

## Iberian Spirantization and Continuant Spreading

Joan Mascaró

Universitat Autònoma de Barcelona

The spirantization of voiced obstruents in languages of the Iberian Peninsula is examined, especially for Catalan and Spanish. Phonological analyses based on the spreading of the feature [continuant] face serious problems and can be maintained only at the cost of empirical inadequacy or postulation of ad hoc interpretation of principles or additional rules. It is proposed that these inadequacies stem from the phonological character of the analyses, and that a phonetic treatment of the alternation gives more satisfactory results.

The alternation between the series of voiced stops [b], [d], [g], and their respective spirant approximants [β], [ð], [ɣ] shows a very similar distribution in the Spanish, Catalan, Basque, and Portuguese dialects of the Iberian Peninsula. Some varieties of these languages show a different distribution, that may have to be analyzed in a different way; here I will use the term "Iberian spirantization" to refer to the distribution of stops and spirants described below, which is shared, according to the available literature and to my own observations, by most Iberian varieties.<sup>1</sup> The determination of the proper nature of this distribution is interesting not on descriptive grounds alone, but also because of the controverted status of the feature [continuant] in phonological theory<sup>2</sup>, in particular with respect to its representational properties which depend on its possibility of spreading.

The aim of this paper is somewhat limited: the main goal is to determine what the exact nature of the distribution is, i.e. to establish the correct linguistic generalization that covers the distribution. Since as far as I can see most current descriptions rely on false assumptions (or

else on very simplified evidence), a review of the basic facts might prove quite useful. More specifically, I will reach two conclusions: at the descriptive level, that the distribution is governed by phonetic factors, and w.r.t. the theory of phonology, that, consequently, Iberian spirantization cases do not constitute arguments for a spreading treatment of [continuant].

### 1. The basic facts

Spanish can illustrate the basic facts. Most descriptions of standard Castilian Spanish (following Navarro Tomás (1971)) present the following state of affairs (which will be revised later):

(1) a. [b], [d], [g]

Postpausally	bjén 'well'	gána 'wins'	des' dén 'dis-dain'
After nasals	ámbos 'both'	ónda 'wave'	uj gáto 'a cat'
After laterals: for d	aldéa 'hamlet'	mál dfa 'bad day'	

b. [β], [ð], [ɣ]

after vocoids (vowels, glides)	áj βíno 'there's wine'	bíwăa 'widow'	áyo 'I do'
after fricatives	dezβío 'detour'	dezðe 'since'	avyáno 'Afghan'
after r	karβón 'coal'	bérðe 'green'	már ɣrwésa 'heavy sea'
After laterals: for b, g	míl βéθes 'a thousand times'		álɣa 'seaweed'

As can be seen from the examples in (1) not all possible contexts are attested in Castilian Spanish; in particular, there are no examples of *b, d, g*, after obstruent stops. This is so because no obstruent stops appear syllable finally; in this position they are normally weakened and spirantized (fúðβol, etc.).

These contexts are found in Catalan, however. This language shows the same distribution of [b], [d], [g] vs. [β], [ð], [ɣ] as in (1) (see, e.g., Wheeler (1979)). But, as opposed to Spanish, obstruent stops are found syllable finally, and in this context the noncontinuant versions [b], [d], [g] show up; note that there is also regressive voicing assimilation, hence no [pb], [kd], etc.:

(2)	fubból	'soccer'
	súbdit	'subject', 'vassal'
	káb gát	'no cat'
	sóg bós	'I am good'
	marágda	'emerald'
	póg gúst	'little taste'

## 2. The standard generalization

Thus standard descriptions have led some authors (Goldsmith (1981), Mascaró (1983), Harris (1984,1985), Hualde (1988), Romera (1990), Palmada (1991)) to propose that spirantization can be captured by the generalization in (3).

- (3) Spirant β, ð, ɣ appear after [+continuant] segments, stops appear after [-continuant] segments and after pause.

