Feature geometry meets contrastive specification: incomplete neutralization reloaded

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So, “final devoicing”? 

- The schoolbook analysis of final devoicing:
  [+voice]→[−voice]/_# or somesuch
- A significant number of phonetic studies claim that
  word-final laryngeal neutralization is in fact incomplete, cf.
  especially Port & Leary (2005)
- Fourakis & Iverson (1984): neutralization is normally
  complete, incomplete neutralization is an artefact of lab
  conditions
- Supported: study of Afrikaans by van Rooy et al. (2003),
  complete neutralization in natural speech, disambiguation
  in the lab

Talk outline

Warning: this talk is large, it contains multitudes

1. Incomplete neutralization in “final devoicing”: phonetics and phonology
2. Two cases of phonological incomplete neutralization:
   Friulian, Breton
3. Representational approach of the Lombardi/Avery kind
4. Privative features and meaningful bare nodes account for
   markedness hierarchies and much more besides
5. Bare nodes come from contrastive specification

Incomplete neutralization in phonetics and phonology

- Van Oostendorp (2008): where/if incomplete neutralization
  is real, the subtle phonetic differences reflect a difference in
  phonological representations
- All well and good, but is there robust phonological evidence
  for incomplete neutralization?
- And might it give us insights into what sort of phonological
  representation we are talking about?
- As you might have guessed, my answer is yes and yes
What are we looking for?

- “Phonetic” incomplete neutralization of laryngeal contrasts often involves vowel and consonant length
- Specifically, (underlyingly) voiced consonants are associated with longer preceding vowels, and vice versa
- We might expect this tendency to be phonologized
- So, we are looking for languages with
  - Phonological distinction between long and short vowels
  - Final devoicing
  - Phonological relationship between vowel length and laryngeal features

Vowel lengthening in Friulian

- Data from Baroni & Vanelli (2000)
- Unstressed vowels are short; stressed vowels are normally short:

\[
\begin{align*}
(3) \quad & \text{a. } [\text{a}^\text{m}i] \quad \text{‘friend} \\
& \text{b. } [\text{me}^\text{t}] \quad \text{‘(s)he puts’} \\
& \text{c. } [\text{can}^\text{tade}] \quad \text{‘sung (fem.)’} \\
& \text{d. } [\text{gust}] \quad \text{‘taste’} \\
& \text{e. } [\text{ma}^\text{nj}] \quad \text{‘hand’} \\
& \text{f. } [\text{bratf}] \quad \text{‘arm’}
\end{align*}
\]

A priori expectations

- Laryngeal change may feed vowel change

\[
\begin{array}{ll}
\text{Rule} & /\text{a}^\text{d}/, /\text{a}^\text{t}/ \\
\hline
\text{Devoicing} & /\text{a}^\text{t}/ \\
\text{Vowel shortening} & /\text{a}^\text{t}/. /\text{a}/. \\
\end{array}
\]

(1)

- Complete neutralization, not really interesting for the purposes of this talk
- Laryngeal change may counterfeed vowel change

\[
\begin{array}{ll}
\text{Rule} & /\text{a}^\text{d}/, /\text{a}/. \\
\hline
\text{Vowel shortening} & /\text{a}/. /\text{a}/. \\
\text{Laryngeal change} & /\text{a}/. /\text{a}/. \\
\end{array}
\]

- Incomplete neutralization
- Opacity?

Vowel lengthening in Friulian

- Stressed vowels can be long:

\[
\begin{align*}
(4) \quad & \text{a. } [\text{vi}^\text{f}] \quad \text{‘alive’ (masc.)} \quad _\text{C}\# \\
& \text{b. } [\text{sp}^\text{o}^\text{r}^\text{k}] \quad \text{‘dirty (masc.)’} \quad _\text{r} \\
& \text{c. } [\text{n}^\text{er}^\text{i}] \quad \text{‘black’}
\end{align*}
\]

- Minimal pairs: final syllables before single consonants:

\[
\begin{align*}
(5) \quad & \text{a. (i) } [\text{l}^\text{a}^\text{t}] \quad \text{‘gone (masc.)’} \\
& \text{b. (ii) } [\text{va}^\text{l}] \quad \text{‘(it is) worth’} \\
& \text{c. (i) } [\text{l}^\text{a}^\text{t}] \quad \text{‘milk’} \\
& \text{b. (ii) } [\text{va}^\text{l}] \quad \text{‘valley’}
\end{align*}
\]

