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*A challenge for Harmonic Serialism with Optimal Interleaving**

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This paper examines two related phenomena from Catalan that pose a challenge to a proposal in McCarthy (2012) that combines Harmonic Serialism (HS) with the theory of Optimal Interleaving (OI) of Wolf (2009). The first phenomenon, found with stems ending in a sibilant, is the selection of a marked masculine allomorph only before the plural morph, also a sibilant, which prevents an OCP violation. The second, phrasal, phenomenon is restricted to one dialect of Catalan: the plural morpheme is not realised in prenominal position only when it would surface between two consonants. It is shown that, with some crucial modifications on the way spell-out proceeds, HS/OI can account for the two phenomena when they occur separately, but when they co-occur within the same phrase, wrong predictions are made, due to the one-change-at-a-time basic property of HS. These problems do not arise in a parallel OT approach.

1 Introduction

McCarthy (2012) proposes a combination of Harmonic Serialism (henceforth HS; Prince & Smolensky 1993, McCarthy 2000 and other work) and the theory of Optimal Interleaving of Wolf (2008) (henceforth OI) to account for different phonological and morphological phenomena found before a pause in Arabic. He calls this combined theory HS/OI. HS is a derivational model of Optimality Theory in which GEN can perform only one change at a time. The output of each pass through GEN and EVAL becomes the input to a next pass through GEN and EVAL, and so on until no further harmonic improvement is possible, in which case convergence has been reached. At each pass the ranking of the constraints is the same. OI is a theory of the phonology–morphology interface based on Opti-

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mality Theory with Candidate Chains (McCarthy 2007), adapted to HS in McCarthy (2012). The key aspect of this theory is the idea that the input to the phonology contains only abstract morphemes (abstract roots, bundles of morphosyntactic features, etc.), represented in this paper in small capitals, e.g. DOG, PL. The selection of morphs or spell-out ('Vocabulary Insertion' in Distributed Morphology terms; Halle & Marantz 1993) is a GEN operation, on a par with phonological operations like deletion, epenthesis and phonological feature changes; in the previous examples the morphs /dɔg/$_{\text{DOG}}$ and /z/$_{\text{PL}}$ will be inserted. The new phonological information does not replace the morphosyntactic information, but is added to it. Spell-out is controlled by the constraint hierarchy, which contains faithfulness constraints like MAX-M[F] in (1) (Wolf 2008: 26). MAX-M[F] penalises morphemes that lack a corresponding morph. F can refer to roots (MAX-M[RT]) or affixes (for instance, MAX-M[PL]).

(1) MAX-M[F]
For every instance φ of the feature F at the morpheme level, assign a violation mark if there is not an instance φ' of F at the morph level, such that $\varphi \Re \varphi'$.

Spell-out constraints are interleaved with phonological constraints; this interleaving allows phonological and morphological operations to interact. Once a morph is introduced, forced by MAX-M[F], it can undergo phonological changes at later steps, due to the pressure of phonological constraints.

The HS/OI model can be illustrated with an example from McCarthy (2012) that is relevant for the cases to be discussed in this paper. The requirement that in Classical Arabic there must be a heavy syllable at the end of an utterance (before a pause) is satisfied in different ways, including epenthesis, metathesis, choice of a specific allomorph, etc. Indefinite nouns often surface with a suffix *-n*, a phenomenon called 'nunation', which is illustrated in (2a). However, in the nominative and the genitive, before a pause (marked with subscript 'Pau') only the stem is found, as shown in (2b). Contextual, non-final forms are marked with subscript 'Cont'.

(2) a. kita:b-u-n$_{\text{Cont}}$ b. kita:b$_{\text{Pau}}$
book-NOM-INDEF
'a book (NOM)'

The realisation of the stem alone in these cases is a puzzle, because the form with nunation in (2a) ends in a heavy syllable, and one would not expect a change to be necessary in order to satisfy the weight requirement. However, these apparently puzzling facts follow naturally from the HS/OI perspective. The input to the phonology is BOOK-NOM-INDEF]$_{\text{Utt}}$. The two tableaux in (3) show the two steps needed to reach the output [kita:b]$_{\text{Pau}}$ ((3b) corresponds to McCarthy 2012: 359 (24)). The constraint

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HEAVYINPAUSE penalises monomoraic syllables in utterance-final position. The other relevant constraints, MAX-M[RT] and a more general MAX-M, are ranked in such a way to ensure spell-out of the most embedded constituent, the root, before less embedded ones. Since HS allows only one change at a time, and spelling out a morpheme constitutes one change, the winner of step 1 contains a realised root and two abstract morphemes, as shown in (3a). At step 2, in (3b), the candidate with realised case, [kita:b-u-INDEF]$_{Utt}$, violates the phonological constraint HEAVYINPAUSE, and is ruled out in favour of the candidate with only a realised root, identical to the input. For this reason convergence is reached at step 2, and it is therefore impossible to generate the candidate [kita:b-u-n]$_{Utt}$. Throughout this paper, as in McCarthy (2012), it is assumed that when morphs are inserted the morphosyntactic features remain, but, in order to simplify the representations, they are not shown. A candidate like (3b.ii), for instance, should be interpreted as [kita:b$_{root}$-u$_{nom}$-INDEF]$_{Utt}$.

(3) <BOOK-NOM-INDEF]$_{Utt}$, kita:b-NOM-INDEF]$_{Utt}$>

a. Step 1

BOOK-NOM-INDEF]$_{Utt}$	MAX-M [RT]	HEAVYIN PAUSE	*COMPLEX CODA	MAX-M
☞ i. kita:b-NOM-INDEF]$_{Utt}$				2
ii. BOOK-NOM-INDEF]$_{Utt}$	W1			W3
iii. BOOK-u-INDEF]$_{Utt}$	W1	W1		2

b. Step 2: convergence

kita:b-NOM-INDEF]$_{Utt}$	MAX-M [RT]	HEAVYIN PAUSE	*COMPLEX CODA	MAX-M
☞ i. kita:b-NOM-INDEF]$_{Utt}$				2
ii. kita:b-u-INDEF]$_{Utt}$		W1		L1

Following Wolf (2008), McCarthy assumes that spell-out proceeds strictly inside out. For this reason, step 2 excludes the candidate [kita:b-NOM-n]$_{Utt}$, with the outermost suffix spelled out instead of the inner suffix.[1] However, it could also be assumed that GEN has no such restriction and that candidates like [kita:b-NOM-n]$_{Utt}$ can in fact be generated. This candidate would not be the winner at step 2, because it would violate *COMPLEXCODA, a constraint that McCarthy (2012) includes in the ranking for other cases. In §2 it will be shown that this second option must be adopted, at least for the data from Catalan presented in this paper; GEN cannot control which morpheme should be spelled out at each step.

In this paper I examine two phenomena from Catalan that involve the plural morph *s* in nominals, in one case within the word and in the other

[1] By the same token, candidate (3a.iii) should not be a possible candidate; it has been included in step 1, following other examples in McCarthy (2012).

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case within the DP. The first one, analysed in §2, is the selection of a marked masculine allomorph to avoid contact between sibilants when the stem ends in a sibilant and the plural morph, also a sibilant, is inserted. After summarising Bonet *et al.*'s (2007) parallel OT analysis of this phenomenon, I show that an account within HS/OI implies forcing the plural morpheme to be spelled out before the gender morpheme, through the relevant ranking of specific MAX-M constraints; the outermost suffix must be realised before the inner suffix. The second phenomenon, discussed in §3, is found in one dialect of Catalan and involves the non-realisation of the plural morpheme in prenominal position under specific syntactic and phonological conditions. The parallel OT analysis of the phenomenon in Bonet *et al.* (to appear) can be adapted, with a few changes, to HS/OI. §4 is devoted to the implications for the parallel and the HS/OI analyses of the two phenomena co-occurring within the same phrase. It is shown that HS/OI cannot account for the data, even if different constraint rankings are assumed for word-internal and phrasal phonology. The parallel analysis does not face such problems. In §5, I argue against alternative analyses of the phenomena presented in §2 and §3. Finally, §6 contains some conclusions and further remarks.

