STRESS-DEPENDENT HARMONY IN ASTURIAN AND HARMONY IN SITU

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In many cases of stress-dependent harmony the trigger is associated with a morpheme. We examine two instances of morphemic harmony where the triggering morpheme is mixed, that is, it consists of segmental material and floating features. The floating features cause stepwise raising of the stressed vowel, /a/ → [e], and /e/ → [i], /o/ → [u]. We examine in particular Felechosa Asturian, where the triggering masculine singular count morpheme usually has the exponent /-o/ and the floating features [+high] and [−low]. When the stressed vowel is mid, /-o/ raises it to high (/negr-o/ → [ˈniɣr-o]). When the stressed vowel is /a/, the suffix raises this vowel to [e] as predicted, but at the same time the triggering morph /-o/ raises to [u] (/blaŋk-o/ → [ˈbleŋk-u]). This phenomenon, which we call harmony in situ, derives from the fact that, because raising is stepwise, one of the floating features cannot link to the stressed vowel, and thus it has to be realized on the trigger itself. Felechosa Asturian is compared to Ḷḷena Asturian, which does not present harmony in situ, and an optimality-theoretic analysis is provided.*

Keywords: Asturian, stress-dependent harmony, metaphony, floating features, harmony in situ

1. INTRODUCTION. One of the basic properties of dynamic harmony processes is that they distinguish a stable element, the trigger, and a variable element, the target. The harmonic process consists in the transfer of some of the properties of the trigger onto the target. In this article, we present a case that deviates in an interesting way from this basic pattern. Stress-dependent harmony in Felechosa Asturian must be analyzed in terms of a trigger that causes a change in situ, in addition to a change in the target.

The basic typology of stress-dependent harmony—that is, vowel harmonic systems involving a stressed position (usually the trigger or the target)—includes but does not reduce to metaphony.[1] We may distinguish the following cases, illustrated in 1 with a hypothetical example involving raising of /e/. In 1a we have an instance of phonological harmony: the trigger and target may or may not be in the same morpheme. The other cases are instances of morphemic harmony (Finley 2009): the trigger is a specific morpheme. The example in 1b is a case in which the segmental properties of the morpheme participate in the harmonic process. In 1c the morpheme is a mixed affix: it contains both a floating feature affiliated with the morpheme and segmental material (/ə/ in the example) that does not participate in the harmonic process. Finally, 1d is a case of featural affixation: there is no segmental material in the trigger position, which consists solely of a floating feature.

(1) Typology of stress-dependent harmony
   a. Phonological harmony
      [$_{Stem}$ *X*]: ˈteti → ˈtiti
      [$_{Stem}$ *X*] - [$_{Affix}$ *Y*]: ˈtet-i → ˈtit-i
   b. Morphemic harmony
      [$_{Stem}$ *X*] - [$_{Affix}$ *Y*]: ˈtet-i → ˈtit-i

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[1] Metaphony in Romance languages refers to a set of stress-targeted vowel harmony processes that raise stressed vowels and are usually triggered by inflectional, final high vowels. Metaphony is conceptually similar to umlaut in Germanic languages. For a comprehensive overview of metaphony, see Calabrese 1998, 2011, Torres-Tamarit et al. 2016, Canalis et al. 2023, and Mascaró 2023.

c. Morphemic harmony caused by a mixed affix
[$_{Stem}$ *X*] - [$_{Affix}$ *Y*, [F]]: ˈtet - [ə, +high] → ˈtit-ə
d. Morphemic harmony caused by a featural affix
[$_{Stem}$ *X*] - [$_{Affix}$ [F]]: ˈtet - [+high] → ˈtit

A stress-dependent harmonic system with, for instance, regressive harmony involves, for 1a, a trigger in *X* (an unsuffixed stem) or in *Y* (a suffix) that initiates harmony to its left. In 1b, the trigger must be in an affix; in 1c the affix is a suffixal complex consisting of segmental material and a floating feature or a set of features that appear unordered with respect to the stem. Finally, in 1d, the trigger is the affix, which consists solely of a floating feature or a set of floating features.

A system belonging to 1a is found, for instance, in Granada Spanish. In this Spanish variety, a final [−ATR] vowel, which is the result of the deletion of final /-s/, triggers regressive [−ATR] harmony in nonhigh vowels within the metrical foot (also in antepenultimate-stressed words, in which harmony can optionally be discontinuous) and optionally within the prosodic word (2a). Systems of type 1b are illustrated with data from Antrodoco in 8a below.

(2) Stress-targeted, phonological regressive harmony in Granada Spanish (Jiménez & Lloret 2020:103)
a. Heteromorphemic

SINGULAR	PLURAL	
/moneder-o/ → moneˈðer-o	/moneder-o-s/ → mɔnɛˈðɛr-ɔ	‘purse’
/trebol/ → ˈtreβol	/trebol-e-s/ → ˈtrɛβɔl-ɛ	‘clover’

b. Monomorphemic
/huebes/ → ˈhwɛβɛ ‘Thursday’
/rebes/ → rɛˈβɛ ‘other side’

Systems of type 1d are illustrated in 3 with Lugo (Romagna, Italy; Savoia & Maiden 1997:21), in which there is no observable trigger on the surface. Here the exponent of the plural morpheme is a floating [+high] feature that links to the stressed vowel.

(3) Stress-dependent harmony caused by a featural affix

ˈspos	‘spouse.M.SG’	ˈspus	‘spouse.M.PL’
ˈner	‘black.M.SG’	ˈnir	‘black.M.PL’

In this article we examine a case of the more interesting 1c type in the varieties of Asturian spoken in the municipality of Ḷḷena[2] and in the village of Felechosa.[3] In some south-central varieties of Asturian, including Ḷḷena, there is stepwise raising of the underlying stressed root vowels /a/, /e/, /o/ by a final affixal [-u], the exponent of the masculine singular count morpheme. However, in Felechosa Asturian (Arias Cabal 1992,

[2] Orthographic <ḷḷ>, or its alternative <l.l>, stands for an alveolar or alveopalatal affricate, in some places retroflex, resulting from Latin initial L- or internal -LL- (Neira Martínez 1976:82–85, 178–79), also known as *che vaqueira*. In General Central Asturian, this sound corresponds to a palatal lateral /ʎ/, represented as <ll>, which contrasts with the palatal approximant /j/, represented as <y>.

[3] Asturleonese, or *bable* (Romance, West-Iberian), is a minoritized, definitely endangered language currently spoken in Asturies (Asturias) by roughly 200,000 people, a fifth of the total population. It is also spoken in Western Cantabria, northwestern Castile and León, and northern Extremadura in Spain, as well as in the municipality of Miranda do Douro in north-eastern Portugal, where it has been co-official with Portuguese since 1999 (UNESCO Atlas of the World’s Languages in Danger). Asturian (*asturianu*) is the glossonym for Asturleonese used in Asturies. Although Asturian is protected by law in Asturies (*Ley 1/1998 de uso y promoción del bable/asturiano*) and is an elective language in some schools, it so far has no recognition as an official language. Asturian is codified by the Academy of the Asturian Language (*Academia de la Llingua Asturiana*), created in 1980.

Nuchi 2009, Nuchi & Paster 2009), a diachronic change has turned most final [-u] into [-o] (4). We give more precise phonetic details in terms of raising and concomitant centralization of vowels in §6, but from now on we assume that stress-dependent harmony in Asturian involves only the features [+high] and [−low].[4]

(4) Stress-targeted harmony caused by a mixed affix

a. Ḷḷena (Hualde 1989:786)		b. Felechosa (Arias Cabal 1992:9, 11, 15)	
ˈbwin-u	'good-M.SG.COUNT'	ˈbwin-o	'good-M.SG.COUNT'
ˈbwen-o	'good-MASS'	ˈbwen-o	'good-MASS'
ˈtunt-u	'silly-M.SG.COUNT'	ˈtunt-o	'silly-M.SG.COUNT'
ˈtont-o	'silly-MASS'	ˈtont-o	'silly-MASS'

In Felechosa, [-o] is the surface realization both of masculine singular count and of mass, although raising of the root vowel happens only in the expected morphosyntactic context: that is, when [-o] is the exponent of masculine singular count. Interestingly enough, when the stressed root vowel is an underlying low vowel [a] that raises to [e], the masculine singular count morph surfaces not as [-o] but as [-u]. In this case, Ḷḷena and Felechosa give the same result, as shown in 5.

(5) Stress-targeted harmony of /a/ in Ḷḷena and Felechosa

ˈbleŋk-u	'white-M.SG.COUNT'
ˈblaŋk-o	'white-MASS'

The formal analysis of harmony in Asturian we provide in this article is based on a firm empirical foundation involving detailed examination of original sources, which has not always been the case for many theoretically informed studies of the phenomenon. On the theoretical side, we find additional evidence for a divide between phonological and morphemic harmony, where morphemic harmony is characterized by the presence of floating features. Most importantly, we also identify a new typological possibility in harmonic systems: when harmony is morphemic, the trigger can act not only on the target, but also on the trigger itself. We call this phenomenon HARMONY IN SITU.

The article is organized as follows. We describe count/mass agreement in Asturian in §2, and then characterize the mechanisms of morphemic harmony in §3, paying attention to morphemic harmony as instantiated by Ḷḷena Asturian, which represents the most widespread kind of Asturian harmony. Section 4 is devoted to understanding the mechanism of morphemic harmony in Felechosa Asturian, the focus of this article, which displays harmony in situ. We then introduce the analytical framework assumed and build up an OPTIMALITY-THEORETIC analysis of the data (§5). In §6 we discuss the phonetic data in the sources in more detail and make sure they are compatible with our analysis, before presenting our conclusions in §7.

2. STRESS-DEPENDENT HARMONY IN ASTURIAN AND THE COUNT/MASS DISTINCTION. The phenomenon of metaphonic stress-dependent harmony in Asturian is restricted to two noncontiguous areas of the Central dialect: a small north-central area close to Cape Peñes on the Cantabrian coast and a larger south-central area, traditionally divided into two main subvarieties depending on whether harmonized /a/ raises toward /e/ (Caudal River valley) or toward /o/ (upper Nalón River valley). The two varieties compared here are 35 km apart and are in the Caudal basin, Ḷḷena by the Ḷḷena River, and Felechosa by the Ayer River. The map in Figure 1 shows the south-central metaphonic area of interest.

[4] Vowel centralization does not affect the phonological analysis undertaken in §5, as is shown in §6.

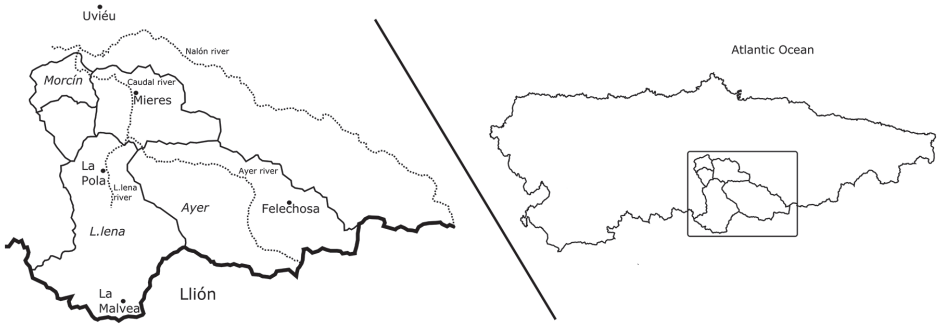


FIGURE 1. The map on the left shows La Pola and La Malvea in the municipality of Ḷḷena, Felechosa in the municipality of Ayer, and the municipality of Morcín. For reference, the map also shows the cities of Uviéu (Oviedo) and Mieres, and the boundary with Llión (León) in the south. The rivers Ḷḷena and Ayer, affluents of the Caudal, and the Nalón are indicated with dotted lines. The map on the right shows the location of these municipal districts within Asturies.

Asturian exhibits a five-vowel system: /i, e, a, o, u/. In final unstressed position, /i/ is rare, and /u/ is limited to the masculine singular count exponent. Since harmony is triggered exclusively by this morph, some discussion of the mass/count distinction in Central Asturian is in order.

