Laryngeal neutralization in Breton:
Loss of voice and loss of contrast

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1.   Introduction

- Two ways of looking at final devocing:

  - Voicing is prohibited: Word-final obstruents should not be voiced.
    E.g., $^*[+\text{VOICE}])_\omega$ (Grijzenhout and Krämer 1998: 13)

  - Voicing **contrasts** are prohibited: Word-final obstruents should not be (independently) specified for voicing.
    E.g., Steriade (1997): Preserve voicing contrasts only where there are robust cues.

- These two possibilities are not necessarily distinct, especially if features are privative.

  Given the representations in (1a), the constraint in (1b) and the rule in (1c) can be seen either as eliminating voicing or as eliminating contrast.

  (1)   a.   *voiceless*   *voiced*   b. $^*\text{VOICE})_\omega$ c.   X   #
                    X   X   ǂ
                                 | Voice
                               Voice

  In a system such as (1a), there is no formal distinction between a voiceless obstruent and one that is unspecified for voicing (though cf. van Oostendorp (2006) on the possibility of distinguishing between absent [Voice] and unparsed [Voice]).

- This talk:

  - analyzes final devoicing and external sandhi in Île de Groix Breton (as described by Ternes (1970))

  - offers an alternative to the syllable-based account of Krämer (2000)

- suggests that final devoicing involves **both** constraints against voicing and constraints against contrast
- Theoretical tools/assumptions:

  - Optimality Theory (Prince and Smolensky 1993)

  - Privative voicing features based on Avery (1996)

  - Contrastive specification using a hierarchy of features (Dresher in press)

  - Featural anti-alignment (Hall 2007a, 2007b)

2. Data

2.1. Final devoicing

Breton final devoicing is illustrated in (2) with data from Ternes (1970: 127), cited by Krämer (2000: 641):

(2) a. /poud/ 'pot':   sg. [pout],   pl. [poud+ew]
     b. /korv/ 'body':   sg. [korf],   pl. [korv+ew]
     c. /kurt/ 'heart':   sg. [kurt],   pl. [kurt+ew]
     d. /grek/ 'coffee pot':   sg. [grek],   pl. [grek+ew]

Obstruents are voiceless in absolute final position, or before a word-initial voiceless obstruent.

2.2. Regressive voicing

Before word-initial voiced segments (including sonorants and vowels), however, word-final obstruents are voiced, regardless of their underlying value for voicing. Data from Ternes (1970: 87, 79–80, 45):

(3) a. [ərɥirijes]   'the virgin'
     b. [ərɥirijez gouxaŋ]   'the eldest virgin'
     c. [ərɥirijez vaːri]   'the Virgin Mary'

(4) a. [ɥenek]   'eleven'
     b. [ɥeneg liːw]   'eleven francs'
     c. [ɥeneg øyr]   'eleven o'clock'

(5) a. [kas]   'send'
     b. [kaz wel ərbaːgew]   'send all the boats'
     c. [kas fətak+paːris]   'send to Paris'

(6) a. [ʃuk+ed əzaj]   'Sit down there!' (pl.)
     b. [ʃug əzaj]   'Sit down there!' (sg.)
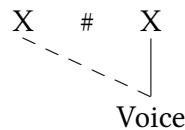
2.3. The picture so far

Thus far, the data suggest that final devoicing is elimination of contrast: word-final obstruents lose their underlying specification for voicing, and are thus subject to assimilation to a following segment, or, if no segment follows, are realized as voiceless by default.

Sketches of two possible analyses:

(7) Faithfulness to voicing in non-final positions ≫ Voicing agreement ≫ Default voicelessness ≫ Faithfulness to voicing in final position

(8)

2.4. Progressive devoicing

However, there are some word-initial voiced stops that, when preceded by a word-final obstruent, become devoiced, rather than triggering regressive assimilatory voicing.

