

Morphological Faithfulness and Phonological Markedness: The Case of Romanian Nominals*

Cristian Iscrulescu

University of Southern California
iscrules@usc.edu

This paper, couched in the framework of Optimality Theory (Prince and Smolensky, 1993), has a threefold goal. First, it brings systematic evidence for the previously assumed input representation of Romanian nominals, in particular for the existence of an underlying vocalic ending in superficially consonant-final masculines and neuters. Second, the (non)realization of the covert final vowel is accounted for from a synchronic perspective in terms of constraint interaction between morpheme realization and phonotactic constraints active in the language, according to the schema $REALIZE-MORPHEME_1 \gg PHONOCONSTRAINT \gg REALIZE-MORPHEME_2$. Finally, once it has been established that the representation argued for is adequate, the paper investigates its consequences for the computation of nominal stress in nominal oxytones. It is shown that the superficial absence of the underlying vocalic ending in consonant-final masculine and neuter oxytones obscures the generalization that in Romanian nominals main stress is assigned by building a syllabic trochee at the right edge of the prosodic word. In the absence of a pronounced final vowel in the actual output, the trochee surfaces as subminimal, which leads to non-surface apparent phonological opacity for which the Turbidity approach (Goldrick and Smolensky, 1999) provides an adequate account.

1. Introduction

Romanian nouns and adjectives have long been claimed to be vowel-final in their underlying representation (Augerot, 1974; Steriade, 1984; Chitoran, 1996, 2002), although only feminines and some of the masculines display the final vowel in surface form. Along the same line, previous researchers have assumed that all Romanian nominals have the input representation */[root]-vocalic ending /* (Chitoran, 1996, 2002). However, most of the arguments put forth for this representation rely on diachrony and dwell upon the fact that the assumed vocalic ending represents a remnant of the nominal theme vowel in the mother language, Latin. Such an argumentation is hard to defend from the perspective of acquisition, as speakers cannot be assumed to have access to diachronic data. From the perspective of Optimality Theory (Prince and Smolensky, 1993), the presence or absence of the vocalic ending in nominal outputs can be shown to be the result of constraint interaction between morphological faithfulness and phonological markedness, at the phonology-morphology interface, under which assumption no recourse is necessary to the history of the language proper.

This paper has two goals. First, it confirms the previously assumed input representation of Romanian nominals, but provides systematic evidence for the existence of the underlying vocalic ending in the superficially consonant-final masculines and neuters, in which the (non-)realization of the covert final vowel is accounted for from a synchronic perspective in terms of constraint interaction within the framework provided by Optimality Theory (OT). Second, once it has been established that this representation is correct, the paper states some of its positive consequences for the computation of nominal stress in Romanian. Specifically, it is shown that in consonant-final masculines and neuters

* Thanks are due to Rachel Walker, Elliott Moreton and Hagit Borer for the constant support, detailed feedback and insightful advice they provided me during the elaboration of this paper. I am also grateful to Dani Byrd, Jack Hawkins, Mario Saltarelli and the audience of USC's PhonLunch session in which part of the paper was presented.

the deletion of the underlying final vowel /u/ leads to phonological opacity in the computation of stress, which can be analyzed in Turbidity Theory (Goldrick, 2000, Goldrick and Smolensky, 1999).

2. The data

In agreement with Chitoran (1996, 2002) I will prove that all Romanian nominals have the underlying representation in (1):

(1) /[root]-vocalic ending /

Vocalic endings (also known as thematic vowels) vary according to gender/ nominal class. Romanian has a three-way gender system that distinguishes between masculines, feminines and neuters. In the base form of feminines, thematic vowels are always realized. As for the masculines/ neuters, the picture is less straightforward, since a good deal of them superficially end in a consonant. In (2) below I summarize the Romanian nominal endings. Unless otherwise indicated, the data is taken from Standard Romanian or Daco-Romanian, the major dialect of the language, spoken north of the Danube. The proposal, which I share with Augerot (1974), Steriade (1984) and Chitoran (1996, 2002) among others, is that all masculines and neuters which end in a consonant or a glide at the output level (and thus have the \emptyset ending at this level of representation) have the underlying thematic vowel /u/.

(2) Romanian Nominal Desinences (base form, Nominative singular)

a. Feminines

- ɔ: <i>ká.s-ə</i>	'house'
<i>só.r-ə</i>	'sister'
<i>lí.te.r-ə</i>	'letter'
- e: <i>kár.t-e</i>	'book'
<i>vîl.p-e</i>	'fox'

b. Masculines and neuters

-e: <i>frá.t-e</i>	'brother'
<i>mîm.t-e</i>	'mountain'

-u

not realized word-finally, after a single consonant:

<i>lîp</i>	'wolf'
<i>bî.vol</i>	'buffalo'

realized as [u] or [w]

<i>al.bás.tr-u</i>	'blue'
<i>kú.pl-u</i>	'couple'
<i>ka.ró-w</i>	'square'

2. Evidence for underlying /u/ in masculines and neuters

In what follows, I will add more flesh to the issue of underlying /u/ and show that this segment is indeed part of the input, even though it may seem that it is epenthetic. Throughout this paper, I will assume, based on Steriade (1984) and Chitoran (2002), that in Romanian the glides [j] and [w] are not phonemic, and represent contextual realizations of underlying /i/ and /u/, respectively. With respect to the thematic vowel /u/ as underlying, although its status has been long acknowledged in Romanian generative phonology, no substantial arguments have been adduced for its presence in the input. Chitoran (2002) merely notes that /u/ surfaces as [u] in the singular definite form of masculines/ neuters or as [w] at the end of certain loanwords, most of which are borrowed from French, after which she concludes that 'there is no independent evidence from the phonology of the language where [u] is an epenthetic vowel, or some kind of preferred default vowel' (Chitoran, 2002: 39).