- Generalization: the vowel before an obstruent is lengthened if the obstruent is underlyingly voiced

\[
\begin{align*}
(6) \quad & \text{a. } [\text{l}^\text{a}^\text{d}^\text{e}] \quad \text{‘gone (fem.)’} \\
& \text{b. } [\text{l}^\text{a}^\text{t}^\text{a}] \quad \text{‘to milk’}
\end{align*}
\]
Phonological redux

- In final stressed syllables, vowel length is distinctive in one position, namely before [l]
- There is also distinctive length in non-final syllables
- Otherwise, length is predictable
- Final devoicing opacifies lengthening (assuming it is not shortening...) but provides cues for disambiguation
- In a sense, then, Friulian is like any “incomplete neutralization” language writ large

Real data

- Baroni & Vanelli (2000) provide data on the realization of devoiced final obstruents
  - Acoustic data do not show voicing
  - Acoustic data show weaker bursts w. r. t. true voiceless stops
  - Statistically significant difference in vowel length w. r. t. word-internal stops
  - Significant difference in vowel quality. Generally gradient and very variable, but before voiceless stops the vowel inventory is best described as [a ɔ e u i], and before devoiced stops it is rather [a o e u]
  - Significant difference in placement of F0 peak on the vowel: before devoiced stops, a HL tone; before voiceless stops, a relatively late H peak
  - Devoiced stops significantly shorter than voiceless ones, about the same duration as word-medial voiced stops
- Vowels before word-medial voiced stops are also lengthened, though by much less than before devoiced word-final stops: “half-long”

Friulian: summary

- Phonological contrast between long and short vowels in final syllables
  - I assume lengthening before word-medial voiced stops is phonetic (a correlate of stress?), but distinct from phonological lengthening-as-bimoraicity; cf. D’Imperio & Rosenthal (1999); Krämer (2009) for Italian
- The consonantal representations of voiceless and devoiced obstruents are distinct: underlying /lad/ is surface /laːd/ and /lat/ is /laːt/
- Analysis further on

Breton

- Work in progress
- Significant dialectal variation
- Jackson (1953), “new quantity system” in Proto-Brythonic: stressed vowels are (mostly) short before voiceless obstruents and all types of clusters, long otherwise
- In Welsh, this remains a strong synchronic generalization, though minimal pairs exist, and dialectal variation runs amok (Wells, 1979; Awbery, 1984)
- Breton: different story, various incarnations: Falc’hun (1951); Kervella (1946); Jackson (1960); Carlyle (1988)
Length in Breton: the big picture

- Here: dialect of Plougrescant (Trégorrois dialect group), described by Jackson (1960); Le Dû (1978)
- Vowels and sonorants may be long or short
- Voiced obstruents can only be short
- Voiceless obstruents may be long or short
- Le Dû (1978) does not note length differences in consonants.

In non-final stressed syllables (in practice, penults):
- Short vowels can be followed only by long consonants (or clusters): no voiced obstruents
  7) a. [ˈtapːut] ‘to take’
     b. [ˈjoːɡɔˈjɔ] ‘more healthy’
     c. [skvˈdeːlo] ‘basins’
- Long vowels can only be followed by short consonants, and voiceless obstruents are disallowed
  8) a. [ˈoːber] ‘to do; to make; to work’
     b. [ˈlɪz@r] ‘letter’
     c. [ˈmeːl@n] ‘yellow’
- Consequence: we expected devoicing to lead to vowel length adjustments. This prediction is confirmed
  9) a. [lɔˈɡud@n] ‘mouse’
     b. [lɔˈɡutːa] ‘to hunt mice’

