Michael Dow (mcdow@indiana.edu)
Indiana University

Manchester Phonology Meeting 21
May 25, 2013

Multiple repairs for voiced obstruent codas in Berbice Dutch Creole[*]

Overview:

- Final devoicing is the most frequent repair for voiced obstruent codas ("voiced codas"), but it need not be the only possible one, as Lombardi (2001) and Steriade (2001) claim, among others.

- I present a conspiracy from Berbice Dutch Creole where (a) deletion and epenthesis repair certain voiced codas and (b) voiced stops block unstressed vowel deletion.

- An optimality theoretic analysis of these data requires a context-specific ban on voiced codas, as well as faithfulness enforcing input [voice] specifications, in sharp contrast to Lombardi's context-free ban on voiced obstruents and a strict exclusion of ID[voice] from CON.

- The Berbice Dutch Creole data, as well as final nasalization in Picard (José & Auger 2004), suggest the need to allow for diverse repairs to voiced codas.

0. Introduction

Berbice Dutch Creole ("Berbice"): Dutch lexifier, Eastern Ijo substrate, spoken in Guyana ca. 1600-2005. All data are taken from Kouwenberg's (1994) grammar, based on 11 elderly, fluent speakers. The language at the time was already moribund.

Recent borrowings from Guyanese Creole English are excluded from this account, as they adhere to their source phonology (e.g. voiced fricatives appear only in these words). Otherwise, the facts noted below are observed in Berbice regardless of etymological origin.

1. Singleton codas: data and analysis

(1) Voiced and voiceless stops in Berbice contrast everywhere except for in coda position.

	Word-initial		*Intervocalic*		*Post-nasal*		*Coda*	
/p/	[pɛlɛ]	'play'	[tapu]	'draw'	[pampuna]	'pumpkin'	[kaptin]	'captain'
/b/	[bɛlɛ]	'sweet'	[tabu]	'soak'	[pamba]	'wing'		—
/t/	[taka]	'branch'	[kuta]	'necklace'	[pontu]	'pound'	[bitmo]	'outside'
/d/	[daka]	'day'	[kuda]	'could'	[pondo]	'punt'		—
/k/	[kau]	'chew'	[ʃiki]	'ill'	[duŋkwati]	'tricky'	[rekti]	'right'
/g/	[gau]	'quick'	[ʃigi]	'shake'	[duŋgru]	'dark'		—

[*] Special thanks to Dan Dinnsen, Michael Becker, Kevin Rottet, and the audience of the 18th Mid-Continental Phonetics & Phonology Conference for their input on this project.

(2) Unstressed, root-final vowels optionally alternate with zero.

a. [pama] ~ [pam] ‘finish’
b. [plɛkɛ] ~ [plɛk] ‘place’
c. [koro] ~ [kor] ‘descend, fall’
d. [jefi] ~ [jef] ‘eat’
e. [kopu] ~ [kop] ‘buy’

As this process occurs before both consonants and vowels, and the alternating vowel is unpredictable, I analyze this as vowel deletion, not epenthesis (Singh & Muysken 1995).

(3) Only voiced stops block vowel deletion, regardless of the following context (i.e., V- or C-initial words). No voiced ~ voiceless alternations occur in these words or elsewhere in Berbice.

a. [kiba], *[kib], *[kip] ‘short’
b. [redi], *[red], *[ret] ‘ready’
c. [fragi], *[frag], *[frak] ‘ask’

(4) Verbs show the same patterns before the past/anterior marker /-tɛ/.