One of the most salient morphosyntactic features of Asturian is the count/mass distinction (Hualde 1992, Arias Cabal 1998, 2011, Viejo Fernández 2003, 2017a,b, Camblor Portilla & Bowden 2005, Fernández-Ordóñez 2007, Mascaró 2011, San Segundo Cachero 2015, Burner 2016, Carretero García 2017, Loporcaro 2017). Very much like in Spanish, in Central Asturian the typical, most common exponent for masculine gender is a nonlow back vowel, and for feminine, the low vowel /a/; the exponent of masculine and feminine can also be another vowel or zero. Unlike Spanish, however, Central Asturian distinguishes two nonlow back vowel exponents, high [-u] and mid [-o]. Gender and number suffixes in Asturian nouns are illustrated in Table 1. Masculine singular count is usually expressed with [-u] (e.g. [ˈpil-u] 'hair-M.SG.COUNT'). Mass is overtly expressed with [-o] only in a closed set of masculine nouns whose final inflective vowel is nonlow and back (e.g. [ˈpel-o] 'hair-M.MASS', cf. [ˈpil-u] 'hair-M.SG.COUNT'; [ˈfil-o] 'thread-M.MASS', cf. [ˈfil-u] 'thread-M.SG.COUNT'; [ˈfjer-o] 'iron-M.MASS', cf. [ˈfjir-u] 'piece.of.iron-M.SG.COUNT'; and many others depending on the specific variety). In other cases, masculine nouns are morphologically ambiguous with respect to a count or a mass interpretation. These cases include the set of masculine nouns ending in [-u] (but also in [-o]) that do not enter into an overt morphological distinction between count and mass (e.g. [ˈfiɣ-u] 'fig', [beˈran-o] 'summer') and the set of masculine nouns ending in a nonback vowel (e.g. [ˈom-e] 'man') or in zero (e.g. [ˈpaŋ] 'bread'). Feminine nouns do not express the count/mass distinction overtly and are therefore ambiguous between a count and a mass interpretation in the absence of a postnominal adjective (e.g. [boˈron-a] 'corn bread').

As we have noted, [-u] usually expresses masculine singular count. This is also the case in postnominal adjectives (and pronouns) (e.g. [ˈsik-u] 'dry-M.SG.COUNT'). In adjectives the exponence of mass and count is much more regular. In postnominal adjectives (and pronouns), mass is always marked with [-o] (e.g. [ˈsek-o] 'dry-MASS'), irrespective of whether the mass adjective modifies a masculine or a feminine noun. Gender and number suffixes in adjectives are illustrated in Table 2.

	SG.COUNT	MASS	PL	
M	-u ˈpil-u	-o ˈpel-o	-o-s ˈpel-o-s	‘hair’
	-u, -e, -o, -a, -Ø, etc. ˈfiɣ-u, ˈom-e, beˈran-o, poˈet-a, ˈpaŋ		-o-s, -e-s ˈfiɣ-o-s, ˈom-e-s, beˈran-o-s, poˈet-e-s, ˈpan-e-s	‘fig, man, summer, poet, bread’
F	-a boˈron-a		-e-s boˈron-e-s	‘corn bread’
	-e, etc. ˈtsitʃ-e		-e-s ˈtsitʃ-e-s	‘milk’

Table 1. Gender/number suffixes in nouns.

	SG.COUNT	MASS	PL	
M	-u ˈsik-u	-o	-o-s ˈsek-o-s	‘dry’
F	-a ˈsek-a	ˈsek-o	-e-s ˈsek-e-s	

Table 2. Gender/number suffixes in adjectives in postnominal position.

To sum up, DPs in Asturian can be ambiguous between count and mass readings, but most of them are not, especially due to the fact that very often the distinction shows up in the agreeing postnominal adjective. In 6a examples with the masculine count exponent both in the noun and in the adjective are shown; in 6b a noun with no intrinsic distinction appears followed by an adjective or a pronominal clitic with the distinction; 6c shows that feminine nouns, which never express the distinction morphologically, can appear in mass DPs, mass being realized in the adjective or pronominal enclitic inflection (examples, in orthographic form (see n. 11), are from Rodríguez Castellano 1952 (6a) and Neira Martínez 1976, 1983 (6b,c)).

(6) DPs

a. i. cuirg-u nigr-u
raven-M.SG.COUNT black-M.SG.COUNT
‘black raven (count)’

ii. focic-u xamusqué-u
muzzle-M.SG.COUNT scorched-M.SG.COUNT
‘scorched muzzle (count)’

b. i. el arroz-Ø nigr-u
the rice-M.SG black-M.SG.COUNT
‘the black rice (count)’

ii. el arroz-Ø negr-o
the rice-M.SG black-MASS
‘the black rice (mass)’

iii. el pie-Ø, metí= lu
the foot-M.SG I.put it.M.SG.COUNT
‘the foot (count), I put it (count)’

c. i. apúrre= me la ceboll-a blanc-a
pass me the onion-F.SG white-F.SG.COUNT
‘pass me the white onion (count)’

ii. semó la ceboll-a blanc-o
s/he.sowed the onion-F.SG white-MASS
‘s/he sowed white onion (mass)’

iii. el agu-a, bebí= lo
the water-F.SG I.drank it.MASS
'the water, I drank it (mass)'

3. THE MECHANISMS OF MORPHEMIC HARMONY. Although the main objective of this article is the analysis of harmony in situ in Felechosa Asturian, an examination of the most widespread kind of Asturian harmony, represented here by Ḷḷena, will help us to better understand the structure of the harmonic system of Felechosa and also the historical changes that led to it. In this section we use Ḷḷena Asturian to illustrate the general mechanisms of Asturian stress-dependent harmony. In §4 we turn to Felechosa Asturian and analyze how these mechanisms apply to this particular dialect.

We start with some general considerations about metaphony. Two properties are particularly important for establishing the typology of stress-dependent harmonic systems: the morphemic affiliation of the trigger and the phonological transparency/opacity of the process. Let us consider morphemic affiliation first. The location of the trigger and target can be indifferent to morphemic affiliation, with trigger and target appearing in the same morpheme or in different morphemes. This first possibility can be illustrated with Granada Spanish, as we saw in 2 in §1.

The second possibility is that trigger and target must be affiliated with different morphemes. In Asturian it is the masculine singular count suffix /-u/ that triggers stepwise raising of /a, e, o/ to [e, i, u], respectively, in the stem. This is a general property of the metaphonic systems of Italo-Romance (Maiden 1991:Ch. 7) and Ibero-Romance (Penny 2009:114–15). An interesting case of transition from a nonmorphemic to a morphemic system has taken place in Eastern Andalusian Spanish. Compare the systems of Úbeda (Jaén province, close to Granada; Soriano 2007, 2012) and Granada. When the trigger is in a suffix, there is leftward spreading of [−ATR] in both Granada and Úbeda (7a). In a monomorphemic context, however, when there is lowering of the final vowel triggered by final /-s/ deletion, there is spreading in Granada, but not in Úbeda, where consonant deletion just triggers lowering of the final vowel (7b).

(7) Granada and Úbeda Spanish (Soriano 2007, 2012)

	ORTHOGRAPHIC	GRANADA	ÚBEDA	
a.	trébol-es	ˈtɾɛβɔl-ɛ	ˈtɾɛβɔl-ɛ	'clover-PL'
	recóge=l-o-s	rɛˈkɔhɛ=l-ɔ	rɛˈkɔxɛ=l-ɔ	'pick.2SG.IMP=3-ACC.M-PL'
	tien-e-s	ˈtjɛn-ɛ		'have-PRS.IND-2SG'
	com-e-s		ˈkɔm-ɛ	'eat-PRS.IND-2SG'
b.	lejos	ˈlɛhɔ	ˈlexɔ	'far away (ADV)'
	reloj	rɛˈlɔ	reˈlɔ	'watch'
	miércoles		ˈmjeɾkolɛ	'Wednesday'
	Londres	ˈlɔndɾɛ		'London'
	Burgos		ˈbuɾɣɔ	(town name)

In the cases where trigger and target are heteromorphemic a further distinction can be made: the relation between trigger and target can be either transparent or opaque. We illustrate this distinction with Italo-Romance. Consider Antrodoco (Scorretti 2012) and Castro dei Volsci (Vignoli 1911), both spoken in Lazio, Italy.

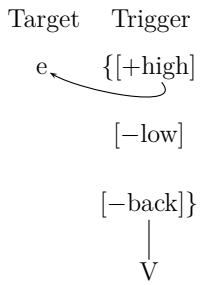
(8) Antrodoco and Castro dei Volsci

a. Antrodoco		b. Castro dei Volsci		
ˈkorr-o	ˈkurr-i	ˈkorr-ə	ˈkurr-ə	'run-1SG/2SG.PRS.IND'
ˈvenn-o	ˈvinn-i	ˈvenn-ə	ˈvinn-ə	'sell-1SG/2SG.PRS.IND'
ˈkwest-e	ˈkwist-i	ˈkeʃt-ə	ˈkiʃt-ə	'this-F.PL/M.PL'

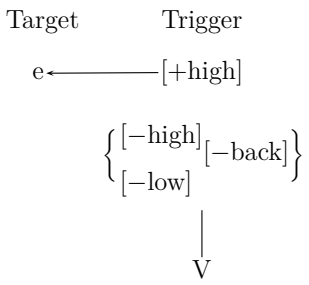
In these varieties the second singular and the masculine plural forms undergo raising of the stressed vowel. In Antrodoco the exponent of these morphological categories is /i/, whose [+high] feature gets associated with the stressed vowel. However, in Castro dei Volsci the exponent does not contain this feature. Diachronically, Antrodoco represents the older stage with a transparent system: the high feature is associated with the stressed vowel and triggers raising. When a sound change turned final vowels into nonhigh [ə] in Castro dei Volsci, the alternation continued, but the relation became opaque. An extreme case is Lugo, illustrated above in 3, where the original segmental exponent has disappeared (equivalently, is a zero exponent). In both cases (Castro dei Volsci and Lugo) the effect of raising can be attributed to a floating [+high] feature. Lugo is a case of featural affixation (Akinlabi 1996, 2011), and in Castro dei Volsci there is a floating feature together with segmental material. We can represent the three cases as in 9. In 9a all of the features are associated with the V slot, and [+high] gets linked to the target; in 9b [−high], [−low], and [−back] are associated with the V slot, but [+high] is floating and gets linked to the target; in 9c there is only a floating feature.

(9) Morphemic harmony

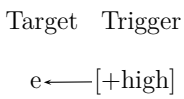
a. Transparent trigger



b. Mixed affix

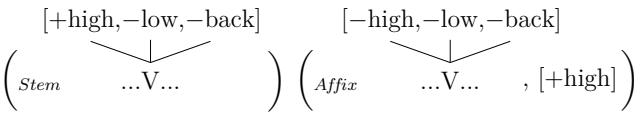


c. Floating feature



The representation in 10 shows in more detail the morphological and phonological structure of 9b. The stem and the part of the affix that is associated with timing units, the skeletal slots, are sequentially ordered. The other element belonging to the affix, the floating feature [+high], is not associated with any skeletal slot and is left unordered with respect to the segment of the same morpheme.

(10) Stem followed by mixed affix



We now move on to describe the pattern of stress-dependent harmony in Ļļena Asturian. In this variety, stress-dependent harmony is caused by the masculine singular count morph, which triggers stepwise raising of the stressed root vowels /a, e, o/ to [e, i, u], respectively. The count interpretation of the DP in Ļļena is signaled by the morph [-u] on the noun or on postnominal adjectives, and by its harmonic effect on the stressed vowel.

Stress-dependent harmony in Ļļena Asturian (Neira Martínez 1955, 1962, 1983; see Hualde 1989 for an early autosegmental analysis of the data) can be illustrated with alternations between pairs of forms within adjectival paradigms, as shown in 11. For now, we represent the masculine singular count morph, the trigger of harmony, as /-u/, although we make use of a segment underspecified for [high] (/-U/) later in this section. Only the masculine singular count morph triggers stress-dependent harmony. When the underlying root vowel is high, no change occurs (see a few examples in 16 below).

(11) Ḷl̥ena

a. /e/

/bwen-u/	→	ˈbwin-u	‘good-M.SG.COUNT’
/bwen-o/	→	ˈbwen-o	‘good-MASS’
/bwen-o-s/	→	ˈbwen-o-s	‘good-M-PL’
/bwen-a/	→	ˈbwen-a	‘good-F.SG.COUNT’
/bwen-e-s/	→	ˈbwen-e-s	‘good-F-PL’

b. /o/

/tont-u/	→	ˈtunt-u	‘silly-M.SG.COUNT’
/tont-o/	→	ˈtont-o	‘silly-MASS’
/tont-o-s/	→	ˈtont-o-s	‘silly-M-PL’
/tont-a/	→	ˈtont-a	‘silly-F.SG.COUNT’
/tont-e-s/	→	ˈtont-e-s	‘silly-F-PL’

c. /a/

/ɡwap-u/	→	ˈɡwep-u	‘pretty-M.SG.COUNT’
/ɡwap-o/	→	ˈɡwap-o	‘pretty-MASS’
/ɡwap-o-s/	→	ˈɡwap-o-s	‘pretty-M-PL’
/ɡwap-a/	→	ˈɡwap-a	‘pretty-F.SG.COUNT’
/ɡwap-e-s/	→	ˈɡwap-e-s	‘pretty-F-PL’

d. Proparoxytone with /a/[5]

/ˈpaʃar-u/	→	ˈpeʃar-u	‘bird-M.SG.COUNT’
/ˈpaʃar-o/	→	ˈpaʃar-o	‘bird-MASS’
/ˈpaʃar-o-s/	→	ˈpaʃar-o-s	‘bird-M-PL’
/ˈpaʃar-a/	→	ˈpaʃar-a	‘bird-F.SG.COUNT’
/ˈpaʃar-e-s/	→	ˈpaʃar-e-s	‘bird-F-PL’

As indicated in Table 1, the masculine singular count morpheme has morphs other than /-u/. These other morphs, however, do not trigger raising. We give examples of some of these morphs in 12; notice in particular that the examples in 12c show that a minority of [-u] allomorphs are exceptions to raising, and that a minority of masculine nouns, those that select /-o/ in the singular count, never undergo raising.[6] Table 3 summarizes the masculine allomorphy for count, mass, and plural.

