

Nasal cluster dissimilation and tier-based strict locality

Andrew Lamont

University of Massachusetts Amherst

alamont@linguist.umass.edu

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- **Nasal cluster dissimilation** (NCD) is a process whereby underlying nasal-stop clusters (NC) lose their nasal feature in the presence of another nasal-stop cluster: $/\dots NC\dots NC\dots/ \rightarrow [\dots NC\dots C\dots]$ (Blust, 2012; Dixon, 2004; Jones, 2001; Stanton, to appear, 2020)
- **Local**, targeting only NCs in adjacent syllables, or **non-local**, targeting NCs in non-adjacent syllables
 - (1) Yindjibarndi (Pama-Nyungan) topic clitic $/-mpa/$ (Wordick, 1982)
 - a. $\underline{na}:\underline{mpa}$ ‘this’ (205)
 - b. $w\underline{u}ntu\text{-}wa\text{-}\underline{mpa}\text{-}tu$ ‘river’ (34)
 - c. $\underline{munt}i\text{-}pa$ ‘really’ (34)
 - d. $\underline{tama}\text{-}\underline{\eta}ka\text{-}pa\text{-}tu$ ‘fire’ (258)
 - (2) Gooniyandi (Bunuban) ergative postposition $/-\eta ga/$ (McGregor, 1984, 1990)
 - a. $po:\underline{ka}\text{-}\underline{\eta}ga$ ‘baby’ (1990:586)
 - b. $\underline{kamba}ji\text{-}\underline{\eta}ga$ ‘boy’ (1990:98)
 - c. $ko:\underline{\eta}bo:\underline{ka}$ ‘woman’ (1990:98)
 - d. $\underline{kamba}\text{-}\underline{ka}$ ‘water’ (1990:585)
 - (3) Diyari (Pama-Nyungan) participial $/-\eta da/$ (Austin, 2013)
 - a. $\underline{dandra}\text{-}\underline{tari}\text{-}\underline{\eta}da$ ‘hit-refl’ (93)
 - b. $\underline{du}\eta ka\text{-}lka\text{-}\underline{\eta}da$ ‘emerge-tr’ (93)
 - c. $\underline{dandra}\text{-}\underline{da}$ ‘hit’ (93)
 - d. $\underline{du}\eta ka\text{-}\underline{da}$ ‘emerge’ (93)
 - (4) Yanyuwa (Pama-Nyungan) directive $/-\eta gu \sim -wu/$ (Kirton, 1971; Kirton & Charlie, 1996)
 - a. $\underline{di}\text{-}b\underline{iga}\text{-}\underline{\eta}gu$ ‘masc-fish hook’ (1971:44)
 - b. $\underline{nu}\eta ga\underline{nu}\text{-}\underline{\eta}irga\text{-}\underline{\eta}gu$ ‘abstr-corroboree’ (1971:44)
 - c. $\underline{di}\text{-}w\underline{u}\eta da\text{-}\underline{wu}$ ‘masc-tree’ (1971:45)
 - d. $ra\text{-}\underline{gamba}\text{-}\underline{wu}$ ‘fem-sun’ (1971:45)
 - (5) Timugon Murat (Austronesian) (Prentice, 1971)
 - a. $\underline{ma}\underline{n}\text{-}tutu$ ‘T/S will pound [O]’ (113)
 - b. $\underline{ma}\text{-}\underline{tumbak}$ ‘T/S will thump e.o.’ (113)
 - c. $\underline{\eta an}\text{-}taun$ ‘years’ (118)
 - d. $\underline{\eta o}\text{-}\underline{gongom}$ ‘fistfuls’ (118)

This talk examines the complexity of NCD as a phonotactic restriction rather than a process

- §1 presents non-local NCD data from Gurindji and demonstrates it is not TSL with vanilla segmental representations
- §2 demonstrates that non-local NCD is TSL when syllabic roles are encoded in segments
- §3 discusses the connection to monotonicity

1 Non-local NCD in Gurindji

- Gurindji (Pama-Nyungan) (McConvell, 1988; Stanton, 2020); similar patterns in Bilinearra (Pama-Nyungan) (McConvell, 1988; Meakins & Nordlinger, 2014), Djaru (Pama-Nyungan) (Tsunoda, 1981), and Mudbara (Pama-Nyungan) (McConvell, 1988)