Assuming the standard two-level system of representation of Optimality Theory, the success of the analysis essentially depends on the choice of representations, especially for underlying representations, which are not directly accessible and have to be deduced. Given the OT principle of

Richness of the Base (Prince and Smolensky, 1993), there are no restrictions on the inputs that can be posited for an actual output, provided that the inputs map to the output given the particular constraint ranking of the language. On the other hand, in terms of learnability, there should be a way for speakers to infer the actual input. This is done by Lexicon Optimization (Prince and Smolensky, 1993); whereby learners, in the absence of other evidence, infer the input as being identical with the actual output. In vowel-final nominals then, the input will be chosen as identical with the phonetic realization, which includes the vocalic ending. In consonant-final forms, the inference process is presumably more complex, and it involves evaluation of related outputs, such as the definite forms in which, as we shall see, the vowel [u] surfaces between the root and the suffixed definite article -l. It can be hypothesized that as elements occupying argument positions in the syntax, definite nominals (DPs) have a high frequency in discourse, potentially higher than that of bare nominals, so there is a consistent exposure of the speakers to forms in which /u/ surfaces faithfully.

Although this algorithm looks reasonable, it should be supplemented by a more comprehensive argumentation for final /u/, in the absence of which one might have to consider the alternative of epenthetic [u], which would lead to a different analysis. Once /u/ has been argued for, the next step is to see what forces are at work in causing its deletion or retention in outputs.

What draws attention in the first place to the possible existence of an underlying vocalic ending /u/ in nominals that end superficially in a single consonant (like *lup* 'wolf') or in a licit consonant cluster (like *opt* 'eight') is the fact that in the singular definite form they systematically display the vowel [u] intervening between the root and the definite article -l, pronominal clitics or any suffixed inflectional material that begins with a consonant:

(3) The vocalic desinence [u] surfacing before consonantal suffixes

<i>lup</i>	'wolf'	<i>hi.p-u-l</i>	'the wolf'
<i>glás</i>	'voice'	<i>glá.s-u-l</i>	'the voice'
<i>glá.s-u-m'</i>	'my voice'		

In (3) above, [u] clearly does the work of breaking a consonant cluster which is disallowed by the phonotactics of Romanian, like Cl#. This indicates that in Romanian the constraint SON-CON (Benua 1995), which bans complex codas rising in sonority, is high-ranked. In the base form, [u] can be found in nominals whose root ends in voiceless consonant + liquid sequence (*muta cum liquida*), which is also disallowed in codas by virtue of SON-CON, as in *al.bás.tr-u/ *al.bástr* 'blue', *kú.pl-u/ *kípl* 'couple' *á.kr-u/ *ákr* 'sour' etc.

Although syllables of type C(C)V(C)C and CC(C) consonant clusters in general are licit in Romanian, vowel epenthesis is sometimes attested to break the consonant onset/ coda clusters, presumably for ease of articulation and/ or to maximize perception of otherwise unreleased stops. Vowel epenthesis occurs in casual speech or in the speech of uneducated speakers when they utter neologisms that contain consonant clusters that are hard to articulate perceive:

(4) a. <i>ad-i-ministrator</i> for <i>administrator</i>	'administrator'
<i>sil-i-vestru</i> for <i>sil.ves.tru</i>	'proper name - Sylvester'
<i>h-i-lizi</i> for <i>hli.zi</i>	'giggle'
b. <i>f-i-kǎalǎ</i> for <i>fkǎa.lǎ</i>	'school'
<i>opt-i-sprezețe</i> for <i>opt.spre.ze.țe</i>	'eighteen'
<i>zun-i-kǎ</i> for <i>zun.kǎ</i>	'young cow'
<i>os-i-tfor</i> for <i>os.tfor</i>	'small bone'

If in the case of (4a) one can detect the flavor of *copy epenthesis* (Kitto and De Lacy, 1999), given the fact that the words contain other instances of the vowel [i], no such explanation is available for the rest of the forms in (4b), where all the vowels of the base form are different from [i] and the situation is typical of *default epenthesis*. It seems therefore that Romanian has at least an unquestionably epenthetic vowel, so the question boils down to whether [u] in (3) can be a second epenthetic vowel in this language. At first blush, [u] does qualify as epenthetic, as there seems to be a fairly clear-cut division of labor between [i] and [u]: both of them serve the purpose of syllable well-formedness, and

the latter is inserted at morpheme boundary, separating the root from inflectional material or clitics, whereas the former is a kind of elsewhere case. It has been shown (Kager, 1999) that in languages with two or more epenthetic segments, these should occur in complementary distribution, in other words, they should not share one and the same context. It appears, however, that this is not always true of Romanian [i] and [u]. Consider by way of example the compound numeral *optsprezețe* ('eighteen', literally 'eight-to-ten'), which is often pronounced [*opt-i-sprezețe*], with epenthetic [i], as illustrated in (4b) above. This is nevertheless not the end of the story, since in casual speech a good deal of speakers utter it as [*opt-u-sprezețe*]. Under these circumstances, the epenthetic status of [u] appears to be at least questionable, since the vowel shares the context of occurrence with the truly epenthetic [i]. I suggest that in such a case speakers adopt an alternative strategy of avoiding a complex consonant cluster and pronounce the input desinence /u/ in *opt(u)* ('eight'), and most probably this is what they do when they apparently 'insert' [u] in the forms in (3).

