

SPANISH STOPS, SPIRANTS AND GLIDES: FROM CONSONANTAL TO [VOCALIC]

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0. Introduction: restrictions on Spanish 'continuant spreading'. Traditional descriptions of Spanish pronunciation, usually based on mainstream Peninsular dialects (e.g. Navarro Tomás 1967), assert that Spanish /b/, /d/ and /g/ receive fricative pronunciation except phrase-initially and after nasals. In addition, /d/ is uniformly occlusive after /l/. The environments in which voiced fricatives are predicted to occur include after glides, /s/, /l/, /r/ and other voiced obstruents, as well as preconsonantly in the syllable rhyme. In reality, a number of regional dialects depart from this pattern, limiting the environments in which voiced continuants can appear.

In much of Central America (El Salvador, Costa Rica, Honduras, and Nicaragua), and in highland Colombia, Venezuela and Ecuador, /b/, /d/ and /g/ receive occlusive pronunciation after semivowels, /l/, /r/ and /s/ (cf. Canfield 1981). Even in these dialects, voiced obstruents are normally continuants following syllable-final voiced obstruents (e.g. in *Magdalena*), as are all syllable-final /b/, /d/ and /g/.

Phonological processes which create geminate consonants also affect the realization of voiced obstruents. For example, vernacular Havana Cuban Spanish is characterized by the frequent neutralization of syllable-final liquids, which often takes the form of a geminated version of the following consonant: *algo* > *aggo*, *puerta* > *puetta*, etc. As noted, e.g. by Guitart (1978), Rufz Hernández and Miyares Bermúdez (1984), and Salcines (1957: 32f.), although postconsonantal voiced obstruents are usually fricatives in Cuban Spanish (except for the combination /ld/, in which /d/ is noncontinuant in all Spanish dialects), when a preceding liquid creates a geminate, the resulting voiced obstruent is noncontinuant. In the Spanish of Honduras, postconsonantal voiced obstruents usually receive an occlusive pronunciation. In this same dialect, syllable-final /s/ is weakened to an aspiration [h], and may disappear altogether. Amastae (1989) observes that even when preconsonantal /s/ is elided, following voiced obstruents often emerge at stops (Amastae 1989: 176).

The most striking departure from a simple rule of 'continuant spreading' comes in the Spanish dialect of Las Palmas de Gran

Canaria, in the Canary Islands. In Las Palmas Spanish (LPS), as in all other Canarian varieties, voiced obstruents receive a continuant pronunciation following syllable-final consonants, thus falling in line with 'mainstream' Spanish dialects. However, among the lower sociolinguistic strata, although /b/, /d/ and /g/ are uniformly fricative following [h] < /s/, when preconsonantal /s/ is elided altogether, the following obstruent receives a STOP articulation (cf. Almeida 1990: 48-52; Catalán 1964; Felix 1979; Trujillo 1981: 164-5). This results in minimal pairs such as [laβaka] *la vaca* vs. [labaka(h)] *las vacas* 'the cow(s).'

1. Contemporary accounts of the stop/fricative alternation.

Restrictions of space preclude a detailed critique of currently available theories of stop/fricative alternations in Spanish, but the leading contenders must be mentioned. Early theories of Spanish phonology presupposed a rule of spirantization of voiced STOPS, i.e. elements underlyingly specified as [-continuant] (e.g. Harris 1969). This approach duplicates the historical route of evolution. Beginning with Lozano (1979), the notion that Spanish voiced obstruents might be underspecified for [continuant] has produced fruitful results. Within an autosegmental framework, Mascaró (1984) suggested that spirantization be analyzed as spreading of a preceding [+continuant] autosegment. Harris (1985) proposed a rule which spreads a [+continuant] autosegment rightwards to a voiced obstruent. The nature of the segment to which the [+continuant] autosegment is attached varies among dialects: for some dialects any available segment may trigger continuant spreading, in other dialects the triggering segment must be syllabic (i.e. a vowel), and so forth. The opposite phenomenon, spreading of [-continuant], has also been proposed, beginning with Goldsmith (1981; 1990: 70-71). The broad assignment of a default value, supplemented by a narrow set of specific instances where the opposite value is assigned, has also been explored (e.g. by Hualde 1989, 1991b: 106-7; Branstine 1991).