- NC and N \times denasalize or delete when preceded by an NC

(6) Gurindji locatives /-ŋka/, /-mpa/

- | | | | | | | | |
|----|---------------------------|----------|-------|----|------------------------------|---------------|-------|
| a. | lucu- <u>ŋka</u> | ‘ridge’ | (137) | d. | kani- <u>mpa</u> | ‘downstream’ | (138) |
| b. | wiŋji- <u>ka</u> | ‘spring’ | (137) | e. | k <u>an</u> ka-pa | ‘upstream’ | (138) |
| c. | pin <u>ka</u> - <u>ka</u> | ‘river’ | (137) | f. | k <u>an</u> k <u>u</u> la-pa | ‘high ground’ | (140) |

(7) Gurindji elative /-jin/

- | | | | | | | | |
|----|---------------------------|---------|-------|----|----------------------------------|---------------------------|-------|
| a. | ku[<u>a</u> -j <u>in</u> | ‘south’ | (147) | c. | k <u>an</u> ka-jit | ‘upstream’ | (148) |
| b. | karra-j <u>in</u> | ‘east’ | (147) | d. | ku[<u>a</u> -ŋ <u>ku</u> la-jit | ‘south side of the river’ | (148) |

- This is not restricted to adjacent syllables

(8) Long-distance NCD in Gurindji

- | | | | |
|----|--|-------------------------|-------|
| a. | ŋaji-wuŋja | ‘with father’ | (139) |
| b. | jawura-ŋ-kari-wuŋja | ‘with another thief’ | (140) |
| c. | ŋana-n-pula ŋa-ŋa | ‘who do you two see?’ | (145) |
| d. | ŋ <u>am</u> pa-wu-wa[<u>a</u> -t-j <u>ina</u> pa-ni | ‘why did you hit them?’ | (145) |

- Dissimilation is blocked by intervening stops and nasals

(9) Stops and nasals are blockers in Gurindji

- | | | | |
|----|---|--------------------------|-------|
| a. | waŋji- <u>ka</u> - <u>nta</u> | ‘where are you lot?’ | (141) |
| b. | ŋu-ŋ <u>an</u> ti <u>pa</u> -ŋ <u>ku</u> lu | ‘they saw us’ | (148) |
| c. | na <u>mp</u> i <u>ci</u> ta-wuŋja | ‘female-without’ | (141) |
| d. | paŋ <u>ku</u> -t <u>i</u> -ŋ <u>ku</u> ra | ‘towards a cross-cousin’ | (141) |

1.1 Tier-based strictly local languages

- Informal definition: if a stringset is TSL, then you can determine whether a string belongs to that stringset by (1) erasing a designated set of segments (“projecting a tier”), and (2) checking whether the result contains any banned substrings (up to some length k) (Heinz et al., 2011)
- TSL languages readily model **long-distance** phonotactics and **blocking** effects, and have wide empirical coverage (McMullin & Hansson, 2015; McMullin, 2016; Heinz, 2018)
- Example: liquid dissimilation in Latin (McMullin, 2016:118-120)

(10) Latin adjectival suffix /-al/

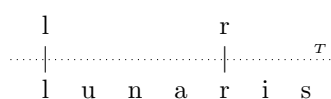
- | | | | | | |
|----|---------------------|-----------|----|--------------------------------|------------|
| a. | nav- <u>al</u> -is | ‘naval’ | c. | consu <u>l</u> - <u>ar</u> -is | ‘consular’ |
| b. | hiem- <u>al</u> -is | ‘winter-’ | d. | lun- <u>ar</u> -is | ‘lunar’ |

(11) Liquids and non-coronals block liquid dissimilation in Latin

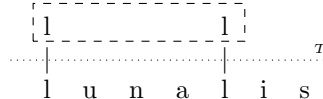
- | | | | | | |
|----|---------------------|----------|----|------------------------------|-----------------------|
| a. | flor- <u>al</u> -is | ‘floral’ | c. | gl <u>eb</u> - <u>al</u> -is | ‘consisting of clods’ |
| b. | plur- <u>al</u> -is | ‘plural’ | d. | leg- <u>al</u> -is | ‘legal’ |

- Tier: {l, r, p, b, f, m, w, k, g, (h)}. Banned strings: {*ll}
- Words cannot contain two laterals...

