Deletion required, but not allowed: Piro consonant clusters, revisited

Eva Zimmermann (Leipzig University)
Eva.Zimmermann@uni-leipzig.de

mfm 22 • May 31, 2014

Main Claim: I propose an analysis for the obstruent co-occurrence restrictions in Piro that are an apparent challenge for an OCP-based analysis inside parallel OT. My analysis relies on standard assumption about feature geometry and MAX-F-constraints and formally implements the intuition that deletion of adjacent segments is more likely if the segments are more similar. An argument is made for a restricted (local) version of the OCP on segmental features.

- Piro (Yine), Maipurean, spoken mainly in the Peruvian Amazon by around 3.000 speakers (Urquía Sebastían and Marlett, 2008)
- sources: Matteson (1954, 1965); Lin (1987, 1993, 1997*a*,*b*, 1998, 2005)

1. The challenge

1.1. Obstruent cluster restrictions in Piro

(1) *Segmental inventory* (Lin, 2005, 126)

vowels	i	u	e	o	a
stops	p	t		k	
fricatives		s	ʃ	ç	
affricates		ts	tʃ	tç	
nasal spirant					h
flaps		l	r		
nasal, glides	m	n		j	w

- some sequences of adjacent obstruents are illicit: deletion of the first C (2-b)

(2) *Obstruent cluster after prefixation* (Matteson, 1965)

a. *Creation of two adjacent obstruents*

p– to	pto	'…s group'	(p.129)
p– çi	pçi	'…s house'	(p.129)
k– poloçite	kpoloçite	'having a basket'	(p.119)
k– ʃimahakle	kʃimahakle	'engaged in fishing'	(p.119)
t– kojwuka	tkojwuka	'she makes an alcoholic beverage'	(p.131)

b. *Two adjacent obstruents are avoided*

t– tʃijahata	tʃijahata *ttʃijahata	'she weeps'	(p.33)
p– pawata	pawata *ppawata	'you make a fire'	(p.33)

(3) *Obstruent coocurrences in Piro*

	p	k	t	ts	tʃ	tç	s	ʃ	ç
p	D	+	+	+	+	+	+	+	+
k	+	D	+	+	+	+	+	+	+
t	+	+	D	D	D	D	Af	+	+
ts	+	+	+	D	D	D	D	D	+
tʃ	+	+	+	D	D	D	D	D	+
tç	+	+	+	D	D	D	+	+	+
s	+	+	+	+	+	+	D	D	D
ʃ	+	+	+	+	+	+	D	D	D
ç	+	+	+	+	+	+	D	D	D

D =deletion of the first C, Af =affrication, '+'=both C's surface

(4) *Feature specifications: S & F*

p	[−cnt, Lab]
k	[−cnt, Dor]
t	[−cnt, Cor, +ant]
s	[+cnt, Cor, +ant, +strid]
ʃ	[+cnt, Cor, −ant, +strid]
ç	[+cnt, Cor, −ant, −strid]

S=stop, A=affricate, F=fricative
[±cnt]=[±continuative], [±son]=[±sonorant],
[±ant]=[±anterior], [±strid]=[±strident],
[Lab]=[labial], [Dor]=[dorsal], [Cor]=[coronal]

1.2. *More phonological facts*

- initial onsets obligatory; sequences of three C's only morphologically derived
- no sonority constraints: any two C's can occur in any order, e.g. /smota/ 'blunt point' vs. /msa/ 'empty corn cob' (Matteson, 1965; Lin, 1993, 307+343)
- phonetic effect: pre-consonantal C's are either syllabic or followed by a transitional vowel (choice depends on the relative sonority), e.g. [sᵊmota] vs. [m̩sa] (Lin, 1998, 175)
- true affricates vs. clusters: a.) absence of the transitional vowels between the two parts (5), and b.) affricates followed by two C's are possible but 4-C-sequences are illicit (6)

(5) *Affricates vs. true clusters* (Matteson, 1965, 26)

a.	tʃiretu	[tʃi]	'palm sb.'	b.	tʃireta	[tᵊʃi]	'she hurries'
	tçirna	[tçi]	'it blazes'		tçirha	[tᵊçi]	'she harvests'

(6) *Affricate clusters* (Matteson, 1965, 26)

ntspatate	'my guave'
wtʃkotute	'our cebus monkey'
ptçripite	'your small parrot'

1.3. *Obstruent cluster restriction as OCP-effect?*

➙ **How to represent affricates?**

1. an underlyingly ordered sequence [−cnt +cnt] (Clements and Keyser, 1983; Sagey, 1986)
2. unordered set of [−cnt][+cnt], ordered at the phonetic level
   (Hualde, 1988; Lombardi, 1990, 1995; van de Weijer, 1996)
3. they are stops (e.g. strident) that become affricates at the phonetic level
   (Rubach, 1985; Kim, 1997; Clements, 1999; Kehrein, 2002)

(7) *OCP-constraints for obstruent cluster restriction if affricates are ordered [−cnt +cnt]*

a. OCP_{XX} Assign a violation mark for every pair of adjacent identical segments.

b. OCP_{FF} Assign a violation mark for every pair of adjacent [+cnt] segments.

c. OCP_{AA} Assign a violation mark for every pair of adjacent [−cnt +cnt] segments.

d. OCP_{AF} [+STRID] Assign a violation mark for every pair of adjacent [+cnt, +strid] segments.

e. OCP_{TA} Assign a violation mark for every pair of adjacent [−cnt] segments with the same place feature.