It is known that epenthesis takes place at the expense of increasing phonological unfaithfulness, so if /u/ is available from the input there seems to be no good reason to assume insertion. In fact Romanian does not seem to favor vowel epenthesis as a means of simplifying consonant clusters (the [i] epenthesis in (4), although documented, is frequent and unsystematic). Instead, the preferred solution is consonant deletion at the expense of DEP-C, as attested in the following substandard pronunciations:

- | | |
|--|-------------|
| (5) <i>pormoneu</i> for <i>portmonew</i> | 'wallet' |
| <i>eskursije</i> for <i>ekskursije</i> | 'excursion' |
| <i>istitut</i> for <i>institut</i> | 'institute' |

Another argument against epenthesis is related to the treatment of loanwords. French borrowings originally ending in a stressed vowel V like [é], [ó], [i], end in V + [w] in Romanian. If we assume that there are no phonemic glides in Romanian, final [w] is the realization of underlying /u/. Let us further assume for the moment that [w] is the realization of epenthetic /u/, possibly modulo some opacity, and that insertion is necessary for reasons of metrical structure¹. The behavior of French loans is illustrated in Table (6) below:

(6) The realization of French loanwords in the indefinite form (with [u] as epenthetic)

French word	Possible Romanian input	Romanian output
pari 'wager' [paʁi]	/paʁi/	pa.ri-w
carreau 'square' [kaʁó]	/kaʁó/	ka.ro-w
lycée 'high school' [lisé]	/litʃe/	li.tʃé-w

Consider again the set of French loans originally ending in [i], [ó] and [é], all of which are neuters in Romanian, this time in their definite form:

(7) The definite form of French loans

French word	Romanian output (indefinite)	Romanian output (definite)
pari 'wager' [paʁi]	paʁi-w	paʁi-u-l *paʁi-l
carreau 'square' [kaʁó]	kaʁó-w	kaʁó-u-l *kaʁó-l
lycée 'high school' [lisé]	litʃé-w	litʃé-u-l *litʃé-l

The definites in (7) are hard to account for in terms of epenthesis, since in the absence of [u] no ill-formedness would have arisen. In spite of that, definite forms like **paʁi-l*, **kaʁó-l* or **litʃé-l* are not attested. In all these cases, the epenthesis of [u] seems unmotivated. A natural solution to the problem would be to assume that /u/ is part of the input, generalized by analogy with the rest of the members of the masculine-neuter class, and that it surfaces as the glide [w] word-finally to form a stressed CVw syllable, in avoidance of a vowel-final form with final stress. In the indefinite, /u/ is retained as [w],

¹ Note that final stressed vowels are severely restricted in Romanian.

presumably due to the fact that Romanian does not tolerate words ending in stressed vowels, except the limited class in (4). Before the definite article [-l], /u/ surfaces faithfully, to avoid the illicit coda [w/#].

Also, [u] is present in cliticized forms even if its epenthesis does not seem necessary, as in *glas-u-j* 'his voice'. Without providing a systematic analysis of Romanian glides here, it is worth noting that, if the possessive clitic [j] is underlyingly /i/, there seems to be no good reason to epenthesize [u], thereby increasing unfaithfulness to the input, as the faithful realization [i] would suffice for syllable well-formedness, but we do not get forms like **glas-i*. In actuality, the assumed sequence /ui/ gets realized as [uj], in accordance with the principles that govern the status of Romanian vowel strings (see Chitoran (2002) for a detailed analysis).

A question which requires an answer is why, if [u] is underlying, it does not always surface in the base form of the masculine-neuters, in violation of MAX-IO?

A closer examination of Romanian indefinite nominals shows that [u] is not the only (unstressed) vowel whose final occurrence severely restricted word finally. The high, central vowel [i] is banned from this position altogether in Romanian words, except in a small class of verbs, in which this vowel carries primary stress. As for [i], the third member of the set of Romanian high vowels, it could in principle occur at the end of certain nominals in the plural indefinite, as the realization of the plural morpheme /i/. However, in practice we find out that final /i/ is realized as palatalization on the preceding consonant [ʲ] in words whose base form ends in a single consonant (or a licit consonant cluster) and [i] after an unsyllabifiable consonant sequence²:

(8) The realization of the plural marker /i/

<i>pom</i>	'fruit-tree'	<i>pomi</i>	'fruit-trees'	UR /pom+i/
<i>albastru</i>	'blue'	<i>albaștri</i>	'blue-plural'	UR /albastr+i/

3. Deriving nominal final vowels from constraint interaction

To return to the main line of analysis, I will show that the (non-)realization of the high vowels /i/ and /u/ in final position in Romanian nominals is the result of the interplay of markedness constraints on sonority (Prince and Smolensky, 1993), correspondence (McCarthy and Prince, 1995) and morpheme exponence (McCarthy and Prince, 1993).

With respect to the dimension of sonority, given the Sonority Hierarchy (Selkirk, 1984; Clements, 1988) segments that rank higher in the hierarchy make better syllable peaks:

(9) Sonority Hierarchy

Low V > High V > Liquid > Nasal > Voiced Fric. > Voiceless Fric. > Voiced Stop > Voiceless Stop

Expressed in terms of constraints, the Sonority Hierarchy states that given a constraint of the form *PK/x that militates against having the particular segment x as a syllable nucleus (peak), the lower the segment x is in the hierarchy, the more high-ranked is the corresponding constraint, as shown in (10) below, following Prince and Smolensky (1993):

(10) *PK/p, t, k >> *PK/b, d, g >> *PK/f, s >> *PK/v, z >> *PK/m, n >> *PK/r, l >> *PK/i, u, i >> *PK/a, o, e, ə

Other things being equal and restricting the discussion to the realization of the nominal ending in Romanian, the ranking above, corroborated with other constraints, correctly predicts the fact that the vocalic ending of feminines /e, ə/ is realized phonetically, while the /u/ ending in masculines/neuters is

² The inflection of Romanian nominals also illustrates cases of more complex alternation, as for example the alternation s/ʃ, as in *pas - paș* ('step - steps'), where the primary coronal or dorsal articulation is involved. For simplicity of exposition, I do not discuss alternations of this sort, as their existence does not crucially affect the demonstration.

codas raising in sonority, to account for the necessity of final [u] in *albastru*, assuming no consonant deletion is active. Thus we obtain the partial hierarchy in (17), exemplified in Tableau (18):