2 Masculine allomorph selection and plurals in Catalan

Catalan masculine nominals have a gender-related morpheme, with the allomorphs Ø and *-o* (pronounced [u] in most dialects).[2] Most nominals choose the zero allomorph Ø; many fewer select *-o*. Some examples of each type appear in (4). The same allomorph appears when the nominal is plural. As mentioned above, the plural morph is *-s*.

(4) *Masculine nominal allomorphs*

a.	*singular*		*plural*		
	gat-Ø	[ˈgat]	gat-Ø-s	[ˈgats]	'cat'
	resum-Ø	[rəˈzum]	resum-Ø-s	[rəˈzums]	'summary'
	estrany-Ø	[əsˈtraɲ]	estrany-Ø-s	[əsˈtraɲs]	'strange'
	feixuc-Ø	[fəˈʃuk]	feixuc-Ø-s	[fəˈʃuks]	'heavy'
b.	*singular*		*plural*		
	mic-o	[ˈmiku]	mic-o-s	[ˈmikus]	'monkey'
	llor-o	[ˈʎɔɾu]	llor-o-s	[ˈʎɔɾus]	'parrot'
	gueny-o	[ˈgɛɲu]	gueny-o-s	[ˈgɛɲus]	'cross-eyed'
	xat-o	[ˈʃatu]	xat-o-s	[ˈʃatus]	'flattened'

[2] There is a third, less common, allomorph, /ə/, which will be ignored in this paper for expository reasons. As for other Romance languages, gender-related morphemes have also been called word markers, class markers or form-class morphemes, among other terms. The exact nature of these morphemes and their direct or indirect relation to gender is irrelevant for the purposes of this paper, and I will refer to them simply as masculine (or feminine) morphemes. For some discussion, see Harris (1991, 1999), for Spanish.

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However, when a nominal with allomorph Ø has a stem ending in a sibilant (/s z ʃ ʒ ʧ ʤ/), the masculine allomorph *-o* is chosen in the plural. This change of allomorph prevents adjacency between two sibilants, one from the stem and one from the plural suffix *s*. Some examples of this phonologically conditioned allomorphy appear in (5). The Ø that appears in the singular forms corresponds to the masculine allomorph. The singular morph is also Ø, but is omitted for clarity. Voiceless [s] is spelled as *ss* between vowels; *ix* corresponds to [ʃ], and *tx* to [ʧ].

(5) *Mixed masculine nominal allomorphs*

singular		*plural*		
gos-Ø	['gos]	goss-o-s	['gosus]	'dog'
peix-Ø	['peʃ]	peix-o-s	['peʃus]	'fish'
despatx-Ø	[dəs'paʧ]	despatx-o-s	[dəs'paʧus]	'office'
fluix-Ø	['fluʃ]	fluix-o-s	['fluʃus]	'weak'
escàs-Ø	[əs'kas]	escass-o-s	[əs'kasus]	'scarce'

The argument against HS/OI to be developed in §4 depends crucially on the interpretation of the mixed masculine nominals assumed here. §5 includes a discussion of the bases for this interpretation and the inadequacy of alternative interpretations.

Bonet *et al*. (2007) propose an analysis of mixed masculine nominals within a parallel model of OT, in which the input contains underlying phonological representations. Following Mascaró (2007), they propose that the input of all masculine nominals contains both allomorphs, in an ordering relation. The lexical entry of the masculine morpheme is given in (6); '>' is to be interpreted as 'is preferred to' or 'is less marked than'.

(6) *Lexical entry*

[MASC]: {Ø > *o*}

A universal constraint, PRIORITY, in (7) (Mascaró 2007: 726), penalises the choice of the less preferred allomorph *-o*. The selection of Ø does not violate this constraint, because Ø is the dominant allomorph; the *-o* morph incurs one violation, because it is the less preferred allomorph.

(7) PRIORITY

Respect lexical priority (ordering) of allomorphs.

The tableaux in (8) and (9) show how different allomorphs of the masculine are chosen in the singular and plural respectively, when the stem, here *gos* 'dog', ends in a sibilant (see Bonet *et al*. 2007 for a detailed analysis). The input contains the root plus the allomorphs of the masculine, with their ordering relation. The constraint OCP_{sib} penalises sequences of sibilants. In (8), the singular form, PRIORITY determines the choice of the unmarked, dominant allomorph Ø, because there is no phonological conflict.

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(8)

gos-{Ø > o}	OCP_{sib}	PRIORITY
☞ a. gos-Ø		
b. goss-o		W1

In (9), the addition of the plural suffix *-s* causes a violation of OCP_{sib} if the unmarked masculine allomorph Ø is chosen; the ranking OCP_{sib} ≫ PRIORITY forces the selection of the marked allomorph *-o*.[3]

(9)

gos-{Ø > o}-s	OCP_{sib}	PRIORITY
☞ a. goss-o-s		1
b. gos-Ø-s	W1	L

Let us now see how these facts can be handled in HS/OI. In OI the input contains only morphosyntactic features, and in HS GEN can perform only one operation at a time. An output like *goss-o-s* cannot be obtained if we assume, with McCarthy (2012), that spell-out necessarily takes place inside out (see the discussion around (3)).[4] The input at step 2 would be *gos*-MASC-PL and we would expect [MASC] to be spelled out before [PL]. But at that stage nothing would prevent the insertion of the dominant allomorph Ø: the allomorph *-o* would violate PRIORITY, and OCP_{sib} would be vacuously satisfied in both cases; the output *goss-o*-PL would be harmonically bounded by *goss*-Ø-PL, and we would expect the same allomorph Ø that we find in the singular *gos*. What triggers the insertion of the masculine allomorph *-o* is the morph *-s* corresponding to [PL]; it is a case of outward-looking allomorphy. This means that the assumption that spell-out proceeds strictly inside outward must be abandoned in favour of a weaker model, in which it is the ranking of specific FAITH-M constraints that determines the order of spell-out, not a restriction on GEN (see Wolf 2008: ch. 3 for discussion along the same lines). We need a constraint MAX-M[PL], ranked above MAX-M[MASC]. The derivation of *goss-o-s* must be <DOG-MASC-PL, *gos*-MASC-PL, *gos*-MASC-*s*, *goss-o-s*>.[5]

[3] Examples like *mico* 'monkey' in (4b) are lexically marked; they subcategorise for the allomorph *-o*. In Bonet *et al.* (2007), a constraint called RESPECT penalises candidates without the lexically marked allomorph.

[4] Even though there seems to be no consensus on the structural position of gender (or class) and number within principles and parameters/minimalist approaches to syntax, when the two are considered together it is assumed that the category hosting number dominates the category hosting gender (or class). See, for instance, Picallo (2008) and Schoorlemmer (2009).

[5] One reviewer suggests that the ranking MAX-M[PL] ≫ MAX-M[MASC] could be motivated by the universally more marked character of gender over number (Greenberg's (1963) Universal 36). This would imply that the order of spell-out can be driven not only by syntactic embedding but also by markedness relations between categories. The same reviewer observes that if the ranking of spell-out constraints were free, one would expect, for instance, that a ranking MAX-M[MASC] ≫ MAX-M[PL] could give rise to a language where number but not gender failed to surface. Of course, this would be the case only if some intervening constraint prevented number from surfacing.