(8) *Obstruent cluster restriction as OCP-effects*

	p	k	t	ts	tʃ	tç	s	ʃ	ç
p		+	+	+	+	+	+	+	+
k	+		+	+	+	+	+	+	+
t	+	+	(7-a)		(7-e)		?	+	+
ts	+	+	+				(7-d)		+
tʃ	+	+	+						+
tç	+	+	+	(7-c)			+	+	+
s	+	+	+	+	+	+			
ʃ	+	+	+	+	+	+			
ç	+	+	+	+	+	+	(7-b)		

Problems with such an account:

1. (Affrication /t/+/s/ → /ts/ needs to follows from another independent mechanism)

2. **Overgeneration**: OCP_{FF} incorrectly excludes all AF clusters (=[−cnt +cnt] [+cnt])

   - argument in Lin (2005): whatever representation for affricates is assumed, a misprediction arises in a standard parallel model based on OCP-constraints like those in (7)
   - solution in Lin (2005): Lexical Phonology & the stop hypothesis is adopted (OCP_{FF} ranked high only in the lexical level where affricates are [−cnt])

3. How **'local' are OCP-constraints?**

   (9) *OCP-constraints*

   a. At the melodic level of the grammar, any two adjacent tonemes must be distinct. (Leben, 1973)

   b. At the melodic level, adjacent identical elements are prohibited. (McCarthy, 1986)

   c. Adjacent identical elements on the same tier are prohibited. (Selkirk, 1988)

   - OCP_{XX} ((7)-a) needs to 'see' the complete feature specification of two segments, whereas OCP_{FF} only 'sees' the feature specification [±cont]

   ➞ Is there a restriction about possible OCP constraints?
   (Is there an OCP against adjacent [−voiced, Dor] or [+round, +nasal],…?)

My claim: OCP-constraints are 'local' and only refer to adjacent elements X_1, X_2 on the same tier n and their direct association with X_1, X_2 on tier n+1. Segmental OCP-constraints only refer to features that are structured on different autosegmental tiers (=feature geometry, cf., for example, Clements, 1985; Clements and Hume, 1995).

2. My analysis

Core of the analysis: $OCP_{[-son]}$ demands non-realization whenever two obstruents are adjacent but non-realization of a segment is only possible if features protected by high-ranked Max-F can reassociate to the phonetically visible C without creating an illicit feature specification.

Background assumptions

- a **containment**-based parallel OT system: no deletion of underlying information (Prince and Smolensky, 1993; Trommer and Zimmermann, 2010; Trommer, 2011; Zimmermann, 2014)
  - 'deletion'=no phonetically visible integration under highest prosodic node (F)
  - 'deletion' of an association line=it is marked as phonetically invisible (⫲)
- a **feature-geometric** representation where features are autosegmental entities:
  - affricates are **ordered sequences** of [−cnt +cnt] (Clements and Keyser, 1983; Sagey, 1986)
  - [±son] is 'root node', dominating place and [±cnt] (cf. Schein and Steriade (1986); McCarthy (1988); for discussion cf., for example, Morén (2003) or Kaisse (2011))
- only **deletion of the first C** in order to repair cluster is considered as possible repair (Wilson, 2001; McCarthy, 2008; Jun, 2011, among many)

(10) *C<C> — Assign a violation mark for every phonetically invisible C not directly preceded by a vowel.

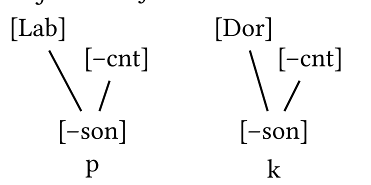
2.1. *Preservation of place and continuancy features*

- deletion of the first obstruent to satisfy $OCP_{[-son]}$ (11-a) is only possible if the place features of the C preserved by $Max_{[pl]}$ (11-b) can reassociate to/be realized on the second C
- only possible if no C with multiple place features results (11-c) (no sec.articulated C's in Piro)

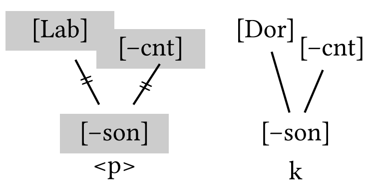
(11)
a. OCP [−son] — Assign a violation mark for every pair of adjacent phonetically visible features [−son].
b. Max [pl] — Assign a violation mark for every place feature specification that is not phonetically visible.
c. *[pl:α,β] — Assign a violation mark for every segment associated with two different major place features in a phonetically visible way.