(12) lun-ar-is



(13) *lun-al-is



- ... unless a blocker intervenes

(14) flor-al-is

l	r	l	T
f	l	o	r
a	l	i	s

(15) gleb-al-is

g	l	b	l	T
g	l	e	b	a
l	i	s		

1.2 Gurindji NCD is not TSL

- Because NCD applies across arbitrarily many vowels and liquids, they cannot be in the tier

(16) *ampa^knta

a	m	p	a ^k	n	t	a	T
a	m	p	a ^k	n	t	a	

- However, without projecting vowels onto the tier, we cannot distinguish an NC cluster from NVC
- No tier over $\Sigma = \{V, N, C\}$ distinguishes the illicit *VNCV^kNCV from the licit NVCV^kNCV, VNV^kNV

(17)	$T = \{V\}$	<u>V</u> ^{k+2}	<u>V</u> ^{k+2}	<u>V</u> ^{k+2}
	$T = \{N\}$	NN	NN	NN
	$T = \{C\}$	CC	CC	λ
	$T = \{V, N\}$	<u>VNV</u> ^k <u>NV</u>	<u>NV</u> ^{k+1} <u>NV</u>	<u>VNV</u> ^k <u>NV</u>
	$T = \{V, C\}$	<u>VCV</u> ^k <u>CV</u>	<u>VCV</u> ^k <u>CV</u>	<u>V</u> ^{k+2}
	$T = \{N, C\}$	NCNC	NCNC	NN
	$T = \{V, N, C\}$	<u>VNCV</u> ^k <u>NCV</u>	<u>NVCV</u> ^k <u>NCV</u>	<u>VNV</u> ^k <u>NV</u>

- If we could treat NCs as single segments, NCD would be TSL: ban *^NC^NC over $\{N, C, {}^N C\}$, but because Gurindji allows heterorganic NCs, this is implausible (Stanton, 2020:§4.1.1)

1.3 Gurindji NCD is non-counting

- First-order definable with precedence; at most **non-counting** (NC) (McNaughton & Papert, 1971)

(18) Definition of successor in terms of precedence

$$(x \triangleleft y) \leftrightarrow (x < y \wedge \neg \exists z (x < z \wedge z < y))$$

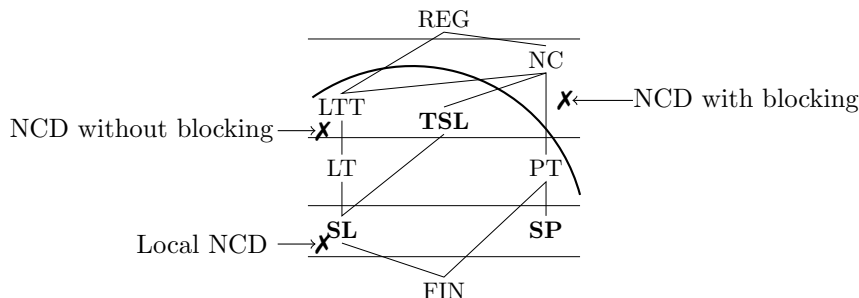
(19) Definition of an NC cluster

$$\text{NC}(x, y) \stackrel{\text{def}}{=} N(x) \wedge C(y) \wedge x \triangleleft y$$

(20) Definition of Gurindji NCD

$$(\exists x, y (\text{NC}(x, y))) \rightarrow (\forall x', y' (\text{NC}(x', y') \rightarrow ((x = x' \wedge y = y') \vee (\exists z (N(z) \vee C(z) \wedge y < z < x')))))$$

(21) Non-local NCD in the sub-regular hierarchy of stringsets (Heinz, 2018)



2.1 Arabana-Wangkangkurru

- NCD only targets retroflex clusters; most consonants block NCD

(30) Arabana-Wangkangkurru (Pama-Nyungan) present tense /-ŋda/ (Hercus, 1994)

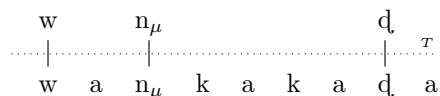
- a. mama-ŋda ‘grab’ (64) c. wanpa-da ‘carry’ (58)
 b. wanka-yiwa-ŋda ‘rise-TR’ (81) d. ŋunta-da ‘show’ (199)

(31) /k, r/ onsets are not blockers in Arabana-Wangkangkurru (Hercus, 1994)