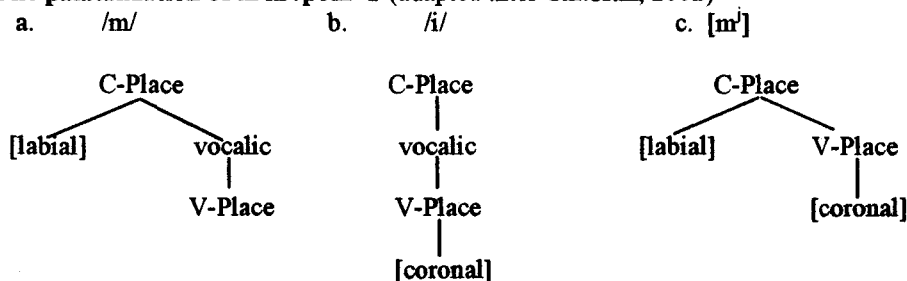
(17) SON-CON >> *PK/i, u >> REALIZE-SINGULAR

(18) Tableau for *pom* 'fruit-tree' and *albastru* 'blue-masculine'

/pom-u _{Sg} /	SON-CON	*PK/i, u	REALIZE-SINGULAR
a. \emptyset pom- \emptyset _{Sg}			*
b. pom-u _{Sg}		*!	
/albastr-u _{Sg} /	SON-CON	*PK/i, u	REALIZE-SINGULAR
a. \emptyset albastr-u _{Sg}		*	
b. albastr- \emptyset _{Sg}	*!		*

Correspondence constraints of the type UNIFORMITY-IO come into the picture in the plural, where there is a potential for palatalization of the consonant adjacent to the plural marker /i/. Before I present an analysis of the morpho-phonological structure of Romanian nominals, a word is in place about the palatal realization of the final consonant in plural forms. With respect to the feature geometry of segments, palatalization in plural forms is accurately described as the spreading of the [coronal] V-Place feature of the vowel [i] (the plural suffix) to the V-Place of the preceding consonant, which acquires a secondary place of articulation, in the spirit of Clements and Hume (1995):

(19) The palatalization of m in /pom+i/ (adapted after Chitoran, 2002)



Palatalization is a process of coalescence by which, while retaining its primary C-Place features, the consonant acquires a secondary [coronal] articulation. The output palatalized nasal [m_{1,2}^l] which corresponds to the input /m_{1,2}/, violates the (anti-)coalescence correspondence constraint UNIFORMITY-IO (McCarthy and Prince 1995), stated in (20):

(20) UNIFORMITY-IO ('No element of the output has multiple correspondents in the input')

Also with respect to coalescence, the Romanian definite article is a clitic with a relatively high degree of integrity and undergoes coalescence only as a last resort, unlike the plural morpheme /i/ which, as we have seen, can coalesce with the final segment of the root giving rise to a palatalized consonant in the plural indefinite. Consider the examples below:

(21)				
a.	<i>pom-\emptyset</i>	'fruit-tree'	<i>pom-u-l</i>	'the fruit-tree'
	<i>pom-i-j</i>	'the fruit-trees'		UR /pom-u-l/ UR /pom-i-i/
b.	<i>munt-e</i>	'mountain'	<i>munt-e-le</i>	'the mountain'
			<i>munts-i-j</i>	'the mountains'
				UR /munt-e-le/ UR /munt-i-i/
c.	<i>kart-e</i>	'book'	<i>kart-e-a</i>	'the book'
d.	<i>mas-a</i>	'table'	<i>mas-a</i>	'the table'
				UR /kart-e-a/ UR /mas-a-a/

In the plural definite form of the masculines (21a - b), the definite article is desyllabified to the corresponding offglide [j], and does not merge with the preceding segment as in the case of the plural marker with which it is homophonous. Feminines (21c - d), which are always overtly vowel-final, attach the article a. If the stem ends in e (21c), this desinence vowel is desyllabified to the corresponding glide and the sequence theme vowel - article is realized as the diphthong [ɛa], with the preservation of the integrity of the clitic segment. If the feminine stem ends in ə (21d), this strategy is no longer available, since in Romanian there is no glide that corresponds to schwa. As the sequence əa is disallowed by a high-ranking phonotactic constraint, the last resort is either to sacrifice the integrity of the article and merge it with ə to form a segment, [a], or to delete ə, to the same effect. Either way, the picture suggests that the clitic article resists coalescence. The property of clitic elements to resist coalescence is the result of the activity of UNIFORMITY-IO-CL:

(22) UNIFORMITY-IO-CL ('No element of the output of a clitic has multiple correspondents in the input')

The fact that UNIFORMITY-IO-CL is sufficiently high-ranked as to protect clitic material from coalescence is supported by the similar behavior of other clitics of the language, like the possessive /i/ in *pom-u-j* 'his fruit-tree', which does not coalesce with the root to yield **pomⁱ*. In contrast, the suffix [-i], which is the plural marker in nouns or the second person singular ending of the Present Indicative in verbs, freely palatalizes the final consonant of the root, as in *pomⁱ* 'fruit-trees' or *dormⁱ* 'you sleep'.