Amastae (1986) claims that spirantization occurs only in syllable-final position, which includes AMBISYLLABIC configurations such as intervocalic voiced obstruents; [-continuant] is assigned to voiced obstruents which are only syllable-initial (i.e. not ambisyllabic). This analysis has the advantage of recognizing cross-dialectal variation (as do the approaches of Harris and Lozano), but proposes an

additional metatheoretical level of ambisyllabicity (cf. D'Introno, Ortiz and Sosa 1989, Lipski forthcoming for some considerations).

2. **The interplay of gemination and spirantization.** Harris (1985), in dealing with gemination phenomena such as *algo* > *aggo*, *puerta* > *puetta* in Havana Spanish, analyzes the resulting geminate consonant as a single feature matrix linked to two skeletal slots, since the Obligatory Contour Principle (McCarthy 1986) disallows adjacent identical matrices. As such, the geminate must respect the Linking Constraint (Hayes 1986) or the Uniform Applicability Condition (Schein and Steriade 1986), which require that linking lines be exhaustive. In other words, for a rule to apply to the linked matrices comprising a phonological geminate, each 'half' of the geminate must meet the structural description of the rule. For Havana Spanish, Harris asserts that when a LIQUID + VOICED OBSTRUENT combination produces a linked structure, both members agree in continuancy, with the value of [continuant] being determined by the SECOND member. However, continuant spreading from a preceding vowel to the second half of the geminate voiced obstruent is prohibited by the Linking Constraint. Therefore, the second element of the geminate can only receive a default specification for [continuant], which in Spanish is [-continuant], in turn transmitting this value to the first half of the geminate (cf. also Amastae 1989). However, in Cuban Spanish, elision of /s/ before a voiced obstruent sometimes creates a gemination of the second consonant, although compensatory vowel lengthening is a more common alternative. The geminate voiced obstruents which result are usually fricative, rather than the stops which would be predicted if the Linking Constraint impeded spreading of [+continuant] (Ruíz Hernández and Miyares Bermúdez 1984). This suggests that 'continuant spreading' following rhyme-final (delinked) liquids is blocked in Cuban Spanish not by the dually linked configuration, but rather by a [-continuant] specification for liquids in at least some dialects or sociolects. A further demonstration of the logical independence of spirantization and gemination comes in the Spanish dialect of Cartagena, Colombia. This variety is also characterized by gemination of syllable-initial consonants following the absorption of a liquid or /s/ in the rhyme of the preceding syllable. In this dialect, when a geminate voiced obstruent is formed, it is usually given a fricative pronunciation (Becerra 1985: chaps. 4, 7).

If continuant pronunciation of Spanish voiced obstruents arises through spreading of [+continuant] from a preceding segment, an analysis based on the blocking effect of the Linking Constraint is inadequate for formal reasons. Under any current model of feature geometry and gemination (cf. Clements 1985, 1987; McCarthy 1988; Sagey 1986; Schein and Steriade 1986; Yip 1989), a geminate consonant consists of a single set of feature specifications linked to two timing slots. Although there is no total consensus on the position of [continuant] within feature geometry, a geminate consonant will have only a single place of attachment for this feature. The linking lines which define a geminate consonant link the skeleton to the feature matrix defining the consonant; a rule spreading [continuant] makes no reference to the skeleton, but only to the node in the geometric structure to which [continuant] attaches. Thus the Linking Constraint is irrelevant to spreading of [continuant]. Providing that no value of [continuant] has previously been supplied (and this is the working hypothesis in the case of Spanish voiced obstruents), there is nothing in principle to prevent a previous [+continuant] specification from spreading to a geminate, by definition affecting both 'halves' of the geminate structure.

3. Towards a comprehensive solution: [continuant] vs. [vocalic]. In the balance, the evidence points toward some sort of spreading, given that in all Spanish dialects, /b/, /d/ and /g/ are uniformly occlusive in those positions for which no possible 'continuant' element precedes: phrase-initially (*pace* those who claim that fricatives can sometimes occur in this position—an idiosyncratic oddity at best) and following a nasal. At the same time, in all dialects voiced obstruents are realized as fricatives after the most 'continuant' segments of all, namely vowels. In both instances, the [-continuant] and [+continuant] values, respectively, are virtually exceptionless; there is no variability in these contexts. The pivotal cases involve consonants and glides, which sometimes seem to share their 'continuant' nature and sometimes are inert as regards continuancy, thus provoking the default assignment of [-continuant] to voiced obstruents. Even in dialects where spirantization of voiced obstruents takes place in postconsonantal contexts, there is considerable variability, involving speed and style, as well as the nature of the particular segments involved. A further look at the two types of

'continuant spreading' suggests a global solution, encompassing two essentially different feature specifications which produce the same epiphenomenon: a voiced continuant.