- If final devoicing were a change from voiced to voiceless, we thus expect it to shorten the preceding vowel
- This is disconfirmed:
  10) a. [ˈtoɡo] ‘hats’
      b. [ˈtɔrk] ‘hat’
- Underlying voiceless obstruents word-finally are long:
  11) a. [kasː] ‘send!’
      b. [ˈkas] ‘cat’
      c. k[aː]xez ‘female cat’
      d. *[kas] Final devoicing: sandhi
- The traditional description of sandhi: all obstruents are voiced before sonorants and voiced obstruents (Stephens, 1993; Favereau, 2001)
- Devoicing sandhi (Krämer, 2000; Hall, 2008): a different story
- The real picture seems to be significant variation: inconsistent transcriptions in texts; explicit statements to the effect of “sometimes it happens and sometimes it doesn’t” (Wmffre, 1998); “weak voicing” and suchlike
- Work in progress: it seems that sandhi voicing can be partial, especially in a vowel-sonorant context
Breton: summary

- Vowel length cues underlying voicing in final position
- Phonetically there also seems to be incomplete neutralization
- Essentially the same conclusion as for Friulian: the output of final devoicing is a third category

Representations

- I adopt a representational system reminiscent of Lombardi (1995, passim), Avery (1996), also Avery & Idsardi (2001)

  \[
  \times \quad \times \quad \times
  \]

  Lar | Lar | [F]

  No specification  Contrastive non-specification  Contrastive specification

- Assuming a difference between an empty node and lack of node
- Markedness/faithfulness constraints may refer to either nodes or features
- Substance-free (Morén, 2003; Blaho, 2008): [F] can be whatever you need for this particular language
- Presence of nodes associated with contrastive specification à la Toronto
- Thus: no node = no contrast
Friulian: good old-fashioned analysis

- Voiceless obstruents are underlyingly moraic, voiced ones aren’t
- Head foot must be bimoraic
- Weight-by-Position for laryngally specified coda segments
  - Laryngeally unspecified segments are not moraic by TETU
  - [F] in Friulian is [voiceless] (Blaho, 2008):
    - Markedness = structure.
    - De Lacy (2006): whatever is preserved is more marked, neutralization is to less marked
- Final devoicing: deletion of [Lar] but preservation of [vcl]

No lengthening in /at/

- Final devoicing driven by *Lar/_\[Wd (whatever...)
- Obstruent projects a mora
- Final [vcl] is protected by MAX[vcl]

Friulian: OT analysis

- MAIN-TO-WEIGHT (Bye & de Lacy, 2008): stressed syllables are bimoraic
- Constraints on weight following Morén (2001)
  - *µ{seg} (certain segment types) cannot be moraic
  - MAX-µ: do not delete morae
  - DEP-µ: do not insert morae
  - MAXLINK-µ{seg}: do not delete moraic associations (for certain segment types)
  - DEPLINK-µ{seg}: do not insert moraic associations (for certain segment types)
- I propose: WEIGHT BY POSITION[Lar]: coda segments with a Lar node should be moraic (a variety of Morén’s “BeMORAIC”)

No lengthening in /at/: OT analysis

<table>
<thead>
<tr>
<th>lat</th>
<th>MTW</th>
<th>MAX[vcl]</th>
<th>WbP(Lar)</th>
<th>*Lar/_[Wd</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>[µₙ]</td>
<td>µₙµₙ</td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>b.</td>
<td>[µₙ]</td>
<td>µₙµₙ</td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>c.</td>
<td>µₙµₙ</td>
<td>*!</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>µₙµₙ</td>
<td>*!</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

- Loss of laryngeal contrasts impossible, so WbP decides
Lengthening in /ad/

- In the case of /ad/, final devoicing must happen.
- Final devoicing creates segments with no Lar node, so WbP(Lar) is inactive, and there is no reason for \( V_\mu C_\mu \Rightarrow \) lengthening.

\[
\begin{align*}
\text{Ft} & \quad \mu & \quad \mu \\
\mu & \quad \text{a} & \quad \text{t} \\
\text{Lar} & \\
\end{align*}
\]

Residual issues

- Richness of the Base:
  - Voiced moraic obstruents: taken care of by markedness over faithfulness, WbP inactive since FS is surface-true.
  - Voiceless moraic obstruents also surface correctly.
  - Moraic Lar-less obstruents ruled out by \( *\mu[\text{obst}] \gg \text{MAX}-\mu \).
- Distinctive length before /l/: underlyingly moraic and nonmoraic /l/.
  - Underlying nonmoraic /l/ behaves like the Lar-less obstruents.
  - Makes sense if Lar is redundant and thus absent from the representation.
- The final nasal [n] (presumably glottal/placeless; de Lacy, 2006) is always moraic: undominated WbP[nasal].
- Coda [r] is always nonmoraic (?): Pandora’s box.