	Bare variants	*Anterior variants*	*Glosses*
a.	[luru, lur]	[luru-tɛ, lur-tɛ]	‘look’
b.	[ʃul]	[ʃul-tɛ][†]	‘shine light’
c.	[nimi, nim]	[nimi-tɛ, nim-tɛ, nin-tɛ]	‘know’
d.	[ban]	[ban-tɛ]	‘be born’
e.	[bifi, bif]	[bifi-tɛ, bif-tɛ]	‘speak’
f.	[sef]	[sef-tɛ]	‘save’
g.	[deki, dek]	[deki-tɛ, dek-tɛ]	‘take’
h.	[trap]	[trap-tɛ]	‘step on’
i.	[fragi], *[frag], *[frak]	[fragi-tɛ], *[frag-tɛ], *[frak-tɛ]	‘ask’

Vowel deletion frequently creates coda consonants with the sole exception of voiced stops.

(5) Constraints:

a. *UNSTRESSEDV: Root-final unstressed vowels are banned.
b. *VOICEDCODA: Voiced stops are banned in coda position. (*VOC)
c. MINIMALWORD: Prosodic words are minimally bimoraic. (MINWORD)

As stress is penultimate in roots, and /-tɛ/ does not attract stress, syncope is captured by *UNSTRESSEDV ≫ MAXV. However, *VOICEDCODA must dominate both of these constraints in order to block vowel deletion. As devoicing never occurs in the language, ID[voice] must be undominated.

(6) Unstressed vowels delete after voiceless, but not voiced, stops.

/deki/	*VOC	ID[voice]	*UNSTRESSEDV	MAXV
a. deki			*!	
b. ☞ dek				*
/kiba/				
c. ☞ kiba			*	
d. kib	*!			*
e. kip		*!		*

(7) Devoicing would not be able to repair hypothetical singleton voiced codas, nor would deletion (in monosyllabic stems). Rather, epenthesis would have to.

/red/	*VOC	MINWORD	ID[voice]	MAXC	DEP	*UNSTRESSEDV
a. ☞ redi					*	*
b. red	*!					
c. ret			*!			
d. re		*!		*		

2. Complex codas: data and analysis

(8) Verbs ending in nasal + stop sequences behave differently according to whether the sequence contains a voiced (ND) or voiceless (NT) stop.

a. [kantɛ, kant] *[kan] ‘not be able’
b. [kjant] *[kjan] ‘turn over’

c. [findi, fin] *[find] ‘find’
d. [tambu, tam] *[tamb] ‘pound in mortar’
e. [maŋgi, maŋ] *[maŋg] ‘run’

Only the voiceless verbs allow reduction to nasal + stop, while they block reduction to N#.

The voiced verbs may be either N# or NDV# but block reduction to nasal + stop. The reduced nasal-final forms distinguish themselves from underlyingly nasal-final verbs in two ways:

- [ŋ] is limited in its distribution and is found stem-finally only when a […ŋgV] variant is also attested, i.e., derived via this process. There are no [VŋV] words.
- Optional nasal assimilation, noted in [nim-tɛ, nin-tɛ], is blocked when the nasal-final variant of this set of verbs comes into contact with the anterior suffix (cf. (10)).

(8c-e) cannot be explained by a ban on complex codas, which are freely permissible in Berbice, again to the sole exception of voiced stops (e.g. [jɛrma, jɛrm] ‘woman’, [helpu, help] ‘help’; [besn] ‘broom’, [sins] ‘since’).

(9) The final vowels of alternating ND verbs are largely predictable.

a. [pɛmbɛ] ‘lay eggs’
b. [fɛndɛ] ‘find’
c. [wɛndɛ] ‘fart’

d. [tambu] ‘pound in mortar’
e. [krombu] ‘bend, twist’

f. [bendi] ‘tie’
g. [tandi] ‘climb’
h. [faŋgi] ‘hold’
i. [priŋgi] ‘jump’

If the syllable-adjacent vowel is [ɛ], the same vowel is noted word-finally (9a-c). [ATR] harmony is a process that holds elsewhere in the language. When the preceding sequence is bilabial, [u] is observed (9d-e). [i] is observed elsewhere (9f-i).

Those NDV# verbs whose vowels do not meet these distributional criteria rarely, if ever, display N-final forms, e.g. [samba], *[sam] ‘groan’; [druŋgu], *[druŋ] ‘get drunk’.

