Underspecification, constriction-based vowel geometry  
and scalar raising in Asturiano

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0. Outline of today’s presentation:

- Introduction
- Geo-political history of the Iberian Peninsula
- Vowels and vowel harmony processes in Spain
- Asturiano (Bable) data
- Previous approaches
  - Hualde (1989a,b)
  - Radical and Contrastive underspecification
- Analysis
  - Consequences of Optimization (Lexicon and Grammar)
  - Constriction-based vowel geometry
- Summary and conclusions
  - Theoretical implications of Asturiano scalar raising
- References

1. Geo-political background:

- Roman Spain, Germanic invasions, Muslim conquest, Christian “Reconquest”, Rise of Castilian and limitation of Asturian, Modern linguistic map of Iberian Peninsula.

2. Vowels and vowel harmony processes in languages of Spain:  
(Also called ‘metaphony’, ‘inflexión vocálica’)

- Features of vowels:

<table>
<thead>
<tr>
<th></th>
<th>front</th>
<th>central</th>
<th>back</th>
</tr>
</thead>
<tbody>
<tr>
<td>high</td>
<td>i</td>
<td>u</td>
<td>[i e a o u]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>high</td>
</tr>
<tr>
<td>mid</td>
<td>e</td>
<td>o</td>
<td>low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>front</td>
</tr>
<tr>
<td>low</td>
<td>a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Effect of final high vowel [-i, -u] on stressed vowel:
• articulatory anticipation of stressed vowel to final high vowel or glide

\[ \begin{align*}
i & \leftarrow u / \text{When word ends with [-i, -u]} \\
\end{align*} \]

(Data below)

\[ \begin{align*}
é & \leftarrow ò \text{ (depends on the dialect)} \\
\end{align*} \]

• Other vowel harmony processes in Spanish:

• final high glide [j] (‘yod’) raises [o, e] of root of stem-changing -ir verbs:

[\text{dormir}] ‘to sleep’ but [\text{durmjó}] ‘s/he slept’
[\text{pedir}] ‘to ask for’ but [\text{pidjó}] ‘s/he asked for’
[\text{sentir}] ‘to feel’ but [\text{sintjó}] ‘s/he felt’

(Lloyd, p. 309)

• raising of stem [e] in verb forms of Latin that ended in [i:]:

\[ \begin{align*}
\text{Lat. FECI} & \rightarrow \text{OSp. fiz(e)}(\text{MSp. hice}), \text{Fr. fis} \ ‘I made’ \\
\text{Lat. VENI} & \rightarrow \text{Sp. vine} (< *vini) \ ‘I came’ \\
\text{Lat. POTUI} & \rightarrow \text{Sp. pude} \ ‘I was able’ \\
\text{Lat. POSUI} & \rightarrow \text{Sp. puse} \ ‘I put’ \\
\text{etc.} \\
\end{align*} \]

• The raising treated here is of another sort.

