowel reduction or underapplication of vowel reduction. To give an example of the difficulties that arise, according to Bibiloni (1998), a derived word like *ventall* 'fan' is pronounced with a stressless unreduced [e], as in its base *v*[ˈe]*nt* 'wind', in spite of the low productivity of the suffix *-all*, while a word like *p*[ə]*drera* 'quarry', with a base *p*[ˈe]*dra* 'stone', has regular vowel reduction in spite of the high productivity of the suffix *-era*. The only cases where underapplication of vowel reduction seems to be systematic is evaluative morphology. It could easily be argued that evaluative morphemes, and more especially diminutives, have a different structure than other word-building suffixes (cf., among many others, De Belder/Faust/Lampitelli 2014 and references therein), and their particular phonological behaviour could be a consequence of this difference (on gradient productivity effects in Spanish, cf. also section 3.1). A further issue to consider is to what extent the application of the notion of subparadigms to derivation can be reduced to the notion of 'lexically indexed constraints' (Pater 2000, among others). Under this type of approach, some constraints have a general version, let's say C_G, but also a restricted one, a lexically indexed constraint, C_L, which applies only to a specified set of lexical items, X_L, C_L always being ranked higher than C_G. Typically these lexically indexed constraints are said to be faithfulness constraints. In the case at hand one could imagine indexed constraints like IdentInitialSyllStem(post)$_L$ (instead of OO-SubparIdentInitialSyllStem(post)), which would be IO constraints.

Finally, it remains to be studied whether an OT serial analysis of these facts would be able to provide better insights on this type of phenomenon.

5 Resorting to blending of existing forms?

In this section we review three phenomena that have been accounted for in several papers by Steriade by resorting to the notion of 'lexical conservatism'. The first of them, section 5.1, concerns the French *bel/beau* allomorphy that was discussed in section 2.1. Here we review the analysis put forward in Steriade (1999a; 2001) and also the counteranalysis suggested in Bermúdez-Otero (to appear). In section 5.2 we sketch the analysis that Steriade puts forward for the Latin perfect (Steriade 2012) and for Romanian derivation (Steriade 2008). Finally, in section 5.3 we address the allomorphy found in imperatives with enclitics in Balearic dialects of Catalan.

5.1 *Bel/beau* allomorphy in French again

Steriade (1999a; 2001), inspired by Perlmutter (1998)'s work on 'lexical sourcing', brings into play the notion of 'lexical conservatism' in order to restrain the number of inputs by limiting the set of candidates to pre-existing output forms that share semantic and morphosyntactic properties. For the French case, the OO correspondence relation that controls the use of a consonant-final form is given in (43).

(43) LEX-C]: The absolute final C in the target allomorph of morpheme μ has a correspondent C' in some listed allomorph of μ and is featurally identical to C'. (Steriade 2001, 7)

The paradigm of adjectives with a single listed stem allomorph, either with a final vowel (e.g. [ʒɔli]) or with a final consonant (e.g. [kɛl]), yields marked syllabifications, with hiatus (e.g. [ʒɔli] *abbé*) or with a closed syllable (e.g. [kɛl] *mari*), because the creation of an unprecedented form through the insertion or loss of phonological material is penalized first (cf. e.g. 44). However, the paradigm of adjectives with two listed stem allomorphs (e.g. [bɛl] and [bo]) can satisfy *HIATUS without the creation of phonologically novel forms by simply resorting to the use of the consonant-final listed allomorph (cf. 45).

(44) Listed allomorphs: [ʒɔli]

	LEX-C]	*HIATUS
[ʒɔl] abbé	*!	
☞ [ʒɔli] abbé		*
[ʒɔlit] abbé	*!	

(45) Listed allomorphs: [bɛl], [bo]

	LEX-C]	*HIATUS
☞ [bɛl] abbé		
[bo] abbé		*!
[bot] abbé	*!	

As mentioned in section 2.1, in favour of the lexically listed output-stem approach, Steriade notices the fact that for many French speakers some liaison forms in the masculine contexts do not completely coincide with the output of the citation feminine form, but show the stem vowel of the masculine and the liaison consonant of the feminine; cf. [sot] *éléphant* in (46).

(46) Fr. [so] *mari* 'silly husband' [sɔt] ~ [sot] *éléphant* 'silly elephant$_M$'
[sɔt] *femme* 'silly woman' [sɔt] *éléphante* 'silly elephant$_F$'

Split-base formations such as [sot] alternating with [sɔt] reveal that while the feminine consonant is always used to satisfy LEX-C], the masculine vowel may be used to partially encode the grammatical gender of the adjective in order to satisfy a lexical conservative constraint targeting the stressed vowel of the stem, which signals gender (LEX-'V(gender)). A global condition on lexical conservatism of stressed syllables (Lex-'σ) ranked above or below LEX-'V(gender) leads to a pure conservative solution ([sɔt] *éléphant*) or to a blend solution ([sot] *éléphant*), respectively.

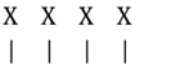
Bermúdez-Otero (to appear) acknowledges the influence of independently existing (listed) output forms but argues against Steriade's view and in favour of a serial approach. One of his main arguments is that Steriade has to resort to a specific constraint on salience to allow split bases in examples like [sot] *éléphant* 'silly elephant (masculine)' but to prevent blending in cases like [bel] *abbé* 'beautiful abbot', for which, through reranking of the relevant constraints, one should expect variation with *[bol] *abbé*, with the final [l] found in the feminine, a form that is never found. Another drawback is related to the resyllabification facts that were pointed out in (3) and (4) in section 2.1: while adjectives like *petit(e)* 'small' allow resyllabification in right dislocation, suppletive adjectives like [bɛl]–[bo] 'nice' do not. Steriade has to resort to specific constraints to account for this different behaviour.