It is significant that in dialects where spreading of [+continuant] takes place only following vowels, but not after syllable-final /l/, /r/, /s/, etc., continuancy spreads precisely from those segments for which it is REDUNDANTLY specified. This includes not only vowels, but also syllable-final voiced obstruents, as in *Magdalena*. In these same dialects, spreading of continuancy does not take place following segments for which [continuant] is DISTINCTIVELY specified. At first glance, this state of affairs is exactly the opposite of what would be predicted by a theory incorporating underspecification and feature-assignment by redundancy rules. If, for example, spirantization were conditioned only by distinctively specified [+continuant] segments (e.g. voiceless fricatives and possibly liquids), but not by segments whose [+continuant] specification is added by a redundancy rule (e.g. vowels and glides), then it could be assumed that continuant spreading occurs prior to the default assignment of [+continuant]. The facts, however, indicate that in all monolingual varieties of Spanish, voiced obstruents are spirantized following those segments which are universally underspecified for [continuant], namely vowels. It is only after segments which are distinctively specified for [continuant] that variation among Spanish dialects is found.

The preferred solution capitalizes on the fact that a different sense of 'continuant' is at work in vowels vs. consonants, in the dialects in which differential behavior of voiced obstruents is observed. Indeed, the feature [continuant] when applied to vowels is not only redundant, as for example voicing in sonorants, but is physiologically imperative, analogous to the fact that a [+low] segment must be [-high]. Under this view, a continuant articulation is an automatic consequence of [+vocalic], and need nowhere be specified as [+continuant]. In fact, vowels do not even contain a node to which [+continuant] could attach.

It is proposed that the exceptionless spirantization of Spanish postvocalic /b/, /d/ and /g/ results from the spread of the feature [+vocalic] (or [-consonantal], in more frequently used terms) rightwards from the nuclear vowel, which creates a continuant segment automatically. This also accounts for the uniformly fricative pronunciation of onset-initial voiced obstruents following a voiced

obstruent in the coda (e.g. *Magdalena*): [+vocalic] spreads from the nuclear vowel to the coda consonant, whence to the following onset-initial consonant. According to this proposal, [consonantal]/[vocalic] is underlyingly specified for all consonants except /b/, /d/, and /g/, which only contain the specifications [-sonorant] and [+voice], together with the relevant place features. The rule spreading [+vocalic] is maximally general:

(1) Operation:	spread
Argument:	[+vocalic]
Direction:	Rightwards
Target conditions:	[-sonorant], [+voice]
Trigger conditions:	None

In Spanish dialects in which spirantization of voiced obstruents occurs only postvocally, but not after a coda consonant, a [+continuant] specification attached to a fricative or liquid does not spread, so that strictly speaking the resulting voiced spirants are not [+continuant], a feature which in these dialects is reserved for distinctive specification. Intervening consonants such as /s/, /r/, /l/, etc. are already specified for [-vocalic/+consonantal], thereby impeding the spreading of [vocalic] from a preceding vowel to a following voiced obstruent. Dialects in which continuant spreading occurs following syllable-final /s/, /l/ and /r/ involve the manner feature [continuant]:

(2) Operation:	spread
Argument:	[+continuant]
Direction:	Rightwards
Target conditions:	[-sonorant], [+voice]
Trigger conditions:	None

According to the present proposal, a continuant articulation of voiced obstruents comes about through two different feature specifications: (a) the presence of [+continuant] as a manner of articulation feature, and (b) the combination of a [vocalic] specification and the activation of a consonantal articulator at the Place node. All Spanish dialects share rule (1), creating postvocalic voiced fricatives. Rule (2), creating voiced fricatives following /s/, /l/ and /r/, is not present in all dialects.

