ASPECTS OF ECUADORIAN VOWEL REDUCTION*

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Reduction and elision of unstressed vowels is frequent in Andean Spanish, particularly in contact with /s/. The front vowels /e/ and /i/ are most often affected. The present study is based on data from Ecuadorian Spanish, and develops a model of unstressed vowel reduction (UVR) which accounts for the interaction of front vowels and /s/. UVR follows devoicing and shortening, which in the extreme case leads to loss of the defining feature [-cons]. Since front vowels share redundant and distinctive articulator features with /s/, this allows for the Root node associated with the devoiced vowel to link to the Place node of /s/, with eventual loss of the skeletal slot. In the final syllable, UVR is given additional momentum by the status of /e/ as the default vowel. It is also suggested that pretonic UVR in words admitting more than one prosodic analysis is partially determined by the existence of paradigmatic alternations with morphologically more basic forms in which the targetted vowel undergoes UVR.

1. INTRODUCTION

1.1. A noteworthy feature of many Latin American Spanish dialects is the reduction and elision of unstressed vowels under certain conditions. Erosion of unstressed vowels, while occurring sporadically in the rapid speech of many areas, is characteristic of two large regions: much of northern and central Mexico, and the Andean highlands of South America, particularly in Ecuador, Peru and Bolivia. In these areas, vowel reduction is most frequent in contact with /s/, hence impressionistic representations like *Potosí* > *Potsí*, *pues* > *ps*, *muchas partes* > *muchs parts*.

1.2. Reduced vowels normally pass through intermediate stages of devoicing, shortening, and at times centralization, so that unstressed vowel reduction (UVR)[1] is not

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simply deletion. In addition to a hierarchical ranking of conditioning environments and a high degree of variability at the idiolectal level, there appear to be qualitative differences among dialects, few of which have been closely examined.

In Mexican Spanish (Lope Blanch 1963), nearly 90% of UVR takes place in contact with /s/. Of these cases in turn, more than 90% occur before /s/ and most follow voiceless consonants. Syllabic structure (open or closed) evidently has no effect on Mexican UVR.

UVR in highland Peruvian Spanish is somewhat different (Hundley 1983). Although /s/ is the major consonant favoring UVR, position of the unstressed vowel with respect to /s/ is of little importance. As with Mexican Spanish, syllabic structure proves to be irrelevant in conditioning UVR.[2]

Fewer details are available for Bolivian Spanish, but available studies (e.g. Gordon 1980) indicate that UVR is most frequent following voiceless consonants and preceding /s/. All studies on UVR coincide in noting /e/ as the vowel most frequently reduced, followed by /o/.

1.3. The diversity of observations regarding UVR in Spanish, together with the paucity of regional studies, encourage additional research. The present study presents UVR data from Ecuadorian Spanish. A model of UVR is proposed in which devoicing and shortening of unstressed vowels entails loss of the specification [-consonantal]. The conditioning effect of /s/ and the preference for front vowels are attributed to partially coinciding feature specifications. Additional momentum is given to posttonic UVR by the morphological redundancy of many instances of /e/ and /o/. Pretonically, it is suggested that choice of stress patterns, hence choice of the syllable affected by UVR, may be affected by paradigmatically-related 'base forms' to which UVR applies predictably.

The remainder of this study is organized as follows: Section 2 presents the Ecuadorian data; Section 3 proposes a phonetic model of UVR; Section 4 examines the interaction of prosodic and morphological structures; Section 5

comments on possible phonotactic restructuring; Section 6 summarizes the discussion.

2. THE ECUADORIAN DATA

2.1. It is not the purpose of this study to offer detailed quantitative data on Ecuadorian UVR, but rather to formulate a model based on widely-observed tendencies. The following observations emerge from an analysis of the Ecuadorian corpus:[3]

(a) UVR is usual only in contact with /s/.

(b) In syllables other than the final, UVR occurs with approximately equal frequency either preceding or following /s/, providing the /s/ is syllable-initial.

(c) UVR attains its highest frequency in the final syllable (roughly 15% of total occurrences). In this position, /e/ is most often affected (approx. 75% of total instances), followed by /o/ (approx. 10%), and then /a/ (approx. 4%); reduction of /i/ and /u/ is negligible.