(12) *The effect of* $Max_{[pl]}$

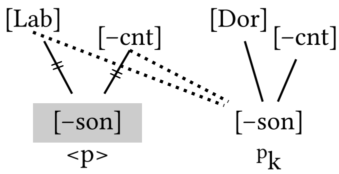
a. *Realization of two adjacent obstruents: violation of* $OCP_{[-son]}$



b. *Non-realization of the first obstruents: violations of* Max_S, $Max_{[pl]}$, $Max_{[cnt]}$



c. *Non-realization of the first obstruents+reassociation: violation of* *[pl:α,β]



(13) *The effect of* Max$_{[\text{PL}]}$*: tableaux*

	Max [pl]	*[pl:α,β]	OCP [−son]	Max S
A. /p/ + /k/ – No deletion				
☞ a. Lab −cnt −son / Dor −cnt −son — pk			*	
b. [Lab −cnt −son] / Dor −cnt −son — k	*!			*
c. Lab −cnt [−son] / Dor −cnt −son — pk		*!		*
B. /p/ + /p/ – Deletion				
a. Cor −cnt −son / Cor −cnt −son — pp			*!	
b. [Cor −cnt −son] / Cor −cnt −son — p	*!			*
☞ c. Cor −cnt [−son] / Cor −cnt −son — [p]				*

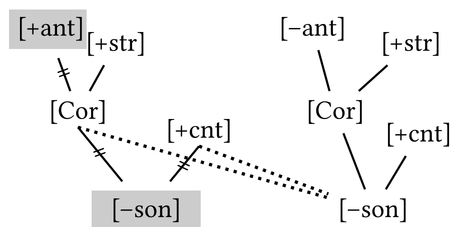
- parallel to the place features, the specification for [±cnt] is preserved (14-a) and the ordered anti-affricate feature specification [+cnt −cnt] is excluded by (14-b)

(14) a. Max [cnt] — Assign a violation mark for every [±cnt] feature specification that is not phonetically visible. *(to be revised!)*

b. *[+c−c] — Assign a violation mark for every sequence of [+cnt −cnt] phonetically visibly associated to a segment node.

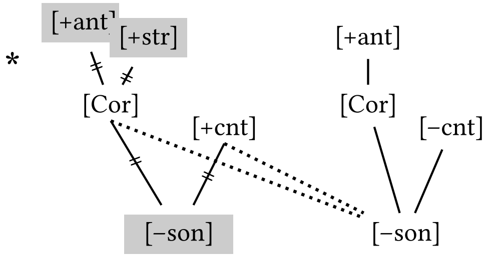
- reassociation of the [±cnt] feature results only in a possible segment specification if:
  - the two C's have one identical value for [±cnt] (FF, SS)
  - an S precedes an A or an F (=affrication, cf. below)

(15) *Reassociation of [+cnt]: FF (/s/+/ʃ/)*



- an illicit [+cnt −cnt] specification results if:
  - an F or A precedes an S
  - an F or A precedes an A

(16) *Impossible reassociation of [+cnt]: FS (/s/+/t/)*



(17) *The effect of* Max$_{[\text{CNT}]}$*: tableaux*

	*[+c−c]	*[pl:α,β]	Max [cnt]	Max [pl]	OCP [−son]	Max S
A. /s/ + /t/ – No deletion						
☞ a. +str +ant Cor +cnt −son / +ant Cor −cnt −son (st)					*	
b. +str +ant Cor +cnt −son / +ant Cor −cnt −son (t)			*!	*		*
c. +str +ant Cor +cnt −son / +ant Cor −cnt −son (t)	*!					*
B. /s/ + /ʃ/ – Deletion						
a. +str +ant Cor +cnt −son / +str −ant Cor +cnt −son (sʃ)					*!	
b. +str +ant Cor +cnt −son / +str −ant Cor +cnt −son (ʃ)			*!	*		*
☞ c. +str +ant Cor +cnt −son / +str −ant Cor +cnt −son (ʃ)						*

➙ the demand to realize [place] and [±cnt] (18) correctly predicts 61 (of 81) contexts

(18) *Ranking (to be completed)*
{*[PL:α,β], *[+C−C], MAX$_{[\text{PL}]}$, MAX$_{[\text{CNT}]}$ } ≫ OCP$_{[-\text{SON}]}$ ≫ MAX$_{\text{S}}$

(19) *Correctly predicted so far*

	p	k	t	ʦ	ʧ	tç	s	ʃ	ç
p	D	+	+	+	+	+	+	+	+
k	+	D	+	+	+	+	+	+	+
t	+	+	D	D	D	D	Af	cf. 2.2.	
ʦ	+	+	+						
ʧ	+	+	+		cf. 2.3.			cf. 2.4.	
tç	+	+	+						
s	+	+	+	+	+	+	D	D	D
ʃ	+	+	+	+	+	+	D	D	D
ç	+	+	+	+	+	+	D	D	D

➙ whenever place and [±cnt] features can reassociate to the second C without creating an illicit specification, deletion (or affrication) results, otherwise both C's are realized faithfully

- (20) lists the feature specifications for the contexts derived so far: the features in bold-face are those that cannot be 'rescued' to the following C