According to Bermúdez-Otero these problems do not arise in his Stratal OT analysis, which relies on the underlying form that the learner would posit for each item, which in turn gives rise to different surface allomorphs. Among the underlying representations he posits, following the basic aspects of the analysis in Wetzels (2002), are the ones that appear slightly adapted below. (47a) corresponds to invariable adjectives (a vowel-final adjective would have the same structure). The lexical item in (47b) (as well as the top one in 47c) has a floating segment. This segment can receive a skeletal slot either by docking to the next syllable in liaison environments or, when the item is feminine, by association to the feature [+fem] (Wetzels 1986). The item in (47c) has two allomorphs. When agreement takes place with a [+fem] noun, the lower allomorph is chosen; since the last consonant has an X slot, the condition in (48) is satisfied. When the item is not feminine the upper allomorph will be selected. The 'S' symbol that appears in (47c) represents allomorph selection prior to phonological evaluation. Finally (47d) also has two allomorphs, both of them without floating segments. The upper one is incompatible with feminine adjectives, which must obligatorily select the lower allomorph. The 'P' symbol indicates that when this incompatibility does not arise (that is, with masculine adjectives), the two allomorphs are available and the decision is left to the phonology.

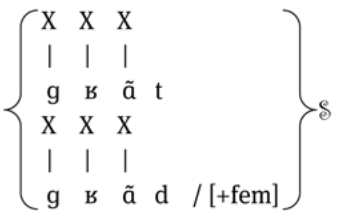
(47) Fr.

a. *lisse* 'smooth'

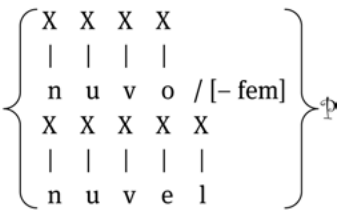
b. *petit* 'small'



c. *grand* 'big'



d. *nouveau* 'new'



(48) Feminine suffix: [+fem]
↕
X

The fact that each lexical item can have a different behaviour with respect to liaison follows here from the lexical idiosyncracies of each lexical item and therefore does not present the problem that Steriade's Lex constraints would face. The differences in realization in right dislocation environments also mentioned above follow here from the underlying representations in (47) and the condition in (48): resyllabification is only possible with consonants that do not have a skeletal slot at the word level. Finally, under the stratal approach, (apparent) blending is only possible if there is a single underlying representation and the differences in the output forms can be attributed to regular phonological processes. An ungrammatical split base formation *[bol] in sequences like *[bol] *abbé* (instead of the grammatical *[bɛl] *abbé*) cannot arise because there is no phonological process of [l]-insertion in French. However, a liaison output form [sot] 'silly', which differs from the citation forms [so] (masculine) and [sɔt] (feminine), can be derived because at the word level, mid vowels are generally realized as mid-low in closed syllables and as mid-high in open syllables (*loi de position* 'law of position'). Under this view it follows that 'blending' will never arise with suppletive allomorphs.

The approach sketched here raises at least a couple of issues. A minor one is that feminine adjectives all end up having a skeletal slot but through two different mechanisms: either the skeletal slot is present in the underlying representation or it is added by association to the feature [+fem]. The other, more important, worry is related to the different treatment given to the underlying representations in (47c) and (47d). In (47c) the presence of the feature [+fem] in one of the allomorphs is said to prevent the other allomorph from being selected in feminine environments, but in (47d) the presence of the feature [–fem] does not prevent the other allomorph from being selected in masculine environments. In spite of the labels 'S' and 'P', this different interpretation of the representations does not follow from anything; it's a mere stipulation.

5.2 Allomorphy in the Latin perfect and Romanian derivation

Mester (1994) brought up an interesting case of allomorphy found in the Latin perfect in an influential paper on prosodic minimality and maximality, when OT was not yet fully developed. He takes into consideration verbs of the Latin conjugation II and proposes that the distribution of the allomorphs *-u* and *-s* in the perfect is prosodically driven, *-u* being the allomorph chosen when no conflict arises. For verbs like *monēre* 'warn (present infinitive)', the 1st person singular perfect *monuī* is

fully parsed with the default allomorph: [*mo nu*]<ī>.[14] However, a verb like *augēre* 'enlarge$_{\text{INF.PRS}}$', must build the 1st person singular perfect with the more marked allomorph *s*, *auksī*, because it is the only one that allows perfect parsing: [*auk*]<*sī*> (cf. *[*au*]*gu*<ī>, with a trapped syllable).[15] Embick (2010) argues that Mester's global proposal wrongly predicts that when other suffixes are considered allomorph selection should vacillate depending on the prosodic structure of the whole word. For instance, one would expect to find **auguimus* for the 1st plural perfect because it can be fully parsed into feet, [*au*][*gui*]<*mus*>, while this is not the case for the grammatical form *augsimus*, [*aug*]*si*<*mus*>, which contains a trapped foot.

Steriade (2012) addresses the allomorphy of the Latin perfect more broadly, taking into account all conjugations (not only the second one), all tenses with perfect aspect, and all types of allomorphy, not just the *-u/-s* alternation. Among other things, she observes that, for any given verb, all perfect forms have a similar perfect stem (while there is a lot of variation across verbs). According to her, this similarity has to do with syllable count, not necessarily with segmental identity. Steriade's crucial point is that although these phonological similarities are tied to morphosyntactically related forms, with one serving as base for the other, one is not contained in the other. This point can be illustrated with the relation between the verbal perfect and the perfect participle.

(49)			1SG perfect	perfect participle		
	Lat.	a.	[scrip-s]-ī	[scrip-t]-us	*scripitus	'write'
		b.	[hab-u]-ī	[hab-it]-us	*haptus	'have'

In (49) the stem, enclosed in square brackets, ends up having the same number of syllables in both the perfect and the perfect participle. Different allomorphs are used but the allomorph chosen does not alter the syllable count. Notice that [*scrip-s*]-*ī* is not contained in [*scrip-t*]-*us* or vice versa. The constraint that controls syllable count is MAX V (PERFECT), which requires the perfect participle to have a vowel if the perfect stem contains one.

Steriade also argues that the building of perfect forms is in turn influenced by non-perfect (*infectum*) forms. The complete direction of influence is *infectum* → perfect verbal forms → perfect participle. The fact that, as shown, there is no containment relation between forms excludes the possibility of a cyclic analysis or an analysis based on output-output correspondence of the sort argued for in Benua (1997). Steriade suggests that the selection of a base is related to type frequency. In the Latin case, the *infectum* has 16 different categories (combinations of mood, tense etc.), the perfect verbal forms six, and the perfect participle only two (participle and supine). A form with more categories can influence a form with fewer categories and

14 Square brackets indicate the edges of feet, while angle brackets mark extrametrical syllables.
15 In the examples from Latin the orthography is adapted phonologically when relevant.

act as a base for that one. She further argues that this conception can be extended to the base-derivative relation, because the base also appears in the derivative, but not the other way around.