(d) Pretonically, UVR is less frequent than in the final syllable, but for reasons to be described in Section 4, it is not feasible to rank various pretonic environments in terms of frequency of UVR. Pretonic UVR is most frequent with /i/ (almost 50% of total cases in the weakest environments, to be described below), followed by /e/ (approx. 30%), with a few instances of UVR affecting /u/ (approx. 5%).

2.2. UVR in the final syllable occurs regardless of the presence or nature of following segments; in particular, it occurs before word-initial vowels: *usted(e)s allá oyent(e)s americanos*, etc. Since resyllabification attaches word-final consonants to the onset of a following syllable, UVR must operate before resyllabification. Once UVR has occurred, word-final /s/ is normally resyllabified with a following vowel. Central Ecuadorian Spanish is noted for voicing of word-final prevocalic /s/ (Robinson 1979; Toscano Mateus 1953:79). In combinations like *usted(e)s allá*, voicing of word-final /s/ occurs about 45% of the time when UVR

has applied, as opposed to about 90% of the time in cases where UVR has not occurred. This difference is presumably due to the devoicing of unstressed final syllables that characterizes UVR.[4]

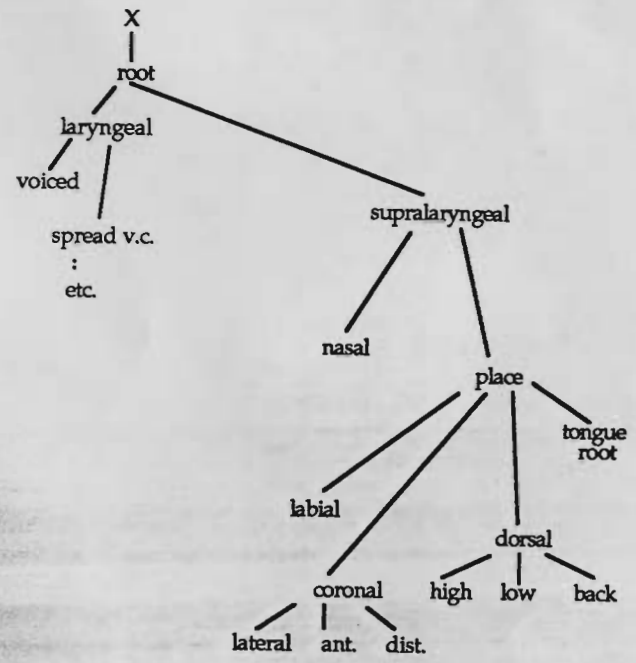
3. TOWARDS A MODEL OF VOWEL REDUCTION

3.1. Boyd-Bowman (1952) postulates that in Mexican Spanish, syllable-final /s/ is responsible for devoicing a preceding vowel, while Lope Blanch (1963) states that the unusually prominent Mexican /s/ 'spreads' to adjacent vowels, devoicing them at the same time. The Ecuadorian data point in the opposite direction: unstressed vowel devoicing is reinforced by a neighboring /s/, rather than being caused by /s/. This conclusion stems from the fact that unstressed vowel devoicing occurs in virtual independence of the nature and voicing of adjacent consonants. Devoicing of unstressed vowels is characteristic of all central highland dialects of Ecuadorian Spanish (and of Andean Spanish in general); it affects contiguous consonants, and frequently spreads over two or more syllables.[5]

Vowel devoicing is the first stage of UVR. However, the preference for /e/ and (pretonically) /i/ to undergo UVR does not follow naturally from devoicing, nor does the extraordinary preference for environments containing /s/. Appeals to 'phonological strength' merely beg the question, and leave unexplained the interaction between specific vowels and consonants that lies at the core of Ecuadorian UVR.[6] What follows is an admittedly speculative model of UVR. To the extent that the remarks can be correlated with events outside the narrow scope of UVR, the proposal gains in circumstantial support.