(20) *Correctly predicted so far*

	p	k	t	ʦ	ʧ	tç	s	ʃ	ç
p	Lab Lab −c−c	**Lab** Dor −c −c	**Lab** Cor −c −c	**Lab** Cor −c −c+c	**Lab** Cor −c −c+c	**Lab** Cor −c −c+c	**Lab** Cor −c +c	**Lab** Cor −c +c	**Lab** Cor −c +c
k	**Dor** Lab −c −c	Dor Dor −c −c	**Dor** Cor −c −c	**Dor** Cor −c −c+c	**Dor** Cor −c −c+c	**Dor** Cor −c −c+c	**Dor** Cor −c +c	**Dor** Cor −c +c	**Dor** Cor −c +c
t	**Cor** Lab −c −c	**Cor** Dor −c −c	Cor Cor −c −c	Cor Cor −c −c+c	Cor Cor −c −c+c	Cor Cor −c −c+c	Cor Cor −c +c	cf. 2.2.	
ʦ	**Cor** Lab −c**+c** −c	**Cor** Dor −c**+c** −c	Cor Cor −c**+c** −c						
ʧ	**Cor** Lab −c**+c** −c	**Cor** Dor −c**+c** −c	Cor Cor −c**+c** −c		cf. 2.3.			cf. 2.4.	
tç	**Cor** Lab −c**+c** −c	**Cor** Dor −c**+c** −c	Cor Cor −c**+c** −c						
s	**Cor** Lab **+c** −c	**Cor** Dor **+c** −c	Cor Cor **+c** −c	Cor Cor **+c** −c+c	Cor Cor **+c** −c+c	Cor Cor **+c** −c+c	Cor Cor +c +c	Cor Cor +c +c	Cor Cor +c +c
ʃ	**Cor** Lab **+c** −c	**Cor** Dor **+c** −c	Cor Cor **+c** −c	Cor Cor **+c** −c+c	Cor Cor **+c** −c+c	Cor Cor **+c** −c+c	Cor Cor +c +c	Cor Cor +c +c	Cor Cor +c +c
ç	**Cor** Lab **+c** −c	**Cor** Dor **+c** −c	Cor Cor **+c** −c	Cor Cor **+c** −c+c	Cor Cor **+c** −c+c	Cor Cor **+c** −c+c	Cor Cor +c +c	Cor Cor +c +c	Cor Cor +c +c

[±]c=[±cnt]

2.2. *The affrication asymmetry*

- the theory so far predicts creation of an affricate whenever /t/ precedes a fricative
- however, only anterior /ʦ/ is derived; before /ʃ/ and /ç/, both C's are realized
- Lin (2005) does not derive this asymmetry: 'any [t-s] sequence surfaces as the alveolar affricate [ʦ] through obligatory affrication' (p.127)

(21) *The affrication asymmetry*

	s	ʃ	ç
t	A	+	+

(22) *The affrication asymmetry: features*

	s	ʃ	ç
t	+str +ant +ant Cor Cor −c +c	+str **+ant** −ant Cor Cor −c +c	−str **+ant** −ant Cor Cor −c +c

➙ **Assumption:** [−ant] affricates are more marked and penalized by (23)

(23) *Aff[−ant] — Assign a violation mark for every affricate that is phonetically associated with [−ant].

- affrication is hence no possibility in /t/ + /ʃ/ and /t/ + /ç/ contexts and deletion is no option since high-ranked Max[cnt] still demands preservation of /t/'s [−cnt] specification

(24) *The effect of* *Aff[−ant]*: tableaux*

	MaxAL [±cnt]	*Aff [−ant]	*[+c−c]	Max [cnt]	OCP [−son]	Max S
A. /t/ + /s/ – Affrication						
a. [+ant Cor −cnt −son] [+str +ant Cor +cnt −son] ts					*!	
b. [+ant Cor −cnt −son (shaded)] [+str +ant Cor +cnt −son] s				*!		*
☞ c. [+ant Cor −cnt −son (−son shaded)] [+str +ant Cor +cnt −son] ts						*
B. /t/ + /ç/ – No Affrication/Deletion						
☞ a. [+ant Cor −cnt −son] [−str −ant Cor +cnt −son] tç					*	
b. [+ant Cor −cnt −son (shaded)] [−str −ant Cor +cnt −son] ç				*!		*
c. [+ant Cor −cnt −son (+ant, −son shaded)] [−str −ant Cor +cnt −son] tç		*!				*

- that [−ant] affricates surface if they are underlyingly present: higher-ranked Max for association lines (25) preserves underlying specification of [±cnt] for segments that are phonetically realized

(25)	MaxAL [Cnt]	Assign a violation mark for every phonetically invisible association line between a phonetically visible [±son] and [±cnt]

(26) *The effect of* *Aff$_{[-\text{ANT}]}$*: preservation of underlying affricates*

	MaxAL [±cnt]	*Aff [−ant]	*[+c−c]	Max [cnt]	OCP [−son]	Max S
C. /tɕ/ – Faithful realization						
☞ a. −ant −str Cor −cnt +cnt −son tɕ		*				
b. −ant −str Cor −cnt +cnt −son ɕ	*!					