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The tableaux in (10) show the HS/OI derivation of *goss-o-s*, with the crucial ranking MAX-M[PL] ≫ MAX-M[MASC]. At step 1, *gos*-MASC-PL is the winner, due to the high ranking of MAX-M[RT]. The relevant steps are step 2 (10b), and step 3 (10c). At step 2, GEN creates candidates with either [MASC] or [PL] spelled out, but not both. Since [MASC] has two allomorphs, either of them can be inserted. Subscripts have been added to each allomorph to indicate their lexical preference relation: $\emptyset_1$ is the dominant, preferred allomorph, and $-o_2$ the less preferred one; the latter, but not the former, violates PRIORITY. The sequence *gos*-MASC-*s*, which is the only candidate that violates OCP_{sib}, is selected as the optimal output, because of the high ranking of MAX-M[PL]. At step 3, a violation of OCP_{sib} is avoided only by the candidate with the marked morph *-o*, the winner. At step 4, not shown in (10), convergence is reached, since no further harmonic improvement is possible.

(10) Derivation of *gossos* 'dogs' in HS/OI

a. Step 1

DOG-MASC-PL	MAX-M [RT]	MAX-M [PL]	OCP_{sib}	MAX-M [MASC]	PRIORITY
☞ i. gos-MASC-PL		1		1	
ii. DOG-MASC-PL	W1	1		1	

b. Step 2 (ranking established: MAX-M[PL] ≫ OCP_{sib}, MAX-M[MASC])

gos-MASC-PL	MAX-M [RT]	MAX-M [PL]	OCP_{sib}	MAX-M [MASC]	PRIORITY
☞ i. gos-MASC-s			1	1	
ii. gos-$\emptyset_1$-PL		W1	L	L	
iii. goss-o_2-PL		W1	L	L	W1
iv. gos-MASC-PL		W1	L	1	

c. Step 3 (ranking established: OCP_{sib} ≫ PRIORITY)

gos-MASC-s	MAX-M [RT]	MAX-M [PL]	OCP_{sib}	MAX-M [MASC]	PRIORITY
☞ i. goss-o_2-s					1
ii. gos-$\emptyset_1$-s			W1		L
iii. gos-MASC-s			W1	W1	L

In this section it has been shown that masculine allomorphy before plurals in Catalan is a case of outward-looking allomorphy, at least under common views of the syntactic relation between gender and number (see note 4). This requires a weakening of the claim that spell-out operates strictly inside out. The phenomenon can be accounted for within HS/OI if constraints of the MAX-M[F] family can be ranked freely. In this case, the necessary ranking is MAX-M[PL] ≫ MAX-M[MASC], with the phonological

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constraint OCP_{sib} being ranked below MAX-M[PL]. An analysis in terms of parallel OT also does not present any problems.

3 Plural non-realisation in NEC Catalan

3.1 The phenomenon

Catalan, like most Romance languages, has gender and number concord within the DP triggered by the noun, as illustrated in (11), where the noun is feminine plural and all the modifiers (determiners, adjectives) are feminine plural, whether prenominal or postnominal.[6]

(11) Aquest-e-s vell-e-s **cas-e-s** abandonad-e-s
this-FEM-PL old-FEM-PL house-FEM-PL abandoned-FEM-PL
'these old abandoned houses'

In North-Eastern Central (NEC) Catalan, however, the plural morph *-s* fails to surface in prenominal position when it would appear between two consonants. The two necessary conditions for the non-realisation of the plural morph *-s* appear in (12).

(12) *Conditions for non-realisation of plural* -s
a. The plural morph belongs to a prenominal element.
b. The plural morph would surface in the context C __ C.

Some examples of this phenomenon appear in (13), where the absence of the expected plural morph (which is present in other dialects of Catalan) is indicated with an underscore. The examples are taken from Bonet *et al.* (to appear) (see also Wolf 2008 and Nevins 2011 for examples and discussion of this phenomenon).

(13) a. molt_ poc_ bon_ **professional-s**
[ˌmol_ ˌpɔg_ ˌbɔm_ pɾufəsjuˈnals]
very few good professional-PL
'very few good professionals'
b. aquell_ **cabell-s** llarg-s tenyit-s
[əˌkɛʎ_ kəˌβɛʎz ˌʎarks təˈɲits]
that hair-PL long-PL dyed-PL
'those long dyed hairs'

[6] The noun appears in bold in (11) and all other examples of this type, to allow easier identification of the prenominal and postnominal modifiers.

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c. aquell_ vell-s **amic-s** present-s
[əˌkɛʎ_ ˌβeʎz əˌmiks prəˈzens]
that old-PL friend-PL present-PL
'those old present friends'

d. quin-e-s mal-e-s **carreter-e-s**
[ˌkinəz ˌmàləs kərəˈteɾəs]
what-FEM-PL bad-FEM-PL road-FEM-PL
'what bad roads'

In (13a) the three modifiers appear in prenominal position (condition (12a)), and all of them start and end in a consonant (condition (12b)); for these reasons they do not surface as *molts*, *pocs* and *bons*. In (13b), as expected, the prenominal demonstrative *aquells* surfaces without the plural morph (the two conditions in (12) are met), but the noun and the two postnominal adjectives do surface with the plural morph, in spite of the fact that the *-s* appears between two consonants in each case; condition (12a) is not met. In (13c), the demonstrative *aquells* surfaces without a plural morph because of the presence of two surrounding consonants, but the prenominal adjective *vells* does surface with the plural morph *-s*, because the following noun, *amics*, starts with a vowel; hence condition (12b) is not met. Finally, in (13d), the plural morph surfaces in all prenominal modifiers and the noun, because it is always preceded by a vowel (the feminine morph *-e*, pronounced [ə]); again, condition (12b) is not met.

3.2 The failure of concord in NEC Catalan

In §3.1 it was assumed that the missing *-s* in NEC Catalan is a case of the non-realisation of a morpheme, rather than the result of phonological deletion. This section is devoted to showing that this is indeed the correct interpretation (see McCarthy 2012 for some similar arguments for Classical Arabic). A deletion analysis faces problems related both to the target of the deletion and to the domain of the deletion.

This phenomenon does not have the properties of conventional phonological deletion, because it does not affect other coronal sibilants of the language in the same phonological context (C __ C), as the examples in (14a) show. In (14a.i), the DP-internal modifier ends in *s*, but it is not deleted, in spite of the fact that it is prenominal and appears between two consonants, because the *s* is not the plural morph, but rather belongs to the stem of the adjective *fals*. This example constitutes an almost minimal pair with (14b.i), where the plural *-s* of the prenominal adjective is not realised; this adjective is realised as *mals* before a vowel in NEC Catalan (e.g. *mal-s amic-s* 'bad friends'). In (14a.ii), an *s* that is the exponent of a morpheme is realised between two consonants, yet this morpheme is not the plural found in nominals, but instead the 2nd person singular morpheme found in verbs, in this case *pots*; this example also shows that the phenomenon is restricted to DPs. Again, the example in (14b.ii) constitutes an almost

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minimal pair with (14a.ii); in (b.ii) the absent *s* is the exponent of the plural morpheme of a prenominal modifier, and it is not realised because it appears between two consonants; before a vowel or in any context in other dialects of Catalan, this modifier would be realised as *pocs* (cf. *poc-s amic-s* 'few friends').

