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Feature geometry meets contrastive specification: incomplete neutralization reloaded

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20 a viz Mae 2010
Skol-Veur Manchester



Pavel Iosad
Setting the scene
The data
Analysis
Implications
References

Incomplete neutralization reloaded

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Incomplete neutralization
Phonological cues for incomplete neutralization

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



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Incomplete neutralization reloaded

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Incomplete neutralization
Phonological cues for incomplete neutralization

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



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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



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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:

- | | | | |
|-----|----|------------|---------------|
| (3) | a. | [a'mi] | ‘friend |
| | b. | [ˈmɛt] | ‘(s)he puts’ |
| | c. | [canˈtade] | ‘sung (fem.)’ |
| | d. | [ˈgust] | ‘taste’ |
| | e. | [ˈmaŋ] | ‘hand’ |
| | f. | [ˈbratʃ] | ‘arm’ |



A priori expectations

- ▶ Laryngeal change may **feed** vowel change

	Rule	/a:d/	/at/
(1)	Devoicing	/a:t/	
	Vowel shortening	/at/	/at/

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

	Rule	/a:d/	/at/
(2)	Vowel shortening		
	Laryngeal change	/a:t/	/at/

- ▶ Incomplete neutralization
- ▶ Opacity?



Vowel lengthening in Friulian

- ▶ Stressed vowels can be long:

- | | | | | |
|-----|----|-----------|------------------|-----|
| (4) | a. | [vi:f] | ‘alive’ (masc.)’ | —C# |
| | b. | [ˈspɔ:rk] | ‘dirty (masc.)’ | —r |
| | c. | [ˈne:ri] | ‘black’ | |

- ▶ Minimal pairs: final syllables before single consonants:

- | | | | | |
|-----|----|------|---------|-----------------|
| (5) | a. | (i) | [ˈla:t] | ‘gone (masc.)’ |
| | | (ii) | [ˈva:l] | ‘(it is) worth’ |
| | b. | (i) | [ˈlat] | ‘milk’ |
| | | (ii) | [ˈval] | ‘valley’ |

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

- | | | | |
|-----|----|----------|---------------|
| (6) | a. | [ˈla:de] | ‘gone (fem.)’ |
| | b. | [laˈta] | ‘to milk’ |



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



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 /laːd̥/ and /lat/ is /lat/
- ▶ Analysis further on



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 ε ʊ ɪ], and before devoiced stops it is rather [ɑ o e u ɪ]
 - ▶ 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”



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.



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Length in Breton: final devoicing

- ▶ If final devoicing were a change from voiced to voiceless, we thus expect it to shorten the preceding vowel
 - ▶ This is **disconfirmed**:
- (10) a. ['tɔ:go] 'hats'
b. ['tɔ:k] 'hat'
- ▶ Underlying voiceless obstruents word-finally are long:

- (11) a. ['kas:] 'send!'
b. ['ka:s] 'cat'
c. k[a:]zez 'female cat'
d. *[kas]



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Length in Breton: the big picture

- ▶ In non-final stressed syllables (in practice, penults):
 - ▶ Short vowels can be followed only by long consonants (or clusters): **no voiced obstruents**

- (7) a. [tap:ut] 'to take'
b. [jaʔ:ɔʔ] 'more healthy'
c. [skɥ'dɛl:o] 'basins'

- ▶ Long vowels can only be followed by short consonants, and **voiceless obstruents are disallowed**

- (8) a. [o:ber] 'to do; to make; to work'
b. [li:zər] 'letter'
c. [me:lən] 'yellow'

- ▶ Consequence: we expected devoicing to lead to vowel length adjustments. This prediction is **confirmed**

- (9) a. [lɔ'gɔ:dən] 'mouse'
b. [lɔ'gɔ:tɔ] 'to hunt mice'



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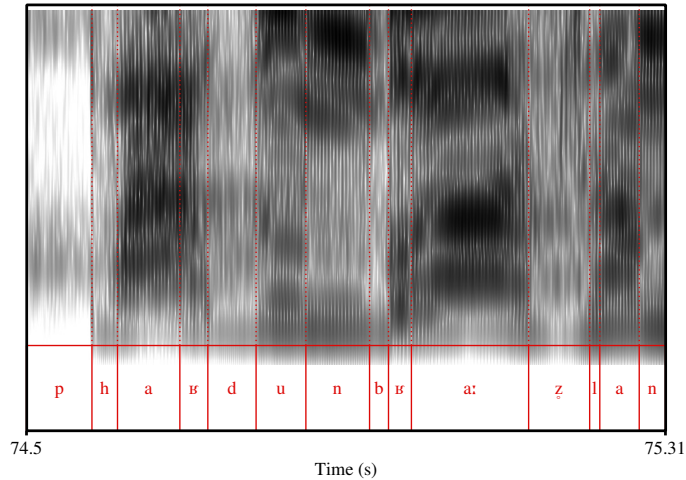
Final devoicing: sandhi

