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:

(3)

a.	[aˈmi]	'friend
b.	[ˈmɛt]	'(s)he puts'
c.	[canˈtade]	'sung (fem.)'
d.	[ˈgust]	'taste'
e.	[ˈmaŋ͡]	'hand'
f.	[ˈbratʃ]	'arm'

A priori expectations

- Laryngeal change may feed vowel change

(1)

Rule	/aːd/	/at/
Devoicing	/aːt/	
Vowel shortening	/at/	/at/

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

(2)

Rule	/aːd/	/at/
Vowel shortening		
Laryngeal change	/aːt/	/at/

- ☞ Incomplete neutralization
- ☞ Opacity?

Vowel lengthening in Friulian

- Stressed vowels can be long:

(4)

a.	[viːf]	'alive' (masc.)'	_C#
b.	[ˈspɔːrk]	'dirty (masc.)'	_r
c.	[ˈneːri]	'black'	

- Minimal pairs: final syllables before single consonants:

(5)

a.	(i)	[ˈlaːt]	'gone (masc.)'
	(ii)	[ˈvaːl]	'(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.	[ˈlade]	'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

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 ɛ ʊ ɪ], and before devoiced stops it is rather [ɑ o e u i]
  - 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 & Rosenthall (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

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.

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. [ˈtaːput] ‘to take’
    b. [ˈjaχːɔχ] ‘more healthy’
    c. [skʏˈdɛlːo] ‘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. [ˈliːzər] ‘letter’
    c. [ˈmeːlən] ‘yellow’

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

(9) a. [lɔˈgoːdən] ‘mouse’
b. [lɔˈgɔtːa] ‘to hunt mice’

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. [ˈtoːgo] ‘hats’
b. [ˈtoːk] ‘hat’

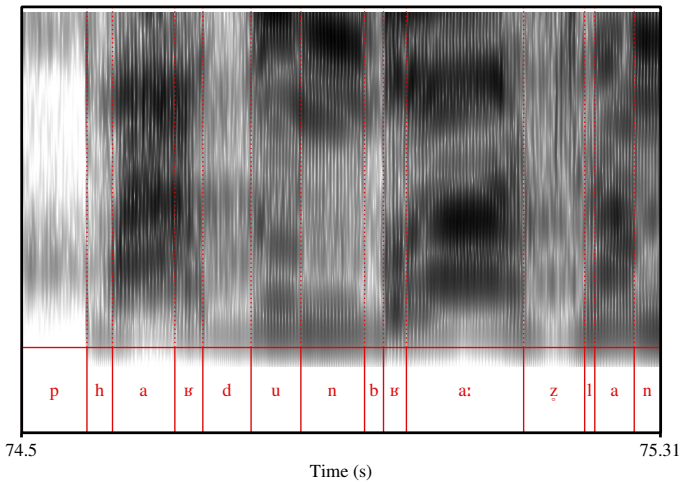
- Underlying voiceless obstruents word-finally are long:

(11) a. [ˈkasː] ‘send!’
b. [ˈkaːs] ‘cat’
c. *k*[aː]*zez* ‘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 is 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

pardon_braz_lanhouarne



[ˌpʰaʀdun ˈbʀaːz̥ lan. . .]
'the big church feast of Lanhouarne'
66% unvoiced frames (Praat), pulses stop about 1/3 into the consonant

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)

×	×	×
	|	|
	Lar	Lar
		|
		[F]
No specification	Contrastive non-specification	Contrastive specification

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

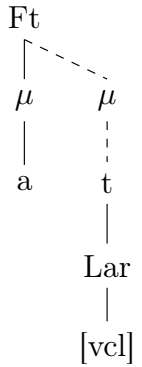
- Voiceless obstruents are underlyingly moraic, voiced ones aren't
- Head foot must be bimoraic
- Weight-by-Position for laryngeally specified coda segments
  - ☞ Laryngeally unspecified segments are not moraic by TETU
- ☞ [F] in Friulian is [voiceless] (Blaho, 2008):
  - Markedness = structure.
  - 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)
  - *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/

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



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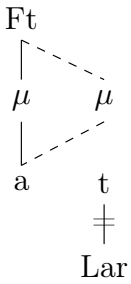
No lengthening in /at/: OT analysis

		lat	MtW	Max[vcl]	WbP(Lar)	*Lar/_]$_{\text{Wd}}$
a.	☞	la$_{\mu}$t$_{\mu}$				*
b.		la:$_{\mu\mu}$t			*!	*
c.		la$_{\mu}$d$_{\mu}$		*!		
d.		la:$_{\mu\mu}$d		*!		

- 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.		$la_\mu d$	*!			*	
b.		$la{:}_{\mu\mu} d$			*	*!	
c.		$la_\mu d_{\mu}$		*!			*
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]≫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)	[aˈfit]	'rent' (It. *affitto*)
	(ii)	[afiˈtut]	'small rent'
b.	(i)	[impjeˈgaːt]	'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

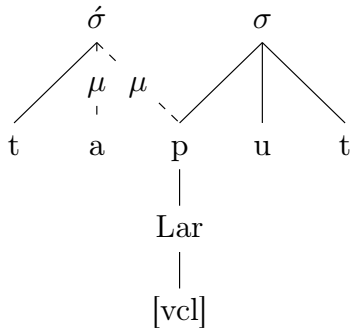
Cursory analysis of Breton I

- 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 lengthens because of Main to Weight: /ad/→/aːμμd̥/
- ⟨Lar,[vcl]⟩ obstruents stay put and license morae, so no lengthening: /at/→[aμtːμ]
- 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

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 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

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]
⟨×⟩	*		
⟨×, Lar⟩	*	*	
⟨×, Lar, [voi]⟩	*	*	*

Stringent constraint violations: faithfulness

⟨×, Lar, [voi]⟩	MAX[Root]	MAX[Lar]	MAX[voi]
∅	*	*	*
⟨×⟩		*	*
⟨×, Lar⟩			*
⟨×, Lar, [voi]⟩			

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

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]

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?

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