The relative ranking of the anti-coalescence constraints UNIFORMITY-IO and UNIFORMITY-IO-CL with respect to other members of the hierarchy is given in (23):

(23) UNIFORMITY-IO-CL >> *PK/i, u >> UNIFORMITY-IO

In support of (23) come the harmonicity relations $pom^i \phi pom_i$ (*PK/i, u >> UNIFORMITY-IO) and $pom_{ij_2} \phi pom^{h_2}$ (UNIFORMITY-IO-CL >> *PK/i, u), as can be seen in Tableau (24):

(24) Tableau for *pomⁱ* ('fruit-trees') and *pom_{ij}* ('fruit-trees - definite')

/pom-i _{Pl} /	UNIFORMITY-IO-CL	*PK/i, u	UNIFORMITY-IO
a. ϕ pom ⁱ			*
b. pom-i _{Pl}		*!	
/pom-i _{1(Pl)}} -i _{2(Def)} /	UNIFORMITY-IO-CL	*PK/i, u	UNIFORMITY-IO
a. ϕ pom-i ₁ -j ₂		*	
b. pom ^{h_{1,2}}	*!		*

The constraints SON-CON, REALIZE-DEF, REALIZE-PL and UNIFORMITY-IO-CL are never violated by the actual outputs, therefore they are undominated. Taking into account the results in (17) and (23), we obtain the final ranking of these constraints:

(25) SON-CON, REALIZE-DEF, REALIZE-PL, >> UNIFORMITY-IO-CL >> *PK/i, u >> UNIFORMITY-IO, REALIZE-SING

Now we are in a position to build a tableau comprising the whole Nominative paradigm of a consonant-final masculine:

(26) Tableau for *póm* 'fruit-tree'

1. Sg. Indef. /pom-u _{Sg} - Ø _{Def} /	REALIZE- DEF	REALIZE- PL	UNIFORMITY -IO-CL	*PK /i, u	UNIFORMITY- IO	REALIZE- SING
a. pomu ⁴				*!		
b. \emptyset pom-Ø						*
2. Pl. Indef. /pom ₁ -i ₂ - Ø _{Def} /	REALIZE- DEF	REALIZE- PL	UNIFORMITY -IO-CL	*PK /i, u	UNIFORMITY- IO	REALIZE- SING
a. pom-Ø		*!				*
b. pom ₁ i ₂				*!		
c. \emptyset pom ₁ ^{j2}					*	
3. Sg. Def. /pom-u _{Sg} -l _{Def} /	SON-CON REALIZE- DEF	REALIZE- PL	UNIFORMITY -IO-CL	*PK/i, u	UNIFORMITY- IO	REALIZE- SING
a. \emptyset pomul				*		
b. pom-Ø	*!					*
c. pomu	*!			*		
d. poml	* !					*
e. pom ^{w1}	*!				*	
4. Pl. Def /pom ₁ -i ₂ -i ₃ /	REALIZE- DEF	REALIZE- PL	UNIFORMITY -IO-CL	*PK/i, u	UNIFORMITY- IO	REALIZE- SING
a. pom ₁ i ₂	*!			*		
b. pom-Ø	*(!)	*(!)				*
c. pom ₁ i ₂ i ₃				*!*		
d. \emptyset pom ₁ i ₂ i ₃				*		
e. pom ₁ i ₃		*!		*		
f. pom ₁ i ₂ i ₃				*	*!	
g. pom ₁ ^{h,2}			*!		**	
h. pom ₁ ^{j2} i ₃				*	*!	

The ranking in (25) correctly predicts the realization of a nominal with overt final [u] like *albastru* 'blue-masculine.' For the purpose of this study, I disregard the alternance s/f in the root. Also with respect to the root, it is worth noting that this morpheme enjoys a high degree of segmental faithfulness, for which reason resolution of the final consonant cluster is not done by deleting segments from the root at the expense of MAX-ROOT-IO, but rather by maximizing the realization of the underlying desinence vowel which surfaces faithfully as the expression of the singular number, as attested by the ranking in (26) and Tableau (27):

(26) MAX-ROOT-IO >> *PK/i, u

⁴ In casual and connected speech, the singular definite is sometimes realized as *pomu*. For the purpose of the present study I will set aside the discussion of the factors that govern casual speech in Romanian and assume that this form is suboptimal.

(27) Partial tableau for *albastru* 'blue-masculine'

/albastr-u _{Sg} /	MAX-ROOT-IO	*PK/i, u
a. \emptyset albastr-u _{Sg}		*
b. albast- \emptyset _{Sg}	r!	

In Tableau (27) the candidate *albast*, although it does not realize the desinence, in compliance with below *PK/i, u, deletes a consonant from the root, and loses due to the crucial ranking in (26).

The Nominative paradigm of *albastru*, a prototypical nominal with the overt vowel ending [u], is given in (28):

(28) Tableau for *albastru* 'blue-masculine'

1. Sg. Indef. /albastr-u _{1Sg} - \emptyset _{Def} /	SON-CON	REALIZE- DEF	REALIZE- PL	UNIFORMITY- IO-CL	MAX-ROOT- IO	*PK/ i, u	UNIFORMITY -IO	REALIZE- SING
a. \emptyset albastru ₁ ⁵						*		
b. albastr	*!							*
c. albast					*!			*
2. Pl. Indef. /albastr-i _{1Pl} - \emptyset _{Def} /	SON-CON	REALIZE- DEF	REALIZE- PL	UNIFORMITY -IO-CL		*PK/ i, u	UNIFORMITY -IO	REALIZE- SING
a. albastr	*(!)		*(!)					*
b. \emptyset albastr ₁						*		
c. albastr ¹	*(!)			*				
3. Sg. Def. /albastr-u _{1Sg} - l _{Def} /	SON-CON	REALIZE- DEF	REALIZE- PL	UNIFORMITY -IO-CL		*PK/ i, u	UNIFORMITY -IO	REALIZE- SING
a. \emptyset albastru ₁						*		
b. albastr	*!							*
c. albastru ₁		*!				*		
d. albastr ₁	*!							*
4. Pl. Def. /albastr-i _{1Pl} - i _{2Def} /	SON-CON	REALIZE- DEF	REALIZE- PL	UNIFORMITY -IO-CL		*PK/ i, u	UNIFORMITY -IO	REALIZE- SING
a. albastr ₁		*!				*		
b. albastr	*(!)	*(!)	*(!)					*
c. albastr ₁ ₂						*!*		
d. \emptyset albastr ₁ ₂						*		
e. albastr ₂			*!			*		*
f. albastr ² ₂						*	*!	
g. albastr ^{1,2}	*(!)			*(!)			*	
h. albastru		*!				*		

⁵ I disregard a candidate like albastr^{w1}, since a labialized consonant in coda position is disallowed in Romanian.