(12) No raising

a. -e, -a, -Ø

ˈpeŋ-e	*ˈpiŋ-e	‘comb-M.SG.COUNT’
proˈβlem-a	*proˈβlim-a	‘problem-M.SG.COUNT’
ˈpaŋ-Ø	*ˈpeŋ-Ø	‘bread-M.SG.COUNT’

b. -o

ˈos-o	*ˈus-o	‘bear-M.SG.COUNT’
ˈor-o	*ˈur-o	‘granary-M.SG.COUNT’
ˈʃenr-o	*ˈʃinr-o	‘son.in.law-M.SG.COUNT’
beˈran-o	*beˈren-o	‘summer-M.SG.COUNT’

[5] More examples of proparoxytones, including examples with stressed mid vowels, can be found in 27 below (§5.1).

[6] Whether final /-i/ triggers raising in Ḷl̥ena Asturian is unclear. Final [-i] is very rare in this variety. The only examples displaying an alternation are the proximal and distal demonstratives ([ˈist-i] ‘this-M.SG’, [ˈest-a] ‘this-F.SG’, [ˈis-i] ‘that-M.SG’, [ˈes-a] ‘that-F.SG’); there are two nonraising cases ([ˈbenti] ‘twenty’, [orˈβeti] ‘interjection’). We follow Neira Martínez (1983:485–88) in assuming that there is no synchronic stress-dependent harmony triggered by /-i/. For the cases in 12c we assume that some roots subcategorize for an /-u/ allomorph without floating features. In the absence of floating features, no harmony can take place. This is also the position suggested by Finley (2009) to explain these kinds of exceptions in Asturian. She also suggests an alternative, that the set of roots that do not undergo harmony are linked to a lexically indexed version of IDENT[F].

c. -u

aseˈmej-u	*aseˈmij-u	‘picture-M.SG.COUNT’	(PL aseˈmej-os)
ˈatʃ-u[7]		‘axe-M.SG.COUNT’	(also ˈetʃ-u)
meˈlandɾ-u	*meˈlendɾ-u	‘badger-M.SG.COUNT’	
ˈpeɾtiɣ-u	*ˈpiɾtiɣ-u	‘pole-M.SG.COUNT’	(cf. peɾtiˈɣal, same meaning)

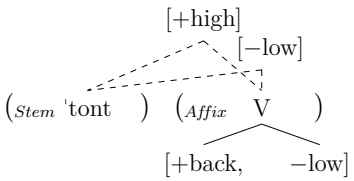
M.SG.COUNT	MASS	M.PL	
/u, [+high], [−low]/	/-o/	/o-s/	
ˈpil-u	ˈpel-o	ˈpel-o-s	‘hair’
/-u/			
meˈlandɾ-u	meˈlandɾ-o	meˈlandɾ-o-s	‘badger’
/-o/			
ˈos-o		ˈos-o-s	‘bear’
/-e, -a, ∅/		/(e)-s/	
ˈom-e		ˈom-e-s	‘man’

Table 3. Masculine inflectional morphs.

As we have seen, the nominal gender markers are either a vowel or zero. The inflectional endings /e, a, o, ∅/ can appear in either count or mass DPs, and /o/ also in the masculine plural. When /u/ appears in the noun it is generally interpreted as count (recall that a noun like [ˈfiɣ-u], for instance, can also be interpreted as mass because it does not allow [-o]). When /u/ appears in the adjective, however, the DP is always interpreted as count. We claim that a phonological property of this allomorph is that it carries floating features that trigger harmony on the stressed vowel. Let us now see how the cases in 11 above are derived.

In the mappings /bwen-u/ → [ˈbwin-u] and /tont-u/ → [ˈtunt-u] exemplified in 11a,b, the initial representation in 13 contains the floating features [+high], [−low] in the affix, and the processes in 14a,b associate these features with the stressed vowel in the stem and with the skeletal V slot in the affix. Hereafter we simplify the representations, omitting morphological structure and the features [round] and [ATR], and representing the segmental part of the affix linked to the V slot as /U/, which is underspecified for [high]. We return to this issue in §5. For convenience, floating features appear above the skeletal V slot and underlyingly linked features appear below it.

(13) /tont-U/ → ˈtunt-u



(14) Processes

a. Associate the floating features of the affix with the stressed vowel of the stem.

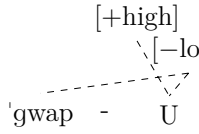
b. Associate the floating features of the affix with the skeletal slot of the morph they are affiliated with.

The same mechanisms apply to stems with stressed mid front vowels (11a). Consider now stepwise raising of low vowels (11c,d).

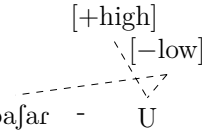
[7] Three variant forms of ‘axe’, [aˈθew], [ˈatʃu], and [ˈetʃu], are possible. Only [ˈatʃu] displays exceptional behavior.

(15) Stepwise raising of /a/

a. /ɡwap-U/ → ˈɡwep-u



b. /paʃar-U/ → ˈpeʃar-u



The harmonic process must proceed in such a way as to determine stepwise raising, the low vowel becoming mid and the mid vowels becoming high. The evidence clearly suggests that raising is structure-preserving. In the case of 13 the association of [+high] and [−low] with /o/ results naturally in [u], but with /a/, a [−ATR, +back, +low, −high, −round] vowel, association of [−low] would result in an open-mid back unrounded vowel [ʌ]. For now we assume that this vowel is not part of the vowel inventory of Asturian, and one of the closest available vowels, namely [e], is chosen.[8] This kind of stepwise raising is very common in metaphonic systems (see Maiden 1991 for cases in Italo-Romance). Note that since the harmonic process applies to floating features, an /u/ allomorph with no floating features, that is, a fully specified high back rounded vowel, will not trigger raising; this predicts the behavior of exceptions to raising in words like [aseˈmeju] and [meˈlandru], presented above in 12c.

4. Metaphony in felechosa asturian. Our data for stress-dependent harmony in the dialect of Asturian as spoken in Felechosa, in the municipality of Ayer, come from the detailed general description of an area including Felechosa and two other neighboring villages by Rodríguez Castellano (1952), and from the more recent description of metaphony in Felechosa by Arias Cabal (1992). According to Arias Cabal, 'the resemblance between the dialect of Felechosa as it is spoken today and as it is described by Rodríguez Castellano … is almost total. The only significant difference involves final vowels' (1992:18, our translation). In Felechosa 'there is always final [-o], as a result of the lowering of an old [-u], except in one case: there is only [-u] when the tonic vowel is a metaphonized primitive [á]' (Arias Cabal 1992:8, our translation). This means that the difference between the variety of Felechosa at the time of Arias Cabal's description and the same variety at the time of Rodríguez Castellano's description is the result of historical lowering of the final [-u] to [-o].[9]

The system of Felechosa at the time of Rodríguez Castellano's description is similar to the system present in Ḷḷena. In 16, we compare Ḷḷena and Felechosa masculine singular count nominals with final [-u]/[-o] that show no harmony because the underlying root vowels in stressed position are high.

(16) Forms with underlying /i, u/ in stressed position

ḶḶENA	FELECHOSA (Arias Cabal 1992:12, 16)	
ˈtsimpj-u	ˈt̪simpj-o	'clean-M.SG.COUNT'
ˈnin-u	ˈnin-o	'child-M.SG.COUNT'
ˈsuθj-u	ˈsuθj-o	'dirty-M.SG.COUNT'

In words with underlying mid vowels in stressed position, historical lowering has not prevented metaphonic raising from occurring, and has given rise to opaque, non-

[8] In the varieties of the Nalón valley the result of the raising of /a/ is the other closest vowel, [o]. Various mechanisms have been proposed in the literature to account for stepwise raising. Calabrese (2011) summarizes these proposals. Our own analysis is presented in §5 below, and a discussion of the metaphonic outcome of /a/ appears in §6. See also n. 16.

[9] The data in Arias Cabal 1992 were gathered shortly before publication. The same is probably true of Rodríguez Castellano (1952), although he had done fieldwork in Felechosa previously in the 1930s.

surface-apparent (or overapplication of) stress-dependent harmony, as illustrated in the examples in 17, to be contrasted with the corresponding ones for Ḷḷena in 11 above.[10]

(17) Forms with underlying /e, o/ in stressed position in Felechosa

a. /e/		b. /o/	
ˈbwin-o	‘good-M.SG.COUNT’	ˈtunt-o	‘silly-M.SG.COUNT’
ˈbwen-o	‘good-MASS’	ˈtont-o	‘silly-MASS’
ˈbwen-o-s	‘good-M-PL’	ˈtont-o-s	‘silly-M-PL’
ˈbwen-a	‘good-F.SG.COUNT’	ˈtont-a	‘silly-F.SG.COUNT’
ˈbwen-a-s	‘good-F-PL’	ˈtont-a-s	‘silly-F-PL’

Arias Cabal (1992) provides many examples of harmonized mid vowels, which are always followed by the inflective masculine singular count morph realized as [-o]. A few more examples with harmonized /o/ and /e/ are given in 18 in orthographic form. Felechosa is compared with Standard Asturian, in which the masculine singular count morph is <u>, but without stress-dependent harmony.[11] All forms display penultimate stress.

(18) More examples with /e/ and /o/ (Arias Cabal 1992:11, 12)

a. /e/

FELECHOSA	STANDARD		FELECHOSA	STANDARD	
dricho	drechu	‘straight’	frisco	frescu	‘fresh’
ḷḷino	llenu	‘full’	fío	feu	‘ugly’
cistu	cestu	‘basket’	estriḷḷo	estrellu	‘the Pleiades’
castiílḷo	castiellu	‘castle’	mayuilo	mayuelu	‘clapper’

b. /o/

puzo	pozu	‘well’	arruyo	arroyu	‘creek’
ḷḷubo	llobu	‘wolf’	palumbo	palombu	‘dove’
gurdo	gordu	‘fat’	rapuso	raposu	‘fox’
trampuso	tramposu	‘cheater’	celuso	celosu	‘jealous’

The third vowel affected by stress-dependent harmony is /a/, for which we would expect just (opaque) raising to [e] (i.e. /ˈgwap-o/ → *[ˈgwep-o], parallel to Ḷḷena /ˈgwap-u/ → [ˈgwep-u] (11c)). But we are now faced with a puzzling and interesting fact: the usual metaphonic effect obtains—that is, /a/ raises to [e]—but the realization of the masculine singular count morph is not [-o] as usual, but [-u]. In other words, the exponent of the masculine singular count morpheme is always [-o], except when there is raising of /a/ to [e]. This is illustrated in 19a. In this situation there is a harmonic effect on the target, but also in situ, that is, in the segmental material in the trigger position. In 19b Ḷḷena and Felechosa are compared for each underlying stressed vowel.

(19) Forms with underlying /a/ in stressed position in Felechosa

a. Adjectival paradigm

ˈgwep-u, *ˈgwep-o	‘pretty-M.SG.COUNT’
ˈgwap-o	‘pretty-MASS’
ˈgwap-o-s	‘pretty-M-PL’
ˈgwap-a	‘pretty-F.SG.COUNT’
ˈgwap-a-s	‘pretty-F-PL’

[10] This is not unexpected. In Italo-Romance, loss of the trigger through final vowel change to schwa or deletion did not prevent stress-dependent harmony from remaining active (cf. examples in 3).

[11] We give orthographic transcriptions as they appear in Arias Cabal 1992. Phonetic transcriptions either are taken from nonoriginal sources like Hualde 1989, 1998 for Ḷḷena, or are our own transcriptions for Felechosa. For Ḷḷena, phonetic transcriptions have been checked against the original source (Neira Martínez 1955). For Felechosa, they are based on the orthographic transcriptions given in Arias Cabal 1992 and the detailed phonetic transcriptions of Rodríguez Castellano.

b. Comparison

UNDERLYING TONIC	ḶḶENA	FELECHOSA	
/e/	ˈbwin-u	ˈbwin-o	‘good-M.SG.COUNT’
/o/	ˈtunt-u	ˈtunt-o	‘silly-M.SG.COUNT’
/a/	ˈget-u	ˈget-u	‘cat-M.SG.COUNT’

More examples taken from Arias Cabal 1992 are shown in 20. In this case, we find [-u] in both Felechosa and Standard Asturian, but harmony only in the former.