Data from Ternes (1970: 79, 193, 86, 87, 190):

(9)
a.	[peamzek]	'fifteen'	h.	[peis]	'peas'
b.	[daj]	'day'	i.	[gri:s]	'grey'
c.	[peamzek taj]	'fifteeen days'	j.	[peis kri:s]	'grey peas'
d.	[beis]	'finger'	k.	[ur+mi:s]	'a month'
e.	[bəziʤet]	'fingers'	l.	[mi:z+jew]	'months'
f.	[bijãn]	'little'	m.	[bənak]	'any'
g.	[ər+beis pijãn]	'the little finger'	n.	[ur+mi:s pənak]	'any month'

As the data in (10) (from Ternes 1970: 88; quoted by Krämer 2000: 651) indicate, the application of progressive devoicing depends on (the initial consonant of) the second word, rather than on any property of the final consonant of the first word:

(10)
a.	[unaʧypaʃ]	'crew'
b.	[ba:k]	'boat'
c.	[bənak]	'any'
d.	[unaʧypaʒ ba:k]	'crew of a boat'
e.	[unaʧypaʃ pənak]	'any crew'

Progressive devoicing—especially the fact that it occurs even when the word-final consonant is underlyingly voiced (as in (9g) and (9n))—indicates that final devoicing in Breton involves not only the elimination of underlying voicing specifications, but also the imposition of voicelessness.

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3.   Representations

Krämer (2000: 652) uses a binary feature [±voice], with archiphonemic underspecification as in Inkelas's (1995) treatment of Turkish, to make the ternary distinction in (11):[1]
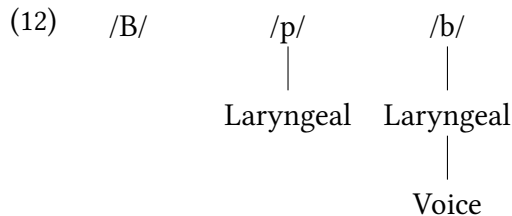
(11)

		Absolute initial position	After voiceless obstruent /k/
/b/	[+voice]	[b]	[g . b]
/P/	[Øvoice]	[b]	[k . p]
/p/	[−voice]	[p]	[k . p]

Krämer (2000: 660–661): Privative features would either be inadequate to account for the facts or else would predict too wide a range of phonetic realizations.
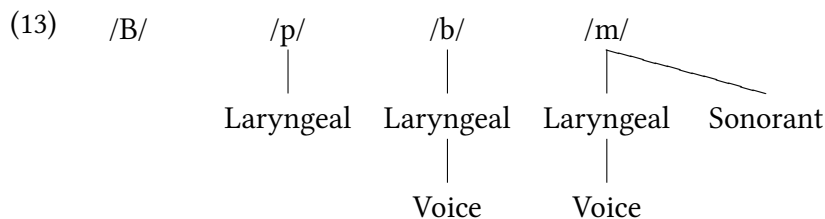
However…

Privative representations based on Avery (1996):

(12)   /B/   /p/   /b/

                          | |

                    Laryngeal   Laryngeal

                                      |

                                   Voice

In Avery's terms, the Breton obstruent system (like those of Dutch and Turkish) represents a mixture of a Laryngeal Voice system and a Contextual Voice system.
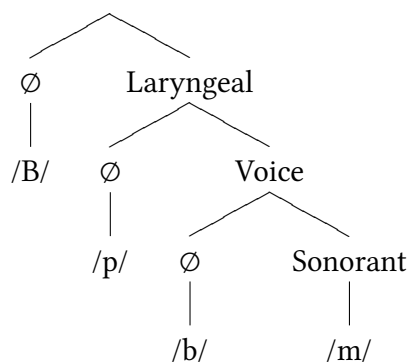
In order to represent assimilation of word-final obstruents to following voiced obstruents and sonorants as a unified phenomenon, we need sonorants (including vowels) to have [Voice] as well (*contra* Avery's (1996: 77–78) Lar-SV Constraint):

(13)   /B/   /p/   /b/   /m/

                          | | |

                    Laryngeal   Laryngeal   Laryngeal   Sonorant

                                      | |

                                   Voice   Voice

Though this produces the appearance of redundancy, it is entirely compatible with a version of contrastive specification based on the notion of a contrastive hierarchy (Dresher, Piggott, and Rice 1994; Hall 2007b; Dresher in press). All that need happen is that [Sonorant] be given unusually narrow scope:

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1. Krämer uses /P/ to represent the underspecified alternating initial segments; I will use /B/, simply to indicate that in the default case these segments are realized as voiced.