(10) The N-final forms of alternating verbs block nasal assimilation with the anterior marker.

	Bare forms	*Anterior forms*	*Gloss*
a.	[nimi, nim]	[nimi-tɛ, nim-tɛ, nin-tɛ]	‘know’
b.	[ban]	[ban-tɛ]	‘be born’
c.	[kanti, kant]	[kanti-tɛ, kant-tɛ]	‘not be able’
	*[kan]	*[kan-tɛ]	
d.	[kjant]	[kjant-tɛ]	‘turn over’
	*[kjan]	*[kjan-tɛ]	
e.	[findi, fin]	[findi-tɛ, fin-tɛ]	‘find’
	*[find]	*[find-tɛ, fint-tɛ]	
f.	[tambu, tam]	[tambu-tɛ, tam-tɛ]	‘pound in mortar’
	*[tamb]	*[tan-tɛ, tamb-tɛ, tamp-tɛ]	
g.	[maŋgi, maŋ]	[maŋgi-tɛ , maŋ-tɛ]	‘run’
	*[maŋg]	*[man-tɛ, maŋg-tɛ, maŋk-tɛ]	

The vowel-final stems of these verbs can be explained by the same ranking which derived /red/ → [redi] in (7). For simplicity’s sake, two scenarios (deletion and epenthesis) with different rankings are outlined. Here, MAXC ≫ DEP would be crucial.

(11) Epenthesis optionally repairs complex voiced codas.

/bend/	*VOC	ID[voice]	MAXC	DEP	*UNSTRESSEDV
a. ☞ bendi				*	*
b. ben			*!		
c. bend	*!				
d. bent		*!			

(12) The N-final variants of NDV-type verbs require DEP ≫ MAXC.

/bend/	*VOC	ID[voice]	DEP	MAXC	*UNSTRESSEDV
a. bendi			*!		*
b. ☞ ben				*	
c. bend	*!				
d. bent		*!			

Other solutions allowing ties or variable rankings could also account for the variation.

(13) Data summary ([ə] = any epenthetic vowel)

	Surface forms	*UR type*	*Example*	*Gloss*	*Notes*
a.	[…T]	/…T/	[tap]	'dip'	
b.	[…T], […TV]	/…TV/	[deki], [dek]	'take'	V ~ Ø = unstressed vowel deletion
c.	[…Də]	/…D/	[redi]	'get ready'	Hypothetical epenthesis as per Richness of the Base
d.	[…DV]	/…DV/	[kiba]	'short'	Vowel deletion blocked
e.	[…N]	/…N/	[ban]	'be born'	N-final form assimilates in anterior
f.	[…N], […NV]	/…NV/	[nimi], [nim]	'know'	V ~ Ø = unstressed vowel deletion, N-final form assimilates in anterior
g.	[…NT]	/…NT/	[kjant]	'turn over'	
h.	[…NT], […NTV]	/…NTV/	[kanti], [kant]	'cannot'	V ~ Ø = unstressed vowel deletion
i.	[…N], […NDə]	/…ND/	[tambu], [tam]	'pound'	Epenthesis *or* deletion, N-final form does not assimilate in anterior
j.	[…NDV]	/…NDV/	[tumbi]	'visit'	Vowel deletion blocked

(13c) is a hypothetical but possible mapping in Berbice, in keeping with Richness of the Base. Where the final vowel is possibly epenthetic, either the consonant- or vowel-final UR (13c OR 13d) would produce the attested forms.

3. Discussion

3.1 Typologies and the Too-Many-Solutions problem

Researchers have claimed that, since languages reportedly repair voiced codas only by devoicing, something must be built into the grammar to restrict an overgeneration of unattested language types, such as limitations on CON (Lombardi 2001) and fixed ranking among faithfulness constraints (Steriade 2001).

Lombardi (2001) argues from negative evidence that devoicing is the only repair for voiced codas, which she accounts for in two ways: (a) context-free markedness banning voiced obstruents (*LAR) with onset [voice] faithfulness and (b) MAX[voice], which would replace ID[voice] in CON.