3. Data: (most from Hualde; additional data from Zamora Vicente, Lapesa, Blaylock)

**Lena dialect** (Neira 1955, treated in Hualde 1989a,b)

<table>
<thead>
<tr>
<th>masc. sg.</th>
<th>masc. pl.</th>
<th>fem. sg.</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>e &lt; a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>benténu</td>
<td>bentános</td>
<td>bentána</td>
<td>‘window’</td>
</tr>
<tr>
<td>gétu</td>
<td>gátos</td>
<td>gáta</td>
<td>‘cat’</td>
</tr>
<tr>
<td>pélu</td>
<td>pálos</td>
<td></td>
<td>‘stick’</td>
</tr>
<tr>
<td>fénú</td>
<td>fános</td>
<td>fána</td>
<td>‘diligent worker’</td>
</tr>
<tr>
<td>tsamérgu</td>
<td>tsamárgos</td>
<td>tsamárga</td>
<td>‘muddy lake’</td>
</tr>
<tr>
<td>i &lt; e</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kábíθu</td>
<td>kabéθos</td>
<td>kabéθa</td>
<td>‘head’</td>
</tr>
<tr>
<td>kaldíru</td>
<td>kaldéros</td>
<td>kaldéra</td>
<td>‘pot’</td>
</tr>
<tr>
<td>kordíru</td>
<td>kordéros</td>
<td>kordéra</td>
<td>‘lamb’</td>
</tr>
<tr>
<td>ninu</td>
<td>nénos</td>
<td>néna</td>
<td>‘child’</td>
</tr>
<tr>
<td>abirtu</td>
<td>abiertos</td>
<td>abierta</td>
<td>‘open’</td>
</tr>
<tr>
<td>puiro</td>
<td>puertos</td>
<td></td>
<td>‘gate’</td>
</tr>
<tr>
<td>nuistru</td>
<td>(nuestros)</td>
<td>(nuestra)</td>
<td>‘our’</td>
</tr>
<tr>
<td>güivo (= huevo)</td>
<td>(huevos)</td>
<td></td>
<td>‘egg’</td>
</tr>
<tr>
<td>Word</td>
<td>Gender/Plural</td>
<td>Gloss</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>---------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>kúku</td>
<td>masc. sg.</td>
<td>worm</td>
<td></td>
</tr>
<tr>
<td>kókos</td>
<td>fem. sg.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kúfu</td>
<td>masc. pl.</td>
<td>cripple</td>
<td></td>
</tr>
<tr>
<td>kófos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tsúbu</td>
<td></td>
<td>wolf</td>
<td></td>
</tr>
<tr>
<td>tsóbos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>matúlu (~ mató)</td>
<td></td>
<td>s/he killed (it)</td>
<td></td>
</tr>
<tr>
<td>matóla</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[mancibo (cf. fem. manceba) is documented as early as 1155 (Lapesa, p. 99)]

In Nalón Valley, [a] raises to [o]:
- gótu vs. gáta, gátos
- Pachu → Pochu
- xatu → xotu
- matando → matóndolu
- ganar → ganólu

A few items with final [-i] also show raising of the stressed vowel:

<table>
<thead>
<tr>
<th>Gender</th>
<th>Word</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>masc. sg.</td>
<td>isti</td>
<td>this</td>
</tr>
<tr>
<td>fem. sg.</td>
<td>ésta</td>
<td></td>
</tr>
<tr>
<td>masc. pl.</td>
<td>isi</td>
<td>that</td>
</tr>
<tr>
<td></td>
<td>ésa</td>
<td></td>
</tr>
</tbody>
</table>

(In Aller, ebri instead of abre ‘s/he opens’, cumi instead of come ‘s/he eats’; other examples from Lena, but these are less numerous and seem to affect only [é])

- Proparoxytones whose stressed vowel (only) is raised, skipping intermediate vowels, even of the same quality as that raised:

<table>
<thead>
<tr>
<th>Word</th>
<th>Gender</th>
<th>Gender</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>péfaru</td>
<td>masc. sg.</td>
<td>masc. pl.</td>
<td>bird</td>
</tr>
<tr>
<td>sábanos</td>
<td>fem. sg.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sábana</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>silikótika</td>
<td>silikótikos</td>
<td></td>
<td>suffering from silicosis</td>
</tr>
<tr>
<td>kákabos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kándanos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>trwébanos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>burwibau</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Previous approaches:

A. Hualde (1989a,b):

**Word markers in Lena:**

<table>
<thead>
<tr>
<th></th>
<th>masc.</th>
<th>fem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>sg.</td>
<td>-u</td>
<td>-a</td>
</tr>
<tr>
<td>pl.</td>
<td>-os</td>
<td>-as/-es/-is (depends on subdialect)</td>
</tr>
<tr>
<td>mass</td>
<td>-o</td>
<td></td>
</tr>
</tbody>
</table>

(There are many convincing arguments in favor of this analysis, as opposed to one where the singular is /-o/ to which is added plural /-s/ but which raises to [-u] in masc. sg. forms. See Hualde 1989b:§ 2 for the particulars.)