Steriade (2008) discusses a case from Romanian to argue that inflection can determine phonological properties of derivation in ways similar to what we saw for Latin. Romanian has a productive phonological process of palatalization by which velar stops palatalize, only in derived environments, before a non-back vowel (K-Palatalization). In (50a) the presence of a palatal vocoid in the plural triggers palatalization, while in (50b) the selection of a non-palatal inflectional suffix does not trigger it:

(50) Rom. a. *stângă* [ˈstɨŋ-ʌ] – *stângi* [ˈstɨndʒ-i̯] ‘$\text{left}_{\text{SG-PL}}$’
b. *foc* [ˈfok] – *focuri* [ˈfok-uri̯] ‘$\text{fire}_{\text{SG-PL}}$’

Steriade (2008) shows that the presence or absence of palatalization in inflection influences derivation in palatalizing contexts. If palatalized and non-palatalized roots alternate in inflection, the behaviour in derivation is as expected: for the adjective *stângă* ‘left’, which surfaces with a palatalized consonant in the plural, cf. (50a), in derivation the suffix *-ist* [-ˈist] triggers palatalization while the suffix *-aci* [-ˈatʃ] doesn’t, cf. (51a). However, for the root meaning ‘fire’, in (50b), there is underapplication of palatalization in derivation: a velar consonant surfaces before a non-back vowel, cf. (51b).

(51) Rom. a. *stângist* [stɨnˈdʒ-ist] ‘leftist’
stângaci [stɨnˈg-atʃ] ‘lefty’
b. *fochist* [foˈk-ist], *[foˈtʃ-ist] ‘locomotive engineer’

The analysis proposed relies on the notion of derived lexicon; the generation of morphologically complex items is done in different passes through the grammar. In a first pass, inflected forms are generated; these are stored in the derived lexicon and are taken into account in the generation of morphologically derived words, through LexP constraints. The relevant LexP constraint for the cases at hand is $\text{Ident}_{\text{Lex}}$[αF] (where F stands for ‘feature’), defined below:

(52) $\text{Ident}_{\text{Lex}}$[αF]: For any segment *s* in a subconstituent C of an expression under evaluation, if *s* is [αF] then *s* has an [αF] correspondent in a listed allomorph of C.

This constraint rules out candidates like *[foˈtʃ-ist], because no listed allomorph has a palatal consonant. An additional point made by Steriade (2008) is that what counts for the presence or absence of palatalization in derivatives is not the *potential*

capacity of palatalizing but the *actual* presence of palatalized consonants in inflected bases. A proper name like *Franco* [ˈfrank-o] has a derivative *Franchist* [franˈk-ist] 'Franco supporter' (*[franˈtʃ-ist]), without palatalization, because the plural of *Franco* does not exist; that means that the plural is not stored in the derived lexicon and therefore cannot serve as a base for derivatives.

The facts analysed in Steriade (2008) pose a challenge for theories based on the cycle, such as Lexical Phonology and Morphology (Kiparsky 1982) and OT versions of it (like Kiparsky 2000), because a plural is not a subconstituent of a derived word and therefore should not be available when derivational suffixes are attached to the root. For a reinterpretation of the facts and an analysis in Stratal Phonology that crucially resorts to thematic elements, cf. Bermúdez-Otero (to appear).

5.3 Imperatives with enclitics in Catalan

In Catalan, the 2nd person imperative of verbs of conjugations II and III does not have any overt inflectional morphology; it also lacks a theme vowel (except for conjugation IIIa verbs, which have an *-eix* increment). In most cases these verbal forms are a bare stem and end in a consonant or a glide. However, when pronominal enclitics are added, extra verbal material appears, which we will refer to as 'accretion'. The accretion can be a single vowel or a longer sequence, depending on the dialect and the verb. The examples below, from Bonet/Torres-Tamarit (2010), illustrate some of the accretions (underlined) in two insular varieties of Catalan: Formenteran and Majorcan. In these two varieties enclisis also causes stress displacement.[16]

(53) Cat. *prometre* 'to promise' (conjugation II)
bullir 'to boil' (conjugation III)

		in isolation	with enclitics	
a.	Majorcan	[pɾoˈmət]	[pɾoməˈt̲əli]	'promise (to him/her)!'
		[ˈbuʎ]	[buˈʎi̲l]	'boil(it$_M$)!'
b.	Formenteran	[pɾuˈmət]	[pɾumaˈt̲əli]	'promise(to him/her)!'
		[ˈbuʎ]	[buʎiˈɣ̲əl]	'boil(it$_M$)!'

Bonet/Torres-Tamarit (2010; 2011) analyse these cases as the effect of a phonological constraint requiring a prosodic head foot that outranks OO constraints. The phonological constraints are slightly different in each variety, Majorcan requiring an iamb

16 Central Catalan also has an accretion in enclisis, which is always realized as a schwa. We do not discuss it in this section because it differs in two significant ways from the other two varieties: (i) the accretion does not appear systematically in enclisis and shows some idiolectal variation; (ii) enclisis does not cause stress shift. Cf. Bonet/Torres-Tamarit (2011) for a description and analysis of the data.

and Formenteran, a moraic trochee. These two constraints, which are needed independently to account for stress shift, appear in (54).

(54) a. Majorcan Cat.
IAMB]: Assign one violation mark for any V+CL sequence that lacks an iamb aligned at the right edge.

b. Formenteran Cat.
μTROCHEE]: Assign one violation mark for any V+CL sequence that lacks a moraic trochee aligned at the right edge.

These phonological constraints would be violated if the accretion were not present (cf. Formenteran [pɾumə(ˈtə̲li)], with a well-formed moraic trochee, vs. *[pɾuˈmətli], which would have an ill-formed foot). Regular epenthesis is also ruled out by ALIGN(CL/VB), requiring adjacency between the verb and clitics; cf. section 3.2 and specifically (30).