(20) More examples with /a/ (Arias Cabal 1992:10)

FELECHOSA	STANDARD		FELECHOSA	STANDARD	
querru	carru	‘cart’	preu	prau	‘meadow’
guetu	gatu	‘cat’	xetu	xatu	‘calf’
pelu	palu	‘stick’	garabetu	garabatu	‘scribble’
trabeyu	trabayu	‘job’	enamoréu	enamoráu	‘in love (man)’

In the case of Ḷḷena (see 11 and 13) the masculine singular count morpheme has the morph /-U/, which triggers harmony, but it also has /-o/, which does not, as shown in 12b above. In Felechosa, the historical change [-u] → [-o] now merges on the surface nominals that exhibit raising with exceptional cases of nominals with no metaphonic raising. The two /-o/s in Felechosa thus correspond diachronically to Ḷḷena’s /-u/ and /-o/. Therefore, we must posit two underlying nonlow back vowels for Felechosa, notated /o_1/ and /o_2/ in 21a.

(21) Two types of /-o/ in Felechosa

		REGULAR			EXCEPTIONAL			
a.	Felechosa	/gord-o_1/	→	ˈgurð-o ‘fat’	/os-o_2/	→	ˈos-o, ‘bear’	*ˈus-o
b.	Ḷḷena	/gord-U/	→	ˈgurð-u ‘fat’	/os-o/	→	ˈos-o, ‘bear’	*ˈus-o

Although the historical lowering of final [-u] is very general, there are two exceptions, in addition to the cases in which there is raising of stressed /a/. One is a lexical exception involving pronominal clitics that is discussed in n. 20 below. The other regards the masculine singular count morph when it is postvocalic. In this case it becomes the glide [-w], which also triggers height harmony. We find many examples of this phenomenon because it affects the masculine singular forms of the past participle: [tosˈte-w] ‘toasted-M.SG.COUNT’, [ʃamusˈke-w] ‘scorched-M.SG.COUNT’, from /tosta-w/, /ʃamuska-w/. Other cases are [ˈkle-w] ‘nail’, [ˈre-w] ‘tail’, [ˈdi-w] ‘finger’, [ˈpɾe-w] ‘meadow’. Plurals with the nontriggering /o/ show the underlying vowel: [ˈde-o-s] ‘fingers’, [ˈpɾa-o-s] ‘meadows’, and so forth. These cases are important because they provide an additional argument for the morphemic character of stress-dependent harmony. Crucially, when [-w] is isomorphemic with the target, there is never raising: [ˈfrawɣw-a] ‘forge’, [ˈjewɣw-a] ‘mare’ (*[ˈjiwɣw-a]), [ˈawɣw-a] ‘water’, [ˈkwaɾkw-a] ‘gully’, [ˈfawl-a] ‘story’.

Summing up and completing the picture, in Felechosa we have three instances of allomorphic or phonetic variants of the masculine singular count morpheme causing raising: [-o_1] (with tonic /e/, /o/), [-u] (with tonic /a/), and [-w] (with tonic /a/, /e/, /o/). There is another /o/, underlying /o_2/, with a phonological representation that is made precise in §5.3 below, which appears in exceptional masculines like [ˈos-o] ‘bear’ that do not show raising in count interpretations. This /o_2/ is also the exponent of mass in nominals that present the count/mass distinction: [ˈfjer-o] ‘iron-MASS’ (opposed to [ˈfjir-o] ‘iron-M.SG.COUNT’), [maˈθan-a ˈfe-o] ‘apple-F.SG ugly-MASS’. This is summarized in Table 4.

	INFLECTIONAL SUFFIX		
STEM VOWEL	-o_1	-o_2	-w
stressed /e/	ˈi - o	ˈe - o	ˈi - w
stressed /o/	ˈu - o	ˈo - o	ˈu - w
stressed /a/	ˈe - u	ˈa - o	ˈe - w

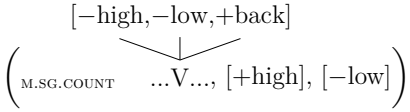
TABLE 4. Agreement suffixes in Felechosa Asturian.

The evidence provided by Felechosa Asturian is important for two reasons. First, it provides strong evidence for a morphemic analysis of stress-dependent harmony based on floating features. Second, it represents an original case in the typology of harmonic systems: the trigger not only has an effect on the harmonic target, but also conditions the phonetic realization of the trigger itself.

As shown above, the surface realization of the masculine singular count morpheme is [-o] when the stressed root vowel is underlyingly mid and raises to high (e.g. /negɾ-o/ → [ˈniɣro] 'black-M.SG.COUNT'). But when the stressed root vowel is underlyingly low and raises to mid, an unexpected result obtains: the trigger is not the usual [-o], but [-u] (e.g. /blank-o/ → [ˈbleŋku] 'white-M.SG.COUNT'). We start by showing the analysis of raising of mid vowels and then proceed to the analysis of raising of /a/.

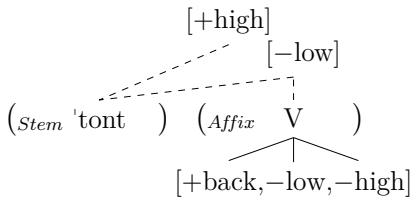
A general phonetic change lowered (almost) all final [-u] to [-o], which introduced a contrast between two surface [-o]s: one that causes raising (/o_1/, historically /u/), and one that does not cause raising (/o_2/, historically /o/). Like in Ḷḷena, the latter is underlyingly /o/; but the former, which in Ḷḷena we represented as {U, [+high], [−low]}, we represent for Felechosa as a fully specified segment /o/, that is, a [−high, −low, +back] vowel, plus the same floating features proposed for Ḷḷena, that is, [+high] and [−low], as shown in 22.

(22) Masculine singular count morph in Felechosa Asturian (/-o_1/)



Recall that in Ḷḷena Asturian the suffixal vowel of the masculine singular count morph was underspecified and the floating features were realized both in the stressed vowel and in the suffixal vowel (see 13). In Felechosa Asturian, when the stressed vowel is mid, the floating features are realized only on the stressed vowel; the fully specified suffixal vowel, /-o/, is unaffected. The effect of the processes in 14 is shown in 23, where 14b applies partially (only [−low] is vacuously associated with the suffix).

(23) /tont-o/ → ˈtunt-o



Consider now the other cases of a final inflective /-o/ that does not trigger raising. For these cases, it can simply be claimed that the morph contains no floating features.

(24) Inflective /-o/ that does not trigger raising

exceptional nontrigger:	[-o]	/os-o/ → ˈos-o 'bear'
plural (nontrigger):	[-o]	/mal-o-s/ → ˈmal-o-s 'bad'
mass (nontrigger):	[-o]	xente /mal-o/ → ˈmal-o 'bad people'

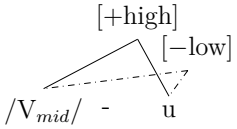
We now come to the crucial point in the analysis. Recall that in Felechosa nominals, final inflective round vowels usually show up as [-o], and that we have to explain why in one case they show up as [-u].

What is particular about Felechosa is the fact that the trigger surfaces as [-u] instead of as [-o] when the target vowel is an underlying /a/ vowel. Descriptively, this anomaly can be explained in the following way. Harmony tries to link both features to the stressed vowel, but [+high] cannot link to underlying low vowels because raising is stepwise, and it cannot remain floating either. This causes a 'boomerang effect': [+high] ends up linking in situ to the nonfloating part of the morph with which it is affiliated, namely the final /-o/, and raises it to [-u]. The term 'in situ' refers to the morpheme level; the suffix vowel is not a trigger in itself because it does not host the features that harmonize. The phonological exponent of the masculine singular count morpheme contains both a vowel and the floating features, which are the triggers of harmony. Sometimes these floating features dock not only onto the stressed vowel but also onto the inflectional vowel, which belongs to the same morpheme as the floating features. We use the term 'in situ' as a descriptive term to capture this pattern of morphemic harmony that has passed unnoticed before. In Ḷḷena this has no visible effect, because the relevant part of the morph is unspecified for [high], but in Felechosa it causes delinking of the [−high] feature underlyingly linked to the V slot and association of the floating [+high].

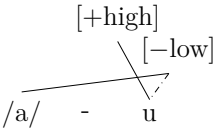
As a final illustration, in 25 we represent the landing sites of floating features in Ḷḷena and Felechosa Asturian. A dashed-dotted line represents vacuous association, that is, an association with no phonetic effect because the target is already specified for the same feature (and value). Notice that 25 does not show output representations; it merely indicates possible landing sites. As opposed to spreading, in which a feature that is underlyingly linked to a segment surfaces as doubly linked, in this context a floating feature associates with a segment *x* (like [+high] in 25b), and, if applicable, it independently associates with a segment *y* (like [−low] in 25b). In Ḷḷena, when the stressed root vowel is underlyingly mid, both [+high] and [−low] are uniformly realized on both the stressed root vowel and the suffix vowel, whereas in Felechosa, only [−low] links to the two vowels and [+high] links only to the stressed vowel (25c). Another crucial difference between Ḷḷena and Felechosa is that only in Felechosa is there surface-evident harmony in situ (25d).

(25) Association of floating features

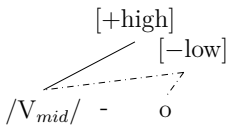
a. Ḷḷena with an underlying mid vowel



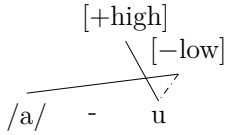
b. Ḷḷena with an underlying low vowel



c. Felechosa with an underlying mid vowel

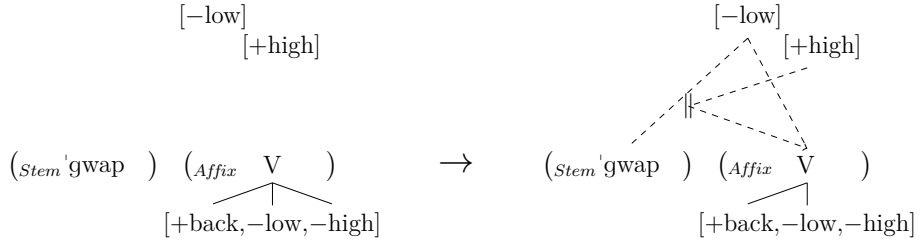


d. Felechosa with an underlying low vowel



In 26 we show again in more detail the mechanisms that derive raising of /a/ to [e] and harmony in situ in Felechosa Asturian. Here, dashed lines refer to the association of floating features, and the two vertical lines simply indicate that the feature [+high] cannot be associated with the stressed vowel, contrary to expectations.

(26) Harmony in situ in Felechosa



Metaphony in Felechosa is interesting because it presents an unusual situation, one in which the harmonic trigger not only modifies a distant target but also has an effect on the same position where it originates. The locus of the trigger is a complex morph that consists of two unordered elements: a V-slot associated with a segmental melody, and a set of floating features. The trigger's action is realized, as is the norm in harmonic or assimilatory processes, on a target in a different locus, in this case the stressed vowel. In the case of a stressed /a/, however, the [−low] feature in the trigger carries out the usual action at a distance, but [+high] acts in situ, thus modifying the segmental material in the same morphological locus (or *situs*) with which it is affiliated.

5. A formal OT analysis.

5.1. Basic assumptions. The analysis of stress-dependent harmony in Asturian that we develop in this section rests upon two main assumptions. First, the underlying representation of the masculine singular count morph (phonetically [-u] in Ḷḷena, [-o] or [-u] in Felechosa) must be different from the underlying representation of [-o] in mass, masculine plural, and exceptional masculine singular count, which do not trigger stress-dependent harmony. Second, we assume that there are featural affixes (Akinlabi 1996, 2011, and references therein) that cause phonological changes by being associated with a prominent vowel in the root. We also assume that, besides featural affixes, there are mixed affixes, that is, affixes with melodic material associated with a skeletal position plus floating features. We claim that this is the case for both Ḷḷena and Felechosa Asturian. Similar accounts for German umlaut in plurals have been proposed by Féry (1994), Wiese (1996), Klein (2000), and Trommer (2021). Finley (2009) considers that Ḷḷena Asturian can be analyzed with or without floating features. We follow her work and further show that floating features are actually needed in Felechosa Asturian.