(14) a. *not plural:* s *realised*

i. fals conseller
false counsellor
'false counsellor'

ii. pot-s menjar
can-2SG eat
'you can eat'

*fal_ conseller

*pot_ menjar

b. *plural:* s *not realised*

i. mal_ conseller-s
bad counsellor-PL
'bad counsellors'

ii. poc_ menjars
few food-PL
'few foods'

The domain in which the absence of the plural morph is found cannot be characterised in prosodic terms either. In order to capture the prenominal–postnominal asymmetry, a single prosodic phrase would have to be postulated containing all prenominal elements plus the noun; each postnominal modifier would have to constitute an independent prosodic phrase: deletion would affect plural *s* between two consonants within a prosodic constituent. The required prosodic constituency is shown schematically in (15). 'Mod' stands for any type of determiner or adjective; prosodic boundaries are indicated by { }.

(15) $\{\text{Mod}_1\ \text{Mod}_2\ \text{N}\}\{\text{Mod}_3\}\{\text{Mod}_4\}$

The prosodic structure in (15) cannot be justified on prosodic grounds. According to Prieto (2002a, b), intermediate prosodic phrases in Catalan are characterised by an abrupt intonational rise on the last syllable, optionally preceded by lowering on the same syllable and optionally followed by a pause; length is not distinctive. Two or more prosodic phrases are found in sentences with long subjects, adjuncts, coordinated structures, most subordinated structures or peripheral elements. No description of Catalan intonation can be found that makes a distinction between the intonation of noun–adjective sequences and that of adjective–noun sequences (Pilar Prieto, personal communication), although, given the facts from NEC Catalan, one would expect a noun to belong to a different phrase than a following adjective, while an adjective should belong to the same prosodic phrase as a following noun. But there are no differences in the intonational contour of sentences like those in (16). In (16a) the adjective follows the noun, while in (16b) the adjective precedes it. In both examples, syllables with secondary stress have high pitch, while syllables with primary stress have low pitch.[7]

[7] See Dehé & Samek-Lodovici (2009) for similar conclusions for Italian, a closely related language.

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(16) a. Hi havia una **boira** densa
[j ə$_{\downarrow}$βiə wnə $_{\downarrow}$βɔjɾə ˈðɛnsə]
there had a fog dense

b. Hi havia una densa **boira**
[j ə$_{\downarrow}$βiə wnə $_{\downarrow}$ðɛnsə ˈβɔjɾə]
there had a dense fog
'there was a dense fog'

Bonet *et al*. (to appear) also show that there is non-realisation whenever the two conditions in (12) are met, regardless of the weight of the prenominal sequence.

An additional reason in favour of the non-realisation interpretation is that other languages have agreement asymmetries within the DP, most often without any obvious phonological context participating in them. In Moroccan Arabic demonstratives agree in gender and number with the noun when postnominal, but are bare stems when prenominal (Shlonsky 2004); Central Ladin feminine plural nouns trigger gender and number agreement postnominally, but only gender agreement prenominally (Rasom 2008); Asturian has mass agreement postnominally but gender agreement prenominally (Fernández-Ordóñez 2007, Bonet & Mascaró 2012). Other examples can be found in Abkhaz (Hewitt 1979) and Spanish (Eddington & Hualde 2008), for instance.

Finally, and more generally, claiming that we are dealing with a case of phonological deletion would imply modifying some standard, well-established assumptions about how phonology works. Since deletion would occur at the phrasal level, we would be dealing with a postlexical phenomenon. But, crucially, the process would have to mention the morphosyntactic status of the target, namely the fact that it is the plural morph.

Thus there are enough reasons to conclude that the absence of the plural *-s* is the result of lack of agreement (lack of concord), rather than phonological deletion.

3.3 Analysis in parallel OT and HS/OI

The parallel OT analysis of plural non-realisation in NEC Catalan to be presented here is the same as that proposed in Bonet *et al*. (to appear), albeit somewhat simplified. In this proposal, the syntax is responsible for postnominal agreement only (possibly through a Spec-Head configuration). Postsyntactically, morphosyntactic faithfulness and markedness constraints that are interspersed with phonological constraints determine the final agreement patterns.[8] The faithfulness constraint MAX(morph) in

[8] Agreement asymmetries have been studied mostly in relation to subject–verb agreement (see, among others, Samek-Lodovici 2002, Ackema & Neeleman 2003, Shlonsky 2004 and Franck *et al*. 2006), but Shlonsky (2004) and Nevins (2011) specifically discuss asymmetries within the DP. Most of these authors attribute

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(17a) prevents the deletion of agreement features assigned by the syntax, present on the noun and postnominal modifiers; the markedness constraint CONCORD in (17b) penalises lack of concord with the noun for any modifier (determiner, quantifier, adjective) present in the DP, either prenominal or postnominal. MAX(morph) and CONCORD can be relativised to different agreement features (gender, number), the relevant features in NEC Catalan being those corresponding to number.

(17) a. MAX(morph)
Every morpheme of the input has a correspondent in the output (no morphological deletion).

b. CONCORD
If an N has an inflectional feature F, all other modifiers within the DP must have the inflectional feature F.

The tableau in (18) illustrates how final concord is obtained for an example like (13c) above. The input contains the plural feature of the noun *amic* and that of the postnominal adjective *present* already realised; postnominal agreement has taken place syntactically, and the corresponding morphs have been inserted. *CsC is the phonological constraint that penalises an interconsonantal *s*.[9]

(18)

aquell vell amic-s_{pl} present-s_{pl}	MAX(num)	*CsC	CONC(num)
☞ a. aquell_ vell-s_{pl} amic-s_{pl} present-s_{pl}		1	1
b. aquell-s_{pl} vell-s_{pl} amic-s_{pl} present-s_{pl}		W2	L
c. aquell_ vell-s_{pl} amic_ present-s_{pl}	W1	L	W2

Candidate (18c) is the only candidate that satisfies the phonological constraint *CsC fully, but it is ruled out by the higher-ranked constraint MAX(num), because the noun has not preserved the feature [PL] that was present syntactically. Candidate (18b) satisfies CONCORD(num), which requires full concord, but it does not win, because it violates *CsC more than the winner. For candidate (18a), the winner, the ranking MAX(num) ⩾ *CsC ensures that the plural morph is realised on the noun and in postnominal position, regardless of the phonological context; the ranking *CsC ⩾ CONCORD(num) triggers prenominal concord as long as a vowel appears before or after the plural morph, as is the case in the partial sequence *vell-s amic-s*. In sequences like *fals conseller* in (14a.i),

agreement asymmetries to differences between the operation Agree (which would result in weaker agreement) and Spec-Head relations, which trigger systematic agreement. For a discussion of some of these proposals, see Bonet (2013).

[9] The proposal in Bonet *et al.* (to appear) is slightly simplified in this paper, for expository reasons. In that paper a distinction is made for inputs like *amic-*s_{pl} between deletion of a morphosyntactic feature like [PL], which violates MAX(num), and deletion of its exponent, which violates MAX(segment). Candidate (18c) violates both.

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the root-final *s* of the adjective already appears in the input, and MAX(segment), ranked above *CsC, prevents its deletion.

Let us now see how this phenomenon can be accounted for within HS/OI. We can assume, as in the previous analysis, that syntactically we find only postnominal agreement. On this assumption, the input of (13c) will be as shown in (19), with abstract roots and the features [PL] and [MASC] only on the noun and the postnominal adjective.