In Formenteran Catalan the verbal root plus the accretion coincides exactly with the inflectional stem found in the first and second person plural imperative. Adopting the notion of lexical conservatism in Steriade (1999a) and later work, Bonet/Torres-Tamarit (2010) propose two CORR_{LEX} constraints. One of them, (55a), allows a correspondence relation to be established between the inflectional stem of the cliticized imperative and other listed forms of the imperative alone, but not with verbal forms belonging to other tenses. (55b) is a more specific version of the constraint that penalizes candidates which, in addition, have different person and number (φ) features:

(55) a. CORR_{LEX} $\text{INFLSTEM}_{\text{Imp}}$ (CORR_{LEX}I):
Assign one violation mark for any inflectional stem of a pre-clitic imperative that does not have a correspondent in the inflectional stem of an imperative form (the base).

b. CORR_{LEX} $\text{INFLSTEM}_{\text{Imp}}$-φ ($\text{CORR}_{\text{LEX}}$I-φ):
Assign one violation mark for any inflectional stem of a pre-clitic imperative that does not have a correspondent in the inflectional stem of an imperative form with the same φ-features (the base).

The tableau in (56) illustrates the proposal. The relevant listed inflectional stems include those belonging to the imperative. The two first candidates have a correspondent in one of the two forms found in the imperative, but the last one has a correspondent in a different tense (which could be, for instance, the imperfective indicative). For this reason this last candidate violates the constraint CORR_{LEX} $\text{INFLSTEM}_{\text{Imp}}$. The only candidate that does not violate any of the CORR_{LEX} constraints violates the highly ranked phonological constraint; therefore it is ruled out.

(56) Formenteran Cat. *bull-la* 'boil it$_F$!' /buʎ#lə/: [buʎiˈɣə#lə]
Listed output inflectional stems: [ˈbuʎ$_i$], [buʎiˈɣə$_j$ (m,w)]

/buʎ#lə/	μTROCHEE]	CORR$_{LEX}$I	CORR$_{LEX}$I-φ
(ˈbuʎ$_i$) lə	*!		
☞ buʎi(ˈɣə$_j$ lə)			*
bu(ˈʎi$_k$ lə)		*!	*

The tableau in (56) does not include any candidates that are an unfaithful copy of one of the inflectional candidates. Such a candidate (for instance bu(ˈʎi$_j$ lə)) would violate an OO-MAX constraint because two of the segments of the listed base ([buʎiˈɣə$_j$ (m,w)]) are not present in the candidate. In addition, the winning candidate has an inflectional stem that contains three segments more than the input; it violates IO-DEP. OO faithfulness constraints (OO-FAITH) have a high ranking in Formenteran Catalan and are always satisfied (the relative ranking being OO-FAITH » IO-DEP). However, the opposite relative ranking in Majorcan (IO-DEP » OO-FAITH) is crucial for the selection of an accretion that is taken from other forms of the same tense, but which contains fewer segments. This point is illustrated in (57). All the forms of the imperative except for the 2nd person singular contain a velar segment [ɣ], but this segment is not present in the accretion of the winning candidate.

(57) Majorcan Cat. *resol-li* 'solve for him/her!' /rəzɔl#li/: [rəzolə#ˈli]
Some listed inflectional stems: [rəzˈɔl$_i$], [rəzolˈɣə$_j$ (m,w)]

/rəzɔl#li/	IAMB]	IO-DEP	OO-FAITH	CORR$_{LEX}$I	CORR$_{LEX}$I-φ
rəzol$_i$ ˈli	*!				
☞ rəzo(lə$_j$ ˈli)		*	*		*
rəzol(ɣə$_j$ ˈli)		**!			*

The phenomenon described here is not easy to account for in a serial model of OT. One aspect to take into account is that in some cases the accretion can hardly be identified with a single morpheme. This is the case of the Formenteran sequence [iˈɣə], whose derivation was illustrated in (56). Another even more relevant aspect is that the appropriateness of the accretion can only be evaluated once it has been inserted and feet have been built. There is no justification for the presence of the accretion before the incorporation of clitics.

6 Conclusion

In this chapter we have presented several phenomena from Romance languages that lie at the core of the phonology-morphology interface. We have discussed different OT analyses of these phenomena, focusing on a central debate in the theory, namely

whether the interaction between the two components proceeds in a parallel or a serial fashion. Parallel accounts need to resort, in many cases, to output-output constraints to explain some of these interactions. Among serial OT models, two of them have been widely explored in the literature. Stratal OT incorporates seriality through morphologically ordered levels, but within each level evaluation is done in a parallel fashion; different levels can have different constraint rankings. Harmonic Serialism, instead, recovers the one-change-at-a-time procedure of classic generative phonology but using ranked constraints instead of rules, with a fixed ranking throughout the whole derivation. Some of the phenomena that have been reviewed here can be treated equally well within both the serial and the parallel views, while for other phenomena one view or the other seems better suited to handle the facts. It is difficult, therefore, to find a single approach that could account for all the phenomena in a satisfactory fashion and close the debate. More work needs to be done in the area of Romance linguistics to tilt the scales, and more attention should be paid to frequency effects, briefly discussed at the end of section 3.1. These effects are explored in models like stochastic Optimality Theory (Boersma/Hayes 2001, and others), in which a mechanism is proposed to compute the probability of outputs through the assignation of a numerical value to each constraint.

7 References

Akinlabi, Akinbiyi (1996), "Featural affixation", *Journal of Linguistics* 32, 239–289.

Albright, Adam/Andrade, Argelia/Hayes, Bruce (2001), "Segmental environments of Spanish diphthongization", in: Adam Albright/Taehong Cho (edd.), *UCLA Working Papers in Linguistics 7. Papers in phonology 5*, 117–151.

Álvarez Blanco, Rosario (1983), "O artigo en galego. Morfoloxía", *Verba. Anuario galego de filoloxía* 10, 169–182.

Aronoff, Mark (1994), *Morphology by itself. Stems and inflectional classes*, Cambridge, MA, MIT Press.

Baković, Eric J. (1998), "Spanish codas and overapplication", in: Armin Schwegler/Bernard Tranel/Myriam Uribe-Etxebarria (edd.), *Romance linguistics. Theoretical perspectives (Selected papers from the 27th linguistic symposium on Romance languages, 1997)*, Amsterdam/Philadelphia, Benjamins, 13–23.

Baković, Eric J. (2001), "Nasal place neutralization in Spanish", in: Michelle Minnick Fox/Alexander Williams/Elsi Kaiser (edd.), *U. Penn working papers in linguistics 7.1: Proceedings of the 24th annual Penn linguistics colloquium*, Philadelphia, PA, PWPL, 1–13.