When fleshed out in some particular theory, (3) takes the form of several variants, depending on whether only  $\beta$ ,  $\delta$ ,  $\gamma$ , (Harris (1984)) only  $b$ ,  $d$ ,  $g$ , (Hualde (1988)) or both (Lozano (1979), Mascaró (1983), Harris (1985), Palmada (1991)) are derived by rule. In the framework of autosegmental phonology (3) has determined, as can be expected, the proposal of a spreading rule that associates delinked or unspecified  $b$ ,  $d$ ,  $g$  to the [cont] value of the preceding segment; in those cases in which no spreading takes place, the unmarked [cont] value is assigned normally by default.

The basic problem faced by analyses based on the generalization in (3) as applying to the data in (1) is the odd behavior of laterals. The lateral determines the appearance of spirants in the case of  $b$ ,  $g$ , but of a stop in the case of  $d$ . (mfl βέθες, άλγα vs. aldéa). But [l] should be either [+cont] or [-cont], and we would expect consequently a uniform solution, i.e., either  $ld$ , \* $lb$ , \* $lg$  or \* $l\delta$ ,  $l\beta$ ,  $l\gamma$ , which is wrong in either case.

Let's call this the "lateral problem." Although I don't want to enter into the phonological treatments in detail, I think that it is fair to say that, as shown by the diversity of treatments available, there are no satisfactory solutions. This is even more the case if the facts are examined in more detail (cf. below).

### 3. The issue of homorganicity.

Almost all phonological analyses, since Harris (1969), have tried to solve the lateral problem by deriving the asymmetry from the homorganic character of the cluster  $ld$ . This has been done by including a condition of sameness of place in the rule itself, or by deriving the effects from more general principles.<sup>3</sup>

In this section I want to show that a "homorganic solution" is wrong on a factual basis. Notice first that in Spanish, as shown in (1), the correlation between lack of spirantization and homorganicity holds owing to a lack of evidence: there are cases of *homorganic* clusters of nasal or lateral + stop (mb, nd, ŋg, ld) which obey the generalization, but no attested cases of *heterorganic* clusters of nasal or lateral + spirant. In other words, the homorganic solution makes a specific prediction, namely that voiced stops after heterorganic nasal or lateral will spirantize, but the prediction cannot be checked because nasals and laterals only appear assimilated in place to the following voiced stop.

Moreover, this lack of counterexamples to the homorganic solution is more apparent than real. In the case of clusters with an initial fricative we can get  $\theta\delta$  (progressive assimilation of place and regressive assimilation of voice): embe $\theta\delta$ e 'instead of', and although it is clearly homorganic with the preceding consonant, the *d* gets spirantized.

But even in the case of nasals and laterals, if we go beyond the normal cases, as those reported in (1), there is counterevidence to the "homorganic solution". If a pronunciation with heterorganic clusters is forced on speakers, we never get the spirant--as a "homorganic solution" would predict. This cannot be done with all the cases, but is quite natural for clusters like md, mg, ŋb, ŋd, in which case the stop appears exactly as in the cases where homorganicity holds. It should be pointed out that in all "homorganic" analyses homorganicity is crucial for laterals, but only in some (e.g. Hualde (1988)) for nasals as well.

- |     |                      |                      |
|-----|----------------------|----------------------|
| (4) | En Vietna[m d]el Sur | 'in South Vietnam'   |
|     | El Isla[m g]uerrero  | 'the fighting Islam' |
|     | parki[ŋ b]arato      | 'cheap parking'      |
|     | go[ŋ d]e plata       | 'silver gong'        |

In the case of Catalan it is much easier to show that spirantization does not depend on homorganicity: heterorganic clusters of oral or nasal stop + b,d,g are quite frequent, and include also laterals.

(5)	a.	súbdit	b.	sóm dós	'we are two'	c.	gáʎ díndi	'turkey'
		káb gát		sóm gráns	'we are big'		báʎdurétʃ	(place name)
		sóg bó		áʎ bó	'good year'		rupéʎ dów	'egg yolk'
		mərágda		áʎ dú	'tough year'		uʎdəβów	'porthole'
				áʎ grán	'big year'			
				síʎ días	'five days'			
				bíʎ dóra	'I come early'			
				tréʎ dálpa	'sunrise'			

#### 4. Back to the facts.

The inefficacy of the homorganic solution leaves us with the lateral problem unsolved. In addition, analyses based on the generalization in (3) face further problems when the empirical domain is checked somewhat more carefully. There are mainly two problems to be added: first, the "differences in variability" that determine an asymmetry between contexts showing fixed solutions, and contexts that allow both spirants and stops in variation; second, the additional odd case of fricative+b,d,g clusters, where we get a distribution similar to that of laterals.