(19) Input in HS/OI: THAT OLD FRIEND-MASC-PL PRESENT-MASC-PL

We assume with McCarthy (2012: §7) that in the first steps of the derivation the spell-out of morphemes and word-internal changes take place in parallel for each word; the domain for serial and gradual derivation is the X^0. At the phrasal level the domain has expanded, and it is natural to assume that any change that takes place at any locus within the DP will then count as one change. In what follows, the relevant domains, the word or the DP, appear between square brackets. On these assumptions, at step 1 of the derivation the root of each word is inserted in parallel, due to the high ranking of MAX-M[PL]. The input to step 2 is therefore as shown in (20).

(20) Input to step 2: [aquell] [vell] [amic-MASC-PL] [present-MASC-PL]

Given the ranking of the spell-out constraints MAX-M[PL] ≫ MAX-M[MASC], argued for in §2, the input to step 3 (output of step 2) is presumably as in (21a), with plural morphs on the noun and the postnominal adjective derived in parallel. The input to step 4 (output of step 3) is as in (21b), with the phonologically realised masculine morph (the dominant allomorph Ø, which satisfies PRIORITY). Prenominal modifiers remain unmodified, because at the word level there is no relevant operation that could apply to them, given that agreement is a phrasal operation, and the derivation has to proceed bottom up.

(21) a. Input to step 3: [aquell] [vell] [amic-MASC-s] [present-MASC-s]
b. Input to step 4: [aquell] [vell] [amic-Ø-s] [present-Ø-s]

The output of step 4 is identical to its input for the purposes of this paper (irrelevant phonological modifications are ignored here). In the phrasal domain, the CONCORD constraints have to force gender and number features to spread to prenominal elements, and these features must be phonologically realised, enforced by the effect of MAX-M constraints. Ignoring here whether CONCORD targets one modifier at a time and whether number and gender spread independently of each other, the input to the relevant step for the issues at hand, step 5, will be as in (22). The features [MASC] and [PL] are now present on the prenominal modifiers. The intermediate square brackets of (21) do not appear in (22), in order

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to make clear that the relevant domain at this stage is the whole DP, the phrasal domain.

(22) Input to step 5: [aquell-MASC-PL vell-MASC-PL amic-Ø-s present-Ø-s]

At this point the relevant constraints are those that realise the gender and number features (MAX-M[PL] and MAX-M[MASC]) and the phonological constraint *CsC. The ranking of *CsC above MAX-M[PL] ensures that the plural morph is realised only when there is no phonological conflict, as the tableau in (23) illustrates. The last modifier, *presents*, has been suppressed to concentrate on the relevant, prenominal, modifiers. Although the realisation (or non-realisation) of the plural morphs should proceed gradually from modifier to modifier, tableau (23) shows all the relevant steps at the same time for convenience, and the steps are numbered as 5/6. In (23), the candidate with all the plural morphs realised, (b), is ruled out because the first one (*aquell*-MASC-*s*) violates the phonological constraint, the faithful candidate, (c), violates the constraint MAX-M[PL] twice, while the winner, (a), violates it only once.

(23) Steps 5/6 (ranking established: *CsC ≫ MAX-M[PL])

aquell-MASC-PL vell-MASC-PL amic-Ø-s	*CsC	MAX-M [PL]	MAX-M [MASC]
☞ a. aquell-MASC-PL vell-MASC-s amic-Ø-s		1	2
b. aquell-MASC-s vell-MASC-s amic-Ø-s	W1	L	2
c. aquell-MASC-PL vell-MASC-PL amic-Ø-s		W2	2

At steps 7/8, the feature [MASC] will be realised, with Ø being selected in preference to *-o* by PRIORITY. The output at convergence will be *aquell*-Ø-PL *vell*-Ø-*s amic*-Ø-*s*.

It seems, then, that HS/OI can account nicely for the asymmetric non-realisation of the plural morpheme in NEC Catalan. However, problems with this model arise when the two phenomena co-occur, that is, when a prenominal modifier in NEC Catalan has a stem ending in a sibilant and the noun is masculine plural. This is considered in the next section.

4 Co-occurrence of allomorph selection and plural non-realisation

4.1 Problems for HS/OI

Not surprisingly, those adjectives that end in a sibilant, like *escàs* 'scarce' in (5), and occur in prenominal position before a masculine plural noun, surface with the less preferred masculine allomorph *-o* and the plural *-s*, i.e. *escass-o-s*; the vocalic gender allomorph favours the realisation of the plural morph, because the C__C context is not met. One such example is given in (24).

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(24) escass-o-s **fet-Ø-s** (*escàs fets)
[əsˌkasus ˈfets]
scarce-MASC-PL fact-MASC-PL
'very few facts'

Following the analysis that was given for (13c), *aquell_ vells amics presents*, the steps for (24) up to the problematic ones will be as shown in (25). The input to step *n* in (25) contains the adjective with the gender and number features, which have satisfied the constraint CONCORD in one or two steps.

(25) a. Input to step 1: [SCARCE] [FACT-MASC-PL] (word domain)
b. Input to step 2: [escàs] [fet-MASC-PL] (word domain)
c. Input to step 3: [escàs] [fet-MASC-s] (word domain)
d. Input to step 4: [escàs] [fet-Ø-s] (word domain)
…
n. Input to step *n*: [escàs-MASC-PL] [fet-Ø-s] (DP domain)

The tableau in (26) shows the derivation of step *n*, which has *escàs*-MASC-PL *fet-Ø-s* as the input. Only one of the abstract morphemes can be spelled out. The candidate with the plural morpheme realised, (c), cannot be the winner, because it violates *CsC (as well as OCP_{sib}), which is crucially ranked above MAX-M[PL]. The ranking *CsC ≫ MAX-M[PL] was established in tableau (23), for *aquell_ vells amics* (*presents*). There is a crucial competition between candidates (26a) and (b) ((d) is included only for completeness). In order to achieve the desired final output *escass-o-s fet-s* we would need the marked gender allomorph *-o*$_2$ to be selected, but because the plural morph has not yet been inserted, there is no pressure for its selection (there is no violation of the phonological constraints *CsC or OCP_{sib}), and the candidate with the less marked allomorph $Ø_1$ is the winner instead.

(26) Step *n*

escàs-MASC-PL fet-Ø-s	*CsC	MAX-M [PL]	OCP_{sib}	MAX-M [MASC]	PRIORITY
☞ a. escàs-$Ø_1$-PL fet-Ø-s		1			
b. escass-o_2-PL fet-Ø-s		1			W1
c. escàs-MASC-s fet-Ø-s	W1	L	W1	W1	
d. escàs-MASC-PL fet-Ø-s		1		W1	

As shown in (27), the consequences of step *n* are fatal at convergence, because the final output is *escàs*-Ø-PL *fet-Ø-s*, i.e. the ungrammatical **escàs fets* of (24). Resorting to a different constraint ranking for phrasal phonology, as in Stratal OT (Kiparsky 2000, Bermúdez-Otero to appear), will not solve the problem. As mentioned above, the only candidate that

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would ultimately lead to the correct grammatical output, *escass-o-s fet-s*, would be candidate (26b), with the *-o* allomorph, but this candidate is harmonically bounded by the winning candidate with the dominant Ø allomorph (26a), so there is no constraint ranking that could make (26b) the winner.

(27) Step $n+1$ (convergence: **escàs fets*)

escàs-$Ø_1$-PL fet-Ø-s	*CsC	MAX-M [PL]	OCP_{sib}	MAX-M [MASC]	PRIORITY
☞ a. escàs-$Ø_1$-PL fet-Ø-s		1			
b. escass-$Ø_1$-s fet-Ø-s	W1	L	W1		

The problem that sequences like *escassos fets* in NEC Catalan pose for HS/OI is directly related to the need for the plural morph to be present in order for the marked masculine allomorph *-o* to be inserted, but at the same time we need the *-o* to be present for the plural morph to have a chance to surface. These two operations cannot be done sequentially, which is precisely the basic feature of HS; they must be done in parallel.