* Plural in Lena (and Pasiego) is thus more complex than in Spanish

* For pluralization, Asturiano combines Spanish system (“add /-s/ to singular form”) and Italian’s (where singular endings are replaced by plural ones that also encode gender: [libr-o], [libr-i] (‘book(s)’), [kás-a], [kás-e] (‘house(s)’)

* This is quite possibly a remnant of the Latin system of pluralization, which depended on case and declension. Spanish masculine plurals come from Latin -os, while the singular forms come from -u.

* This lack of segmentability is also apparent in the feminine.

* Lower Lena, e.g., has [-a] vs. [-es], instead of [-a] / [-as] (Same true of Valencian Catalan)
  (Small region of Asturias, [kás-a] vs. [kás-is])
  ([e] instead of [a] also in verbal plurals: *cantaben* (cf. Sp. *cantaban* ‘they used to sing’)

Hualde (1989a:790):

• “Metaphony in Lena Bable is a stressed-vowel raising rule that consists in the metrical spreading of the feature [+high] of the final vowel to the head of the prosodic foot.”

  • [+high] from final [-i, -u] spreads to stressed vowel:

  \[
  \begin{array}{c|c}
  V\bar{V} & \text{[+high]} \\
  \hline
  \bar{V} & \text{[+high]} \\
  \end{array}
  \]

  • **Result:** /e/ → [i], /o/ → [u], /a/ → [e]
• **Examples:**

```
/p e l u/ \rightarrow [p í l u] /g a t u/ \rightarrow [g é t u]
```

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[+high]</td>
<td>[+low]</td>
<td>[+high]</td>
<td></td>
</tr>
<tr>
<td>[+high]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• **Major stipulation and problematic assumption:**

- When the vowel [a] is the stressed vowel, it must add the feature [+high] to its [+low] feature. This is a logical contradiction, an impossible combination.
- Hualde proposes that the illicit combination [+high, +low] is changed to [-high, -low].

**B. Approaches rooted in underspecification:**

- Basic tenets of underspecification:

  **Lexical Minimality** (Steriade 1995:114):

  *Underlying representations must reduce to some minimum the phonological information used to distinguish lexical items.*

  along with **Default / Redundancy Rules** lead to

  **Full Specification** (Steriade 1995:114)

  *The output of the phonological component must contain fully (or at least maximally) specified feature matrices.*

  Basically, this says that lexical items are stored in their simplest form possible. Predictable information (features that characterize vowels and consonants) is omitted, but surfaces eventually.

- Underspecification makes a hypothesis about the mind and about lexical storage in the brain: Make the lexicon as basic as possible; let the grammar fill in the rest and do the rest of the work.

- Two principal possibilities, Radical and Contrastive underspecification:

  - **Radical:** Get rid of ALL predictable information; only marked features in UR:
    
    i | e | a | o | u (Archangeli and Pulleyblank)
    
    high  +  +  +
    
    low  +  +
    
    [back  +  +  +]
    
    (UG default rules assign unmarked feature values, whether or not feature contrasts one segment with another. [ ] \rightarrow [-high, -low, -back]; [+low] \rightarrow [+back].)

  - **Contrastive:** Specify values that distinguish segments; get rid of all other values:
(Default rules assign redundant, predictable features. [ ] → [-high, -low]; [+low] → [+back]; i, e are already [-back] because this feature distinguishes them from o, u, which are correspondingly marked [+back]. Likewise, e, o are specified for [-high] because it distinguishes them from [+high] i, u.)

• Problems:

For Radical underspecification, the change from [a] → [e] (or [o]) by spreading of [+high] requires Hualde’s stipulation that [+high, +low] is changed to [-high, -low], or that it is equivalent to [e] (or [o]).

For Contrastive underspecification, the same problem exists, as [+high, +low] is generated. The change from [e] → [i] and [o] → [u] is also problematic because it requires us to change the underlying representation, in effect destroying information, not just adjusting it by making it more complete.