Benua, Laura (1995), "Identity effects in morphological truncation", in: Jill Beckman/Laura Walsh Dickey/Suzanne Urbanczyk (edd.), *University of Massachusetts occasional papers in linguistics 18. Papers in Optimality Theory*, Amherst, MA, Graduate Linguistic Student Association, 77–136, http://roa.rutgers.edu/files/74-0000/74-0000-BENUA-0-0.PDF (06.05.2016).

Benua, Laura (1997), *Transderivational identity. Phonological relations between words*, PhD dissertation, University of Massachusetts, Amherst (published as *Phonological relations between words*, New York, Garland, 2000).

Bermúdez-Otero, Ricardo (2006), "Morphological structure and phonological domains in Spanish denominal derivation", in: Fernando Martínez-Gil/Sonia Colina (edd.), *Optimality-theoretic studies in Spanish phonology*, Amsterdam/Philadelphia, Benjamins, 278–311.

Bermúdez-Otero, Ricardo (2013), "The Spanish lexicon stores stems with theme vowels, not roots with inflectional class features", *Probus* 25, 3–103.

Bermúdez-Otero, Ricardo (to appear), "Stratal phonology. Arguments for cyclic containment, morphological implications", in: Andrew Spencer (ed.), *The handbook of morphology*, second edition, Oxford, Blackwell.

Bertinetto, Pier Marco/Loporcaro, Michele (2005), "The sound pattern of Standard Italian, as compared with the varieties spoken in Florence, Milan and Rome", *Journal of the International Phonetic Association* 35, 131–151.

Bibiloni, Gabriel (1998), "La e àtona en el català de Mallorca", in: Josep Massot i Muntaner (ed.), *Estudis de llengua i literatura en honor de Joan Veny* II, Barcelona, Universitat de Barcelona/Publicacions de l'Abadia de Montserrat, 533–539.

Boersma, Paul/Hayes, Bruce (2001), "Empirical tests of the gradual learning algorithm", *Linguistic Inquiry* 32, 45–86.

Bonet, Eulàlia/Lloret, Maria-Rosa (2002), "OCP effects in Catalan cliticization", *Catalan Journal of Linguistics* 1, 19–39.

Bonet, Eulàlia/Lloret, Maria-Rosa (2003), "More on alignment as an alternative to domains. The syllabification of Catalan clitics", *Probus* 17, 37–78.

Bonet, Eulàlia/Lloret, Maria-Rosa (2005), "Against serial evaluation in Optimality Theory", *Lingua* 115, 1303–1323.

Bonet, Eulàlia/Lloret, Maria-Rosa/Mascaró, Joan (2003), "Phonology-morphology conflicts in gender allomorphy. A unified approach", paper presented at the *26th Generative Linguistics in the Old World Colloquium*, Lund University.

Bonet, Eulàlia/Lloret, Maria-Rosa/Mascaró, Joan (2007), "Allomorph selection and lexical preferences", *Lingua* 117, 903–927.

Bonet, Eulàlia/Torres-Tamarit, Francesc (2010), "Allomorphy in pre-clitic imperatives in Formenteran Catalan. An output-based analysis", in: Sonia Colina/Antxon Olarrea/Ana Maria Carvalho (edd.), *Romance Linguistics 2009. Selected papers from the 39th Linguistic Symposium on Romance Languages (LSRL), Tucson, Arizona, March 2009*, Amsterdam/Philadelphia, Benjamins, 337–351.

Bonet, Eulàlia/Torres-Tamarit, Francesc (2011), "Les formes d'imperatiu seguides de clític. Un cas de conservadorisme lèxic", in: Maria-Rosa Lloret/Clàudia Pons (edd.), *Noves aproximacions a la fonologia i la morfologia del català* (Col·lecció Symposia Philologica), Alacant, Institut Interuniversitari de Filologia Valenciana, 37–61.

Burzio, Luigi (1996), "Surface constraints versus underlying representations", in: Jacques Durand/Bernard Laks (edd.), *Current trends in phonology. Models and methods*, Salford, European Studies Research Institute, 123–141.

Burzio, Luigi (2002), "Surface-to-surface morphology. When your representations turn into constraints", in: Paul Boucher (ed.), *Many morphologies*, Somerville, MA, Cascadilla Press, 142–177.

Burzio, Luigi (2005), "Sources of paradigm uniformity", in: Laura J. Downing/T. Alan Hall/Renate Raffelsiefen (edd.), *Paradigms in phonological theory*, Oxford, Oxford University Press, 65–106.

Bybee, Joan (1985), *Morphology*, Amsterdam/Philadelphia, Benjamins.

Carstairs, Andrew (1987), *Allomorphy in inflexion*, London, Croom Helm.

Carstairs, Andrew (1988), "Some implications of phonologically-conditioned suppletion", in: Geert Booij/Jaap van Marle (edd.), *Yearbook of morphology 1988*, Dordrecht, Foris, 67–94.

Chierchia, Gennaro (1986), "Length, syllabification, and the phonological cycle in Italian", *Journal of Italian Linguistics* 8, 5–34.

Colina, Sonia (1995), *A constraint-based analysis of syllabification in Spanish, Catalan and Galician*, PhD dissertation, University of Illinois, Urbana-Champaign.

Côté, Marie-Hélène (2011), "French liaison", in: Marc van Oostendorp/Colin J. Ewen/Elizabeth Hume/Keren Rice (edd.), *The Blackwell companion to phonology*, vol. V: *Phonology across languages*, Chichester, Wiley-Blackwell, 2685–2710.

Crosswhite, Katherine (1999), *Vowel reduction in Optimality Theory*, PhD dissertation, UCLA. [Published in 2001, New York/London, Routledge].

Crosswhite, Katherine (2004), "Vowel reduction", in: Bruce Hayes/Robert Kirchner/Donca Steriade (edd.), *Phonetically based phonology*, Cambridge, Cambridge University Press, 191–231.

Davis, Stuart (1990), "Italian onset structure and the distribution of 'il' and 'lo'", *Linguistics* 28, 43–55.

De Belder, Marijke/Faust, Noam/Lampitelli, Nicola (2014), "On a low and high diminutive. Evidence from Italian and Hebrew", in: Artemis Alexiadou/Hagit Borer/Florian Schäfer (edd.), *The syntax of roots and the roots of syntax*, Oxford, Oxford University Press, 149–163.