To conclude this section on the representation of nominals in Romanian, final high vowels surface only under certain well-defined circumstances, as the result of the interaction between constraints on syllable constituency, morpheme exponence and integrity. The picture is reminiscent of high vowel apocope, attested in Kagoshima Japanese, Balto-Finnic (Kenstowicz, 1994), Gilbertese (Blevins, 1997), Old English (Hogg, 2000) etc., under a wide variety of conditioning factors, as high vowels are favorite targets for apocope (Howe and Pulleyblank, 2001), possibly due to their low place on the sonority scale and favored by word final position. Specifically, in Romanian high vowel apocope is triggered by the specific sandwiching of a constraint regulating the presence of a segment as a syllable peak (*PK/i, u) between constraints that require the realization of morphological material (REALIZE-DEF, REALIZE-PL and REALIZE-SING). To all this we should add the specific patterning of word classes with respect to prosodic structure, the major split being the one between verbs and nominals, well-attested in Romance (Roca, 1999).

4. Final [u] from the perspective of diachrony and dialectology

So far I have provided an array of synchronic arguments for the claim that all Romanian nominals are underlyingly vowel-final and that the vowel is realized in masculines and neuters only under specific circumstances. The history of the language provides us, if not with a full-fledged argument, at least with a confirmation of the logic of the analysis. Diachronically, [u] is a remnant of the Latin thematic vowel [u] in second declension nouns like *pom-u-s* 'fruit-tree', the precursor of Romanian *pom*. After the drop of final consonants in Vulgar and Late Latin, the process went on in Proto-Romanian and [u] was dropped too. In other Romance idioms, [u] either survived as such (Portuguese and the Aromanian dialect of Romanian) or was lowered to [o] (Italian, Spanish). Although generally unpronounced in the base form of nominals, Romanian [u] continued to surface in certain contexts like the definite singular (*pom-u-l*) or when preceded by consonant clusters (*albastr-u*) to ensure syllable well-formedness.

The logic of language change seems to be in favor of underlying /u/ as opposed to epenthetic [u]. For the sake of the argument, suppose that in the transition from Late Latin to (Old) Romanian the thematic vowel was dropped from the underlying representation and that later on, with the emergence of the suffixed article [l], [u] was epenthesized between the root and the article to ensure syllable well-formedness. As Hawkins (*p.c.*) points out, this schema is highly implausible, as historically languages do not first delete a segment and then revert to the same phonological material, unless as a pure coincidence. More plausibly, there was a period in the development of the language when final /u/ was both present underlyingly and pronounced, as it is in present-day Aromanian dialect of the language. In Standard Romanian, /u/ remained part of the underlying representation and was realized only when dictated by the phonotactics of the language, in particular, by the necessities of syllabification. Its constant presence in the definite singular of masculines and neuters cued the speakers as to its presence in the input.

If we examine data from the Aromanian dialect of Romanian, spoken mainly south of the Danube, /u/ does surface in the indefinite form of masculines and neuters, irrespective of the context:

(29) The realization of final /u/ Aromanian indefinite nominals

Standard Romanian		Aromanian Dialect	
Output	Input	Output	Input
<i>kurs</i> 'course'	/kursu/	<i>kurs-u</i>	/kursu/
<i>mult</i> 'much'	/multu/	<i>mult-u</i>	/multu/
<i>standard</i> 'standard'	/standardu/	<i>standard-u</i>	/standardu/

In this particular dialect the definite marker is [lu], not [l] as in standard Romanian⁶. It seems that the two dialects, which started their divergent evolution in the early Middle Ages, reflect two different strategies of handling one and the same input, resulting in a reordering of constraints, a standard

⁶ Whether *u* in *-lu* is epenthetic or underlying is not an issue here.

pattern of language change from the point of view of Optimality Theory. Thus the constraint *PK/i, u came to be higher ranked in Standard Romanian, but dominated by MAX-IO in Aromanian:

(30) *PK/i, u >> MAX-IO (Standard Romanian)

The workings of this ranking in Standard Romanian are shown in Tableau (31):

(31) Partial tableau for *pom* 'fruit-tree' in Standard Romanian

/pom-u/	*PK/i, u	MAX-IO
a. σ pom-Ø		*
b. pom-u	*!	

Roughly speaking, this picture is indicative of the existence of a factorial typology, in which the constraint ranking *PK/i, u >> MAX-IO (30) yields nominal outputs like the ones in Standard Romanian, while the opposite ranking (MAX-IO >> *PK/i, u) leads to the high vowel final nominals of Aromanian.

5. Consequences for the computation of nominal stress

Primary stress in Romanian nominals has been assumed to be assigned by building a syllabic trochee at the right edge of the prosodic word (Chitoran, 1996; Iscrulescu, 2001, 2002), although there is no consensus as to the way nominal stress is computed in Romanian (for a different view see Chitoran, 2002). A full discussion of the nominal stress system of Romanian is not in place here. In this section I will only mention some consequences the representation proposed for Romanian nominals has on the assignment of primary stress and I suggest that the representation this paper argues for offers an argument in favor of the syllabic trochee analysis.