We claim that morphemic stress-dependent harmony triggered by mixed (or featural) affixes is different from pure phonological harmony and morphemic harmony caused by a transparent trigger. Pure phonological harmony and morphemic harmony caused by a transparent trigger must be derived by constraints that target underlyingly linked features and demand that all vowels in a domain be linked to that feature. We suggest

that morphemic harmony caused by an opaque trigger (mixed affix or featural affix) is instead derived by LINK constraints, which explicitly refer to floating features. The constraint responsible for phonological and transparent morphemic harmony should favor continuous harmony, although gapped configurations may arise due to the effect of other constraints,[12] and should also predict myopia (and undergenerate nonmyopia, a look-ahead effect).[13] We further claim that stress-dependent harmony triggered by a mixed (or featural) affix, as opposed to phonological harmony and transparent morphemic harmony, can actually operate across a potential undergoer, thereby creating a gapped harmonic configuration. This effect is due to LINK, which demands that floating features be realized in a specific position. This is what we see in Asturian varieties with stress-dependent harmony. Antepenultimate-stressed words show the effects of stress-dependent harmony on the stressed vowel across an unaffected potential undergoer, a posttonic vowel. In the examples in 27, we see that underlying /a/ raises to [e] and that underlying /e/ raises to [i] in stressed position, whereas posttonic /a/, which is a potential undergoer of harmony, faithfully surfaces as [a], not [e].[14]

(27) Stress-dependent harmony in Ḷḷena proparoxytones (Neira Martínez 1955: 214, 267, 269, 274, 281, 289)

ˈpeʃaɾ-u, *ˈpeʃeɾu	ˈpaʃaɾ-a	‘bird-M/F.SG.CT’
ˈpempan-u, *ˈpempen-u	ˈpampan-o-s	‘old man-M.SG.CT/M-PL’
ˈkendan-u, *ˈkenden-u	ˈkandan-o-s	‘dry branches-M.SG.CT/M-PL’
ˈseβan-u, *ˈseβen-u	ˈsaβan-a	‘sheet-M/F.SG.CT’
ˈtɾwiβan-u, *ˈtɾwiβen-u	ˈtɾweβan-o-s	‘beehive-M.SG.CT/M-PL’
buˈɾwiβan-u, *buˈɾwiβen-u	buˈɾweβan-o-s	‘wild strawberry-M.SG.CT/M-PL’

The examples in 27 display gapped harmonic configurations across a potential undergoer of harmony and are therefore clear instances of morphemic harmony (Cole 1991, Dillon 2004, Finley 2009, Mascaró 2016).

Let us make the harmonic process more precise. Our OT analysis is based on the reasonable assumption that there must be constraints determining where floating features should be realized. We propose that morphemic harmony is the result of satisfying a LINK constraint enforcing affixal floating features to be realized on the stressed vowel (see Mascaró 2016 for an analysis of stress-dependent harmony using the same con-

[12] This might be the case in Granada Spanish, which has two optional outcomes in addition to the one reported in §1 and §3, namely [ˈtɾɛβolɛ] in addition to [ˈtɾɛβɔlɛ], and [reˈkɔhelɔ] in addition to [rɛˈkɔhɛlɔ]. This could be due to the result of the independently justified constraint *[−stress, −ATR], against open-mid unstressed vowels, which dominates the constraint enforcing harmony. Note that we cannot get *[rɛˈkɔhelɔ], meaning that the prosodic domain for harmony must be either the metrical foot (or a minimally layered foot in proparoxytones) or the prosodic word; in Granada Spanish, both domains are possible.

[13] Mascaró (2019), in response to Walker (2010) and Kimper (2012), has shown that there is no robust empirical evidence for nonmyopia in stress-dependent harmonic systems in Italo-Romance with a surface-true trigger (morphemic harmony triggered by a transparent trigger). Apparent nonmyopia is actually the absence of harmony in antepenultimate-stressed words. A myopic stress-dependent harmonic system is one in which an intervening undergoer in an antepenultimate-stressed word is harmonized despite the fact that the stressed target of metaphony is a nonundergoer. This is found in proparoxytones in Venetan varieties such as Grado, a system with morphemic harmony caused by a transparent trigger.

[14] Similar examples in Felechosa, from Rodríguez Castellano 1952:59, are: [ˈpeʃaɾ-u] – [paʃaˈɾ-iŋ] ‘bird-M.SG.COUNT/DIM’, [ˈseβan-u] – [ˈsaβan-o-s] ‘bedsheet-M.SG.COUNT/M-PL’, [ˈtelaðɾ-u] – [ˈtalaðɾ-o-s] ‘drill-M.SG.COUNT/M-PL’, [ˈeβan-u] – [ˈaβan-o-s] ‘snow.bank-M.SG.COUNT/M-PL’).The absence of examples with posttonic /e/, /o/ is due to the historical deletion of Latin internal posttonic vowels except for /a/, although some learned words can retain them.

straint for the analysis of morphemic stress-dependent harmony in Italo-Romance).[15] We call this constraint Link(Floating[F], ˈV), defined in 28a. Because floating features are sometimes part of the representation of an affixal morpheme (mixed affixes), we propose another Link constraint, Link(Floating[F], morph), that favors floating features being realized on the morpheme with which they are affiliated (28b). When a floating feature is realized on a specific site (i.e. it is associated with a specific skeletal position), it ceases to be floating. The Link constraints can determine multiple realization of a floating feature. Multiple realization triggered by Link is different from the result of spreading in phonological harmony, a process that determines a single instance of a feature to be multiply associated with all contiguous positions within a domain. Finally, an input-output Ident[F] faithfulness constraint penalizes changing feature values between segments standing in input-output correspondence (28c). We also make use of local constraint conjunction of Ident[F] (28d) to block fell-swoop raising, which involves a simultaneous violation of more than one Ident[F] constraint. We follow Kirchner's (1996) proposal to derive chain shifts from local constraint conjunction, also applied to Ḷḷena Asturian by Finley (2009) and Walker (2005, 2011). Stepwise raising (e.g. a → ɛ, ɛ → e, e → i) is well attested in metaphonic systems (Maiden 1991, Savoia 2015:203–62).

(28) Constraints (here, and for all the tableaux that follow, F should be interpreted as [+high], [−low])
   a. Link(Floating[F], ˈV) (Link([F], ˈV)): Assign a violation mark to every occurrence of a floating feature in the input that is not associated with the stressed vowel in the output.
   b. Link(Floating[F], morph) (Link([F], morph)): Assign a violation to every occurrence of a floating feature affiliated with a morpheme in the input that is not associated with a segment in the corresponding output morpheme.
   c. Ident[F] (Id[F]): Assign a violation mark for every input-output pair of segments that have different values for the feature [F].
   d. Ident[F]$_1$&Ident[F]$_2$ (Id[F]$_1$&Id[F]$_2$): Assign a violation mark for every input-output pair of segments that have different values for both the feature [F]$_1$ and the feature [F]$_2$.

For the representation of vowels in Ḷḷena and Felechosa Asturian we assume five binary distinctive features, [high], [low], [back], [ATR], and [round], and the feature values in Table 5. As before, since [round] and [ATR] are predictable, we do not include them in the representations.

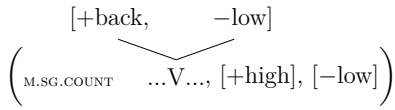
	[high]	[low]	[back]	[ATR]	[round]
i	+	−	−	+	−
e	−	−	−	+	−
a	−	+	+	−	−
o	−	−	+	+	+
u	+	−	+	+	+

Table 5. Vowel feature specifications.

[15] Link constraints are formally equivalent to Anchor constraints as defined in Finley 2009, in the sense that they conflate faithfulness and alignment. However, Link constraints, as opposed to Finley's Anchor or positional licensing constraints like those in Walker 2011, explicitly refer to floating features. In §5.2 and §5.3 we discuss the problems inherent in previous analyses.

5.2. Ḷḷena asturian. As we have seen, we propose that the phonological exponent of the masculine singular count morpheme in Ḷḷena Asturian is a mixed suffix containing a [−low, +back] segment underspecified for the feature [high], represented as /U/, which is unordered with respect to two floating features, [+high], [−low], that is, two floating features that as such are not associated with any skeletal position. The phonological representation of this inflectional morpheme is given in 29. Notice that there are two [−low] features: one attached to the skeleton, and one that is floating.

(29) Masculine singular count morph in Ḷḷena Asturian (/-U/)



We use the simplified representation $\{U, [+high], [-low]\}_{M.SG.COUNT}$ for 29. Recall that V is ordered with respect to the stem in the input, but [+high] and [−low] are unordered with respect to the skeletal slot of the suffix because they are floating features, and only root nodes enter into linear precedence relations. The other allomorph of masculine singular count, which appears in *os-o* (21), will have the simple representation /o/, with no floating features. Consider the underlying and surface representations for [ˈtuntu] (11b) and [ˈpeʃaɾu] (11d).

(30) Underlying representations for masculine singular count morphemes in Ḷḷena
   a. tont-($_{M.SG.COUNT}$ U, [+high], [−low])
      [ˈtunt-u]
   b. paʃar-($_{M.SG.COUNT}$ U, [+high], [−low])
      [ˈpeʃaɾ-u]

The floating features in Ḷḷena Asturian end up being associated with both the stressed vowel and the segment that also belongs to the morpheme with which they are affiliated morphosyntactically. This is why there is raising of the stressed root vowel and at the same time the masculine singular count morpheme is realized as [-u]. This result is obtained when both Link(Floating[F], ˈV) and Link(Floating[F], morph), which are unranked with respect to each other, dominate Ident[F]. This ranking is illustrated in the tableau in 31. The linking of the floating features to specific vowels is indicated through subscripts.

(31) /tont-{U, [+high, −low]}/ → [ˈtunt-u]

tont-{U, +high$_i$, −low$_j$}	Link([F], ˈV)	Link([F], morph)	Id[F]
☞ a. ˈtu$_{i,j}$nt-u$_{i,j}$			*
b. ˈto$_j$nt-U$_j$, [+high$_i$]	*(!)	*(!)	
c. ˈtu$_{i,j}$nt-U$_j$		*!	*
d. ˈto$_j$nt-u$_{i,j}$	*!		

Candidate 31d, with no raising, violates Link(Floating[F], ˈV) because the floating [+high] feature is not associated with the stressed root vowel. The floating feature [−low] does associate with the stressed vowel, but the effect of associating this feature with an already nonlow vowel is vacuous. Candidate 31c, with raising, satisfies Link(Floating[F], ˈV), but fatally violates Link(Floating[F], morph) because the floating [+high] feature is not associated with the suffix. A candidate in which neither of the two floating features is associated with the suffix, not included in the tableau, incurs two violations of Link(Floating[F], morph). Candidate 31b leaves one floating feature

unassociated. Therefore, this candidate violates not only Link(Floating[F], ˈV) but also Link(Floating[F], morph). The winning candidate is 31a, in which the two floating features [+high] and [−low] are linked to both the stressed root vowel and the suffix. This candidate violates Ident[F] only once due to the mapping of /o/ onto [u]. The underspecified /U/ in the input is not specified for the feature [high], so when the floating features [+high] and [−low] are linked to this vowel in the output, Ident[F] is not violated.

When the stressed root vowel is /a/, stepwise raising occurs. Realizing both floating features on the stressed vowel, as in 32c, incurs a fatal violation of the locally conjoined Ident[F] constraint. The first two candidates satisfy this constraint, so the decision is left to Link(Floating[F], ˈV). Candidate 32a, with stepwise raising, violates Link(Floating[F], ˈV) less severely than candidate 32b does, with no raising at all. This candidate associates the floating feature [−low] with the stressed vowel. Associating only [+high], but not [−low], would satisfy the locally conjoined faithfulness constraint. However, we assume that GEN cannot generate such a candidate because [+high] and [+low] are universally incompatible features.[16]

(32) /gwap-{U, [+high, −low]}/ → [ˈgwep-u]

gwap-{U, +high$_i$, −low$_j$}	Id[F]$_1$&Id[F]$_2$	Link([F], ˈV)	Id[F]
☞ a. ˈgwe$_j$p-u$_{i,j}$		*	*
b. ˈgwap-u$_{i,j}$		**!	
c. ˈgwi$_{i,j}$p-u$_{i,j}$	*!		**

Let us now consider a word with antepenultimate stress. We have seen above (27 and discussion) that the floating features are never associated with the intervening posttonic vowel. Linking the floating features to the posttonic vowel incurs more violations of Ident[F], as shown in 33. Gapped configurations across a potential undergoer give support to featural affixes, which do not require a continuous harmonic domain, but just association with particular segments.

(33) /paʃaɾ-{U, [+high, −low]}/ → [ˈpeʃaɾ-u]

paʃaɾ-{U, +high$_i$, −low$_j$}	Link([F], ˈV)	Id[F]
☞ a. ˈpe$_j$ʃaɾ-u$_{i,j}$	*	*
b. ˈpe$_j$ʃe$_j$ɾ-u$_{i,j}$	*	**!

Let us finally consider all remaining nominal inflectional count morphs, which do not cause harmonic raising since they have no floating features. As discussed in §4, in Felechosa the suffix [-o] can cause raising, whereas in Ḷḷena it cannot: /-o/ can be the exponent of mass (as in [ˈpel-o] ‘hair-mass’, opposed to [ˈpil-u] ‘single hair’), the expo-

[16] The vowel /a/, as shown in 5, is [+back], but also [−ATR]. Changing the feature value of [low] would produce [ʌ]. However, there are markedness constraints against nonlow back unrounded vowels, which must be undominated in Asturian. For the purpose of our analysis, which focuses on harmony in situ, we further assume that all open-mid vowels are banned in Asturian. Therefore, we assume that the low vowel, which is [−ATR], maps onto a close-mid vowel (*[−ATR, −low, −high], against open-mid vowels, dominates Ident(ATR)). Then, if Ident(round) dominates Ident(back), the outcome of metaphony will be [e], as in Ḷḷena, whereas the opposite ranking between these two faithfulness constraints gives stressed [o], as in the Nalón valley varieties. In the tableaux in this section, we concentrate on candidates with or without metaphony, and abstract away from nonoptimal metaphonic outcomes. In §6, however, we also entertain the idea, based on more accurate descriptions of the metaphonic outcome of /a/, that metaphony in Asturian is both nonneutralizing and centralizing. In this case, the input low vowel /a/ would realize the floating features [−low] and also [+central] (with concomitant deletion of [+back]), yielding an open-mid central unrounded vowel [ɜ], which is the transcription of metaphonized /a/ given by Penny (2009).

nent of masculine in the plural (['pel-o-s] 'hair-M-PL'), or the exponent of masculine count in a few nouns that exceptionally take /-o/ instead of /-U/ (ex. 12 above). We illustrate all of these cases with ['os-o] 'bear', which takes the allomorph /-o/ even when it is interpreted as singular count. As shown in the tableau in 34, in the absence of floating features in the input the fully faithful candidate harmonically bounds the candidate with raising.