Del Gobbo, Francesca (2001), "An OT account of the distribution of articles in Italian", in: Wind Cowles/Linda Godson/Andy Hickl/Alicia Muñoz/Paola Nieddu/Todd O'Bryan/Heidi Tonomura (edd.), *Proceedings of the 5th annual Southwest workshop on Optimality Theory* (SWOT V), University of California, San Diego, May 15–16, 1999 (Linguistic notes from La Jolla, vol. 20), La Jolla, CA, Department of Linguistics, University of California, San Diego, 1–18.

Dols, Nicolau (1993), "La silabificación del catalán de Mallorca", *Hispanorama* 65, 22–26.

Dols, Nicolau (2000), "Teoria fonològica i sil·labificació. El cas del català de Mallorca", PhD dissertation, Palma, Universitat de les Illes Balears.

Dols, Nicolau/Wheeler, Max W. (1996), "El consonantisme final mallorquí i el 'llicenciament d'obertures'", *Caplletra. Revista internacional de filologia* 19, 51–63.

Eddington, David (1996), "Diphthongization in Spanish derivational morphology. An empirical investigation", *Hispanic Linguistics* 8, 1–13.

Eddington, David (2012), "Morphophonological alternations", in: José-Ignacio Hualde/Antxon Olarrea/Erin O'Rourke (edd.), *Handbook of Hispanic linguistics*, Cambridge, Wiley-Blackwell, 193–208.

Embick, David (2010), *Localism versus globalism in morphology and phonology*, Cambridge, MA, MIT Press.

Embick, David (2013), "Contextual conditions on stem alternations. Illustrations from the Spanish conjugation", in: Irene Franco/Sara Lusini/Andres Saab (edd.), *Romance languages and linguistic theory 2010. Selected papers from "Going Romance", Leiden, 2010*, Amsterdam/Philadelphia, Benjamins, 21–40.

Greenberg, Joseph H. (1963), "Some universals of grammar with particular reference to the order of meaningful elements", in: Joseph Greenberg (ed.), *Universals of language*, Cambridge, MA, MIT Press, 73–113.

Halle, Morris/Harris, James W./Vergnaud, Jean-Roger (1991), "A reexamination of the stress erasure convention and Spanish stress", *Linguistic Inquiry* 22, 141–159.

Hargus, Sharon (1998), "Prosodically conditioned allomorphy in Optimality Theory. Brevity in Witsuwit'en", Ms., University of Washington.

Harris, James W. (1969), *Spanish phonology*, Cambridge, MA, MIT Press.

Harris, James W. (1983), *Syllable structures and stress in Spanish. An autosegmental analysis*, Cambridge, MA, MIT Press.

Harris, James W. (1985), "Spanish diphthongization and stress. A paradox resolved", *Phonology Yearbook* 2, 31–45.

Harris, James W. (1992), "The form classes of Spanish substantives", in: Geert Booij/Jaap van Marle (edd.), *Yearbook of Morphology 1991*, Dordrecht, Kluwer, 65–88.

Harris, James W. (1999), "Nasal depalatalization 'no', morphological wellformedness 'sí'; the structure of Spanish word classes", in: Karlos Arregi/Benjamin Bruening/Cornelia Krause/Vivian Lin (edd.), *MIT working papers in linguistics 33. Papers on morphology and syntax, cycle one*, Cambridge, MA, MIT, 47–82.

Jaeggli, Osvaldo A. (1980), "Spanish diminutives", in: Frank H. Nuessel (ed.), *Contemporary studies in Romance languages*, Bloomington, IN, Indiana University Linguistics Club, 142–158.

Jiménez, Jesús (1997), "L'estructura sil·làbica del dialecte valencià", PhD dissertation, Universitat de València.

Jiménez, Jesús/Todolí, Júlia (1995), "La forma dels pronoms clítics catalans. Condicions sil·làbiques i alineament morfològic", in: Carlos Martín Vide (ed.), *Lenguajes naturales y lenguajes formales XI*, Barcelona, PPU, 429–437.

Kager, René (1999a), "Surface opacity of metrical structure in Optimality Theory", in: Ben Hermans/Marc van Oostendorp (edd.), *The derivational residue in phonological Optimality Theory*, Amsterdam/Philadelphia, Benjamins, 207–245.

Kager, René (1999b), *Optimality Theory*, Cambridge, Cambridge University Press.

Kenstowicz, Michael (1994), "Syllabification in Chukchee. A constraint-based analysis", in: Alice Davison/Nicole Maier/Glaucia Silva/Wan Su Yan (edd.), *Proceedings of the formal linguistics society of Mid America 4*, Iowa City, University of Iowa, 160–181.

Kenstowicz, Michael (1997), "Quality-sensitive stress", *Rivista di Linguistica* 9, 157–187.

Kenstowicz, Michael (2002), "Paradigmatic uniformity and contrast", in: Anikó Csirmaz/Zhiqiang Li/Andrew Nevins/Olga Vaysman/Michael Wagner (edd.), *MIT working papers in linguistics 42. Phonological answers (and their corresponding questions)*, Cambridge, MA, MITWPL, 141–164. (Republished in: Laura J. Downing/T. Allan Hall/Renate Raffelsiefen (edd.), *Paradigms in phonological theory*, Oxford, Oxford University Press, 2005, 145–169).

Kikuchi, Seiichiro (1999), "Opacity and transparency in Spanish plurals. A sympathetic approach", *On'in Kenkyu* [Phonological Studies] 2, 61–68.

Kikuchi, Seiichiro (2006), "On Galician definite article allomorphy", *On'in Kenkyu* [Phonological Studies] 9, 41–48.

Kiparsky, Paul (1982), "From cyclic phonology to lexical phonology", in: Harry van der Hulst/Norval Smith (edd.), *The structure of phonological representations*, part I, Dordrecht, Foris, 131–175.

Kiparsky, Paul (2000), "Opacity and Cyclicity", *The Linguistic Review* 17, 351–367.

Lloret, Maria-Rosa (2002), "Estructura sil·làbica", in: Joan Solà/Maria-Rosa Lloret/Joan Mascaró/Manuel Pérez Saldanya (edd.), *Gramàtica del català contemporani*, vol. 1, Barcelona, Empúries, 195–249.