(14)

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            ┌──────────┐
            ∅       Laryngeal
            │       ┌──────────┐
           /B/      ∅         Voice
                    │       ┌──────────┐
                   /p/      ∅        Sonorant
                            │          │
                           /b/        /m/
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4.   Constraints

Given these representations, final devoicing and regressive and progressive assimilation can be accounted for by the following constraints, ranked in the order in which they are listed:

MAX[SON] – If a segment is associated with the feature [Sonorant] in the input, then the corresponding output segment (if any) is also associated with [Sonorant].

SONORANT VOICING – If an output segment is associated with [Sonorant], then it is also voiced (i,e., it is associated with a [Laryngeal] node bearing [Voice]).

MAX[LAR]/ONSET – If the input correspondent of an output segment in an syllable onset is associated with a [Laryngeal] node, then the output segment is associated with **a featurally identical** [Laryngeal] node.

> I.e., if the input segment has a bare [Laryngeal] node, the output segment must also have a bare [Laryngeal] node; if the input segment has a [Laryngeal] node bearing [Voice], the output segment must also have a [Laryngeal] node bearing [Voice]; but if the input segment is not associated with a [Laryngeal] node, the constraint is satisfied vacuously.

DISALIGN-R(ω, LAR) – The right edge of a word should not be aligned with the right edge of the scope of a [Laryngeal] node.

FINAL DEVOICING – A word-final segment should be associated with a bare [Laryngeal] node.

MAX[LAR] – If the input correspondent of an output segment is associated with a [Laryngeal] node, then the output segment is associated with a featurally identical [Laryngeal] node.

DEFAULT VOICING – Output segments should be voiced.

Featural anti-alignment does a lot of the work here:

- Assimilation in both directions is driven by DISALIGN-R(ω, LAR).

- This constraint effectively penalizes any word-final segment with a voicing specification that it does not share with a segment to its right. (Compare Itô, Mester, and Padgett's (1995) licensing of voicing on nasals by association with a following stop.)

- See Hall (2007a) for a discussion of how featural anti-alignment is useful for implementing contrastive specification in OT.

However, the FINAL DEVOICING constraint is also necessary, to ensure that a word-final obstruent followed by an underlyingly underspecified segment does not end up voiced (in cases such as (9g) and (9n)).

(Assumption: All output segments are fully specified as to voicing; there is no [B] at the surface.)

(15) Vacuous assimilation with two underlyingly voiced segments, as in /miːz dy/ [miz dy] 'December' (lit. 'black month'):

/z　#　d/ ｜　　｜ Lar　Lar ｜　　｜ Voi　Voi	MAX[LAR]/ONS	DISALIGN	FINDEV	MAX[LAR]	DEFVOI
☞　[z　#　d] ＼＿＿／ Lar ｜ Voi			*		
[z　#　d] ｜　　｜ Lar　Lar ｜　　｜ Voi　Voi		*!	*		
[s　#　d] ｜　　｜ Lar　Lar 　　　｜ 　　　Voi		*!		*	*
[s　#　t] ＼＿＿／ Lar	*!			**	**

(16) Final devoicing before an underlyingly voiceless segment, as in /miːz kalãgwaŋ/ [mis kalãgwaŋ] 'the month of November':

/z # k/ Lar Lar Voi	Max[Lar]/Ons	Disalign	FinDev	Max[Lar]	DefVoi
☞ [s # k] Lar				*	**
[z # k] Lar Lar Voi		*!	*		*
[z # g] Lar Voi	*!		*	*	

(17) Final devoicing 'feeding' progressive devoicing, as in /ur+miːz Bənak/ [ur+miːs pənak] 'any month' (9n):

/z # B/ Lar Voi	Max[Lar]/Ons	Disalign	FinDev	Max[Lar]	DefVoi
☞ [s # p] Lar				*	**
[z # b] Lar Voi			*!		
[s # b] Lar Lar Voi		*!		*	*

(18) Regressive assimilation to a sonorant, as in /trizek miːz/ [trizeg miːs] 'thirteen months':

/k # m/ (Lar; Lar Son; Voi)	MAX[SON]	SV	MAX[LAR]/ONS	DISALIGN	FD	MAX[LAR]
☞ [g # m] (Lar Son; Voi)					*	*
[k # m] (Lar; Lar Son; Voi)				*!		
[k # m̥] (Lar Son)		*!	*			*
[k # p] (Lar)	*!		*			*