Lengthening in /ad/: OT analysis

\[
\begin{array}{|c|c|c|c|c|c|}
\hline
\text{lad} & \text{MTW} & *\mu[\text{cons}] & \text{WbP(Lar)} & *\mu/L_\text{ad} & \text{MAX(Lar)} \\
\hline
\text{a.} & \text{la}_\mu \text{d} & *! & | & | & | \\
\text{b.} & \text{la}_\mu \text{d} & | & | & | & | \\
\text{c.} & \text{la}_\mu \text{d} & | & *! & | & | \\
\text{d.} & \text{la}_\mu \text{d} & | & | & | & * \\
\hline
\end{array}
\]

- There is no constraint that could force a mora to surface on the Lar-less devoiced obstruent.
- The extra structure effectively licenses moraicity; high-ranking \( *\mu[\text{cons}] \) (or \( *\mu[\text{obst}] \)) is necessary anyway to prevent gratuitous mora insertion.

Residual issues

- Further evidence for final voiceless obstruents as moraic: Italian borrowings (Baroni & Vanelli, 2000):

  (12) a. (i) \[a'fit\] ‘rent’ (It. affitto)
  (ii) \[afi'tut\] ‘small rent’
  b. (i) \[impje'gat\] ‘clerk’ (It. impiegato)
  (ii) \[impjegade\] ‘female clerk’ (It. impiegata)

- Non-final stress: bisyllabic foot, WbP inactive anyway.
- Final affricates: for further research.
Friulian: conclusion

- Crucial difference: underlying voiceless stops can surface as moraic, underlying voiced stops cannot
- Proposed analysis: voiceless obstruents have most structure which allows them to hold on to morae, voiced ones lose structure
- The analysis is similar to that of Hualde (1990), but does not rely on opacity or compensatory lengthening. Also affinities with the analysis of Milanese by Prieto i Vives (2000)
- Obvious affinities with what de Lacy (2006) says about “markedness”
- But the markedness relations follow from the structure rather than being stipulated by fiat

Cursory analysis of Breton I

- Work in progress
- Recall that voiceless obstruents can geminate but voiced ones cannot
- True voiceless obstruents shorten preceding vowels, devoiced ones do not
- Same representations as for Friulian
- Additional observation: distribution of voiceless obstruents very restricted
- Essentially initial syllables, stressed syllables and sometimes word-final position (but not as a result of final devoicing)
- Further argument for [voiceless]

Cursory analysis of Breton II

- ⟨Lar⟩ obstruents lose laryngeal specification and cannot license morae, vowel lengths because of MAIN TO WEIGHT: /ad/ → /aᵢ µ_d/ 
- ⟨Lar,[vcl]⟩ obstruents stay put and license morae, so no lengthening: /at/ → [aᵢ µ_t] 
- Word-medially voiceless obstruents become moraic in order to be parsed into the stressed syllable and survive the markedness constraint

Cursory analysis of Breton III

- Hopefully you get the picture
- In Breton, the drive is to save the marked feature by trying to parse it in a positional-faithfulness position
Why is this useful empirically?

- It is widely acknowledged that ternary contrasts in laryngeal phonology are a genuine problem for privative-feature theories (Wetzels & Mascaró, 2001)
- My aim here is to show that feature geometry is not just a formal gimmick to save the theory but gives us genuinely interesting ways to analyze the patterns
- Phonetic ternary contrasts: Taiwanese (Hsu, 1998)
- More phonological cases:
  - Help?
  - One claim is that Modern German has lengthening before word-final ‘lenes’, and it’s a final-devoicing language...
  - ...but see Seiler (2009) on why this isn’t (primarily) a question of laryngeal features

Feature geometry vs. markedness hierarchies I

- De Lacy (2006) argues forcefully against representational approaches to markedness
- Much of his criticism is to the point, but much is an attack on the cross-linguistic validity of markedness statements (“Coronal is universally unmarked” vs. “Velar is universally unmarked”)
- Way out: markedness hierarchies
- These are also supposed to be universally valid, which is empirically problematic
- Here: feature geometry + substance-free phonology = theory of markedness effects