4.2 A parallel OT analysis

A parallel account of the two phenomena does not face the problems that arise with HS/OI. The ranking $OCP_{sib} \gg$ PRIORITY was shown to be necessary to derive the selection of the less preferred masculine allomorph *-o*, in §2 (see tableau (9) for *goss-o-s*). The constraint ranking needed to account for the asymmetric absence of the plural morph within the DP was shown to be MAX(num) ≫ *CsC ≫ CONCORD(num) (see tableau (18) for *aquell_ vells amics presents*). These rankings also account for the cases where the two phenomena co-occur, like *escass-o-s fet-s* in (24). The tableau in (28) shows the one-step derivation of this sequence. As has been assumed all along, the prenominal adjective does not have any gender or number features in the input; these are assigned at PF by GEN, together with the corresponding morphs, and are controlled by the relevant constraints. The noun contains all the allomorphs of [MASC] and the plural morph *-s*. In order to focus on the fate of the adjective, there are no candidates in (28) that violate MAX(num).

(28) Parallel OT (ranking established: CONCORD(num) ≫ PRIORITY)

escàs fet-$\{Ø_1 > o_2\}_{masc}$-s_{pl}	MAX (num)	*CsC	OCP_{sib}	CONC (num/gend)	PRIORITY
☞ a. escass-o_2-s fet-$Ø_1$-s					1
b. escàs-$Ø_1$ fet-$Ø_1$-s				W1	L
c. escas-$Ø_1$-s fet-$Ø_1$-s		W1	W1		L
d. escàs fet-$Ø_1$-s				W2	L

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Because candidates in parallel OT can have any number of changes with respect to the input, (28a) is a valid candidate, an option not available in HS/OI. Contrary to candidates (b) and (d), the winner agrees in gender and number with the noun, and therefore satisfies CONCORD(num) and also CONCORD(gend) (added here for completeness). The candidate with the dominant masculine allomorph Ø, (c), violates the two phonological constraints, which makes (a) the winner, because it violates only low-ranked PRIORITY. The simultaneous presence of *-o* and *-s* in (a) has as a consequence the satisfaction of *CsC and OCP_{sib}, a possibility that is unavailable in a model in which morphs must be introduced one at a time.

5 Alternative HS/OI analyses

As pointed out by two reviewers, the problems raised for HS/OI in §4 by examples like *escass-o-s* 'scarce-MASC-PL' would disappear if a different morphological segmentation were attributed to mixed masculine nominals. The segmentation could be *escasso-s* or *escass-os*, with the vowel *o* belonging either to the stem or to the plural morpheme. If the plural had two allomorphs, *-s* and *-os*, at the step in which the plural is spelled out in sequences like *escassos fets* (see (26), with an input *escàs*-MASC-PL *fet-Ø-s*), the allomorph *-os* for the adjective would win over *-s* or the lack of spell-out, because it would avoid the phonological problems, while satisfying the constraint MAX-M[PL]. However, these alternative segmentations would be clearly undesirable for other reasons. Considering the vowel *o* as part of a plural allomorph *-os* would miss two generalisations: (a) the vowel of this allomorph coincides with the masculine morph of many masculine nouns and adjectives, as illustrated in (4b) with nouns like *mic-o* 'monkey-MASC' and adjectives like *gueny-o* 'cross-eyed-MASC'; (b) the *-os* ending appears only with masculine nouns and adjectives, never with feminine ones; the feminine of the adjective that means 'cross-eyed' is *gueny-a* ['gɛɲə] (*gueny-e-s* ['gɛɲəs] in the plural), for instance. With invariable adjectives like *feliç* [fə'lis] 'happy', the masculine plural is realised with *o*, but the feminine plural is realised with a schwa, which can be interpreted either as the typical feminine morph or as an epenthetic vowel, depending on the analysis (see, for instance, Bonet *et al.* 2007). The inflectional paradigm of the adjective *feliç* is given in (29).

(29)

	singular		*plural*	
masculine	feliç	[fə'lis]	feliç-o-s	[fə'lisus]
feminine	feliç	[fə'lis]	felic-e-s	[fə'lisəs]

With two plural allomorphs, *-s* and *-os*, and an invariable adjective, we would expect to find invariable *feliços* for masculine and feminine in the plural.

If the vowel *o* were attributed to the stem, we would have to posit two allomorphs for all masculine nouns and adjectives ending in a sibilant.

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Taking the examples in (5), we would have *gos* ['gos] and *gosso* ['gosu] 'dog', *peix* ['peʃ] and *peixo* ['peʃu] 'fish', *despatx* [dəs'patʃ] and *despatxo* [dəs'patʃu] 'office', and so on (together with some constraint, with or without lexical ordering, that favoured the consonant-final allomorph in the singular). It would be an accident that all the nouns and adjectives ending in a sibilant happen to have an allomorph that has the same added vowel *o*; in addition, this allomorphy would be found only with masculine nouns and adjectives (with adjectives like *feliç* requiring three allomorphs: *feliç* [fə'lis] for the singular, masculine and feminine, *feliço* [fə'lisu] only for the masculine singular and *felice* [fə'lisə] only for the feminine plural).

Under the interpretation assumed in this paper, the vowel *o* is the same marked masculine morph that appears in *mico*, *guenyo* and other masculine words, and surfaces in the plural of masculine plural nominals to avoid an unwanted sibilant cluster. Mixed masculine nominals have been extensively discussed in the literature on Catalan, and attributing *o* to the stem or to the plural has never been considered a possibility (see, among others, Wheeler 1979, 2005, Mascaró 1985, Lloret & Viaplana 1992 and Clua 2002). As mentioned by one of the reviewers, the *o* could also be considered a case of morphological epenthesis, a term used in Lloret & Viaplana (1992) for this phenomenon. This is a good descriptive term, because the vowel is inserted to avoid a phonological problem, but the inserted vowel is not the usual epenthetic vowel of Catalan, schwa, but rather a vowel that is taken from the morphology of the language. The analysis in Bonet *et al*. (2007) assumed in §2 formalises this intuition within Optimality Theory. Along the lines of Mascaró (1985) and Clua (2002), for instance, this morphological vowel is identified with the masculine morph used in nouns like *mico* and adjectives like *guenyo*. This is the reason why this vowel appears in (29) in the masculine plural, but not in the feminine plural, which would have the same phonological problem.

A very different HS/OI alternative account, which avoids the problems mentioned in §4, is suggested by an anonymous reviewer. This alternative assumes the strong lexicalist hypothesis, according to which all words, including inflection, are derived in the lexicon. Under this view, the final form of all categories (nouns, adjectives, etc.) would be derived step by step, as assumed in §2; a plural like *gossos* would be derived as in (10) (<DOG-MASC-PL, *gos*-MASC-PL, *gos*-MASC-*s*, *goss-o-s*>). The crucial difference would be that only fully formed words would be inserted at syntactic terminals, as atomic units, because spell-out internal to words, as well as their phonology, would occur within the lexicon. Incomplete words like *gos*-MASC-*s* would never enter the postsyntactic evaluation; only the singular *gos* and the plural *gossos*, and similar fully spelled-out forms, would be possible candidates for insertion at a syntactic terminal. The reviewer provides the two tableaux reproduced in (30), with a noun starting in a consonant, *fets*, to illustrate the difference between a prenominal adjective like *escassos*, with plural agreement, and a prenominal adjective like *vells*, without plural agreement, *vell*. The constraint MAX[PL]$_{ph}$ applies only at the phrasal level, while MAX[PL]$_{wd}$ (equivalent to MAX-M[PL] in

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(10)) would apply within the lexicon. In (30) the input contains an abstract prenominal element to which [PL] has been assigned through CONCORD constraints, as was assumed in §3. It is also assumed that the noun has already been spelled out. The candidates are the two options that the lexicon provides, the singular adjective *escàs* and the plural adjective *escassos*, both derived step by step within the lexicon. The plural candidate is chosen when no conflict arises with the higher-ranked *CsC.