(34) /os-o/ → ['os-o]

os-o	LINK([F], 'V)	ID[F]
☞ a. 'os-o		
b. 'us-o		*!

Before moving forward and presenting the analysis of stress-dependent harmony in Felechosa Asturian, we close this section by briefly reviewing previous optimality-theoretic (OT) analyses of Ḷḷena Asturian.[17] In the next section, we also review the only previous analysis of Felechosa Asturian. We want to highlight that our intention is to show not that analyses based on constraints other than LINK (e.g. AGREE, ANCHOR, LICENSE, etc.) could not appropriately handle the data, but rather that the existing previous analyses did not succeed. Therefore, our arguments are about those specific analyses, but not about specific frameworks or constraints. This being said, the central idea of our analysis, which is absent from previous analyses, is that the harmonizing features are floating and that the harmony-driving constraints, which we call LINK, make explicit reference to floating features and favor their realization in specific positions.

In Martínez-Gil 2006 an OT analysis of Ḷḷena Asturian is developed. The constraint responsible for stress-dependent harmony in this study is an AGREE constraint, defined in 35. This constraint refers to the stressed vowel as the target of harmony, as in our constraint, and to any high vowel following the stressed vowel as the trigger of harmony.

(35) AGREE Vowel-Height (Martínez-Gil 2006:128): A stressed vowel must agree with the features specified in the height node of a following high vocoid.

Finley (2009) claims that harmony in Ḷḷena Asturian is a case of morphemic harmony with the floating features [+high] and [−low], as in our analysis, because the harmonizing feature is always associated with a morpheme. However, we have shown that the trigger is one specific allomorph of the masculine singular count morpheme, the one with which the floating features are associated, as noted in 12 and Table 3. According to Finley (2009), morphemic vowel harmony is analyzed as the preservation of the harmonizing input feature associated with a specific edge of the output domain, or with the stressed vowel. Finley makes use of morpheme-specific versions of Left-ANCHOR and Right-ANCHOR constraints, and an O-CONTIGUITY constraint against gapped configurations. Our LINK constraint, like ANCHOR, conflates faithfulness (preservation of a feature

[17] In a previous, rule-based analysis, Hualde (1992:100–110) presents three arguments against a morphological analysis of stress-dependent harmony in Ḷḷena. They are all based on the fact that count is more basic—that is, less marked—than mass. This may be true, but although there is a tendency for semantic, syntactic, morphological, and phonological marking to coincide, this need not always be the case. In the English present paradigm, for instance, though the third-person singular is the least marked, it is the only one that has an overt phonological exponent; in Calvello (Basilicata; Gioscio 1985), as in many other Italo-Romance varieties (Maiden 1991:160–70), the metaphonized forms of adjectives are the masculine (singular and plural), whereas the feminine forms remain phonologically unmarked (Calvello: ['solə] 'alone.F.SG/PL', ['sulə] 'alone.M.SG/PL').

value) and alignment (the locus of realization). For the specific case of Ḷḷena Asturian, in which harmony is stress-targeted, Finley proposes the Anchor constraint in 36.

(36) ˈV-[αF]-Morph (Finley 2009:487): The [αF] feature of Morph in the input must be in correspondence with all stressed vowels in [the] output of the lexical domain (which therefore must be [αF]).

Ḷḷena Asturian has also been analyzed by Walker (2011), who makes use instead of a License constraint License$_L$([Height]/V$_h$[+high], ˈσ) (Walker 2011:52, 170–71). This constraint performs over all height features of a high vowel, that is, [+high] and [−low], and requires these features to be associated with the stressed vowel. This constraint is lexically indexed to harmonizing inflectional suffixes, as not all masculine singular count morphs trigger harmony. Also, following a proposal by Campos-Astorkiza (2009: 173), Walker proposes that this licensing constraint targets only suffixes which are coindexed with a subscript 'h' that encodes minimal contrastive status for the height dimension. This diacritic is present only for /-u/ (which contrasts with /-o/), and is absent from /-i/ (which does not contrast with any suffix /-e/) and /-a/ (which does not satisfy the criterion for a minimal contrast with nonlow vowels for the height dimension in the suffixal domain).

Let us now discuss these three approaches. The Agree constraint in Martínez-Gil 2006 wrongly predicts that any high vowel, not only inflectional but also posttonic high vowels belonging to the root in antepenultimate-stressed words, triggers raising of the stressed root vowel, contrary to facts, as shown by the examples in 37, from Neira Martínez 1955.

(37) No raising

meˈtaliko	'spring mattress'	
ˈperðiɣa	'loss'	(cf. perˈði-a 'lost')
roˈmatiko	'rheumatic'	
ˈθambiɣo	'silly, scatterbrained'	

Both Finley's (2009) Anchor constraint and Walker's (2011) License constraint resemble our Link(Floating[F], ˈV) constraint (although our constraint is closer to Finley's than it is to Walker's). As opposed to Walker's License constraint, we do not need to make use of lexical indexing or idiosyncratic marking of the suffix in terms of minimal contrast. Indexing with the 'h' diacritic that encodes minimal contrast for height is not the right solution. Campos-Astorkiza's (2009) proposal is based on the premise that in Ḷḷena there is no /e/-/i/ contrast, but as made clear by Neira Martínez (1955:5, 14–15, 45, 264), there is such a contrast. Although the majority of words ending in front vowels end in /e/, there are cases of words ending in /i/; the examples found in Neira Martínez 1955 are [ˈist-i] 'this-m.sg.count', [ˈis-i] 'that-m.sg.count', and [ˈbent-i] 'twenty' and its compounds (for the interjection [oɾˈβeti] it is not clear whether the final vowel is inflectional).[18]

The difference with respect to Finley's Anchor constraint, although more subtle, lies in the fact that only our Link constraint explicitly refers to floating features. Finley (2009) states that it is not necessary to assume floating features for Ḷḷena Asturian be-

[18] Some of the problems with Walker's (2011) analysis can be attributed to errors in Campos-Astorkiza 2009. The examples *abáxu*, *fjéru*, *jélsu* (Walker 2011:168) are taken from Campos-Astorkiza 2009:142, but there they are an erroneous interpretation of Neira Martínez 1983:489. In that article Neira Martínez is referring to Central Asturian, not to Ḷḷena particularly; in fact he gives, in orthographic form, the two pronunciations found in Central Asturian: 'yelso ~ yelsu, … fierro ~ fierru, … abaxo ~ abaxu'. In Ḷḷena, as indicated in Neira Martínez 1955:193–293, these words are pronounced with final [-o]. Note also that the second consonant in *abaxo* is not [x] but /ʃ/.

cause the suffix has the same surface identity as the floating features: that is, the suffix is also [+high] and [−low].[19] However, she also considers the idea that an analysis based on floating features accounts better for exceptional masculine singular count morphs that do not trigger harmony, as it can simply be stated that these suffixes contain no floating features. More importantly, the strongest argument in favor of an analysis of stress-dependent morphemic harmony based on floating features, besides gapped configurations across potential undergoers, comes from Felechosa Asturian, to which the next section is devoted.

5.3. FELECHOSA ASTURIAN. As we have seen, in Felechosa Asturian the suffixal vowel of the masculine singular count morph is a fully specified /o/ vowel. This morph also carries the floating features [+high] and [−low]. The phonological representation of this inflectional morpheme is given again in 38.

(38) Masculine singular count morph in Felechosa Asturian (/-o_1/)

$$\left(\underset{\text{M.SG.COUNT}}{} \quad \overset{[-\text{high},-\text{low},+\text{back}]}{\overbrace{}} \quad ...\text{V}..., \ [+\text{high}], \ [-\text{low}]\right)$$

Recall that in Ḷḷena Asturian the suffixal vowel of the masculine singular count morph was underspecified and the floating features were realized both in the stressed vowel and in the suffixal vowel. In Felechosa Asturian, when the stressed vowel is mid, the floating features are realized only on the stressed vowel; the fully specified suffixal vowel, /-o/, is unaffected. This is shown in the tableau in 39; the ranking IDENT[F] ≫ LINK(Floating[F], morph) is responsible for the surface realization of the masculine singular count morpheme as [-o], since IDENT[F] forces [−high] in /o/ to remain faithful. The ranking LINK(Floating[F], ˈV) ≫ LINK(Floating[F], morph) expresses the preference for floating features to link to the stressed vowel (rather than to the morpheme with which they are affiliated). As a result, the suffix vowel is not affected and remains [-o], and the stressed vowel raises to high.

(39) /tont-{o, [+high, −low]}/ → [ˈtunt-o]

tont-{o, +high$_i$, −low$_j$}	LINK([F], ˈV)	ID[F]	LINK([F], morph)
☞ a. ˈtu$_{i,j}$nt-o$_j$		*	*
b. ˈtu$_{i,j}$nt-u$_{i,j}$		**!	
c. ˈto$_j$nt-u$_{i,j}$	*!	*	
d. ˈto$_j$nt-o$_j$, [+high$_i$]	*!		*

Candidate 39d is ruled out because it fails to associate the floating feature [+high] with the stressed root vowel, so it violates LINK(Floating[F], ˈV). This candidate associates only [−low] with the stressed root vowel, but the surface effect is vacuous as the stressed root vowel is also [−low]; it does not violate IDENT[F], but it violates LINK(Floating[F], morph) once because only the floating feature [−low] is associated with its affiliated suffix. Candidate 39c, like candidate 39d, violates LINK(Floating[F], ˈV) as it shows no raising of the stressed root vowel. This candidate, however, violates IDENT[F] once because the floating feature [+high] is associated with its affiliated suffix, which is /-o/ in Felechosa. Both 39b and 39a satisfy the high-ranked constraint LINK(Floating[F], ˈV) be-

[19] Given the RICHNESS OF THE BASE HYPOTHESIS, our analysis with floating features is not incompatible with an analysis of the masculine singular count morph as containing both a fully specified segment /-u/ and floating features, instead of an underspecified segment /-U/ and floating features.

cause they display stress-targeted harmony. However, in Felechosa, as opposed to what happens in Ḷḷena, faithfulness is ranked higher than LINK(Floating[F], morph). Therefore, the suffix /-o/ does not raise to [-u].[20]

We now come to the crucial point in the analysis. Recall that in Felechosa nominals, final inflective round vowels usually show up as [-o], and that we must be able to explain why in one case they show up as [-u]. In Table 6 we summarize the distribution described in §4.

	STRESSED V SURFACES AS	INFLECTIONAL V SURFACES AS	
SINGULAR COUNT TRIGGER			
target is /e/, /o/	[i], [u]	[-o]	/tont-o/ → ˈtunt-o 'silly'
target is /a/	[e]	[-u]	nino /mal-o/ → ˈmel-u 'bad child'
NONTRIGGERS			
exceptional nontrigger	=	[-o]	/os-o/ → ˈos-o 'bear'
plural (nontrigger)	=	[-o]	/mal-o-s/ → ˈmal-o-s 'bad'
mass (nontrigger)	=	[-o]	xente /mal-o/ → ˈmal-o 'bad people'

TABLE 6. Stressed vowel and inflective vowel in masculine singular count nominals in Felechosa.

As we already know, fell-swoop raising of /a/ is prevented (as shown in candidate 40d) and stepwise raising derived. Candidate 40c, the faithful candidate with no stress-dependent harmony, is ruled out because it violates LINK(Floating[F], ˈV) more severely than candidates 40b and 40a do. In 40 we add the constraint *FLOATING[F] (FLOAT[F]), which penalizes phonetically uninterpretable floating features in the output. We introduce this constraint now because it was not relevant in the previous tableaux. *FLOATING[F] discards candidate 40b with floating [+high] and favors 40a. Note that we do not consider candidates in which floating features are deleted: either MAX[F] is undominated in Asturian, or GEN cannot generate candidates in which floating features are deleted.