(19) No devoicing of sonorants, as in /təjal kãprein/ [təjal kãprein] 'you can understand':

/l # k/ (Son Lar Lar; Voi)	MAX[SON]	SV	MAX[LAR]/ONS	DISALIGN	FD	MAX[LAR]
☞ [l # k] (Son Lar Lar; Voi)				*	*	
[l # g] (Son Lar; Voi)			*!		*	*
[l̥ # k] (Son Lar)		*!				*
[ɬ # k] (Lar)	*!					*

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5. Evaluation

5.1. Syllable structure and word-internal clusters

- The present account: voicing assimilation across word boundaries is driven by featural anti-alignment.

- Krämer (2000): voicing assimilation between and within words is driven by constraints on syllable structure.

  - Assimilation to voiced obstruents is driven by the syllable contact constraint CoCo, which penalizes any coda consonant that is less sonorous than an immediately following onset consonant.
  - Assimilation to sonorants is achieved by parsing the word-final obstruent into the onset of the following syllable, where it is subject to a local conjunction of an alignment constraint with the constraint responsible for default voicing of underspecified onsets:

  (20) /trizek miːz/ [trizeg miːs] 'thirteen months' (Krämer 2000: 658):

/trizek # miːz/		IDENT[SON]	A&OV	CoCo	IDENTONS[VOICE]	ALIGNL
☞	[tri.ze.(g#miːs]				*	*
	[tri.zek.(#miːs]			*!		
	[tri.ze.(k#miːs]		*!			*
	[tri.zeŋ.(#miːs]	*!				

  - A&OV – Local conjunction of ALIGNL(STEM, PWD) with ONSETVOICING
  - CoCo – A coda consonant should not be less sonorous than an immediately following onset consonant.

- However, the comprehensive lists of word-internal and -initial consonant clusters given by Ternes (1970, 1992) offer no independent evidence that plosive–nasal sequences are possible onsets in Breton. In obstruent–sonorant sequences that do not cross a word boundary, the sonorant is always either a liquid or a glide.

- What about voicing agreement in word-internal obstruent clusters?

  - All word-internal obstruent clusters agree in voicing.
  - However, they seem to be subject to stricter requirements than those governing across-word clusters:
    * Place: At least one of the obstruents in a word-internal cluster must be coronal.
    * Voicing: Nearly all word-internal obstruent clusters are voiceless; the exception is /gz/, of which Ternes's examples all appear to be borrowings from French (e.g., /egzaktəmãt/ 'exactly').

  (21) Word-internal obstruent clusters:
        sp sf st   sk
                ʃt   ʃʧ
            kt ks
                gz

5.2. Underspecification, contrast, and faithfulness

- The tree in (14) assumes that there is such a thing as an underlying inventory, and that underspecified segments such as /B/ are phonemes in it.

- Richness of the Base rejects the idea of language-specific input inventories.

- The representations in (13) are not incompatible with RotB; the tree in (14) just shows that they are also compatible with contrastive specification based on the Successive Division Algorithm.

- Alternant Optimization (Inkelas 1995) will allow for underspecifications in the lexicon where necessary.

- RotB predicts underspecification in other places, too, but, as in Krämer's (2000) analysis, underspecified segments in non-initial position will not be distinguishable from specified ones.

- The view of featural faithfulness assumed here does not require correspondence relations between features, only between segments. The identity of output features does not matter; only their existence does.[2]

  - There is no (empirical) need for Dep[Lar] here; all output segments are specified as to voicing, and Max[Lar] as formulated here incorporates Dep[Voice].
  - We do need Dep[Sonorant], or something like it (possibly *Sonorant ranked below Max[Son]).
  - The underlying contrast between segments with and without [Laryngeal] is neutralized at the surface; the contrast between sonorants and obstruents is not.

5.3. Conclusions

- Featural anti-alignment offers a way of accounting for external sandhi in Breton without parsing sequences like /gm/ as onsets.

- The Breton facts suggest that final devoicing involves both a loss of voicing and a loss of contrast.

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2. Compare Struijke's (2002) Existential Faithfulness, and see also Causley (1999).

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