2.3. *The markedness of affricate clusters*

- the theory so far predicts that A+A should be realized faithful: [−cnt +cnt] cannot reassociate to the second C without creating an illicit [+cnt −cnt] contour
- however, deletion can be observed in all these contexts

(27) *Affricate-affricate clusters*

	ts	tʃ	tɕ
ts	D	D	D
tʃ	D	D	D
tɕ	D	D	D

(28) *Affricate-affricate clusters: features*

	ts	tʃ	tɕ
ts	+str +str +ant +ant Cor Cor −c**+c** −c+c	+str +str **+ant** −ant Cor Cor −c**+c** −c+c	**+str** −str **+ant** −ant Cor Cor −c**+c** −c+c
tʃ	+str +str **−ant** +ant Cor Cor −c**+c** −c+c	+str +str −ant −ant Cor Cor −c**+c** −c+c	**+str** −str −ant −ant Cor Cor −c**+c** −c+c
tɕ	**−str** +str **−ant** +ant Cor Cor −c**+c** −c+c	**−str** +str −ant −ant Cor Cor −c**+c** −c+c	−str −str −ant −ant Cor Cor −c**+c** −c+c

→ **Assumption:** two adjacent affricates are penalized by an undominated (29) and deletion hence applies although not all [±cnt] features of the first C can reassocaite to the second C

- it is *local* in the sense that it refers to features on different tiers that are directly adjacent[1]

(29)	OCP [±c±c]	Assign a violation mark for every pair of adjacent segmental root nodes that are both phonetically associated to more than one specification for [±cnt].

[1]Crucial is that two [±cnt] values are linked to one mother node – it does not matter which one ('oral cavity' in Clements (1987), '[±son,±cons] in McCarthy (1988)', 'root' in Sagey (1988), place nodes in Padgett (1995), ….

(30) *The effect of* $\text{OCP}_{[\pm c \pm c]}$*: tableaux*

	OCP [±c±c]	*[+c−c]	*[pl:α,β]	Max [cnt]	Max [pl]	OCP [−son]	Max S
/ts/ + /tç/ – Deletion							
a. +str −str +ant −ant Cor Cor −cnt +cnt −cnt+cnt −son −son tstç	*!					*	
☞ b. +str −str +ant −ant Cor Cor −cnt +cnt −cnt+cnt −son −son tç				**			*
c. +str −str +ant −ant Cor Cor −cnt +cnt −cnt+cnt −son −son tç͡tç		*!					*

2.4. *The stridency asymmetry in Affricate-Fricative clusters*

- the theory predicts that A+F results in affrication ([−cnt +cnt +cnt] after reassociation); however, deletion is observed for all [+strid] contexts, else realization of both C's

(31) *Affricate-Fricative clusters*

	s	ʃ	ç
ts	D	D	+
tʃ	D	D	+
tç	+	+	+

(32) *Affricate-Fricative clusters: features*

	s	ʃ	ç
ts	+str +str +ant +ant Cor Cor −c+c +c	+str +str **+ant** −ant Cor Cor −c+c +c	**+str** −str **+ant** −ant Cor Cor −c+c +c
tʃ	+str +str **−ant** +ant Cor Cor −c+c +c	+str +str −ant −ant Cor Cor −c+c +c	**+str** −str −ant −ant Cor Cor −c+c +c
tç	**−str** +str **−ant** +ant Cor Cor −c+c +c	**−str** +str −ant −ant Cor Cor −c+c +c	−str −str −ant −ant Cor Cor −c+c +c

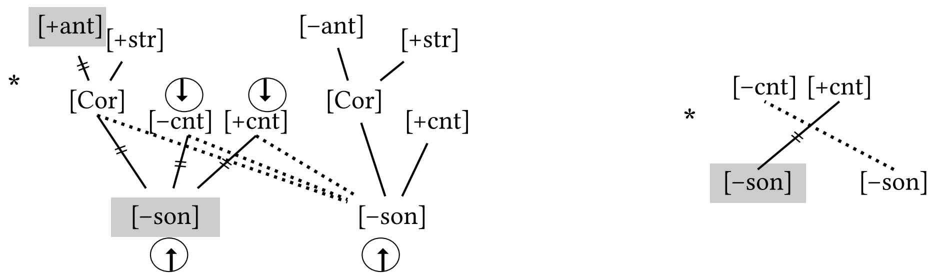
➙ **Assumption I:** affrication impossible for A+F since it would result in crossing association lines

- the crossing AL configuration involves a phonetically invisible and a visible association lines: such configurations are not generally excluded by GEN but penalized by a constraint like (33)

(33) *CrossAL — Given elements A ≻ B on tier n and elements X ≻ Y on tier n-1: Assign a violation mark if A is associated to Y and B to X.

- this undominated constraint excludes (34): only [+cnt] can reassociate in AF configurations

(34) *Affrication involves crossing association lines: /ʦ/ + /ʃ/*



- we hence expect realization of both C's in all A+F contexts (tableau (37))

→ **Assumption II:** deletion for the four [+strid] contexts in (31) follows from additional (35)

(35) OCP [+strid] — Assign a violation mark for every pair of adjacent phonetically visible features [+strid].