Some of the literature rightly stresses the variability of the phenomenon: in some cases the solution presented in (1) is dominant, but not unique, and spirant and stop can both appear in some contexts.<sup>4</sup> Second, contexts do not behave equally with respect to variability. In some cases there is hardly any variation: the forms in (6a) are forms that are not only very rare statistically in front of the spirantized forms in (6a'): when presented with such sequences,

speakers have strong negative judgements of acceptability. On the other hand, for (6b) those judgements range from dubious to acceptable, when compared with the more normal cases of (6b').

- (6) a. \*aba \*ada \*aga a.' aβa aǰa aɣa  
       \*amβa \*anǰa \*aŋɣa \*alǰa amba anda aŋga alda  
 b. (?)axba (?)asda (?)aθga b.' axβa asǰa aθɣa<sup>5</sup>  
       (?)βa (?)ǰa (?)ɣa ba da ga

In the absence of more detailed experimental data, the variability can be summarized as follows. I indicate the different contexts (7a-k) and the continuant values of the element to the left of *b*, *d*, or *g*, and of *b*, *d*, *g* themselves, and I have added an example.

(7)	CLUSTER	CONT VALUE		EXAMPLE
		[cont] 1st	[cont] 2nd	
a.	OBSTRUENT STOP	-	-	súbdit (Cat.)
b.	NASAL	-	-	ónda
c.	VOCOIDS, R	+	+	bíwǰa
d.	LATERAL + D	?	-	aldéa
e.	LATERAL + B, G	?	+	alya
f.	AFTER PAUSE	/	- (+)	gána
g.	FRICATIVES + B D G:			
h.	F + B	+	- (+)	búf brúsk (Cat.)
i.	OTHER, HOMORGANIC	+	+	dezǰe
j.	F + D, G	+	+	búf ðirékta (Cat.)
k.	OTHER HETERORGANIC	+	+	dezpio

(7) incorporates the observation, formally reported at least for Catalan (Recasens (1986)), that in the case of the cluster *fb* we normally find the stop ([fb]). According to my own observations with several speakers, the stop is much more favored in the case of *fb* than in the other cases of fricative + *b, d, g.*, i.e.:

(8)	a.	$b > \beta$	b.	$\delta > d$	c.	$\gamma > g$
		buf brusc		buf directe		buf glacial
		filòsof basc		filòsof discret		filòsof gallec
		triomf verbal		triomf doble		triomf gloriós

The data summarized in (7) show the following problems for an analysis based on spreading of [continuant]. First the lateral problem, as already noted. Second, the fact that, although homorganicity has been shown not to play a role in the case of nasals, laterals and stops, in the case of fricatives a close place of articulation makes the stop, if not strictly necessary, at least preferred (7h), or possible (7i). Third, why should there be variability in postpausal position, and after homorganic or quasi-homorganic fricatives? It is rather striking that in the cases in which the [continuant] value is assigned by default, as for vowels and nasals, or unclear (laterals) we get a fixed solution, whereas in those cases where it is underlying (fricatives) we get variability. Dialects showing Iberian spirantization differ widely in surface results depending on the interaction of other processes, but all show the kind of fixed behavior of (3) or (7).