3.2. Ecuadorian UVR is feasibly approached within an articulator-based model of feature geometry. A total concensus on feature geometry has yet to be achieved; the configuration in (1) illustrates widely accepted common denominators (cf. Clements 1985, 1987; Halle 1983, 1988; Ladefoged 1988; Sagey 1986):

(1)



3.3. The vowels /i/ and /e/ engage the Dorsal articulator, while /s/ engages the Coronal articulator. This does not mean that the remaining articulators remain motionless, but only that they are not intentionally activated during the production of the sounds in question. Halle (1988:180) explains thus:

> When an articulator node switch is thrown into the off position ... the articulator will persist in the position to which it was instructed to proceed during the preceding timing slot, or it may continue to move in the direction of that position ... or ... the articulator may move to its neutral position. In any event, the behavior of an articulator under these circumstances is determined by ... factors that are independent of the speaker's linguistic intentions.

Clements (1976), using a theory that antedates articulator-based models, claims that /e/ and /i/ are [+coronal], and submits evidence of parallel behavior of these vowels and [+coronal] consonants, including [s]. More than a century before, and using a terminology that foreshadowed current models of feature geometry, Rufino J. Cuervo made similar observations (1939:589, refining observations of Cuervo 1867-1872:402):

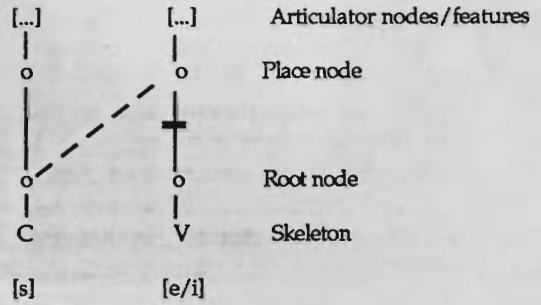
> articúlase la *e* en punto mas inmediato a la *s* que la *a*, y la *i* todavía mas que la *e*, de donde resulta la acción que ejerce la sibilante ... sobre la *e* ...

It has been observed in turn (e.g. Keating 1988:276) that [s] is phonetically [+high].[7] This suggests a greater similarity between front vowels and the coronal consonants implicated in UVR (especially [s]) than is reflected by traditional feature specifications.

3.4. The Root node, or in the model of Bromberger and Halle (1989) the Stricture node, defines the resulting segment as a consonant or a vowel. Sonority and lack of oral constriction are the predominant articulatory characteristics of vowels. In the case of a devoiced and shortened vowel, sonority is not present, and the temporal domain allocated to a minimally constricted articulation is reduced. I submit that, as a transient event which eventually coalesces into a replicable synchronic process, the combination of devoicing and shortening undermines, and in the extreme case removes, the specification [-cons]. At this point both the vocalic matrix and the adjacent /s/ are specified [+continuant] (redundantly in the case of vowels). The Coronal and Dorsal articulator features, which define tongue position and not stricture, are identical for both segments; /s/ actively engages the Coronal articulator while Dorsal features 'come along for the ride,' whereas the reverse distribution characterizes front vowels. The final stage of UVR occurs when the Place node associated with the front vowel is delinked from its Root node, and linked to the Root node of /s/. This may be a

consequence of the Obligatory Contour Principle (e.g. McCarthy 1986), prohibiting adjacent identical elements linked to different skeletal slots. The Root node thus left stranded is eventually pruned, together with the skeletal slot, which is the extreme case of UVR: elision. Schematically this is shown in (2), using the model developed by Schein and Steriade (1986):

(2)



Ecuadorian UVR does not always involve total elision; when elision does not occur, (2) does not come into play, merely an articulatory rapprochement. Only removal of the unstressed vowel requires a mechanism such as (2), which may be extended to other vowels through analogy, at times facilitated by morphological redundancy.