In the case of the superficially vowel-final nominals with penultimate stress in (2), the construction of the right edge syllabic trochee is transparent. Masculine and neuter consonant-final forms with final stress (2) seem to pose a problem for this line of analysis, since they end in a stressed CVC syllable at the output level, and no proper syllabic trochee can be built. However, if one acknowledges the fact that even these nominals are underlyingly vowel-final and that final [-u] is deleted as dictated by the constraint hierarchy in (25), the syllabic trochee analysis becomes plausible. In this situation (counterbleeding) opacity arises, blurring the regular process of building a disyllabic foot ($\sigma\sigma$) at the right edge of the prosodic word. For the sake of comparison, consider a derivational account of stress assignment in a consonant-final masculine like [im.pə.rát] 'emperor' and a vowel-final adjective like al.bás.tru 'blue-masculine, where both nouns end in a high vowel at the input (SR) level:

(33) A derivational account of stress assignment in Romanian nominals

UR	/impəratu/	/albastru/
1. <i>Syllabification</i>	im.pə.ra.tu	al.bas.tru
2. <i>Footing, stress assignment</i>	im.pə.(rá.tu)	al.(bás.tru)
3. <i>u-deletion</i>	im.pə.(rát)	N/A
SR	im.pə.(rát)	al.(bás.tru)

Assuming an input not specified for stress, as in the unmarked case, Process 1 (Syllabification) parses the sequence of segments into syllables, after which Process 2 (Footing and stress assignment) builds a disyllabic trochee at the right edge of the word. Finally, Process 3 (u-deletion) applies whenever allowed by syllable structure and the syllabic trochee is destroyed. If Process 3 applied before Process 2, the result would be the unattested output *im.(pə.rat). Note that the rule of u-deletion must be ordered after footing and stress assignment, to prevent the realization of illicit syllable structure as in *albástr. The way things are, the situation is reminiscent of counterbleeding or non-

surface apparent opacity (McCarthy, 1999). To overcome the difficulty arising from this type of opacity, a Sympathy analysis *à la* McCarthy, 1999 can be implemented (Isculescu, 2002). Alternatively, one could make a case for enriched outputs along the line of Turbidity Theory (Goldrick, 2000; Goldrick and Smolensky, 1999) and consider that the final vowel in the input does project a mora, but does not get pronounced in the actual output.

According to Turbidity Theory, outputs are allowed to contain abstract material, that can project an element on a higher tier (for example, a segment that projects a mora), but is not necessarily pronounced. With this specification, the two-level representation of a masculine consonant-final noun like *pom* ‘fruit-tree’ is the one in (34):

(34) a. UR: /pomu/

b. SR:



The tension between the elements of abstract representation allowed in the output and the phonetic shape of items is captured in terms of constraints on covert representation (\nearrow) and constraints on phonetic realization/ pronunciation (\searrow). The key observation is that the final input vowel, which starts out with a projected mora⁷, is not pronounced due to the activity of a high-ranked version of *PK/u \searrow that does not allow it to be pronounced. Let this constraint be *PK/u \searrow :

(35) *PK/u \searrow (‘do not pronounce the peak u’)

The unmarked situation, in which projected elements Y have a reflex in the phonetic realization of the respective segments X, is expressed by the constraint RECIPROCITY^{X_Y} or \mathfrak{R}^{X_Y} , defined below following Goldrick (2000):

(36) RECIPROCITY^{X_Y} (‘if Y projects to X, then X must pronounce Y’)

In the particular case under study, X represents a vocalic segment and Y, the mora it projects. The fact that the final vowel *u* has no overt realization shows that *PK/u \searrow and MAX-IO are undominated. Both of them crucially dominate RECIPROCITY^{X_Y}:

(37) *PK/u \searrow , MAX-IO >> RECIPROCITY^{X_Y}

Tableau (38) shows how the actual output (b) is generated. This is the candidate that projects the expected metrical structure in agreement with the syllabic trochee ($\sigma\sigma$) pattern observed in lexically-unmarked nominals. Since the mora on the final vowel is not pronounced and is reaffiliated with the final vowel of the root, the trochee is realized as sub-minimal (σ). The fully faithful candidate (a) is penalized by *PK/u \searrow , while the candidate that is homophonous with the winner, (c), loses on MAX-IO:

⁷ I assume that input vowels are inherently moraic; to what extent they preserve their moraic status results from constraint interaction.

(38) Tableau for *póm* 'fruit-tree'⁸

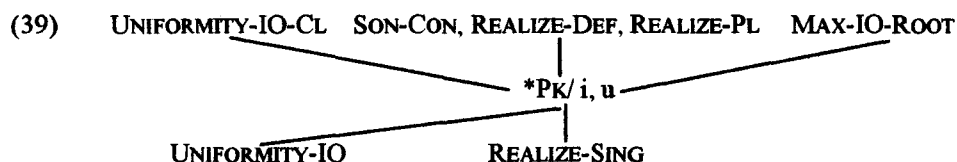
/pomu/	*PK/u ↘	MAX-IO	RECIPROCITY ^{X_Y}
a. $\begin{array}{c} \mu \\ \\ (\text{p}\acute{o}.\mu\text{u}) \end{array}$	*!		
b. $\begin{array}{c} \emptyset \\ \nearrow \mu \\ (\text{p}\acute{o}.\mu\text{u}) \end{array}$			*
c. (póm)		*!	

Interestingly, the implementation of Turbidity seems to offer independent evidence for final CVC syllables in Romanian as being heavy, due to the fact that the mora originally projected by the final high vowel gets pronounced on the superficially final consonant, while the underlying final vowel does not find a phonetic expression.

The analysis presented in this section shows that the representation of Romanian nominals argued for in this paper is not only borne out by synchronic and diachronic arguments, as appears from the preceding chapters, but is also useful in accounting for stress assignment and syllable weight in this language.