(14) Epenthesis impossible (harmonically bounded)

/pid/		*LAR	DEP	MAX[voice]
a.	[pid]	*		
b.	[pit]			*
c.	[pidi]	*	*	

(15) Deletion impossible (harmonically bounded)

/pid/		*LAR	MAX	MAX[voice]
a.	[pid]	*		
b.	[pit]			*
c.	[pi]		*	*

Note that ID[voice] instead of MAX[voice] could favor (15c).

Lombardi claims the impossibility of deletion follows from a privative analysis of [voice]. My analysis does not rely on the nature of [voice] (see Kaye, Lowenstamm & Vergnaud 1985 and Zonneveld 2007, for examples of a privative view, and Wetzels & Mascaró 2001 for a binary view).

The definition of ID[voice] ensures that it is violated by any change but vacuously satisfied by deletion. MAX[voice] can be low-ranked in the analysis of Berbice.

(16) ID[voice] allows deletion to be optimal.

/pid/		*VOC	MAX	ID[voice]	MAX[voice]
a.	[pid]	*			
b.	[pit]			*	*
c.	[pi]		*		*

Similarly, *VOC does not exclude the more general *LAR, which would merely be low-ranked in Berbice.

(17) *VOC allows epenthesis to be optimal.

/pid/	*VOC	DEP	ID[voice]	*LAR
a. [pid]	*			*
b. [pit]			*	
c. [pidi]		*		*

Steriade's (2001) P-map proposal takes a different approach to the same problem of negative evidence and incorporates into grammar a hierarchy based in perceptual similarity, where certain contrasts are more distinctive than others.

(18) Hierarchy of distinctiveness in contrasts (➢ = more distinctive)

C_1VC_2 vs. C_2VC_1, [ə] vs. Ø ➢ C vs. Ø ➢ obstruent vs. sonorant ➢ D vs. T/V_]

This translates into a fixed ranking among corresponding faithfulness constraints: if contrast A is more distinctive than contrast B, faithfulness A will outrank faithfulness B.

(19) Fixed ranking of faithfulness constraints

LINEARITY, DEP ≫ MAX ≫ ID[sonorant] ≫ ID[voice]

Crucially, in response to voiced codas, ID[voice] cannot outrank any other faithfulness, and only devoicing or fully contrastive languages may exist.

Berbice shows that deletion and epenthesis repair voiced codas. However, such languages are rare: devoicing is empirically most attested. The hierarchy in (18) may rather reflect the likelihood of relationships among faithfulness constraints rather than a fixed ranking.

Kawahara and Garvey's (2010) auditory experiments on English speakers support the naturalness of diverse repairs for voiced consonants. Epenthesis pairs (e.g. [itab] ~ [itabə]) were overwhelmingly judged as most similar of all (45% average vs. 20% average). Devoicing pairs dominated deletion pairs for only one of six, [ab] ~ [ap].

As their stimuli concerned singleton voiced codas, it remains to be seen what patterns hold for Berbice-like conditions (i.e., N# vs. NT# vs. ND#). Upon experimentation, these may demonstrate different preferences than in Kawahara and Garvey's (2010) experiment or in Steriade's (2001) hierarchy.

3.2 Picard

José and Auger (2004) argue that nasalization repairs certain voiced codas in Vimeu Picard, an endangered Romance language spoken in northern France.

(20) Voiceless and voiced stops contrast in coda position after oral vowels.

a. [wep] ‘wasp’
b. [tyb] ‘pipe’

c. [tapɛt] ‘mouse trap’
d. [berlœd] ‘old ewe’

e. [fabrik] ‘factory’
f. [gœg] ‘nut’

(21) There are no bilabial or alveolar voiced codas adjacent to nasal segments, though voiced obstruent onsets are allowed next to nasals (e.g. [bãk] ‘bank’).

a. /gãb/ [gãm] ‘leg’ (cf. [gãbe] ‘kicking action’)
b. /repɔ̃d/ [repɔ̃n] ‘to answer’ (cf. [repɔ̃dy] ‘answered’)

c. /rydmɛ̃/ [rynmɛ̃] ‘roughly’ (cf. [ryd] ‘rough’)

d. /lãp/ [lãp] ‘lamp’
e. /atirãt/ [atirãt] ‘seductive (fem.)’