4. Motivating the spread of [+vocalic]. The idea that a major class feature such as [vocalic] could attach to a consonantal segment, or that [consonantal] could attach to a vocalic element, has been the subject of previous consideration within phonological theory. However, there has been no consensus as to the relationship among (i) association of [consonantal]/[vocalic], (ii) position within the syllable, and (iii) phonetic manifestations. For example, Kaisse (1992) has explored the possibility that the feature [consonantal] can spread, examining several cases of the 'hardening' of glides and vowels. Kaisse claims that spreading of [+consonantal] automatically entails a [-sonorant] specification. She queries whether [-consonantal] (presumably [+vocalic]) can also spread in the same fashion. The difficulty with finding probative cases lies in the inevitable interaction of weakening and strengthening depending upon syllable position. However, all the observations on 'hardening' and 'vocalization' are set against the background assumption that any 'spreading' of a major class feature such as [consonantal] completely transforms the resulting segment into a member of the 'opposite' category: hardened glides or vowels become obstruents, and vocalized consonants become glides or vowels.

In a comprehensive study of glide-hardening in a dialect of Romansch, Kamprath (1986) has also claimed that the acquisition of consonantal features is in principle independent of syllabification. Her analysis demonstrates that hardened glides, having assimilated [+consonantal] from a following consonant, remain in the nucleus. Montreuil (1992) presents evidence from varieties of Franco-Provençal which indicate that postnuclear hardened glides have become reanalyzed as codas. Adopting a much different concept of distinctive feature structure, Smith (1988) suggests that the simple addition of [consonantal] to a vocalic element is sufficient to transform it into a consonant. By examining a variety of Spanish data which exhibit alternations between glides and voiced obstruents, a different picture emerges: in Spanish, the phonetic realization of a [+vocalic] element is intimately linked to syllabification.

At the vernacular level, many dialects of Spanish exhibit 'glide hardening,' in which a semivocalic element in the syllabic rhyme is replaced by a homorganic voiced obstruent. Most frequently, glides susceptible to hardening are followed by /l/ and /r/ (the only Spanish consonants which occur as the second element in two-member onset clusters) (cf. Alonso 1930, Oroz 1966):

- | | |
|-----------------------|------------------------------|
| (3) aire > adre | Laureano > Labreano |
| Aurora > Abrora | laurel > labrel |
| bautizar > babtizar | maura > mabra |
| Braulio > Brablio | Mauricio > Mabricio |
| caerá > cairá > cadrá | médula > meula > mebla |
| jaula > jabla | taburete > taurete > tabrete |

These data show a systematic alternation between semivowels and voiced fricatives, depending upon syllable position. Semivocalic [j] alternates with [δ], confirming the close relationship between front vowels and coronal consonants, involving activation of the Coronal articulator (cf. Clements 1976, 1991). Similarly, semivocalic [y] alternates with [β], both elements involving the Labial articulator. The free alternation of [j]-[δ] and [y]-[β], which contain identical place features, supports the claim that all elements are specified [+vocalic], with position within the syllable ultimately determining manner of articulation.

The hardened glides initially remain in the syllabic rhyme. Spanish resyllabification, reassigning a coda consonant to the onset of a following syllable, requires that the second syllable be vowel-initial (cf. Harris 1983). In the cases shown in (3) resyllabification of the hardened glides will not occur, because there has been no new juxtaposition of skeletal configurations (a prime requirement for resyllabification), and because the following consonant remains in the syllable onset (cf. Kamprath 1986: 225). This in turn suggests that glide-hardening is a manifestation of a shift from nucleus to coda of a [+vocalic] element (for a similar approach, see Hualde 1991a). Naturally, reanalysis of the resulting voiced fricative into the onset of the following syllable can eventually occur, reflecting the general Romance tendency of onset maximization.

The opposite alternation is also observed in vernacular Spanish of many regions: 'vocalization' of a postvocalic voiced obstruent (which emerges as a fricative due to spread of [+vocalic]), usually followed by a liquid:

- | | |
|---------------------|---------------|
| (4) amable > amaule | madre > maire |
| hablar > aular | padre > paire |
| cuadra > cuaira | |

In these instances, the voiced obstruent in question has previously been syllabified as a coda consonant (for a historical perspective, cf. Martínez-Gil 1990). This is a possible option, since all the consonants subject to 'vocalization' may also occur rhyme-finally in Spanish words (cf. the wide selection of examples in Oroz 1966: 140-5; but for an alternative explanation which does not entail prior resyllabification, see Steriade 1988).