Lloret, Maria-Rosa (2003), "Variació condicionada. Aspectes qualitatius i quantitatius", *Catalan Review. International Journal of Catalan Culture* 17, 107–122.

Lloret, Maria-Rosa (2004a), "The phonological role of paradigms. The case of insular Catalan", in: Julie Auger/Clancy Clements/Barbara Vance (edd.), *Contemporary approaches to Romance linguistics*, Amsterdam/Philadelphia, Benjamins, 275–297.

Lloret, Maria-Rosa (2004b), "Efectes col·laterals de la 'desinència zero' en la flexió verbal algueresa", in: *Miscel·lània Joan Veny*, vol. 5 (*Estudis de llengua i literatura catalanes* 49), Barcelona, Abadia de Montserrat, 233–266.

Lloret, Maria-Rosa/Jiménez, Jesús (2008), "Marcatge posicional i prominència en el vocalisme àton", *Caplletra. Revista internacional de filologia* 45, 55–91, http://www.raco.cat/index.php/Caplletra/article/view/276800/364747 (06.05.2016).

Lloret, Maria-Rosa/Mascaró, Joan (2006), "Depalatalization in Spanish revised", in: Fernando Martínez-Gil/Sonia Colina (edd.), *Optimality-theoretic studies in Spanish phonology*, Amsterdam/Philadelphia, Benjamins, 74–98.

Marotta, Giovanna (1993), "Selezione dell'articolo e sillaba in italiano. Un'interazione totale?", *Studi di grammatica italiana* 15, 255–293.
Mascaró, Joan (1978), *Catalan phonology and the phonological cycle*, Bloomington, IN, Indiana University Linguistics Club.
Mascaró, Joan (1983), "Three Spanish variations and a Majorcan theme", Ms., Universitat Autònoma de Barcelona.
Mascaró, Joan (1986), *Morfologia*, Barcelona, Enciclopèdia Catalana.
Mascaró, Joan (1996), "External allomorphy and contractions in Romance", *Probus* 8, 181–205.
Mascaró, Joan (2002), "El sistema vocàlic. Reducció vocàlica", in: Joan Solà/Maria-Rosa Lloret/Joan Mascaró/Manuel Pérez Saldanya (edd.), *Gramàtica del català contemporani*, vol. 1, Barcelona, Empúries, 89–123.
Mascaró, Joan (2007), "External allomorphy and lexical representation", *Linguistic Inquiry* 38, 715–735.
McCarthy, John J. (1993), "The parallel advantage. Containment, consistency and alignment", Talk presented at Rutgers Optimality workshop 1, Rutgers University, New Brunswick, NJ.
McCarthy, John J. (1999), "Sympathy and phonological opacity", *Phonology* 16, 331–399.
McCarthy, John J. (2000), "Harmonic serialism and parallelism", in: Masako Hirotani/Andries Coetzee/Nancy Hall (edd.), *Proceedings of the North East linguistic society 30*, Amherst, MA, Graduate Linguistic Student Association, 501–524.
McCarthy, John J. (2005), "Optimal paradigms", in: Laura J. Downing/T. Allan Hall/ Renate Raffelsiefen (edd.), *Paradigms in phonological theory*, Oxford, Oxford University Press, 170–210.
McCarthy, John J./Prince, Alan (1993), "Generalized alignment", in: Geert Booij/Jaap van Marle (edd.), *Yearbook of Morphology*, Dordrecht, Kluwer, 79–153.
McCarthy, John J./Prince, Alan (1994), "The emergence of the unmarked. Optimality in prosodic morphology", in: Mercè González (ed.), *Proceedings of the North East linguistic society*, Amherst, MA, Graduate Linguistic Student Association, 333–379.
McCarthy, John J./Prince, Alan (1995), "Faithfulness and reduplicative identity", in: Jill Beckman/Laura Walsh Dickey/Suzanne Urbanczyk (edd.), *University of Massachusetts occasional papers in linguistics 18. Papers in Optimality Theory*, Amherst, MA, Graduate Linguistic Student Association, 249–384, http://roa.rutgers.edu/files/60-0000/60-0000-MCCARTHY-0-0.PDF (06.05.2016).
McCrary, Kristie Marie (2004), *Reassessing the role of the syllable in Italian phonology. An experimental study of consonant cluster syllabification, definite article allomorphy and segment duration*, PhD dissertation, University of California, Los Angeles.
Mester, Armin (1994), "The quantitative trochee in Latin", *Natural language and linguistic theory* 12, 1–61.
Morelli, Frida (1999), *The phonotactics and phonology of obstruent clusters in Optimality Theory*, PhD dissertation, University of Maryland, College Park.
Nevins, Andrew (2011), "Phonologically conditioned allomorph selection", in: Marc van Oostendorp/Colin J. Ewen/Elizabeth Hume/Keren Rice (edd.), *The Blackwell companion to phonology*, vol. 4: *Phonological interfaces*, Chichester, Wiley-Blackwell, 2357–2382.
Ohannesian, Maria/Pons, Clàudia (2009), "Shattering paradigms. An attempt to formalize pressures within subparadigms", in: Gilles Boyé/Nabil Hathout/Fabio Montermini (edd.), *Proceedings of Décembrettes 6*, Somerville, MA, Cascadilla Proceedings Project, 76–94.
Paster, Mary (2006), *Phonological conditions on affixation*, PhD dissertation, University of California, Berkeley, http://pages.pomona.edu/~mp034747/Paster_dissertation.pdf (06.05.2016).
Pater, Joe (2000), "Non-uniformity in English secondary stress. The role of ranked and lexically specific constraints", *Phonology* 17, 237–274.
Pensado, Carmen (1997), "On the Spanish depalatalization /ɲ/ and /ʎ/ in rhymes", in: Fernando Martínez-Gil/Alfonso Morales (edd.), *Issues in the phonology and morphology of the major Iberian languages*, Washington, Georgetown University Press, 595–618.

Perlmutter, David (1998), "Interfaces. Explanation of allomorphy and the architecture of grammars", in: Steven Lapointe/Diane Brentari/Patrick M. Farrell (edd.), *Morphology and its relation to phonology and syntax*, Stanford, CSLI Publications, 307–338.