(30) a. *escassos fets* [əsˌkasus ˈfets] 'scarce facts'

[SCARCE.PL] fets	*CsC	MAX[PL]$_{ph}$	OCP$_{sib}$
☞ i. escassos fets			
ii. escàs fets		W1	

b. *vell_ fets* [ˌbeʎ_ ˈfets] 'old facts'

[OLD.PL] fets	*CsC	MAX[PL]$_{ph}$	OCP$_{sib}$
☞ i. vell fets		1	
ii. vells fets	W1	L	

A sequence like *escassos fets* was shown to be problematic in §4, but it can successfully be derived under this strong lexicalist variant of HS/OI.

However, this account runs into problems in the case of adjectives that have a final *n* alternating with Ø. Especially in nouns and adjectives, *n* is not realised in word-final position when preceded by a stressed vowel. Some examples appear in (31).

(31) a. n *not realised*

cançó	[kənˈso]	'song'
vi	[ˈbi]	'wine'
fundació	[fundəˈsjo]	'foundation'
tardà	[tərˈða]	'late'
ple	[ˈplɛ]	'full-MASC-SG'

b. n *realised*

cançons	[kənˈsoⁿs]	'songs'
cançoner	[kənsuˈⁿne]	'song book'
vins	[ˈbiⁿs]	'wines'
vinós	[biˈⁿnos]	'wine-like'
vinet	[biˈⁿnɛt]	'wine-DIM'
fundacions	[fundəˈsjoⁿs]	'foundations'
fundacional	[fundəsjuˈⁿnal]	'foundational'
tardans	[tərˈðaⁿs]	'late-MASC-PL'
tardana	[tərˈðaⁿnə]	'late-FEM-SG'
tardaner	[tərðəˈⁿne]	'often late-MASC-SG'
plena	[ˈplɛⁿnə]	'full-FEM-SG'
plenitud	[pləⁿniˈtut]	'fullness'

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The *n* ~ Ø alternation is considered a phonological process in Mascaró (1976), Wheeler (1979) and Bonet & Lloret (1998), for instance, but as a case of allomorphy in Wheeler (2005) and Bonet *et al*. (to appear). Under either interpretation, adjectives with this alternation constitute a problem for the strong lexicalist version of HS/OI, given that what enters post-syntactic evaluation is a fully formed word that has undergone whatever phonological changes or allomorph selection the lexical constraint ranking has imposed. The problem is illustrated with the adjective *ple* 'full', whose inflectional paradigm appears in (32).

(32)

	singular		*plural*	
masculine	ple	['plɛ]	plen-s	['plɛns]
feminine	plen-a	['plɛnə]	plen-e-s	['plɛnəs]

The strong lexicalist version of HS/OI predicts that the masculine singular form *ple* will be used in NEC Catalan in prenominal position, to avoid a violation of *CsC. But what surfaces is in fact the non-paradigmatic form ['plɛn], as the example in (33), taken from Bonet *et al*. (to appear), illustrates.

(33) plen_ poders
full powers
'full powers'

The tableau in (34) shows how the masculine singular is chosen; crucially, the form ['plɛn] cannot be a candidate.

(34) ***ple poders*** [ˌplɛ puˈðɛrs] 'full powers'

[FULL.PL] poders	*CsC	MAX[PL]$_{ph}$	OCP$_{sib}$
☞ a. ple poders		1	
b. plens poders	*W	L	

In the parallel non-lexicalist approach in Bonet *et al*. (to appear), the grammatical output *plen* is interpreted as a root without inflection, a possibility not available in this analysis.[10]

In conclusion, although at first sight this alternative strong lexicalist proposal would deal with the problems posed by mixed masculine nominals, it would fail to account for additional facts related to the *n* ~ Ø alternation.

[10] Spanish has a concord asymmetry, not phonologically conditioned, where the prenominal variant can also be considered a bare stem: modifiers like *primer-o* 'first-MASC-SG', *algun-o* 'some-MASC-SG' and *buen-o* 'good-MASC-SG', for instance, surface as *primer*, *algún* and *buen*, without the masculine vowel *-o*, in prenominal position. A similar case is found in Italian. See Bonet *et al*. (to appear) for an analysis of these cases.

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6 Conclusions

The HS/OI model, with a crucial modification, has been shown to be well suited to account separately for two related phenomena from Catalan. One of the phenomena, the selection of a marked masculine allomorph *-o* that prevents sequences of sibilants, is general in Catalan and, as has been shown, is a case of outward-looking allomorphy. A first result of this paper is that this fact requires giving up the restriction on GEN that spell-out works strictly inside out; the burden must be passed to constraints and constraint ranking. The crucial ranking MAX-M[PL] ≫ MAX-M[MASC] enforces the insertion of the plural morph first, which, in a later step, enforces the selection of the marked allomorph *-o* to avoid an OCP_{sib} violation. The second phenomenon, restricted to NEC Catalan, is found in the phrasal domain, the DP, and consists of the non-insertion of the plural morph *-s* only in prenominal position when it would surface between two consonants. For these type of cases it was assumed that the syntax triggers only postnominal agreement and that at PF constraints on agreement, interspersed with phonological constraints, determine final agreement within the DP. For NEC Catalan, the crucial ranking *CsC ≫ MAX-M[PL] prevents the spell-out of the plural morph at any step in the phrasal domain. A second, more important, result of this paper is that it has shown that HS/OI is incapable of deriving the right output when the two phenomena co-occur within the same DP, i.e. when a prenominal modifier with a stem ending in a sibilant appears next to a masculine plural noun starting with a consonant, in which case the prenominal adjective surfaces with the marked *-o* allomorph plus the plural morph. For the *-o* allomorph to be selected, the plural morph *-s* would have to be inserted first, but for the plural morph to be realised, the presence of a previously selected *-o* allomorph would be necessary, yet these two desired situations cannot be achieved simultaneously in a model like HS, where changes can only be introduced one at a time. A parallel analysis of each case and the combination of the two does not run into the problems faced by the HS/OI approach, because in parallel OT GEN can introduce several changes at once. Here, crucially, it can insert any gender allomorph together with the number allomorph. It has also been shown that assuming different morph segmentations for mixed masculine nominals or assuming the strong lexicalist hypothesis is inadequate to account for the complete set of facts; the former alternative must be rejected on conceptual grounds, while the latter fails to account for additional facts.

Although the parallel approach has been shown to be more adequate for the phenomena analysed in this paper, it cannot account for the phenomenon from Classical Arabic, exemplified in (2), which was used to illustrate HS/OI. McCarthy (2012) shows the clear advantages of deriving the absence of nunation before a pause in HS, with the gradual insertion of morphs. In principle, parallel OT wrongly predicts that the output before pause should be identical to the output in the contextual form, because a form like $[kita:b\text{-}u\text{-}n]_{Cont}$ satisfies the weight requirement

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(HEAVYINPAUSE); the output $[\text{kita:b}]_{\text{Pau}}$ (more precisely $[\text{kita:b-NOM-INDEF}]_{\text{Pau}}$) is not expected.