More empirical usefulness

- If the accounts of final devoicing presented here are correct, this allows us to reconcile two existing claims
  - FD is weakening or loss of structure (Harris, 2009)
  - “FD” is nonassimilatory addition of structure (Iverson & Salmons, 2007)
- Note that Breton has both phonological devoicing-as-weakening and imposition of a [vel] feature in some morphological contexts, best analyzed as mora affixation (cf. Trommer & Zimmermann this conference)
- Finally, at least in Breton word-final obstruents seem to be phonologically underspecified for laryngeal features: consistent with Keating (1988)

Feature geometry vs. markedness hierarchies II

- I accept the insights of de Lacy (2006) on effects such as markedness reduction, conflation and preservation (what he calls the xo Theory)
- But I reject his insistence on the universality of featural representations and markedness relationships
- Many languages clearly need a [voice] feature rather than [voiceless]. The markedness effects should still be valid within a language (e.g. devoicing as loss of [voice] and consequent neutralization with ⟨Lar⟩ is still markedness reduction)
Stringent constraint violations: markedness

<table>
<thead>
<tr>
<th></th>
<th>*Root</th>
<th>*Lar</th>
<th>*[voi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>⟨×⟩</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>⟨×, Lar⟩</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>⟨×, Lar, *[voi]⟩</td>
<td>*</td>
<td>*</td>
<td>* *</td>
</tr>
</tbody>
</table>

Stringent constraint violations: faithfulness

<table>
<thead>
<tr>
<th></th>
<th>MAX[Root]</th>
<th>MAX[Lar]</th>
<th>MAX*[voi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>⟨×⟩</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>⟨×, Lar⟩</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>⟨×, Lar, *[voi]⟩</td>
<td>*</td>
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</tbody>
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Substance-free markedness

- Essentially a Trubetzkoyan approach: markedness is merely the presence of structure
- More empirically adequate: the hypothesis is that given a proper theory of how features are assigned, it is possible to account for the patterns without stipulations on substantive markedness hierarchies...
- ...and preserve the advantages of xo Theory
- Hypothesis: features are assigned on the basis of phonological activity (Dresher, 2009, and many more)
- Language-internal versus cross-linguistic markedness

Unanswered questions so far

- Where do the empty nodes come from?
- Where does the difference between node-less and feature-less segments come from?
- How can one reconcile this representational proliferation with the avowed minimalist perspective?
- Proposal: feature geometry is a way to capture the generalization that only distinctive feature specifications are phonologically active (Dresher, 2009)
- Presence or absence of node makes the difference between contrastive non-specification and redundant non-specification (hence absent features)
Feature geometry as successive division I

- If feature \([F]\) is contrastive for a subset of the inventory, then the subset is further divided into two subsets
- Those features which receive \([F]\) also receive the node it is associated with
- The complement of the set of \([F]\) segments receives the node but not the feature
- Similar proposals: Ghini (2001a,b)
- Given standard autosegmental assumptions, this derives the generalization that only segments contrastively specified for a feature are active in phonological processes involving that feature

Wrap-up

- Final devoicing in Friulian and Breton involves a ternary contrast, and thus phonological incomplete neutralization
- Proposed account in terms of feature geometry with privative features
- Advantages:
  - Less stipulative account of markedness hierarchies
  - Reconciliation of contrastive specification with feature geometry
  - Feature geometry is not just a way to “get” ternary effects
  - All very programmatic, but I believe it is a reasonable set of initial assumptions
- Further questions
  - Does the phonetic account of Breton hold up? (In progress)
  - Can we dispense with tiers and have features depend on features (Blaho, 2008)?
  - Does this thing work at all?

Feature geometry as successive division II

- This ties in with the standard assumption that tiers define locality domains: so in order for a segment to be able to accept some feature it has to be present on that feature’s tier
- But the predictions are still restrictive in a feature-geometric way: within a language, one can have a maximum distinction between activity of one feature and activity of the whole tier
- Contrast binary-feature theories, which open the possibility of three types of processes, those involving \([+F]\), \([-F]\) and \([\alpha F]\)

References I

References II


References III


References IV


References V


References VI


References VII


References VIII