(40) /gwap-{o, [+high, −low]}/ → [ˈgwep-u]

gwap-{o, +high$_i$, −low$_j$}	ID[F]$_1$&ID[F]$_2$	LINK([F], ˈV)	*FLOAT[F]	ID[F]	LINK([F], morph)
☞ a. ˈgwe$_j$p-u$_{i,j}$		*		**	
b. ˈgwe$_j$p-o$_j$, [+high$_i$]		*	*!	*	*
c. ˈgwap-o$_j$, [+high$_i$]		**!	*		*
d. ˈgwi$_{i,j}$p-o$_j$	*!			**	*

As noted in §4, we get final [-u] when the stressed vowel is /a/ because, since raising is stepwise, the floating [+high] cannot dock onto /a/ and has to be realized elsewhere, namely in situ, in the suffix vowel.[21]

[20] A referee notes that the 3SG.M.COUNT clitic is [lu] and not [lo], as would be expected, and that it triggers raising: /tomaɾ=lu/ → [toˈme=lu] 'take.INF=3ACC.SG.M.COUNT', /faθeɾ=lu/ → [faˈθi=lu] 'make.INF=3ACC.SG.M.COUNT'. This is certainly odd, and the only interpretation we can think of is that it is a remnant of the previous stage: masculine count /-U/ has exceptionally persisted in the accusative clitic. Note also that infinitives with enclitics show allomorphy, the infinitive /ɾ/ not showing up. Unfortunately, Arias Cabal (1992) does not discuss or give examples of this clitic following other verb forms (e.g. cases like those in Rodríguez Castellano 1955:179: *metióren=lu* 'they put it', *djé=yos=lu* 'I gave it to them') to enable us to check whether there is metaphony in general or only in the case of the infinitive.

[21] A referee notes that the analysis makes the following prediction: when the stressed vowel is underlyingly low, [+high] must find a different host, and because IDENT[F] dominates LINK([F], morph), the preferable landing site could be a vowel that is already high, rather than the suffixal /-o/. There are actually forms with a

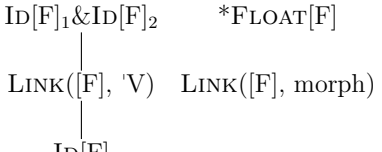
The preceding tableau shows how this is formally achieved. LINK(Floating[F], ˈV) favors realization of the floating features [+high] and [−low] in the stressed vowel; [−low] can be linked, raising /a/ to [e], but [+high] cannot link because the candidate with [+high], [−low] is discarded by high-ranked $\text{IDENT[F]}_1\&\text{IDENT[F]}_2$. The constraint *FLOATING[F] does not allow [+high] to remain floating, so it is realized on the suffix. As a result, the candidate with raised /a/ and raised /o/, candidate 40a, is the winner.

The analyses of gapped harmonic configurations in antepenultimate-stressed words and of exceptional masculine singular count morphemes that do not trigger stress-dependent harmony work as in Ḷḷena Asturian, so we refer the reader to the tableaux in 33 and 34 above.

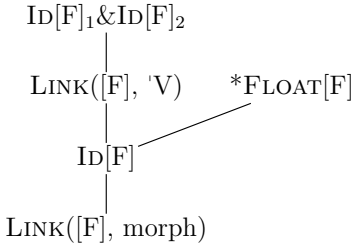
In 41, we summarize all constraint rankings for Ḷḷena and Felechosa Asturian by means of Hasse diagrams. In Ḷḷena Asturian, LINK(Floating[F], morph) is unranked (and thus undominated). In Felechosa Asturian, IDENT[F] dominates LINK(Floating[F], morph). Also, in Ḷḷena Asturian, either LINK(Floating[F], ˈV) or LINK(Floating[F], morph) or *FLOATING[F] dominates IDENT[F] (this disjunctive ranking can be seen in the tableau in 31); in the Hasse diagram, *FLOATING[F] and LINK(Floating[F], morph) are represented as unranked (and thus undominated constraints). In Felechosa Asturian, however, *FLOATING[F] dominates IDENT[F].

(41) Hasse diagrams

a. Ḷḷena



b. Felechosa



Before concluding this section, we review the only previous analysis of the Felechosa Asturian data, given in Nuchi 2009 and Nuchi & Paster 2009 and also framed within OPTIMALITY THEORY. Nuchi (2009) and Nuchi and Paster (2009) follow Walker (2004) and posit the stress-dependent harmony-triggering constraint defined in 42 to motivate stress-dependent harmony in Felechosa Asturian.

(42) ∃LICENSING(height)/ˈσ (∃LIC(height)/ˈσ): For any instance of [high] and [low] in a high vowel, some member of that feature's chain belongs to a stressed syllable.

According to Walker (2004), a phonological element (e.g. a feature) in an output candidate and all of its correspondents create a phonological object called a chain (Walker 2004:791, 2011:44). The features $[-\text{low}]_2$, $[-\text{low}]_2$ and $[+\text{ATR}]_2$, $[+\text{ATR}]_2$ in 43 form chains. The constraint in 42 can actually be satisfied by means of association of a single feature with adjacent vowels (indirect licensing), as in 25a, or through correspondence between multiple features belonging to a chain (identity licensing). Walker (2004) ar-

high vowel in Felechosa Asturian by which we can check this prediction, but in these cases the suffix still surfaces as [-u] (e.g. [espiˈneθu] 'backbone', *[espiˈneθo]). This indicates that floating features are never realized by vowels other than the stressed vowel, a metrically prominent vowel, or the suffixal vowel, a morph associated with a grammatical morpheme. In order to discard a candidate in which the floating feature [+high] is realized by a nonprominent high vowel, a markedness constraint against this type of association is needed.

gues that gapped configurations across an unaffected potential undergoer are obtained through identity licensing as a way to minimize faithfulness violations, as illustrated in 43. Both candidates 43a and 43b equally violate ∃Licensing(height)/ˈσ, because only [−low], and not [+high], can be realized on the stressed vowel due to local constraint conjunction (not shown in the tableau), as in our analysis. Local spreading in 43b, represented through multiple association, violates Ident(height) more severely than 43a does. Integrity-IO (Int-IO), which penalizes elements in the input with multiple correspondents in the output, is low ranked and cannot promote candidate 43b. Walker (2004) argues that this shows that multiple correspondence emerges in cases where the licensor, the stressed vowel, is located at a distance.

(43) /paʃaɾ-u/ → [ˈpeʃaɾ-u] (adapted from Walker 2004:795)

p a ʃ a ɾ -u | | (+low, −ATR)$_1$ (−low, +ATR)$_2$	∃Lic(height)/ˈσ	Id(height)	Int-IO
☞ a. p é ʃ a ɾ -u | | (−low, +ATR)$_2$ (−low, +ATR)$_2$	*(+high)	**	**
b. p é ʃ e ɾ -u | (−low, +ATR)$_2$	*(+high)	***!*	

Nuchi (2009) and Nuchi and Paster (2009) base their analysis on Walker 2004 and also assume identity licensing to explain stress-dependent harmony in antepenultimate-stressed words in Felechosa.[22] For the really problematic case, namely, the fact that some [-o] cause raising, they assume that they are underlyingly /-u/ (e.g. /pal-u/ → [ˈpel-u], /wej-u/ → [ˈwij-o]). In order to get these mappings they resort to the constraint in 44, based on Walker 2001.

(44) Crisp(σ, [high]): A single [high] feature may not be linked to multiple syllables.

In 45c the feature [+high] on the stressed root vowel triggers a fatal violation of Crisp(σ, [high]), since a single feature [high] is linked to more than one syllable. The winning candidate according to Nuchi (2009) and Nuchi and Paster (2009) is the one that satisfies both Crisp(σ, [high]) and ∃Licensing(height)/ˈσ by means of lowering /-u/ to [-o], even if it violates Ident[high]), as shown in the tableau in 45.[23]

[22] There is a descriptive problem in Nuchi 2009:11–12 and Nuchi & Paster 2009:2. They wonder whether final [-o] appears only in words with tonic raising of /e/, /o/ or also in words with underlying /i/, /u/. But it is clear from Arias Cabal's (1992:8) description that final [-o] is general in both cases: 'This vocalic subsystem diverges from the general Asturian norm … because there is always final [-o], as a result of lowering of an old [-u], except in one case: there is only [-u] when the tonic vowel is a metaphonized primitive [á]' (translation provided). Moreover, Arias Cabal (1992:16) gives the adjectives *ḷḷimpio* 'clean' and *sucio* 'dirty' (pronounced [ˈt̪simpjo] and [ˈsuθjo]) with underlying high vowels and final [-o], as shown in 16.

[23] We reproduce exactly the tableau in Nuchi & Paster 2009:5. We have not found the word for 'eye' in Arias Cabal 1992. It cannot be [uílo] because historically by diphthongization the first syllable should be [we] ([wí] by raising). Rodríguez Castellano (1952:56, 218) gives [ˈgwiju]. But there are many other examples in Arias Cabal 1992 with the same change, tonic raising and an inflective mid vowel [-o], that could have been used, with the same consequences.

(45) *uijo* 'eye' (Nuchi & Paster 2009:5)[24]

uej-u	MAX[high]	CRISP(σ, [high])	∃LIC(height)/ˈσ	ID[high]	ID[low]
a. uéju			*!		
b. uéjo	*!	*		*	
c. uíju		*!		*	
☞ d. uíjo				**	

The authors assume identity licensing for antepenultimate-stressed words, as in /ˈpaʃar-u/ → [ˈpeʃar-u], with two [−low] features independently associated with [e] and [-u], that is, a structure like the one in 43a. But they do not consider such candidates in their evaluation of penultimate-stressed words. Crucially, identity licensing could also be recruited to avoid a violation of CRISP(σ, [high]). Compare the tableau in 45 with the next tableau, in which identity-licensing candidates are considered: candidate 46a is the same candidate as 45d, and 46c is the same candidate as 45c. A new candidate 46b, with an identity-licensing structure, is added. Candidate 46b, segmentally identical to 46c, does not violate CRISP(σ, [high]). Having fewer violations of IDENT[high] than the desired winner 46a, *[ˈuiju] is wrongly predicted to be the output of /uej-u/.

(46) /uej-u/ 'eye-M.SG.COUNT' → [ˈuij-o]

u e j -u | [+high]$_1$	CRISP(σ, [high])	ID[high]	INT-IO
☹ a. u í j -o | [+high]$_1$		**	
☞ b. u í j -u | | [+high]$_1$ [+high]$_1$		*	*
c. u í j -u \ | [+high]$_1$	*!	*	

If identity licensing is an available option, it cannot be prevented from emerging when feature spreading would cause a violation of CRISP(σ, [high]). Recall from 43 that INTEGRITY-IO, against indirect licensing, is dominated by IDENT[high]. Therefore, the analysis of Nuchi (2009) and Nuchi and Paster (2009) has proven inoperative.[25]

6. DISCUSSION. In this section we discuss issues related to data, sources, and phonetic detail and their relevance to phonological analyses. It is important to determine the extent to which phonetic detail is crucial to the specific phonological proposals. We start by briefly reviewing the literature from which the data are gathered. Our primary sources have been Neira Martínez 1955, 1962, 1976, 1983, Rodríguez Castellano 1955, Navarro Tomás 1975, Arias Cabal 1992, and Viejo Fernández 2017a,b, but in fact the

[24] Candidate (b) is assigned a violation of CRISP(σ, [high]) in Nuchi & Paster 2009. If the feature [high] is deleted, CRISP(σ, [high]) is vacuously satisfied. We regard this as a typo in their handout.

[25] A referee notes that under the definition of CRISP in Walker 2011, chains matter for this constraint, and that if some member of a [+high] feature's chain is outside of the stressed syllable, CRISP is also violated. However, our objection to Nuchi and Paster's analysis, in which CRISP is violated only when a single [high] feature is linked to multiple syllables (that is, when [+high] is licensed through indirect licensing, not when it is licensed through identity), still holds.

literature on stress-dependent harmony in Asturian goes back more than one hundred years (Menéndez Pidal 1899; for later sources, see also Hualde 1998 and Penny 2009). It was not until much later, however, that more extensive descriptive work (the mid-twentieth century) and theoretical work (starting in the 1980s) were published. Since different phonetic interpretations of the data have been provided by different authors, the issue needs to be critically addressed.

Concerning Ḷḷena and Felechosa, we have detailed descriptions of stress-dependent harmony in Ḷḷena (Neira Martínez 1955 and subsequent work) and in Felechosa and two other villages (Rodríguez Castellano 1952), as well as Arias Cabal's (1992) more recent description of harmony in Felechosa. The use of notation by these authors is important and revealing. Both Neira Martínez's work and Arias Cabal's paper use orthographic transcription,[26] but Rodríguez Castellano uses both orthographic transcription and a narrow phonetic notation based on Navarro Tomás's alphabet for the *Atlas Lingüístico de la Península Ibérica* (ALPI 1962), and his phonetic descriptions are much more detailed. As one of the six researchers involved in gathering data for the ALPI, Rodríguez Castellano underwent, under Navarro Tomás, 'a long and intensive period of systematic exercises in phonetic transcription … there was special stress on the oscillations and tendencies of vowel timbre' (Navarro Tomás 1975:11–12).