Let's examine the lateral problem first. And let us suppose for a moment that we abandon the requirement of a strict phonological solution. Is there anything in common, e.g. between clear stops, as in (7a, b), and [l] or [ʎ] followed by [d]? Is there anything in common, similarly, between clear continuants, like vowels or glides (7c), and [l] or [ʎ] followed by [β] or [δ]? A careful examination of the execution of a sequence like [ld] shows that the articulatory



correlates of [+cont], airflow through an open vocal tract hold true for all the vocal tract, except for its central part, in the palatoalveolar region. In this area the airflow is interrupted by the contact of the front part of the tongue blade and the teeth. Lowering of the back of the tongue blade allows the air to escape around the central closure, between the cheek and the teeth. A phonological solution imposes /l/ to be either [+continuant] or [-continuant], but phonetically the correlates of this feature are not equally distributed along the vocal tract. For /l/ there is airflow from the glottis to the lips, but the dento-palato-alveolar region is excluded. The same holds true for /ʎ/, which differs from the former because the lingual contact is extended further back. In a certain sense we are extending the idea that nasals, though clearly continuants in a global sense, are *oral* stops, to laterals, that --N.B., phonetically--though continuants in a global sense, are stops in the central alveopalatal region.

The general idea is thus that a) *no phonation* implies (under normal circumstances) *NO airflow*; b) *total oral closure* implies *NO airflow* (or close to zero if there is a pressure increase); c) *total oral aperture* (during phonation) implies *airflow*.; d) *local closures* determine *airflow* in general, but *NO airflow* locally..

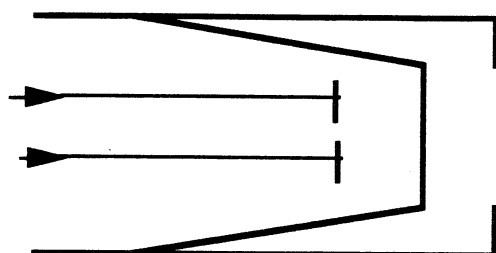
There is an obvious way to capture the ideas sketched above. Spirantization is correlated with existence of airflow during the production of the preceding segment. But, crucially, this airflow has to be registered at the place of articulation of the spirantizing consonant, not at the place of the preceding segment itself. In other words, [d] is a stop because at *its* place of articulation, i.e. the dental region, there is no airflow during the articulation of [l]. On the other hand, [β] and [ɣ] are spirants because at *its* place of articulation, i.e. the labial and the velar regions, respectively, there is airflow during the articulation of [l]

There is an obvious way to capture the ideas sketched above. Spirantization is correlated with existence of airflow during the production of the preceding segment. But, crucially, this airflow

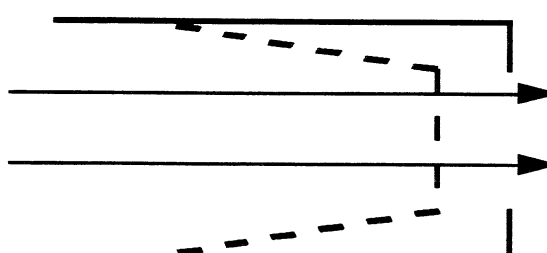
has to be registered at the place of articulation of the spirantizing consonant, not at the place of the preceding segment itself. In other words, [d] is a stop because at *its* place of articulation, i.e. the dental region, there is no airflow during the articulation of [l], as shown schematically in (9c). On the other hand, [β] and [ð] are spirants because at *its* place of articulation, i.e. the labial and the velar regions, respectively, there is airflow during the articulation of [l]

(9)

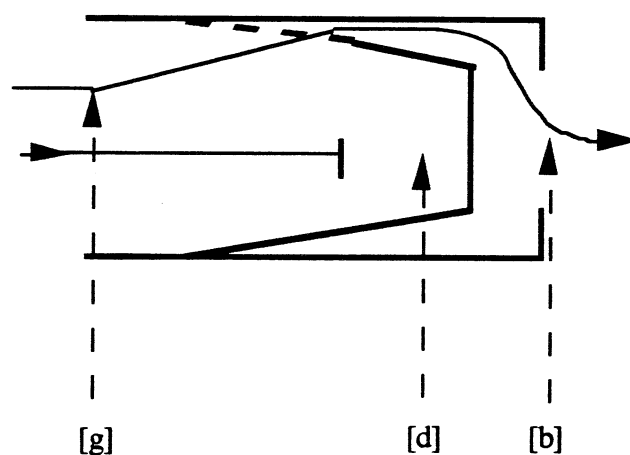
a. [t]



b. [s]



c. [l]



In the case of *f*, the preference of the stop is probably due to specific properties of the articulation of labiodentals, which tend to show a central close contact with some lateral airflow.