4. THE ROLE OF MORPHOLOGICAL AND PROSODIC STRUCTURE

4.1. Ecuadorian UVR occurs in two main contexts: in the final syllable before /s/, and pretonically, before or after /s/. Regardless of the theoretical model, UVR affects minimally stressed syllables. However, formal models generate more than one stress configuration for certain words; actually occurring patterns involving UVR must be accounted for.[8]

4.2. Spanish word-level prosodic trees are right-branching (*w*) *s*, while foot trees are left-branching *s* (*w*) (Harris 1983:96).[9] In Spanish paroxytones, the final vowel receives weak stress. Stipulating UVR for the weakest vowels in the word suffices to produce the correct results, since UVR may simultaneously affect a final posttonic syllable and a maximally weak pretonic syllable (e.g. *ant(e)cedent(e)s*) Pretonic and posttonic UVR are quantitatively differentiable, in that final vowels succumb to UVR with greater frequency than pretonic vowels with equivalent stress values.[10] UVR in the final syllable affects not only /e/, but also /o/ and at times /a/, in all cases more frequently than pretonic UVR.

4.3. Word-final UVR is most frequent in the combination /-es#/. There are no major differences in UVR based on the internal morphological structure of /-es#/ (e.g. as part or all of the plural morpheme). However, as default vowel (Harris 1987), /e/ is characterized by maximal predictability. This predictability is also shared with the first-personal plural morpheme /-mos#/, which is the other most frequent candidate for word-final UVR, representing nearly the totality of instances of reduction of posttonic /o/. Although morphological redundancy does not directly cause UVR in endings such as /-es/ and /-mos/, it does permit an existing process of UVR to proceed unabated.[11]

4.4. Many words of four or more syllables are subject to nonunique prosodic analyses, reflecting the two basic patterns of nonprimary stress (Harris 1983:86):

(i) nonprimary stress on the first syllable of the word,

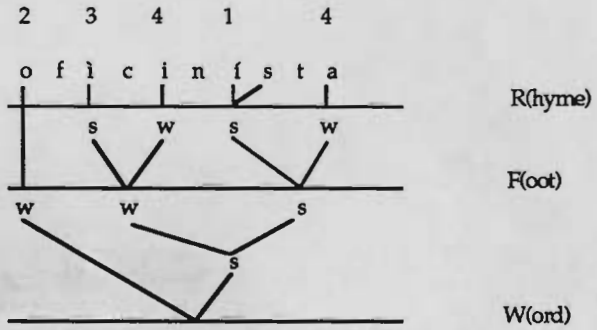
or

(ii) alternating nonprimary stress and unstressed syllables, counting leftward from the primary stressed syllable.

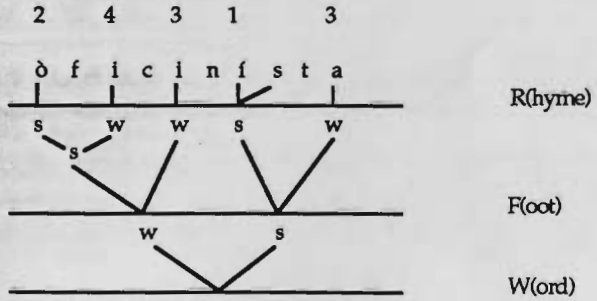
Pattern (i) is frequently considered colloquial, and pattern (ii) is more rhetorical or formal. Taking as an example the word *oficinista*, secondary stress may fall on either of the first two vowels. The prosodic trees and accompanying

stress values (*1* represents primary stress) are shown in (3) and (4):[12]

(3)



(4)



In (3), the second vowel receives secondary stress while the third vowel is maximally weak. In (4), the first vowel receives secondary stress, the second vowel is comparatively weaker, while the third vowel is maximally weak. In the Ecuadorian corpus, *of(i)cinista* is the only result when UVR applies, thus indicating a derivation such as (3). Other items follow a similar pattern:

prof(e)sorado, pres(u)puestario, ofr(e)cimiento, ant(e)cedente, nec(e)sidad, art(e)sanía, repr(e)sentante, ant(i)cipación, sat(i)sfacción, etc.

There is a (smaller) group of similarly-formed words in which UVR occurs in the third syllable, suggesting an analysis such as (4):

expos(i)tor, compos(i)tor, dispos(i)ción, ecos(i)stema, solic(i)tud, etc.

Finally, there are a few words in which UVR alternates between two adjacent pretonic syllables, as illustrated by the following group of paradigmatically-related forms:

partic(i)par-part(i)cipar,
part(i)cipamos-partic(i)pamos,
part(i)cipado-partic(i)pado,
part(i)cipación-partic(i)pación, etc.