- no misprediction in other [+strid][+strid] contexts since Max[+cnt] and Max[−cnt] are ranked differently:

(36) Max[+cnt] ≫ $\text{OCP}_{\text{+strid}}$ ≫ Max[−cnt]

- this predicts for [+strid] obstruent combinations:
  - FA and FF: no deletion since [+cnt] of the first C cannot reassociate to the second C
  - AA: deletion since $\text{OCP}_{[\pm c \pm c]}$ is undominated
  - AF: deletion since only [−cnt] cannot reassociate

(37) *The stridency asymmetry for affricates: tableaux*

	Max [+cnt]	*Cross AL	*[+c−c]	OCP [+strid]	Max [−cnt]	OCP [−son]	Max S
A. /ʦ/ + /ç/ – No deletion							
☞ a. +str +ant Cor −cnt +cnt −son / −str −ant Cor +cnt −son ʦç						*	
b. +str +ant Cor −cnt +cnt −son / −str −ant Cor +cnt −son ç	*!				*		*
c. +str +ant Cor −cnt +cnt −son / −str −ant Cor +cnt −son ʧ		*!					*
d. +str +ant Cor −cnt +cnt −son / −str −ant Cor +cnt −son ç					*!		*

	Max [+cnt]	*Cross AL	*[+c−c]	OCP [+strid]	Max [−cnt]	OCP [−son]	Max S
B. /ts/ + /ʃ/ – Deletion							
a. +str +ant Cor −cnt +cnt −son / +str −ant Cor +cnt −son tsʃ				*!		*	
b. +str +ant Cor −cnt +cnt −son / +str −ant Cor +cnt −son ʃ	*!				*		*
c. +str +ant Cor −cnt +cnt −son / +str −ant Cor +cnt −son ʧ		*!					*
☞ d. +str +ant Cor −cnt +cnt −son / +str −ant Cor +cnt −son ʃ					*		*

2.5. *Summary*

- deletion of all adjacent obstruents required but only possible if certain features can reassociate to following C; additional constraints:
  - only anterior affricates are derived – follows from *Aff$_{[-\text{ant}]}$
  - A+A cluster penalized by OCP$_{[\pm c \pm c]}$ and deletion applies although [+cnt] cannot reassociate to following C
  - A+F[+strid] penalized by OCP$_{[+\text{strid}]}$ and deleted although [−cnt] cannot reassociate
- implements insight: ‘consonants that are more similar to adjacent segments are more likely to delete than consonants that are more contrastive’ – perceptually motivated since more contrast between segments makes them more salient and deletion less likely (Côté, 2004, 2)
- cf. analysis in Morales (1995) for final cluster reduction in Catalan (=final S deletes if preceded by homorganic C): stops are underspecified and do not contain manner features; fusion/merging applies if feature structure of B is a subset of A’s

(38) *Ranking:*

$$\{ \text{OCP}_{[\pm c \pm c]}, \text{*Aff}_{[-\text{ant}]}, \text{Max}_{[+\text{cnt}]}, \text{Max}_{[\text{pl}]}, \text{*}[\text{pl}{:}\alpha,\beta], \text{*}[+c-c] \} \gg \text{OCP}_{[+\text{strid}]} \gg \text{Max}_{[-\text{cnt}]} \gg \text{OCP}_{[-\text{son}]} \gg \text{Max}_{S}$$

3. Further predictions

3.1. *Deletion that is not triggered by the general phonology*

- one plural allomorph in Hessian German is subtraction of a final C (39-a) – subtraction and ø-marking are in complementary distribution and subtraction is phonologically predictable (39-b)
  (Maurmann, 1898; Kirchberg, 1906; Golston and Wiese, 1996; Knaus, 2003; Wiese, 2009)

➙ one representation for the subtracting/ø-allomorph
  (claim that subtraction is affixation in Trommer and Zimmermann, 2010; Trommer, 2011; Zimmermann, 2014)

(39) a. *Subtraction in Hessian* (Golston and Wiese, 1996, 148+149)

	SINGULAR	PLURAL	
i.	faind	fain	'enemy'
	ʃʊk	ʃʊ	'shoe'
	vɛk	vɛ	'way'
	hond	hon	'dog'
ii.	bam	bam	'tree'
	$ʃta^n$	$ʃta^n$	'stone'
	hoːmər	heːmər	'hammer'

b. *Subtraction only if the stem ends in*
ld, nd, ŋg, ʀg
Vg

- given that vowels are dorsal: **morphological deletion is only possible if a segment with an identical place feature precedes**

➙ whatever it is that triggers subtraction (*not* the OCP), is restricted by $\text{MAX}_{[\text{PL}]}$ and *[PL:α,β]

3.2. *Contextual Markedness*

- instances of 'contextual similarity avoidance' where the likelihood of deletion depends on the similarity to all adjacent segments (Côté, 2004, 30)
- in Hungarian, two adjacent C's are systematically retained intervocalically but may optionally be deleted adjacent to another C: likelihood depends on the similarity to this segment

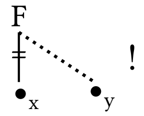
(40) *Deletion of adjacent identical consonants* (Côté, 2004, 32)