The explanation offered above in terms of airflow, and possibly other dynamic properties like air pressure or constriction section, needs of course more specific experimental investigation. But even in its actual overall form, it adequately solves the lateral problem, and offers some hope for the more variable cases involving fricatives.

●This paper benefited from the PB 89-0344 C.I.C.Y.T. Grant.

## Notes

<sup>1</sup> Most differences in the distribution among Iberian dialects are due to the interaction of spirantization with other processes. It might be appropriate to indicate that other dialects of the languages under study do not show the process or show a different kind of spirantization. To cite an example Central American (El Salvador, Nicaragua, Honduras) and Colombian varieties show spirants in postvocalic position only, stops elsewhere (including after glides); see Canfield (1962), Harris (1985) .

<sup>2</sup> See McCarthy (1988).

<sup>3</sup> Goldsmith (1981) proposes that features underlyingly unspecified receive their specification by a "minimum distance principle."

<sup>4</sup> The usual reference is Navarro Tomás (1971:141) who repeatedly stresses the variation between stop and spirant under the influence of segmental context and style. As early as in the fourth edition of Menéndez Pidal's well-known historical grammar (Menéndez Pidal 1918:97-111) the variability in some of the contexts is reported, in particular in the case of a preceding fricative. The first generative analysis, Harris (1969) distinguishes "careful" and "casual" solutions. See also Malmberg (1985) and Lozano (1979).

<sup>5</sup> I have disregarded the possibility of regressive voicing assimilation in the examples in this row.

## References

- Canfield, D. L. (1962) *La pronunciación del español en América*, Publicaciones del Instituto Caro y Cuervo, Bogotá.
- Goldsmith, J. (1981) "Subsegmentals in Spanish Phonology", in W. W. Cressey and D. J. Napoli (eds.) *Linguistic Symposium on Romance Languages*, Georgetown University Press, Washington D. C. 1-16.
- Harris, J. (1969) *Spanish Phonology*, MIT Press, Cambridge.
- Harris, J. (1984) "La espirantización en castellano y su representación fonológica autosegmental", in Bartra et. al. (eds.) *Estudis Gramaticals*, Universitat Autònoma de Barcelona, Bellaterra.
- Harris, J. (1985) "Autosegmental phonology and liquid assimilation in Havana Spanish", in L. D. King and C.A. Maley (eds.) *Selected Papers from the XIIIth Linguistic Symposium on Romance Languages*, John Benjamin, Amsterdam, 127-148.
- Hualde, J.I. (1988) *A lexical phonology of Basque*, Ph.D. thesis, USC.
- Lozano, C. (1979) *Stop and spirant alternations: fortition and spirantization processes in Spanish phonology*, IULC, Boomington.
- Malmberg, B. (1965) *Estudios de fonética hispánica*, CSIC, Madrid.
- Mascaró, J. (1983) "Continuant spreading in Basque, Catalan, and Spanish", in M. Aronoff and R.T. Oehrle (eds.) *Language Sound Structure*, MIT Press, Cambridge.
- McCarthy, J. (1988) "Feature geometry and dependency: a review", *Phonetica*, 45, 84-108.
- Menéndez Pidal, R. (1918) *Manual de gramática histórica española*, Espasa-Calpe, Madrid.
- Navarro Tomás, T. (1971) *Manual de pronunciación española*, CSIC, Madrid.

- Palmada , B. (1991) *La fonologia del català i els principis actius*, Doctoral dissertation, Universitat Autònoma de Barcelona.
- Recasens, D. (1986) *Estudis de fonètica experimental del català oriental central*, Abadia de Montserrat, Barcelona.
- Romera, L. (1990) *Problemas teóricos en fonología generativa (análisis del castellano)*, Doctoral dissertation, Universitat de Barcelona , 1990.
- Wheeler, M. (1979) *Phonology of Catalan*, Blackwell, Oxford.

*Departament de Filologia Catalana*

*Facultat de Lletres*

*Edifici B*

*Universitat Autònoma de Barcelona*

*08193 Bellaterra*

*E-mail [ilft8@cc.uab.es](mailto:ilft8@cc.uab.es)*