'Vocalization' of voiced obstruents in the coda is also observed in words in which the relevant consonant has not been resyllabified from an originally onset-initial position. In the case of voiceless stops, the first stage is reanalysis and conversion to the corresponding voiced obstruent, after which spreading of [+vocalic] can occur, with the concomitant phonetic modifications:

- | | |
|-----------------------|---------------------------------|
| (5) abdomen > audomen | afecto > afeuto |
| absoluto > ausoluto | cápsula > cáβsula > cáusula |
| acción > ausión | doctor > dogtor > doitor/doutor |
| adquirir > aiquirir | eclipse > eclibse > ecliuise |

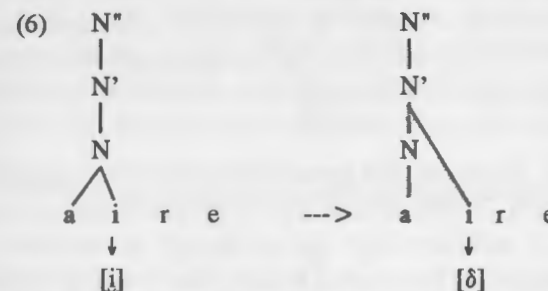
As in the preceding examples, [δ] shifts to [j] and [β] shifts to [y]; the dorsal [ɣ] sometimes alternates with the labial semivowel [y] and sometimes with the coronal semivowel [j], reflecting the fact that Spanish has no semivowel which corresponds exactly to the place features of [ɣ]. This vocalization reflects the incorporation of coda consonants, already specified as [+vocalic] by spreading from the nuclear vowel, into the nucleus, resulting in a semivocalic articulation.

In partial summary, it has been suggested that [+vocalic] can, under certain circumstances, attach to segments syllabified in the nucleus, coda, or onset. When [+vocalic] is combined with the defining characteristics [-sonorant], [+voice] and consonantal articulator features, the result of incorporation into the nucleus (inevitably in post-head position, due to relative sonority constraints) is a glide whose place features correspond to those of the original consonant (modulo the modifications induced by incorporation into a 'vocalic' position). When syllabified into a coda or an onset, positions reserved for 'consonantal' articulations, the same configuration results in a voiced fricative.

The preceding analysis might lead to the erroneous conclusion that a single set of feature specifications underlies ALL manifestations of, e.g. [i], [j], [y], and [δ], or [β], [u], [w] and [y]. This conclusion, if

true, would render oppositions such as *cada* [kaða] vs. *calla* [kaya], or *haba* [aβa] vs. *agua* [awa] impossible to derive. In fact, however, neutralization of underlyingly distinct segments occurs only in RHYME positions. An underlying vocoid acquires consonantal characteristics upon being transferred to coda position, while an underlying consonant receives a vocalic articulation upon being incorporated into the nucleus. Consider first the derivation of *aire* > *adre*. Underlyingly, the form is /aire/, whose second element is [+vocalic], [+high], [-back]. The core syllabification rules of Spanish (cf. Harris 1989a, 1989b; Hualde 1991b) entail that /i/ will emerge as a post-peak glide. Upon transfer of this glide to coda position (presumably a freely available option, constrained only by normative pressures), language-specific realization rules produce a voiced dental fricative as output. The position of Spanish glides in the syllabic rhyme has been treated with some ambiguity. Harris (1983: chap. 2) seems to suggest that post-peak glides form part of the nucleus, the same as pre-peak glides (providing the latter are not syllable-initial). The more elaborate syllabification procedures outlined in Harris (1989a, 1989b) allow for complex nucleus formation in the case of pre-peak glides (e.g. in *tieso*). However, all unsyllabified material to the right of the nucleus is adjoined at the level of N', i.e. as a coda. Hualde (1991b) explicitly analyzes Spanish post-peak glides as belonging to the coda. However, neither author provides substantial justification for the differential placement of pre- and post-peak glides vis-à-vis the nucleus. Both use the term 'nucleus' to refer both to the syllable head or stressable element (a single vocoid) and to the rising diphthong resulting from complex nucleus formation. Carreira (1990) argues that Spanish rising diphthongs are monomoraic, while falling diphthongs are bimoraic (originally derived from two successive syllables), the same as the combination of NUCLEAR VOWEL + CODA CONSONANT. Although this could be taken as an oblique indication that post-peak glides are in the coda, nothing precludes a bimoraic nucleus in Spanish. Stress restrictions involving falling diphthongs (cf. Harris 1983, 1992; Carreira 1990) can be accounted for in the same fashion, whether post-peak glides are regarded as belong to the coda or the nucleus. In yet another model of syllabic structure, Milliken (1988) proposes that the syllable nucleus be subdivided into the *peak* (a single, syllabic vowel) and the remaining, semivocalic element(s). Postnuclear consonants are directly dependent on the syllable node, as are onset