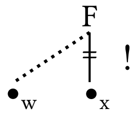
a.	O-	direkttermő	'type of wine'	[dirɛk(t)tɛrmøː]	↓ simplification less likely
	N-	csonttányér	'bone plate'	[ʧon(t)taːɲeːr]	
	L-	talppont	'foot-end'	[tɔl(p)pont]	
b.	-O	kisstílű	'petty'	[kiʃ(ʃ)tiːlyː]	↓ simplification less likely
	-N	őssmink	'proto-make-up'	[øʃ(ʃ)miŋk]	
	-L	szépipróza	'prose fiction'	[seːp(p)roːzɔ]	

➙ *in my account:* **the likelihood that the to-be-deleted segment can reassociate more of its features increases if it is surrounded by more similar segments**

- the analysis is based on the assumption that every feature whose original host segment remains invisible must reassociate to *both* the surrounding adjacent segments

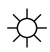
- follows if independently motivated constraints about the direction of new association lines (41) &(42) are both high-ranked[2]

(41)  Assign a violation mark for every phonetically invisible morphological association between feature F and root node R_x that is not followed by a phonetically visible association of F to a root node R_y following R_x.

(42)  Assign a violation mark for every phonetically invisible morphological association between feature F and root node R_x that is not followed by a phonetically visible association of F to a root node R_y following R_x.

- the feature matrices in (43) show 6 exemplifying contexts: features that cannot reassociate to both adjacent segments without creating an illicit specification are marked in boldface

(43) *Hungarian: the likelihood of consonant deletion*

							Likelihood of deletion:
	k	t	t	ʃ	ʃ	t	
son	–	–	–	–	–	–	
cnt	–	–	–	+	**+**	–	
appr	–	–	–	–	–	–	
	n	t	t	ʃ	ʃ	m	
son	+	**–**	–	–	**–**	+	
cnt		**–**	–	+	**+**		
appr	–	–	–	–	–	–	
	l	p	p	p	p	r	
son	+	**–**	–	–	**–**	+	
cnt		**–**	–	–	**–**		
appr	+	**–**	–	–	**–**	+	

4. Conclusion

The challenge:

- the distribution of Piro obstruent clusters paired with the question of how to represent the affricates in the language

My solution:

- rather than trying to capture the classes of segments where deletion is *required* in a certain context, it is restricted which segments are *allowed* to undergo deletion in a certain context
- reference to these contexts follows from constraints demanding realization of features
- an analysis assuming only **local OCP constraints**
- this analysis easily extends to instances where morphological deletion is restricted by the phonological make-up of the sounds in question (e.g. Hessian) and to instances of (bidirectional) contextual similarity dependencies (e.g. Hungarian)

[2]Note that high-ranked (i) can predict the onset/coda asymmetry in deletion.

References

Clements, George N. (1985), 'The geometry of phonological features', *Phonology Yearbook* **2**, 225–252.

Clements, George N. (1987), Phonological feature representation and the description of intrusive stops, *in* A.Bosch, B.Need and E.Schiller, eds, 'Papers from the 23rd Annual Regional Meeting of hte CLS', Chicago Linguistic Society, pp. 29–50.

Clements, George N. (1999), Affricates as noncountoured stops, *in* O.Fujimura, B.Joseph, B.Palek, O.Fujimura, B.Joseph and B.Palek, eds, 'Proceedings of LP '98', Karolinum Press, Prague, pp. 271–299.

Clements, George N. and Beth Hume (1995), The internal organization of speech sounds, *in* J.Goldsmith, ed., 'The Handbook of Phonological Theory', Cambridge: Blackwell, pp. 245–306.

Clements, George and Samuel Keyser (1983), *CV phonology*, MIT Press, Cambridge, MA.

Côté, Marie-Hélène (2004), 'Syntagmatic distinctness in consonant deletion', *Phonology* **21**, 1–41.

Golston, Chris and Richard Wiese (1996), 'Zero morphology and constraint interaction: subtraction and epenthesis in German dialects', *Yearbook of Morphology 1995* pp. 143–159.

Hualde, Jose (1988), Affricates are not contour segments, *in* H.Borer, ed., 'WCCFL 7', Stanford Linguistic Association, Stanford, pp. 77–89.

Jun, Jongho (2011), Positional effects in consonant clusters, *in* M.van Oostendorp, C. J.Ewen, E.Hume and K.Rice, eds, 'Companion to Phonology', Wiley Blackwell, chapter 46.

Kaisse, Ellen M. (2011), The stricture features, *in* M.van Oostendorp, C. J.Ewen, E.Hume and K.Rice, eds, 'The Blackwell Companion to Phonology', Blackwell.

Kehrein, Wolfgang (2002), *Phonological representation and phonetic phasing: affricates and laryngeals*, Niemeyer, Tübingen.

Kim, Hyonsoon (1997), The phonological representation of affricates: evidence from Korean and other languages, PhD thesis, Cornell University.

Kirchberg, Carl (1906), *Laut- und Flexionslehre der Mundart von Kirn a.d. Nahe, mit Berücksichtigung der näheren Umgebung*, DuMont Schauberg, Straßburg.