6. Conclusion

In this paper I have presented an optimality-theoretic account of the phonological shape of Romanian nouns and adjectives. The account I propose for the representation of nominals in Romanian confirms the fact, which has been noted in the literature, but never systematically accounted for, that all nominals are vowel-final at the input level, and that the underlying vocalic desinence surfaces in all feminines and under special circumstances, in masculines and neuters as well. The novelty that the paper brings resides in providing evidence for the covert existence of the vocalic desinence in the base form of masculines and neuters, and deriving this behavior from the interaction between markedness constraints on sonority, correspondence and morpheme exponence constraints. The lattice of constraints that are active in shaping the representation of Romanian nominals is given in (39):



More generally, the (non-)realization of the vocalic ending in nominals is the result of the interaction of morphological faithfulness and phonological markedness, as expressed by the hierarchy in (40):



The analysis conducted on Romanian nominals in point of representation consequences for primary stress assignment illustrates the theoretical issue of the interaction between the morphological module of the grammar and phonology, which manifests itself in two major ways: first, the morphological status of segments (related to morpheme exponence) proves active in determining the phonological realization of nominals; second, certain morphemes, stems, are privileged in enjoying a special prosodic status in the computation of primary stress, a picture which is reminiscent of morphologically-dependent (interface) systems (Revithiadou, 1998).

⁸ For ease of exposition, I disregard the moraic properties of *o*, the other vowel in the word.

References

- Augerot, James E. (1974). *Romanian phonology: a generative phonological sketch of the core vocabulary of standard Romanian*, Idaho Research Foundation, Inc., University of Idaho.
- Benua, Laura (1995). Identity Effects in Morphological Truncation, in Jill Beckman, Laura Walsh Dickey and Suzanne Urbanczyk (eds.), *Papers in Optimality Theory*. University of Massachusetts Occasional Papers in Linguistics 18, Amherst, Mass.: Graduate Linguistic Student Association
- Blevins, Juliette (1997). Rules in Optimality Theory: two case studies in Iggy Roca (Ed.), *Derivations and Constraints in Phonology*, 227-60. New York: Oxford University Press.
- Chitoran, Ioana (1996). Prominence vs. Rhythm: The Predictability of Stress in Romanian in Zagona, Karen (Ed.), *Grammatical Theory and Romance languages: Selected papers from the 25th Linguistic Symposium on Romance Languages (LSRL XXV) Seattle, 2-4 March 1995*, Amsterdam, The Netherlands: John Benjamins Publishing Co, pp. 47-58
- Chitoran, Ioana (2002). *The Phonology of Romanian: A Constraint-Based Approach*, Mouton de Gruyter, Berlin-New York
- Clements, George N. (1988). The Role of the Sonority Cycle in Core Syllabification, *Working Papers of the Cornell Phonetics Laboratory* 2, 1-68
- Clements, George N.; Hume, Elizabeth (1995). Internal organization of speech sounds in J. Goldsmith (Ed.) *The Handbook of Phonological Theory*, Oxford: Blackwell, pp. 245-306
- Goldrick, Matthew (2000). Turbidity and the unity of opacity, [ROA-368, <http://roa.rutgers.edu>]
- Goldrick, Matthew; Smolensky, Paul (1999). Opacity, Turbid Representations, and Output-based Explanation, paper presented at the Workshop on the Lexicon in Phonology in Phonetics, University of Alberta, Edmonton, Alberta
- Hogg, Richard M. (2000). On the (non-)existence of High Vowel Deletion in A. Lahiri (Ed.) *Markedness and Language Change*. Berlin: Mouton de Gruyter, 353-376
- Howe, Darin; Pulleyblank, Douglas (2001). Patterns and timing of glottalisation, *Phonology* 18:1, 45-80
- Isculescu, Cristian (2001). Romanian nominal stress in Optimality Theory, Ms., University of Southern California, Los Angeles.
- Isculescu, Cristian (2002). Constraint Interaction in the Phonology of Romanian Nominals, Ph D Screening Paper, University of Southern California, Los Angeles.
- Kager, René (1999). *Optimality Theory*, Cambridge University Press
- Kenstowicz, Michael (1994). *Phonology in Generative Grammar*, Cambridge, MA: Blackwell.
- Kitto, Catherine and De Lacy, Paul (1999). A correspondence theory of epenthetic quality, in Catherine Kitto and Carolyn Smallwood (Eds.) *Proceedings of AFLA (Austronesian Formal Linguistics Association) VI*. Toronto Working Papers in Linguistics, pp. 181-200.
- Kurisu, Kazutaka (2001). *The Phonology of Morpheme Realization*, Ph.D. Dissertation, University of California, San Diego, [ROA-490, <http://roa.rutgers.edu>]
- McCarthy, John J. (1999). Sympathy and phonological opacity, *Phonology* 16, 331-399
- McCarthy, John J.; Prince, Alan (1993). Prosodic Morphology I: constraint interaction and satisfaction [ROA-482 <http://roa.rutgers.edu>]
- McCarthy, John J.; Prince, Alan (1995). Faithfulness and reduplicative identity, in Jill Beckman, Laura Walsh Dickey and Suzanne Urbanczyk (Eds.), *Papers in Optimality Theory*. University of Massachusetts Occasional Papers in Linguistics 18, Amherst, Mass.: Graduate Linguistic Student Association 249-384.
- Prince, Alan; Smolensky, Paul (1993). *Optimality Theory: constraint interaction in generative grammar*, Ms., Rutgers University, New Brunswick and University of Colorado, Boulder.
- Revithiadou, Anthi (1998). *Headmost Accent Wins: Head Dominance and Ideal Prosodic Form in Lexical Accent Systems*, Holland Academic Graphics, The Hague.
- Roca, Iggy M. (1999). Stress in the Romance Languages, in van der Hulst, Harry (Ed.), *Word Prosodic Systems in the Languages of Europe*, Mouton de Gruyter, Berlin -New York
- Selkirk, Elizabeth (1984). On the Major Class features and Syllable Theory, in M. Aronoff and R.T. Oehrle, (Eds.), *Language Sound Structure: Studies in Phonology Dedicated to Morris Halle by his Students* MIT Press, Cambridge, Mass.
- Steriade, Donca (1984). Glides and Vowels in Romanian, *Berkeley Linguistics Society* 10, 47-64
- Walker, Rachel (2000). Nasal reduplication in Mbe affixation, in *Phonology* 17 (2000) 65-115.