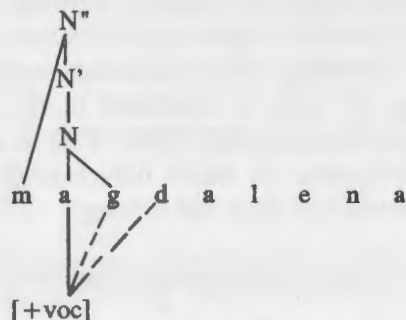
consonants. Milliken's model would be compatible with the proposals made in the present study. In short, no substantive body of data argues against the possibility that Spanish post-peak glides could reside in the nucleus:



When /i/ is syllabified as an onset, i.e. when it is syllable-initial, it emerges as a palatal obstruent, whose precise articulation varies cross-dialectally. However, Spanish does not permit palatal obstruents in the rhyme, thus precluding the emergence of a palatal consonant when post-peak /i/ moves from the nucleus to the coda. The [ð] which occurs, while appropriately related to /i/ in terms of articulator activation, is a compromise solution, being one of the consonants licensed by the Spanish coda (cf. Goldsmith 1989, 1990 on coda licensing). The converse possibility, for [ð] < /d/ in the coda to incorporate into the nucleus, depends on prior resyllabification of /d/ from a two-member onset (e.g. *pa-dre* > *pad-re* > *pai-re*). Since Spanish permits no bisegmental onset clusters beginning with [y] < /i/, there is never a possibility for a single instance of underlying /i/ to alternate between [ð] and [y]. The only alternations possible are /i/: [j]/[ð], and /d/: [ð]/[j].

The derivation *padre* > *paire* proceeds in the opposite fashion. Underlyingly, /d/ is specified [-sonorant], [+voice], [+coronal], etc. It receives [+vocalic] through spreading from the preceding vowel, and at the beginning of the derivation is syllabified as a coda consonant. The freely available option of incorporating a [+vocalic] segment into the nucleus results in semivocalic [j], again through a language-specific realization rule:

- (c) Spreading of [+vocalic] to voiced obstruents with syllable head trigger condition



5. *Las Palmas* and *Honduran Spanish* revisited: the 'empty' consonant. Two dialects remain to be accounted for in terms of the realization of voiced obstruents, namely *Las Palmas Spanish* (LPS), and *Honduran Spanish* (HS). At first glance, different configurations result in each case: in LPS the normal spirantization of voiced obstruents after all non-nasal segments is impeded (creating a very exceptional syntagmatic pattern), while in HS the limited environment in which spirantization of voiced obstruents takes place is further reduced, albeit creating an opaque surface configuration where a voiced stop appears after a vowel. In both dialects, the same solution obtains: spreading of [+vocalic] or [+continuant] continues unabated as in other environments, but loss of /s/ leaves behind some phonological material whose presence impedes spreading of the relevant feature 'across' the slot to a following voiced obstruent.

The slot vacated by elision of /s/ in LPS and HS is more than an empty position on the skeleton, such as have been postulated in phonological analysis involving opacity of superficial elements to presumably exceptionless processes (e.g. Clements and Keyser 1983). In a maximally constrained system of autosegmental phonology, spreading does not displace existent feature values, i.e. spreading can only take place to a node unspecified for the feature in question. Similarly, nodes already specified for a given feature block further spreading. At the same time, no potential target can be 'skipped over' during spreading. In other words, if a given element is transparent to spreading, it can only be because this element CANNOT receive the autosegment in question, either because of fundamental incompatibility,

