

Neutralization and Dominance in Basque Sibilant Harmony

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Introduction: Starting with Michelena (1961), linguists have noted that within Basque roots, sibilants generally share a single place of articulation. Although Basque sibilant harmony has been considered widely in the literature (see Hansson 2010), the discussion has been based entirely on scattered observations in Michelena (1961) and a small wordlist collected by Salaburu (1984). Using a lexicon of Basque with 35,000 entries (*Lexikoa Atzo eta Gaur*), I show that sibilant harmony is a robust phenomenon, but that it can be violated by a neutralization rule. I confirm that Basque exhibits a dominant-recessive harmony system, which I analyze using Agreement by Correspondence (ABC). Finally, I argue that ABC cannot capture the combination of a pure dominant-recessive harmony system with a neutralization rule that overrides harmony.

Probabilistic Neutralization: Standard Basque maintains a three-way place contrast for sibilants (both stops and affricates): lamino-alveolar (orthographic *z* and *tz*), apico-alveolar (*s* and *ts*), and lamino-postalveolar (*x* and *tx*). Within roots, sibilants frequently share one place of articulation (e.g. *zuzen* ‘direct’ and *sits* ‘moth’, but not **zuso*). Excluding loanwords and compounds, the lexicon contains 145 harmonic roots and 23 disharmonic roots. The majority (19/23) of exceptions to Basque sibilant harmony involve a preconsonantal *s* (e.g. *txistu* ‘flute’). Statistics taken from the entire lexicon show an asymmetry in the distribution of preconsonantal sibilants. Table 1 shows that, before consonants, *z* and *x* probabilistically undergo neutralization to *s*.

Table 2 shows that the distribution of disharmonic roots almost perfectly aligns with what would be expected if disharmonic roots are underlyingly harmonic and undergo the same preconsonantal neutralization that applies throughout the lexicon. Just as *x* is far more likely than *z* to neutralize to *s*, *x* is far more likely than *z* to occur with a preconsonantal *s*. Thus, 19 of the disharmonic roots are arguably not exceptions to sibilant harmony, but rather cases of opacity. This leaves just 4 truly exceptional roots out of 168 total roots with at least two sibilants.

Table 1

	Pre-Voc (%)	Pre-Cons (%)	O/E
z:	50.1%	36.4%	0.73
s:	33.1%	60.6%	1.83
x:	16.7%	3.0%	0.18

Table 2


	Harm.	Disharm.	% Disharm.	% Neutralized
z:	18	9	33%	27%
x:	2	10	83%	82%

Dominant-Recessive Harmony: Historical change in Basque provides evidence for a dominant-recessive harmony system. Some loanwords and compounds have undergone harmonization in Basque. If a *z* occurs with either an *s* or an *x* and the form undergoes harmonization, the *z* always changes to match the other sibilant, regardless of linear order. Thus, there are several cases of apparent left-to-right harmony (e.g. *sazoi* → *sasoi*, *txantza* → *txantxa*), and also several cases of apparent right-to-left harmony (e.g. *zats* → *sats*, *bizkotxa* → *bixkotxa*). I use the following constraints based on Hansson (2010) to capture the dominance of *s* over *z*:


- CORR-[apic, del.rel]: If two segments share every feature value except optionally [apical] and/or [delayed.release], they are in a CC-correspondence relation
- IDENT[apic]-CC: Assign a violation mark for any CC-corresponding segments that differ in the feature [apical]

- IDENT[+apic]-IO: Assign a violation mark for any [+apical] segment in the input corresponding to a [−apical] segment in the output
- IDENT[−apic]-IO: Assign a violation mark for any [−apical] segment in the input corresponding to a [+apical] segment in the output

Note that *z* is [−apical] and *s* is [+apical]. The following tableau shows that *z* harmonizes to become *s*, independent of ordering. I use subscript numbers to represent CC-correspondence:

Input: /solaz/	CORR-[apic, del.rel]	IDENT[apic]-CC	IDENT[+apic]-IO	IDENT[−apic]-IO
a. [s ₁ olaz ₂]	*!			
b. [s ₁ olaz ₁]		*!		
c. [z ₁ olaz ₁]			*!	
d.  [s ₁ olas ₁]				*

Neutralization and ABC: Preconsonantal neutralization can be modeled by assuming a constraint *zC which assigns a violation mark for any preconsonantal *z* in the output (similarly *xC for *x*). The fact that neutralization is probabilistic can be captured using Stochastic OT. However, this account fails when combined with the ABC analysis of sibilant harmony. As shown before, the harmony constraint outranks the faithfulness constraint that prevents *z* from becoming *s*. Therefore, when trying to derive a disharmonic form like *zisku*, there is nothing to prevent a second *z* from becoming *s* in order to satisfy the harmony constraints:

Input: /zizku/	CORR-[apic, del.rel]	IDENT[apic]-CC	*zC	IDENT[−apic]-IO
a. [z ₁ is ₂ ku]	*!			*
b. [z ₁ is ₁ ku]		*!		*
c. [z ₁ iz ₁ ku]			*!	
d.  [s ₁ is ₁ ku]				**

Hansson (2010) uses ABC with targeted constraints to analyze a case of contextual markedness overriding harmony in Ineseño Chumash, but his account crucially relies on the existence of a directionality effect. Schematically, in Hansson’s analysis, the markedness constraint outranks the constraints driving left-to-right harmony, but no constraints enforce right-to-left harmony. As a result, there is no pressure to move from *zisku* to *sisku*. Because Basque in fact exhibits both left-to-right and right-to-left harmony, this analytic move is unavailable.

Conclusion: I have shown that sibilant harmony is a robust phenomenon in Basque, and that the majority of exceptions are cases of opacity due to a neutralization rule. Furthermore, I have argued that ABC cannot capture the combination of a purely dominant-recessive harmony system with a neutralization rule that can override harmony. These results illustrate the importance of using a large corpus when testing claims about harmony systems. Previous studies lacked sufficient data to investigate the details of preconsonantal neutralization and provided less evidence that Basque sibilant harmony is based solely on dominance. Extending ABC to account for the entire Basque harmony system remains a challenge for future research.

Hansson, G. 2010. *Consonant Harmony*. Berkeley: University of California Press.

Michelena, L. 1961. *Fonética histórica vasca*. San Sebastián: Diputación de Gipúzcoa.

Salaburu, P. 1984. *Arau Fonologikoak. Hizkuntz Teoria eta Baztango Euskalkia: Fonetika eta fonologia, II*, Bilbao: Univ. del País Vasco.