4.5. Given (i) the restricted set of UVR environments, (ii) the small number of test words in which UVR could potentially affect more than one pretonic vowel, (iii) the low text frequency of such words, and (iv) complicating factors such as differences among vowels, surrounding consonants, etc., there are few 'minimal pairs' upon which to base a theoretical account. Notwithstanding the limited data, it is noteworthy that words like *of(i)cinista* alternate paradigmatically with forms which are morphologically more basic, and in which the targetted vowel undergoes UVR: *of(i)cina, prof(e)sor, pres(u)puesto, art(e)sano*, etc. Forms like *ecos(i)stema, solic(i)tud* and *dispos(i)ción* are similarly derived from words (e.g. *sistema, solicitar, posición*) in which UVR affects the targetted vowel. In cases like *expos(i)tor* and *compos(i)tor*, analogy with items like *pos(i)tivo* may be operative, or the lack of paradigmatically related forms may itself be a factor affecting the choice of the vowel to which UVR applies. Finally, alternating cases such as

part(i)cipamos-partic(i)pamos,
part(i)cipado-partic(i)pado,
part(i)cipación-partic(i)pación, etc.

all involve verb paradigms and words derived from verbs. The choice of vowels affected by UVR reflects the member of the verb paradigm taken as basic: more frequently a conjugated singular form is involved (*part(i)cipa*),[13] but in other instances the infinitive is the basic form (*partic(i)par*).

4.6. The data just analyzed suggest that in words in which more than one vowel is targetted by alternative prosodic analyses, the resulting stress configuration (and concomitant UVR) is partially affected by the existence of paradigmatically-related forms in which UVR operates predictably. If these observations are born out by subsequent research, it will constitute an interesting type of interrelation between segment-level phonological rules and prosodic variation.

5. UVR AND POTENTIAL SYNTAGMATIC RESTRUCTURING

5.1. UVR potentially produces consonant clusters which violate general Spanish constraints; Hundley (1983, 1986) proposes such an evolution for Peruvian Spanish. Toscano Mateus (1953:61) asserts that in popular Ecuadorian Spanish, at least two verb forms have become lexicalized with initial /s+C/: *spera* < *espera*, and *state* < *estate*. Among literate speakers, UVR is a variable rule. However, UVR is frequent among all social groups, and many speakers apply UVR nearly categorically in their speech; it is thus possible that some phonological restructuring involving vowel deletion has occurred even in the speech of literate individuals. Despite this potential for restructuring, several observations combine to yield the conclusion that the timing slots associated with the vowels in question are not deleted from the phonological representation.[14]

5.2. Borrowed words with initial or final clusters disallowed by general Spanish constraints are equally problematic in Ecuadorian Spanish, while Ecuadorians who learn English, for example, suffer the same difficulties with initial and final consonant clusters as do Spanish speakers from dialects where UVR is not frequent.[15] Additional evidence comes from observing the behavior of 'potential' new clusters, in which altered configurations with respect to the syllable boundary would be expected to produce well-studied consonantal modifications.

In *profesor(e)s*, if /r/ were transferred to the rhyme of the preceding syllable, it should exhibit the assibilation characterizing syllable-final /r/ in Ecuadorian Spanish; such behavior is never observed. Similarly, in *part(i)cipa*, if the /t/ were to form part of the preceding rhyme, it should undergo the fricativization/voicing which accompanies other cases of syllable-final /t/, if not total effacement; again this behavior never occurs. On the other hand, if /ts/ were attached to the onset of the following syllable, a major phonotactic restriction would be contravened. *Of(i)cina* should yield similar results, since in the handful of Spanish words containing syllable-final /f/ (e.g. *difteria*), this is either aspirated to [h] or lost entirely; such does not occur when UVR affects *oficina*. Another example is *digam(o)s*, where if the /m/ became syllable final, it would participate in the nearly exceptionless process of homorganic nasal assimilation or, in the case of the Ecuadorian dialect, of preconsonantal velarization of /n/; this never occurs. In *nosotr(o)s*, deletion of the final vowel would create a rhyme cluster */trs/, which in addition to violating the rigid prohibition of four-segment rhymes in Spanish (Harris 1983:23-4), would violate the hierarchy of sonority requiring elements in the rhyme to occur in strictly descending order of sonority. Finally, if elided vowels were deleted from the phonological representation, words such as *añ(o)s*, *noch(e)s*, *call(e)s* would contain in rhyme position consonants which are excluded by general phonotactic templates.