- ▶ 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



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pardon_braz_lanhouarne



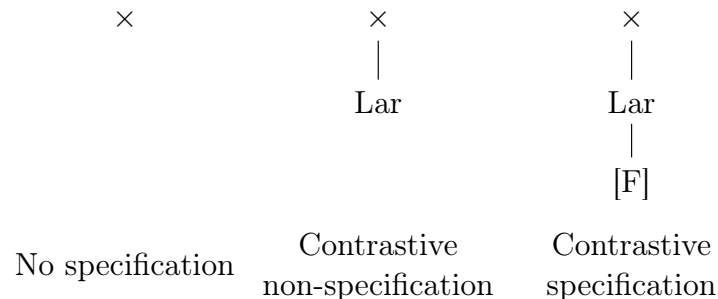
[pʰardun 'bra:z lan...]
'the big church feast of Lanhouarne'

66% unvoiced frames (Praat), pulses stop about 1/3 into the consonant



Representations

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



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

- 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 laryngeally 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]



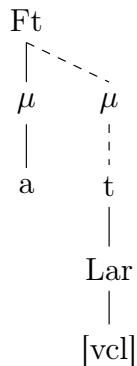
Friulian: OT analysis

- ▶ MAIN-TO-WEIGHT (Bye & de Lacy, 2008): stressed syllables are bimoraic
- ▶ Constraints on weight following Morén (2001)
 - ▶ $*\mu([\text{seg}])$: (certain segment types) cannot be moraic
 - ▶ $\text{MAX-}\mu$: do not delete morae
 - ▶ $\text{DEP-}\mu$: do not insert morae
 - ▶ $\text{MAXLINK-}\mu([\text{seg}])$: do not delete moraic associations (for certain segment types)
 - ▶ $\text{DEPLINK-}\mu([\text{seg}])$: 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/

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



No lengthening in /at/: OT analysis

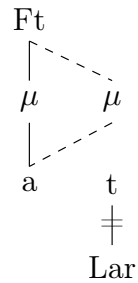
	lat	MTW	$\text{MAX}[\text{vcl}]$	WBP(Lar)	$*\text{Lar}/_]_{\text{Wd}}$
a.	$\text{la}_\mu \text{t}_\mu$				*
b.	$\text{la}_\mu \text{t}_\mu$			*!	*
c.	$\text{la}_\mu \text{d}_\mu$		*!		
d.	$\text{la}_\mu \text{d}_\mu$		*!		

- ▶ 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



Lengthening in /ad/: OT analysis

	lad	MTW	* μ [cons]	WBP(Lar)	*Lar/_]wd	MAX(Lar)
a.	la μ d	*!			*	
b.	la: $\mu\mu$ d			*	*!	
c.	la μ d μ		*!			*
d.	la: $\mu\mu$ d					*

- ▶ 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 * μ [cons] (or * μ [obst]) is necessary anyway to prevent gratuitous mora insertion



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 * μ [obst] \gg MAX- μ
- ▶ 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 [ŋ] (presumably glottal/placeless; de Lacy 2006) is always moraic: undominated WBP[nasal]
- ▶ Coda [r] is always nonmoraic (?): Pandora's box



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'ga:t] '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 & 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 II

- ▶ $\langle \text{Lar} \rangle$ obstruents lose laryngeal specification and cannot license morae, vowel lengthens because of MAIN TO WEIGHT: $/ad/ \rightarrow [a_{\mu}t_{\mu}d]$
- ▶ $\langle \text{Lar}, [\text{vcl}] \rangle$ obstruents stay put and license morae, so no lengthening: $/at/ \rightarrow [a_{\mu}t_{\mu}]$
- ▶ Word-medially voiceless obstruents become moraic in order to be parsed into the stressed syllable and survive the markedness constraint

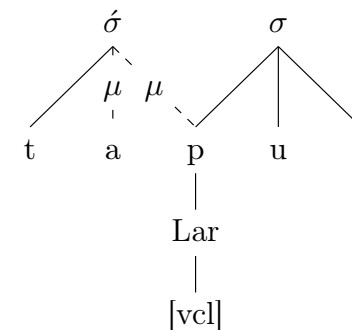


Cursory analysis of Breton I

- ▶ 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 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 [vcl] 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

	*Root	*Lar	*[voi]
$\langle \times \rangle$	*		
$\langle \times, \text{Lar} \rangle$	*	*	
$\langle \times, \text{Lar}, [\text{voi}] \rangle$	*	*	*



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



Stringent constraint violations: faithfulness

$\langle \times, \text{Lar}, [\text{voi}] \rangle$	MAX[Root]	MAX[Lar]	MAX[voi]
\emptyset	*	*	*
$\langle \times \rangle$		*	*
$\langle \times, \text{Lar} \rangle$			*
$\langle \times, \text{Lar}, [\text{voi}] \rangle$			



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 [αF]



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