5. Analysis:

A. The consequences of Optimization for Underspecification:

The concepts of lexicon and grammar optimization developed in Prince and Smolensky (1993) and Inkelas (1994) allows for profitable reconsideration of the data. These are stated here:

Lexicon Optimization: (Inkelas 1994):

[O]f all the possible underlying representations that could generate the attested phonetic form of a given morpheme, that particular underlying representation is chosen whose mapping to phonetic form incurs the fewest violations of highly ranked grammatical constraints.

Grammar Optimization: (Inkelas 1994, developing the non-OT Kiparsky 1993)

The optimal grammar is the most transparent, i.e. the one in which alternations are maximally structure-filling. In terms of Optimality Theory, this means that Parse [FAITHFULNESS] is ranked as high as possible.

Under an approach that assumes these principles, in order to eliminate gratuitous constraint violation, only those segments that undergo alternations are underspecified, and only for the alternating features, full specification being the norm when the system is stable. (This is nearly identical to Girelli’s 1988:116 Neutral Ground Hypothesis.)
• To optimize both the grammar and the lexicon, Asturiano creates **archisegments** that lack only the alternating features for those cases of alternating *a, e, o* (only); high harmony may be viewed as **feature-filling**.

**B. Constriction-based vowel geometry:**

This may be done by adopting the constriction-based vowel geometry of Clements and Hume (1995), in which [±high] is supplanted by two tiers of [±open]. Under the current approach, the following are the underlying representations of height for the vowels of Asturiano, both alternating and stable:

\[
\begin{array}{cccccc}
\text{i, u} & \text{e, o} & \text{a} & \text{A} & \text{E, O} \\
\text{aperture} & \text{aperture} & \text{aperture} & \text{aperture} & \text{aperture} \\
\text{Tier 1} & - & - & + & - \\
\text{Open:} & & & & & \\
\text{Tier 2} & - & + & + & + \\
\end{array}
\]

**C. Scalar raising revisited:**

(a → e; e → i, o → u) due to spreading of [-open] (no more [±high])

• This is purely feature filling; no underlying information is destroyed, because the lexicon knows, in effect, that it’s going to change, so it doesn’t bother to store those feature values. *(Faithfulness is maintained; Invariance* *(Steriade 1995:123).*

• Nonalternating vowels are fully specified, including many cases of *a, e, o*.

• Only alternating *a, e, o* are underspecified, as /A E O/.

• No more need for problematic assumption regarding [+high, +low].

• **Examples:**

\[
\begin{array}{l}
/p\text{ E l u/} \rightarrow [p \text{ í l u}] & /g\text{ A t u/} \rightarrow [g \text{ é t u}] \\
/ts\text{ O b u/} \rightarrow [ts \text{ ú b u}] & \\
\end{array}
\]

| Tier 1 | - | - | - | - | - |

(Evidence seems to be lacking about what level of [-open] is spreading.)
6. Summary and conclusions:

Scalar raising may be seen here as the result of the spreading of [-open], without restriction to the tier that spreads or is affected. The result is that we obtain uniform results with archiphonemic segments at all height levels that alternate, /A, E, O/, and the harmony process may be viewed as a feature-filling one that does away with the need for the coalescence of contradictory features. Neither of these results may be easily attained under traditional approaches to vowel geometry or to underspecification.

References

Hualde, José Ignacio. 1989b. Metaphony and count/mass morphology in Asturian and Cantabrian dialects. In Christiane Laeuf er and Terrell A. Morgan, eds., Theoretical Analyses in Romance Linguistics: Selected Papers from the Nineteenth Linguistic Symposium on Romance Languages (LSRL XIX). The Ohio State University, 21-23 April 1989. 99-114.
Inkelas, Sharon. 1994. The consequences of optimization for underspecification. NELS 24 and Rutgers Optimality Archive [http://ruccs.rutgers.edu/roa.html].