6. SUMMARY AND CONCLUSIONS

The preceding discussion can be summed up in the following points:

(1) Ecuadorian UVR occurs in the weakest syllables on either side of the primary stressed syllable.

(2) UVR occurs principally in contact with /s/, and preferentially affects front vowels. In the final syllable, reduction of /o/ is also frequent.

(3) In the final syllable, UVR is given additional momentum by the status of /e/ as the default vowel, and of the morphologically predictable status of most instances of /o/.

(4) UVR follows devoicing and shortening, which in the extreme case leads to loss of the defining feature [-cons]. Since front vowels share redundant and distinctive articulator features with /s/, this allows for the Root node associated with the devoiced vowel to link to the Place node of /s/, with eventual loss of the skeletal slot.

(5) Pretonic UVR in words admitting of more than one prosodic analysis is partially determined by the existence of paradigmatic alternations with morphologically more basic forms in which the targetted vowel undergoes UVR.

(6) There is no evidence that UVR in Ecuadorian Spanish has led to phonological restructuring.

The final word on UVR has not been given here, and as linguistic theory evolves, the portrayal of UVR will continue apace. I hope to have demonstrated both the inherent simplicity of UVR as a phonetically-motivated phenomenon, and the complexity introduced by morphological and lexical factors. Remaining unsolved include the ultimate origins of Ecuadorian UVR (language-internal evolution vs. language contact), and the extent to which the present model can be applied to other Spanish dialects in which UVR occurs.

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NOTES

Parts of the present study were presented at the Symposium on Spanish Linguistics, University of Illinois at Chicago (November, 1988). The final version has benefitted enormously by the painstaking and penetrating comments of James Harris, Tracy Terrell, an anonymous HL reviewer, and the HL editorial staff. To all, my sincere thanks; I hope they are not unduly dismayed at this incarnation of their suggestions. Naturally, any remaining inadequacies are mine alone.

[1] In the following discussion, the term *unstressed vowel reduction* refers to any vocalic modification which at the perceptual level results in loss of vocalic identity and/or syllabicity, independent of any acoustic correlates. This includes not only total elision, but also the variable intersection of shortening, devoicing and centralization.

[2] Hundley (1983) postulates that highland Peruvian Spanish is best regarded as *stress-timed*, unlike most other dialects of Spanish, which are *syllable-timed*.

[3] The Ecuadorian data represent interviews with 20 individuals of middle-class background, of age range 18 to more than 80, male and female, from Ibarra, Quito, Riobamba, Cotopaxi, and Cuenca, representing the principal area in which UVR occurs. Each individual was interviewed for 30-40 minutes, and the interviews were taped and subsequently analyzed.

[4] If voicing of word-final prevocalic /s/ is regarded as a form of intervocalic lenition, as has commonly been supposed, then presumably it must apply after resyllabification. However, since UVR evidently occurs before resyllabification, the concurrent action of both processes would appear to be excluded. However, I have proposed (Lipski a) that /s/-voicing is a word-level phenomenon not requiring access to a following segment, and not critically ordered with respect to UVR. Thus, no ordering paradox is involved.

[5] This is vividly demonstrated in spectrographic evidence, in which as many as three or four syllables in a row may be pronounced without voicing. My spectrographic analysis was done under the auspices of the Institute for the Advanced Study of the Communication Process at the University of Florida; thanks are due to W. S. Brown and Harry Hollein for their kind cooperation and technical assistance.

[6] Unstressed vowels in all dialects of Spanish are uniformly shorter than their stressed counterparts, and there is a cross-linguistic tendency for /e/ and /i/ to be proportionately shorter than non-front vowels (cf. Lehiste 1970:18f.; Lipski 1974). Major (1985) demonstrates that Brazilian Portuguese posttonic vowels are weaker than pretonic vowels, a finding which is noteworthy since BP exhibits patterns of UVR which are nearly identical with those found in Ecuadorian Spanish.