If we put together the three phenomena that have been discussed in this paper, two from Catalan and one from Classical Arabic, one possible conclusion to draw from this puzzle is that it is only for word-internal evaluation that GEN is restricted to taking one step at a time; for phrasal phenomena GEN would not have such restriction. This might not be a desirable move, because it would imply that different properties are attributed to GEN depending on the level of derivation, but more research is needed on HS and phrasal phenomena to find out whether this is the direction to take. Obviously, another option is to find an alternative analysis for the Classical Arabic facts in a parallel approach. However, it is difficult to see at this point what a plausible HS/OI alternative analysis for the Catalan phenomena might be.

REFERENCES

Ackerman, Peter & Ad Neeleman (2003). Context-sensitive spell-out. *NLLT* **21**. 681–735.

Bermúdez-Otero, Ricardo (to appear). *Stratal Optimality Theory*. Oxford: Oxford University Press.

Bonet, Eulàlia (2013). Agreement in two steps (at least). In Alec Marantz & Ora Matushansky (eds.) *Distributed morphology today: morphemes for Morris Halle*. Cambridge, Mass.: MIT Press. 167–184.

Bonet, Eulàlia & Maria-Rosa Lloret (1998). *Fonologia catalana*. Barcelona: Ariel.

Bonet, Eulàlia, Maria-Rosa Lloret & Joan Mascaró (2007). Allomorph selection and lexical preference: two case studies. *Lingua* **117**. 903–927.

Bonet, Eulàlia, Maria-Rosa Lloret & Joan Mascaró (to appear). The prenominal allomorphy syndrome. In Eulàlia Bonet, Maria-Rosa Lloret & Joan Mascaró (eds.) *Understanding allomorphy: perspectives from Optimality Theory*. London: Equinox.

Bonet, Eulàlia & Joan Mascaró (2012). Asimetrías de concordancia en el SD: el rasgo de masa en asturiano. In Antonio Fábregas, Elena Felíu, Josefa Martín & José Pazó (eds.) *Los límites de la morfología: estudios ofrecidos a Soledad Varela Ortega*. Madrid: Servicio de Publicaciones de la Universidad Autónoma de Madrid. 91–104.

Clua, Esteve (2002). Gènere i nombre en els noms i en els adjectius. In Solà *et al.* (2002). 483–534.

Dehé, Nicole & Vieri Samek-Lodovici (2009). On the prosody and syntax of DPs: evidence from Italian noun–adjective sequences. *NLLT* **27**. 45–75.

Eddington, David & José Ignacio Hualde (2008). *El abundante agua fría*: hermaphroditic Spanish nouns. *Studies in Hispanic and Lusophone Linguistics* **1**. 5–31.

Fernández-Ordóñez, Inés (2007). El 'neutro de materia' en Asturias y Cantabria: análisis gramatical y nuevos datos. In Inmaculada Delgados Cobos & Alicia Puigvert Ocal (eds.) *Ex admiratione et amicitia: homenaje a Ramón Santiago*. Madrid: Ediciones del Orto. 395–434.

Franck, Julie, Glenda Lassi, Ulrich H. Frauenfelder & Luigi Rizzi (2006). Agreement and movement: a syntactic analysis of attraction. *Cognition* **101**. 173–216.

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

https://doi.org/10.1017/S0952675713000201 Published online by Cambridge University Press

Halle, Morris & Alec Marantz (1993). Distributed Morphology and the pieces of inflection. In Kenneth Hale & Samuel Jay Keyser (eds.) *The view from building 20 : essays in honor of Sylvain Bromberger*. Cambridge, Mass.: MIT Press. 111–176.
Harris, James W. (1991). The exponence of gender in Spanish. *LI* **22**. 27–62.
Harris, James W. (1999). Nasal depalatalization *no*, morphological wellformedness *sí*: the structure of Spanish word classes. *MIT Working Papers in Linguistics* **33**. 47–82.
Hewitt, George (1979). *Abkhaz*. Amsterdam: North-Holland.
Kiparsky, Paul (2000). Opacity and cyclicity. *The Linguistic Review* **17**. 351–365.
Lloret, Maria Rosa & Joaquim Viaplana (1992). Les vocals finals dels elements nominals en català. In Antoni Ferrando & Albert G. Hauf (eds.) *Miscel·lània Joan Fuster : estudis de llengua i literatura*. Vol. 5. Barcelona: Publicacions de l'Abadia de Montserrat. 419–445.
McCarthy, John J. (2000). Harmonic serialism and parallelism. *NELS* **30**. 501–524.
McCarthy, John J. (2007). *Hidden generalizations : phonological opacity in Optimality Theory*. London: Equinox.
McCarthy, John J. (2012). Pausal phonology and morpheme realization. In Toni Borowsky, Shigeto Kawahara, Takahito Shinya & Mariko Sugahara (eds.) *Prosody matters : essays in honor of Elisabeth Selkirk*. London: Equinox. 341–373.
Mascaró, Joan (1976). *Catalan phonology and the phonological cycle*. PhD dissertation, MIT. Distributed 1978, Indiana University Linguistics Club.
Mascaró, Joan (1985). Catalan nominal markers and vowel insertion. *Cornell Working Papers in Linguistics* **7**. 162–175.
Mascaró, Joan (2007). External allomorphy and lexical representation. *LI* **38**. 715–735.
Nevins, Andrew (2011). Convergent evidence for rolling up Catalan adjectives. *LI* **42**. 339–345.
Picallo, M. Carme (2008). Gender and number in Romance. *Lingue e Linguaggio* **7**. 47–66.
Prieto, Pilar (2002a). Entonació. In Solà *et al*. (2002). 393–462.
Prieto, Pilar (2002b). *Entonació : models, teoria, mètodes*. Barcelona: Ariel.
Prince, Alan & Paul Smolensky (1993). *Optimality Theory : constraint interaction in generative grammar*. Ms, Rutgers University & University of Colorado, Boulder. Published 2004, Malden, Mass. & Oxford: Blackwell.
Rasom, Sabrina (2008). *Lazy concord in the Central Ladin feminine plural DP : a case study on the interaction between morphosyntax and semantics*. PhD dissertation, University of Padua.
Samek-Lodovici, Vieri (2002). Agreement impoverishment under subject inversion: a crosslinguistic analysis. In Gisbert Fanselow & Caroline Féry (eds.) *Resolving conflicts in grammar : Optimality Theory in syntax, morphology, and phonology*. Hamburg: Buske. 49–82.
Schoorlemmer, Erik (2009). *Agreement, dominance and doubling : the morphosyntax of DP*. PhD dissertation, University of Leiden.
Selkirk, Elisabeth (2009). On clause and intonational phrase in Japanese: the syntactic grounding of prosodic constituent structure. *Gengo Kenkyu* **136**. 35–73.
Shlonsky, Ur (2004). The form of Semitic Noun Phrases. *Lingua* **114**. 1465–1526.
Solà, Joan, Maria-Rosa Lloret, Joan Mascaró & Manuel Pérez Saldanya (eds.) (2002) *Gramàtica del català contemporani*. Vol. 1: *Introducció, fonètica i fonologia, morfologia*. Barcelona: Empúries.
Wheeler, Max W. (1979). *Phonology of Catalan*. Oxford: Blackwell.
Wheeler, Max W. (2005). *The phonology of Catalan*. Oxford: Oxford University Press.
Wolf, Matthew (2008). *Optimal interleaving : serial phonology–morphology interaction in a constraint-based model*. PhD dissertation, University of Massachusetts, Amherst.

https://doi.org/10.1017/S0952675713000201 Published online by Cambridge University Press