(22) Nasalization targets voiced, not voiceless, codas in nasal environments (adapted):

/tyb/	ID[voice]	MAX	DEP[nasal]	*VOC	ID[nasal]
a. ☞ tyb				*	
b. tym			*!		*
c. typ	*!				
d. ty		*!			
/repɔ̃d/					
e. repɔ̃d				*!	
f. ☞ repɔ̃n					*
g. repɔ̃t	*!				
h. repɔ̃		*!			
/atirãt/					
i. ☞ atirãt					
j. atirãn	*!				*
k. atirãd	*!			*	
l. atirã		*!			

Nasalization satisfies the ban on voiced codas while not changing the [voice] specification. These data further suggest that Steriade’s (2001) hierarchy is not fixed, as ID[voice] must dominate ID[nasal] (as included under ID[sonorant]).

Kawahara and Garvey (2010) found in several cases in the same experiment that nasalization pairs were accepted to an equal, if not larger, proportion than devoicing pairs ([ag] ~ [aŋ] preferred over [ag] ~ [ak], 12% to 9%).

4. Conclusion

- The Berbice and Picard data together suggest that devoicing is not the only way languages may repair illicit voiced codas: deletion, epenthesis, and nasalization are all possibilities, which Kawahara & Garvey's (2010) auditory experiment supports.

- Languages show a clear preference for devoicing. Steriade's (2001/2008) P-Map proposal captures this via perceptual similarity and limits the typology with a fixed ranking of context-specific faithfulness constraints.

- Given the proposed diversity of repairs available to languages, Steriade's hierarchy may reflect a bias rather than a fixed fact.

- Berbice and Picard both employed their repair strategies very selectively (e.g. N_], _]N). These environments may demonstrate different perceptual hierarchies than their less specific counterpart (i.e., _]), which may be tested experimentally.

References

José, B., & Auger, J. (2004). (Final) nasalization as an alternative to (final) devoicing: The case of Vimeu Picard. *IULC Working Papers Online, 4*(3), 1-44.

Kawahara, S., & Garvey, K. (2010). Testing the P-map hypothesis: Coda devoicing. Ms. Rutgers University.

Kaye, J., Lowenstamm, J. & Vergnaud, J-R. (1985). The internal structure of phonological representations: a theory of Charm and Government. *Phonology Yearbook*, *2*, 305-328.

Kouwenberg, S. (1994). *A grammar of Berbice Dutch Creole*. Berlin: Mouton de Gruyter.

Lombardi, L. (2001). Why place and voice are different: Constraint-specific alternations in Optimality Theory. In L. Lombardi (Ed.), *Segmental phonology in Optimality Theory: Constraints and representations*. Cambridge: Cambridge University Press.

Singh, R., & Muysken, P. (1995). Wanted: A debate in pidgin/creole phonology. *Journal of Pidgin and Creole Languages, 10*(1), 157-169.

Steriade, D. (2001). Directional asymmetries in place assimilation: A perceptual account. In E. Hume & K. Johnson (Eds.), *The Role of speech perception in phonology* (pp. 219-250), New York: Academic Press.

Wetzels, W. L., & Mascaró, J. (2001). The typology of voicing and devoicing. *Language, 77*(2), 207-244.

Zonneveld, W. (2007). Devoicing in Dutch. In J. v. d. Weijer & E. J. v. d. Torre (Eds.), *Voicing in Dutch: (De)voicing - phonology, phonetics, and psycholinguistics* (pp. 1-40). Amsterdam: John Benjamins.