[7] In the history of Romance, /s/ has exhibited characteristics of both consonants and, at times, of vowels (Bourciez 1967:48, 156; Anderson 1972:34). Harris (1983:29-30, 1987) argues in favor of a [+syllabic] specification for morpheme-initial /s/ before consonants, whose syllabicity is subsequently absorbed by a prothetic neutral vowel /e/.

[8] I owe to an anonymous HL reviewer the suggestion that UVR may be described exclusively in terms of prosodic structure. While the present section proposes a slight relaxation of this hypothesis, the ensuing discussion follows directly from this challenge, for which I am grateful.

[9] In more recent work (e.g. Harris 1988), Spanish prosodic structures have been described using grid-based models, particularly Halle and Vergnaud (1987). Using grids rather than foot- and word-trees properly accounts for main word stress, but does not always indicate secondary stress, or relative intensity of unstressed syllables. An adequate formulation of UVR crucially depends on relative intensity of syllables which are not formally differentiated as to relative stress, hence on some type of node-counting model.

[10] Relative values of stress are calculated from prosodic trees using the algorithm of Liberman and Prince (1977): starting at the rhyme level, the first *w* node dominating that rhyme is identified. The number of nodes dominating this first *w* node are counted, and *1* is added to the total. The primary stressed syllable receives a value of *1* by default. Using the procedures described, e.g., in Harris (1983), most final syllables of paroxytones receive the weakest stress specification; in proparoxytones and some complex paroxytones (e.g. *antecedentes*), the final vowel receives the second-weakest stress value. This fact usually has no observable consequences, except in words like *ápices*, where UVR nearly always affects the final vowel, despite the fact that the penultimate vowel receives a weaker stress value.

[11] This situation is similar to that characterizing loss of word-final /s/ in other Spanish dialects, where the morphological value of /s/, as well as the presence of other elements in the phrase which supply the information carried by /s/, facilitate elision (cf. Terrell 1977, 1979; Poplack, 1980, 1981).

[12] The relative stress values resulting from the Liberman and Prince (1977) algorithm do not totally coincide with observed pronunciation, since the same stress value is assigned to the (unstressed) first vowel in (3) and the (secondarily stressed) first vowel in (4). Moreover, other discrepancies arise with respect to secondary accents: the derivation of *gramàticalidad* (Harris 1983:96) results in a weaker stress value for the (secondarily stressed) second vowel than for the (unstressed) first vowel. This suggests that the algorithm assigning stress values based on metrical trees be modified, e.g. by counting *s* nodes. Prince (1983) discusses multiple interpretations of metrical grids, and the mapping between grids and perceived patterns of stress.

[13] This lends support to independently motivated theories which postulate the third person singular as the maximally unmarked verb form in Spanish (e.g. Bybee 1985:54-60; Bybee Hooper 1980:166-8).

[14] UVR in Ecuadorian Spanish has not been carried to the extreme found, for example, in many varieties of Portuguese, where vowel loss has resulted in phonological restructuring of both metrical structure and syllabic configurations (e.g. Martins 1982).

[15] In the present corpus, there were no convincing cases of total loss of a word-initial vowel before syllable-final /s/ (e.g. *estamos* > *stam(o)s*). Word-initial /e/ before /s/ may fuse with a preceding vowel, particularly /e/ (e.g. *puede* (*e*)*sperar*). In such cases, no prohibited syllable-types are formed. There is no evidence of a revised set of syllabic structure constraints, as indicated, for example, by hesitation pauses and interruptions, which never resume with the combination *sC-. Lope Blanch (1963) remarked that when Mexican speakers were presented with isolated tokens in which vowels had been deleted (e.g. *barzbés* < *varias veces*, as Canellada and Zamora Vicente (1960) transcribe their Mexican examples), they were totally unable to interpret such combinations as real words. The same experiment was informally tried with Ecuadorian Spanish speakers, with identical results.

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