Rodríguez Castellano's (1952) characterization of stress-dependent harmony in Upper Ayer is clearly nonneutralizing. Although transcriptions vary from orthographic to mixed, and are completely phonetic only in some vocabulary entries and in the transcribed texts, his description of the pronunciation of harmonized vowels on pp. 58–59 establishes its phonetic character very clearly. The harmonized vowels are both raised and centralized; the results of /e/ and /o/ are close to [ɨ] and [ʉ], respectively, and the result for /a/ is [ɜ].[27] For harmonized /a/ Rodríguez Castellano uses the symbol [e] with two superscript dots aligned vertically; this corresponds to the symbol that Navarro Tomás defines as 'mixed, a central semi-closed vowel; English *bird* (but not as long)' (ALPI 1962:Introduction).[28]

The notation in Neira Martínez's descriptions is different. It is basically orthographic; he introduces just two nonorthographic signs for consonants: <ŝ> for an affricate, for some speakers a slightly retroflex postalveolar, and <š> for [ʃ]. For vowels he uses only the orthographic symbols *a*, *e*, *i*, *o*, *u*, contrasting with Rodríguez Castel-

[26] In Neira Martínez 1955 a few broad transcriptions appear with the drawings of objects of ethnographic interest, from which no solid conclusions regarding phonetic detail can be drawn.

[27] 'The vowels that result from this metaphony are not sounds with a clear and precise timbre, like in Spanish; they present in all cases a dark and mixed shade which is very characteristic. … To a foreign ear metaphony gives rise to real homophonies. … But for the speakers of this region such a confusion does not exist.' (Rodríguez Castellano 1952:58–59, our translation)

[28] Hualde (1998:102) has a different interpretation for Rodríguez Castellano's description: 'We may perhaps interpret this "dark and mixed quality" and "throaty quality" as being produced by the retraction of the tongue root; that is, as pharyngealization'. Rodríguez Castellano's terms *mixto* 'mixed', *oscuro* 'dark', and *engolado* 'throaty' clearly indicate centralization, although additional tongue-root retraction is not impossible. 'Mixed', in the Spanish philological tradition, means 'central', as shown in the above citation from the ALPI; 'dark' and 'throaty' must be understood perceptually as impressionistically referring to a timbre, not to an articulatory property. Rodríguez Castellano was from a village in Western Asturies, and his speech had no centralized vowels (as the text corresponding to his own speech in Rodríguez Castellano 1954:272–75 bears witness), so he could not observe it in his own speech. He could only see the lip and tongue-tip positions of his informants, and in his palatograms he could not record tongue-root position. In his transcriptions, the vowels have a double, vertically aligned dot, which in the ARFE (the *Revista de Filología Española* alphabet) indicates centralization.

lano's use of nineteen vocalic symbols (excluding nasal, relaxed, and long vowels). Thus, all we can infer from Neira Martínez's notation of orthographic <i> in cases like *díu* 'finger' (from underlying /deu/, in our analysis) and <i> in *día* 'day' (from underlying /dia/) is that the raised <i> in the former word and the unchanged <i> in the latter are phonetically similar, and that they are somewhat close to Spanish [i]. The same applies to orthographic <e> in *reyu* (/raju/) 'lightning' and *reya* (/reja/) 'ploughshare', and for <u> in *fundu* (/fondu/) 'deep' and *fumo* (/fumo/) 'smoke'.

Given these facts, we cannot infer, as assumed by Hualde (1998:102, 106) and subsequent theoretical analyses of the Ḷḷena and Ayer data framed within optimality theory that were briefly reviewed in previous sections, that Ḷḷena's harmony is neutralizing, while Ayer is not. From an examination of the sources mentioned, we can conclude that Ayer is not neutralizing, but we cannot say anything definite about Ḷḷena. Fortunately enough, there are other sources for Ḷḷena that can lead us to a more concrete conclusion. If we check the data for the only village in Ḷḷena in the ALPI atlas (ALPI 1962; fieldwork 1931–1935), namely La Malvea,[29] the conclusion is that raising in Ḷḷena was similar to raising in Felechosa in phonetic terms at the time of Neira Martínez's description. Most cases of raised /e/, /o/, and /a/ appear with the diacritic marking a centralized high vowel (e.g. in IPA notation, [foɾˈmjɨntʉ] 'yeast', [ˈbrɜθʉ] 'arm'); Felechosa shows similar results. These results coincide with the opinion of Ralph Penny (2009:115–16), who knows well the metaphonic Asturleonese area: he ascribes to harmonized vowels in south-central Asturian (which includes Ḷḷena and Ayer) the surface values [ɨ, ʉ, ɜ].[30]

We conclude that the harmony in both Ayer and Ḷḷena involves raising of the affected vowel by one degree, as well as centralization. In the case of /a/, raising makes it close in height to [e], thus explaining its confusion with [e] by Spanish speakers reported in the literature, but the resulting vowel stays central. Mid vowels /e/ and /o/ are raised and centralized.

There are two more recent contributions to Asturian stress-dependent harmony that contain or consist of experimental phonetic studies. One is centered on Felechosa, another on three municipalities of Central Asturian: Llaviana in the Nalón River valley and Ḷḷena and Ayer in the Caudal River valley. Unfortunately, they do not furnish information on the phonetic nature of harmonized vowels that is both relevant and reliable in connection with the present discussion. In Nuchi 2009, there is an analysis of the vowels of a single subject, 'around 50 years old'. The results regarding the quality of raised /a/, /e/, /o/ are not conclusive. Nuchi (2009) reports that the metaphonized variants have the same timbre as their nonraised counterparts. The fact that there was no control of possible influence of more prestigious varieties (General Central Asturian and Spanish) is crucial. The words were elicited using the corresponding Spanish words. As noted by many authors (Rodríguez Castellano 1955, Neira Martínez 1969, Penny 2009, Barnes 2019), speakers are often influenced by the more prestigious variety of General Central Asturian and by Spanish, and often use different situational variants, some of them not corresponding strictly with the local variety used with other local speakers; in such a situation, external influence should be controlled more strictly. It is also important to emphasize that subjects belonging to different, distant generations should be kept apart in the description, a fact acknowledged by Barnes (2019:37). Nuchi's subject was born around seventy years later than Rodríguez Castellano's subjects and some forty-five

[29] Only the first volume of ALPI (1962) has been published. Six additional entries are available online at http://www.alpi.csic.es. The Asturian zone was completed in 1935.

[30] Alonso Fernández (1954:46), who analyzes the variety of Morcín (see the map in Fig. 1), makes the same observation as Rodríguez Castellano for Ayer, namely, that speakers clearly distinguish the vowel resulting from raising of /a/ from nonharmonized /e/.

years later than Arias Cabal's subjects. Note that the final [-u] in Rodríguez Castellano's description changed to [-o] over a twenty-four-year period, so it is probable that other phonetic changes occurred over longer periods.

The experiment in Barnes 2019 is much better controlled. It was conducted in Asturian, and data were elicited through a picture-naming task. But the objective was to determine variation: there were forty consultants ranging from eighteen to ninety-two years old from eleven villages/towns in three subdialectal areas (Ḷḷena, Ayer, and Nalón). The results are interesting, but the fact that results were aggregated in groups (Caudal, that is, Ḷḷena plus Ayer, and Nalón), each group containing all speakers, makes it impossible to draw any useful conclusions for our specific purposes. In particular, we cannot determine whether there was any homogeneous subgroup in Ḷḷena and Ayer with active and regular stress-dependent harmony close or similar to what was described around sixty years earlier by Neira Martínez and Rodríguez Castellano.

Returning to our conclusion that stress-dependent harmony in Ḷḷena and Ayer involves not only raising but also centralization, we must evaluate its consequences for the phonological analyses undertaken in §5. The addition of centralization can be straightforwardly incorporated into our OT analysis based on floating features. Next to floating [+high] and [−low], the feature responsible for centralization can also be affiliated with the masculine singular count morpheme. Let us assume, following Picard's (2001) analysis of the Asturleonese variety Pasiego, that this feature is [+central]. In Ḷḷena the three floating features [+high], [−low], and [+central] will be realized on the stressed vowel and on the suffix for mid vowels. The winning candidate, [ˈtʉnt-ʉ] (corresponding to [ˈtunt-u] in 31), will violate only the lowest-ranked constraint Ident[F] twice, because of /u/ → [ʉ]. For the low vowel, the same will happen, except that Ident[F]$_1$&Ident[F]$_2$ will prevent fell-swoop raising. In the case of Felechosa, for mid vowels high-ranked Link(Floating[F], ˈV) will force realization of the three floating features on the stressed vowel, and the ordering Ident[F] ≫ Link(Floating[F], morph) will prevent their association with the suffixal vowel, as in 39 above. In cases like /gwap-{o, +high, −low, +central}/ → [ˈgwɜp-ʉ], Ident[F]$_1$&Ident[F]$_2$ will prevent fell-swoop raising, that is, the realization of [+high] on the stressed vowel, while Link(Floating[F], ˈV) will force the realization of [−low] and [+central]. To explain the centralization of the trigger, Ident(central) needs to be dominated by Link(Floating[F], morph), whereas all other Ident[F] constraints dominate Link(Floating[F], morph), as shown in 39. Note that for both varieties, the low vowel /a/ needs to be phonologically specified as a [−ATR] vowel in order to derive the open-mid output vowel [ɜ] when the floating feature [−low] raises /a/ (see n. 16).[31]

Although stress-dependent harmony in Asturian (and in Cantabrian varieties) has featured in many theoretical papers since the 1980s, acoustic analyses of stress-dependent harmony are almost nonexistent. Taking Barnes 2019 as a starting point, future instrumental investigations of stress-dependent harmony in Asturian should better control for the sociolinguistic profile of the speakers involved in the study. This will be important not only for theoretical phonology, which relies on robust linguistic generalizations drawn from homogeneous speech communities, but also for a more nuanced understanding of the sociolinguistic variables responsible for variation. Such studies should also include analyses of stress-dependent harmony in antepenultimate-stressed words and of the final harmonic trigger, not analyzed by Barnes (2019). These analyses would

[31] The primary sources do not mark the trigger as centralized, but this is probably due to the 'relaxed' character of final vowels, which is indicated in the transcriptions. In Penny's transcriptions and descriptions of Pasiego it is indeed notated as a centralized vowel.

help elucidate in more detail what phonological features may participate in vowel harmony in contemporary Asturian.

7. Conclusion. The analysis of stress-dependent harmony in Felechosa Asturian pursued in this article, based on data from Arias Cabal 1992 and Rodríguez Castellano 1952, 1955, brings forth new evidence for morphemic harmony as affixation of floating features. We have also claimed that stress-dependent harmony in Felechosa Asturian is caused by a mixed affix consisting of both segmental material and floating features, [+high], [−low] (and [+central]). These floating features dock onto the stressed root vowel when stepwise raising targets an underlying mid vowel (the realization of [−low] is vacuous as it does not cause any segmental change). When the target is a low vowel, however, only [−low] can be realized on the stressed root vowel, because realizing [+high] would imply fell-swoop raising, which is banned. In this context, the floating feature [+high] ends up being realized on the suffix with which it is morphologically affiliated. Therefore, two situations are observed in Felechosa Asturian: (i) both [+high] and [−low] dock onto the stressed root vowel, or (ii) [−low] docks onto the stressed root vowel and [+high] docks onto the suffix. Which outcome obtains depends on the featural make-up of the stressed root vowel.

Stress-dependent harmony in Felechosa Asturian represents a typological pattern in harmonic systems that has not been reported before. Vowel harmony and assimilation in general are conceived as processes whose structural description contains a trigger and a target, and a structural change that affects the target but not the trigger. The major theoretical claim of this article has been that only when harmony is triggered by floating features can the harmonic trigger act not only on the target of harmony, but also on the trigger itself, a pattern we have called harmony in situ. It is important to note that, once mixed affixes are incorporated into the theory of representations, harmony in situ is immediately predicted. Pure featural affixes can be realized only outside of the trigger, because the trigger contains no skeletal material. But mixed affixes consist of floating, unordered features and also segmental material; hence two possibilities arise. One possibility is that the floating feature or features are realized only outside of the affix. This is the case, for instance, in German umlaut (Wiese 1996): the diminutive affix contains the segmental sequence /laɪn/ and the floating feature [−back], which is realized on the preceding root only, not affecting the segmental material in the suffix: [ˈman] ‘man’ – [ˈmɛn-laɪn] ‘man-dim’. But we also have the option to realize the floating feature on the root and on the affix—provided that alternations exist, since if it were always realized on the affix the harmonizing feature would be better analyzed as part of the segmental material. Harmony in situ is therefore predicted by a theory of vowel harmony that includes mixed affixes, and Felechosa Asturian confirms this prediction. Link constraints, relativized to refer to at least two landing sites: metrically prominent positions (Link(Floating[F], ˈV)) and the morpheme with which the feature is affiliated (Link(Floating[F], morph), predict the outcomes. For Felechosa Asturian, harmony in situ arises because (i) not all harmonizing features are always able to be realized on the preferred target (the stressed vowel) due to a faithfulness requirement (the prohibition against fell-swoop raising), and (ii) the prohibition of floating features (the satisfaction of *Floating[F]) takes priority over the featural identity of the suffix (a violation of Ident[F]).

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