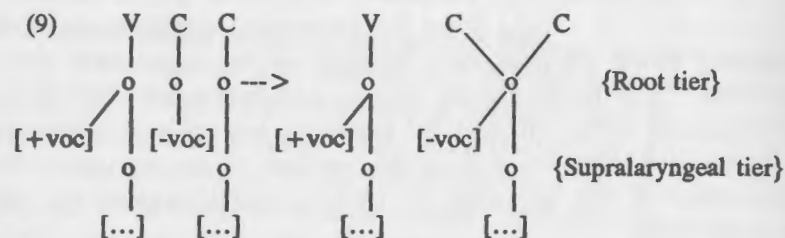
or because of underspecification so severe as to provide no appropriate node to which the autosegment may adjoin. Consider first the case of LPS, in which [+continuant] spreads rightward from a syllable-final consonant to an onset-initial voiced obstruent. If loss of preconsonantal /s/ resulted in a completely empty skeletal slot, then nothing would prevent spreading of [+vocalic] from the preceding vowel to the following voiced obstruent. Assuming that [vocalic] is a daughter of the root node (as suggested by Kaisse 1992 for [consonantal]), the root node of the voiced obstruent would provide an appropriate docking point for the spreading of [+vocalic] (a process which must occur in LPS when postvocalic /b/, /d/ and /g/ spirantize). The phonological opacity of the slot left by elision of preconsonantal /s/ indicates that at the very least, there remains a root node, to which [+consonantal/-vocalic] is still attached.

In HS, spreading of [+continuant] is never an option, but loss of preconsonantal /s/ should place the [+vocalic] specification on the preceding vowel phonologically adjacent to the onset-initial voiced obstruent. That this is not the case is demonstrated by the lack of spirantization of /b/, /d/ and /g/ following loss of a preceding /s/. Once more, this pattern defines the 'outline' of an intervening root node which is still specified for [+consonantal/-vocalic] (cf. also Amastae 1989).

In LPS a voiced obstruent can receive a spirant pronunciation through spreading of [+continuant] from a preceding segment. Since manner of articulation is most feasibly analyzed as attached to the supralaryngeal node (or perhaps even further 'down' the geometric structure, attached to individual articulator nodes), by excising the supralaryngeal node, the material remaining after /s/ has been deleted contains no specification for [continuant]. There is no way that [+continuant] can spread from the preceding vowel, since in the phonological model proposed here, vowels contain no manner features whatsoever.

Trujillo (1981: 164-5) suggests that in LPS, total assimilation of the [h] < /s/ to a following voiced obstruent produces a geminate which then acquires an occlusive pronunciation, AS A CONSEQUENCE OF a prior geminate articulation. However, the present analysis shows that the opposite course of events provides a more adequate explanation. In LPS, gemination of the voiced obstruent is an optional consequence of delinking of the /s/, which occurs when the root node

representing /s/ links to the supralaryngeal node of a following voiced obstruent. If the root node underlying /s/ contained the same features as the root node of the following voiced obstruent, the Shared Features Convention would result in a single root node linked to two skeletal slots, i.e. a true geminate. If the root node representing /s/ were not specified for [-vocalic/+consonantal], the resulting geminate would not be specified for [vocalic], since voiced obstruents contain no specification for this feature, and [+vocalic] could spread from a preceding vowel to create a spirant geminate. In LPS, however, the root node representing /s/ is specified [-vocalic/+consonantal]. Since the root node of a following voiced obstruent is underspecified for [vocalic], the two root nodes are phonologically nondistinct, and the Shared Features Convention will still produce a single root node, to which [+consonantal/-vocalic] is linked:



This configuration will block spreading of [+vocalic] from the preceding vowel, and a voiced geminate stop will result. In any event, occlusion logically precedes gemination, rather than the opposite course of events postulated by Trujillo (1981).

6. Conclusion. A reanalysis of 'continuant spreading' or 'spirantization' of /b/, /d/ and /g/ has been combined with an approach to dialectal variation in the stop/fricative realization of these elements, and the interaction with gemination and with elision of preconsonantal /s/. The principal conclusion is that in Spanish dialects where postconsonantal voiced obstruents are realized as fricatives, spreading of [+continuant] is at work in these contexts. Spread of [+vocalic] is involved in the spirantization of postvocalic /b/, /d/ and /g/, as well as onset-initial voiced obstruents which follow a voiced obstruent in the coda of the preceding syllable. This explains the differential behavior of Spanish dialects: in some, spirantization of voiced obstruents can be effected by spread of [+continuant], while in others only a [+vocalic]

specification, which can only be triggered by a vowel in the nucleus, is able to provide a continuant articulation for /b/, /d/ and /g/. This differential behavior is also reflected in historical developments, where early Romance voiced obstruents apparently spirantized first after vowels, and only later after [+continuant] consonants (cf. Steriade 1988; Martínez-Gil 1990: Chap. 4).

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