Piera, Carlos (1985), "On the representation of higher order complex words", in: Larry D. King/Catherine A. Male (edd.), *Selected papers from the XIIIth Linguistic Symposium on Romance Languages, Chapel Hill, N.C., 24–26 March 1983*, Amsterdam/Philadelphia, Benjamins, 287–313.

Pons-Moll, Clàudia (2007), "The true mystery of the world is the visible, not the invisible. Some reflections on the verbal morphophonology of Balearic Catalan", *Acta Linguistica Hungarica* 54, 295–339.

Pons-Moll, Clàudia (2011), "Underapplication of vowel reduction to schwa in Majorcan Catalan productive derivation and verbal inflection", in: Janine Berns/Haike Jacobs/Tobias Scheer (edd.), *Romance languages and linguistic theory 2009. Selected papers from "Going Romance", Nice 2009*, Amsterdam/Philadelphia, Benjamins, 273–289.

Pons-Moll, Clàudia (2012), "When diachrony meets synchrony. Phonological change, phonological variation and Optimal Paradigms", in: Gunther De Vogelaer/Guido Seiler (edd.), *The dialect laboratory. Dialects as a testing ground for theories of language change*, Amsterdam/Philadelphia, Benjamins, 197–225.

Prince, Alan/Smolensky, Paul (1993/2004), *Optimality Theory. Constraint interaction in generative grammar*, New Brunswick/Boulder, Rutgers University/University of Colorado, 1993, http://roa.rutgers.edu/files/537-0802/537-0802-PRINCE-0-0.PDF (06.05.2016). Reprint: Malden, MA, Blackwell, 2004.

Repetti, Lori (1991), "A moraic analysis of raddoppiamento fonosintattico", *Rivista di Linguistica* 3, 307–330.

Serra, Pep (1996), *La fonologia prosòdica del català*, PhD dissertation, Universitat de Girona.

Steriade, Donca (1999a), "Lexical conservatism in French adjectival liaison", in: Jean-Marc Authier/Barbara E. Bullock/Lisa A. Reed (edd.), *Formal perspectives in Romance linguistics. Selected papers from the 28th linguistic symposium on Romance languages*, Amsterdam/Philadelphia, Benjamins, 243–270.

Steriade, Donca (1999b), "Alternatives to syllable-based accounts of consonantal phonotactics", in: Osamu Fujimura/Brian D. Joseph/Bohumil Palek (edd.), *Proceedings of the 1998 linguistics and phonetics conference*, Prague, The Karolinum Press, 205–242, http://www.linguistics.ucla.edu/people/steriade/papers/Alternatives_to_Syllables.pdf (06.05.2016).

Steriade, Donca (2001), "Lexical conservatism and the notion base of affixation", Ms. University of California, Los Angeles, http://www.linguistics.ucla.edu/people/steriade/papers/LexicalConservatism.pdf (06.05.2016).

Steriade, Donca (2008), "A pseudo-cyclic effect in Romanian morphophonology", in: Asaf Bachrach/Andrew Nevins (edd.), *Inflectional identity*, Oxford, Oxford University Press, 313–359.

Steriade, Donca (2009 [2001]), "The phonology of perceptibility effects. The P-map and its consequences for constraint organization", in: Kristin Hanson/Sharon Inkelas (edd.), *The nature of the word. Studies in honor of Paul Kiparsky*, Cambridge, MA, MIT Press, 151–179.

Steriade, Donca (2012), "The cycle without containment: Latin perfect stems", Ms. Cambridge, MA, MIT.

Tranel, Bernard (1981), *Concreteness in generative phonology. Evidence from French*, Berkeley/Los Angeles, The University of California Press.

Tranel, Bernard (1990), "On suppletion and French liaison", *Probus* 2, 169–208.

Tranel, Bernard (1996a), "Exceptionality in Optimality Theory and final consonants in French", in: Karen Zagona (ed.), *Grammatical theory and Romance languages. Selected papers from the 25th linguistic symposium on Romance languages (LSRL XXV), 2–4 March 1995*, Amsterdam/Philadelphia, Benjamins, 275–291.

Tranel, Bernard (1996b), "French liaison and elision revisited. A unified account within Optimality Theory", in: Claudia Parodi/Carlos Quicoli/Mario Saltarelli/María Luisa Zubizarreta (edd.), *Aspects of Romance linguistics. Selected papers from the Linguistic Symposium on Romance Languages XXIV, March 10–3, 1994*, Washington, D.C., Georgetown University Press, 433–455.

Tranel, Bernard (1999), *Suppletion and OT. On the issue of the syntax/phonology interaction*, in: Emily Curtis/James Lyle/Gabriel Webster (edd.), *The proceedings of the sixteenth West coast conference on formal linguistics (WCCFL 16)*, Stanford, CSLI Publications, 415–429.

Viaplana, Joaquim (1980), "Algunes consideracions sobre les formes pronominals clítiques del barceloní", *Anuario de Filología* 6, 459–483.

Vogel, Irene (1977), *The syllable in phonological theory with special reference to Italian*, PhD dissertation, Stanford University.

Wetzels, Leo (1986), "The timing of latent consonants in Modern French", in: Carol Neidle/Rafael Núñez-Cedeño (edd.), *Studies in Romance languages*, Dordrecht, Foris, 283–317.

Wetzels, Leo (2002), "Les adjectifs pré-nominaux du français. Formes longues et formes féminines", in: Haike Jacobs/Leo Wetzels (edd.), *Liber amicorum Bernard Bichakjian*, Maastricht, Shaker, 273–306.

Wheeler, Max W. (1979), *Phonology of Catalan*, Oxford, Blackwell.

Wheeler, Max W. (2005), *The phonology of Catalan*, Oxford, Oxford University Press.

Wiltshire, Caroline/Maranzana, Elisa (1999), "Geminates and clusters in Italian and Piedmontese. A case for OT ranking", in: Jean-Marc Authier/Barbara E. Bullock/Lisa A. Reed (edd.), *Formal perspectives on Romance linguistics. Selected papers from the 28th linguistic symposium on Romance languages (LSRL XXVIII), University Park, 16–19 April 1998*, Amsterdam/Philadelphia, Benjamins, 289–303.

Wolf, Matthew (2008), *Optimal interleaving. Serial phonology-morphology interaction in a constraint-based model*, PhD dissertation, Amherst, University of Massachusetts.