Knaus, Johannes (2003), Subtraktive Pluralformen in deutschen Dialekten, Master's thesis, Philipps-Universität Marburg.

Leben, William (1973), Suprasegmental Phonology, PhD thesis, MIT.

Lin, Yen-Hwei (1987), Theoretical implications of Piro syncope, *in* J.McDonough and B.Plunkett, eds, 'NELS 17', pp. 409–423.

Lin, Yen-Hwei (1993), Sonority and postlexical syllabicity in Piro, *in* C.Canakis and Denton, eds, 'CLS 28', pp. 333–344.

Lin, Yen-Hwei (1997*a*), Cyclic and noncyclic affixation in Piro, *in* G.Booij and J.van de Weijer, eds, 'Phonology in progress – progress in phonology', Holland Academic Graphics, The Hague, pp. 167–188.

Lin, Yen-Hwei (1997*b*), 'Syllabic and moraic structures in Piro', *Phonology* **14**, 403–436.

Lin, Yen-Hwei (1998), On minor syllables, *in* O.Fujimura, B. D.Joseph and B.Palek, eds, 'Proceedings of LP '98', pp. 163–183.

Lin, Yen-Hwei (2005), Piro affricates: Phonological edge effects and phonetic anti-edge effects, *in* J.van de Weijer and M.van Oostendorp, eds, 'The Internal Organization of Phonological Segments', Mouton de Gruyter, Berlin, New York, pp. 121–152.

Lombardi, Linda (1990), 'The Nonlinear Organization of the Affricate', *NLLT* **8**, 375–425.

Lombardi, Linda (1995), 'Affricates, level-ordering, and the feature [strident]', *University of Maryland Working Papers in Linguistics* **3**, 89–115.

Matteson, Esther (1954), 'Piro phonemes and morphology', *Kroeber Anthropological Society Papers* **11**, 17–59.

Matteson, Esther (1965), *The Piro (Arawakan) Language*, University of California Press, Berkeley.

Maurmann, Emil (1898), Grammatik der mundart von mühlheim an der ruhr, *in* O.Bremer, ed., 'Sammlung kurzer Grammatiken deutscher Mundarten', Breitkopf und Härtel.

McCarthy, John (1986), 'OCP effects: Gemination and anti-gemination', *Linguistic Inquiry* **17**, 207–63.

McCarthy, John (1988), 'Feature geometry and dependency: A review', *Phonetica* **43**, 84–108.

McCarthy, John (2008), 'The gradual path to cluster simplification', *Phonology* **25**, 271–319.

Morales, Alfonso (1995), On deletion rules in Catalan, *in* J.Amastae, G.Goodall, M.Montalbetti and M.Phinney, eds, 'Contemporary research in Romance linguistics (LSRL XXII)', John Benjamin, Amsterdam/Philadelphia, pp. 37–52.

Morén, Bruce (2003), The parallel structures model of feature geometry, *in* 'Working Papers of the Cornell Phonetics Laboratory 15', Ithaca, USA, pp. 194–270.

Padgett, Jaye (1995), Partial class behavior and nasal place assimilation, *in* 'Proceedings of the South Western Optimality Theory Workshop 1995', The University of Arizona Coyote Papers, Tuscon, AZ, pp. 145–183.

Prince, Alan and Paul Smolensky (1993), 'Optimality theory: Constraint interaction in generative grammar', Technical reports of the Rutgers University Center of Cognitive Science.

Rubach, Jerzy (1985), 'Affricates as strident stops in Polish', *LI* **25**, 119–143.

Sagey, Elizabeth (1986), The representation of features and relations in non-linear phonology, PhD thesis, MIT.

Sagey, Elizabeth (1988), Degree of clusore in complex segments, *in* H.van der Hulst and N.Smith, eds, 'Features, Segmental Structure and Harmony Processes', Foris, Dordrecht, pp. 169–208.

Schein, Barry and Donca Steriade (1986), 'On geminates', *LI* **17**, 691–744.

Selkirk, Elisabeth O. (1988), 'Dependency, place, and the notion 'tier'', paper, presented at the LSA.

Trommer, Jochen (2011), 'Phonological aspects of Western Nilotic mutation morphology', Habil. University of Leipzig.

Trommer, Jochen and Eva Zimmermann (2010), 'Generalized mora affixation', talk given at the 18th Manchester Morphology Meeting, Manchester, 20th-22th May 2010.

Urquía Sebastían, Rittma and Stephen A. Marlett (2008), 'Yine', *Journal of the International Phonetic Association* **38**, 365–369.

van de Weijer, Jeroen (1996), *Segmental structure and complex segments*, Niemeyer.

Wiese, Bernd (2009), 'The grammar and typology of plural noun inflection in varieties of german', *Journal of of Comparative Germanic Linguistics* **12**, 137–173.

Wilson, Colin (2001), 'Consonant cluster neutralisation and targeted constraints', *Phonology* **18**, 147–197.

Zimmermann, Eva (2014), A phonological account of morphological length, PhD thesis, Leipzig University.