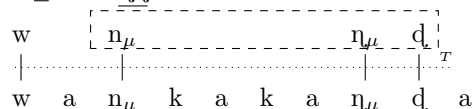
- a. wanka-ka-da ‘rise-TR’ (33) c. mintika-da ‘walk.about’ (58)
 b. tanka-(k)a-da ‘sit down for a while’ (58) d. kankara-da ‘burp’ (58)

- Tier: consonants – {k, r}. Banned strings: {*N_μn_μd}

(32) wanka-ka-da ‘rise-TR’



(33) *wanka-ka-ŋda ‘rise-TR’



2.2 Kalkatungu

- NCD targets a specific set of suffixes, including the nasal initial participle /-ŋin/

(34) Kalkatungu (Pama-Nyungan) habitual /-ŋcaŋu/ (Blake, 1979)

- a. tuni-ŋcaŋu ‘run’ (19) c. inka-caŋu ‘go’ (19)
 b. citaanmaji-ŋcaŋu ‘look after’ (56) d. anka-caŋu ‘ail’ (19)

(35) Kalkatungu participle /-ŋin/ (< *ŋca-na (Breen & Blake, 2007:80))

- a. tuna-ŋin ‘run’ (19) c. inka-cin ‘go’ (19)
 b. luna-ŋin ‘cry’ (60) d. anka-cin ‘ail’ (109)

- Word-initial NC clusters are triggers; derive historically from initial syllable loss (Blake, 1979:133)

(36) Kalkatungu ergative /-ŋku/

- a. ku-ŋku ‘water’ (30) c. ŋk:a-ku ‘yam’ (30)
 b. palta-ŋku ‘fork (of tree)’ (30) d. ŋtja-ku ‘stone’ (42)

- All NC clusters are triggers, but coronals and labials are not blockers

(37) Coronal and labial onsets aren’t blockers in Kalkatungu (Blake, 1979)

- a. api-ŋcama-ti-caŋu ‘sing-tr-re-habit’ (90) c. ŋita-ŋcama-cin ‘steal-tr-participle’ (91)
 b. luna-ŋtiti-caŋu ‘cry-plur-habit’ (92) d. nu-ŋcaani-cin ‘lie-contin-part’ (115)

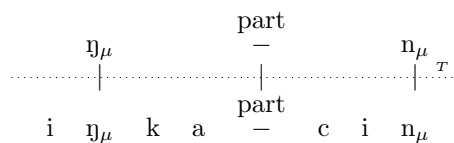
- Word-final nasals are not targeted

(38) Kalkatungu concomitant /-a:n/ (allomorph with C-final stems)

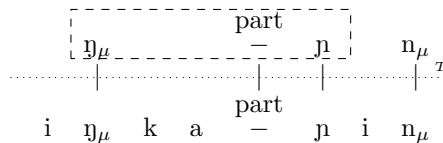
- a. arkun-a:n ‘battle’ (19) c. janpar-a:n ‘beard’ (19)
 b. putur-a:n ‘good’ (77) d. ŋunkur-a:n ‘cold’ (78)

- Tier: nasals + certain morpheme boundaries. Banned strings: $\{ *N_\mu N_\mu, *N_\mu - N \}^{\text{part}}$

(39) iŋka-cin ‘go-participle’



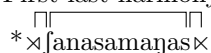
(40) *iŋka-nin ‘go-participle’



3 NCD and monotonicity

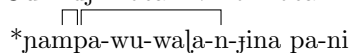
- Graf (2018) argues that phonotactic restrictions are monotonic with respect to locality

(41) First-last harmony is local \rightarrow non-local \rightarrow local

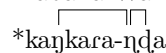


- As analyzed above, long-distance NCD respects monotonicity

(42) Gurindji: local \rightarrow non-local

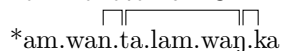


(43) Arabana-Wangkangkurru: non-local \rightarrow local



- Monotonicity would be violated if any of these languages allowed other nasal-initial coda-onset clusters

(44) Non-monotonic NCD in a language with nasal-glide clusters



- This would also make the TSL analysis impossible; cannot distinguish $\underline{V}N\underline{W}V\underline{C}V\underline{N}C\underline{V}$ from $\underline{V}N\underline{C}V\underline{N}C\underline{V}$ and treat glides as transparent
- Happily, all three languages only have flat/falling sonority nasal-initial clusters

⊙ Gurindji: data from scraping a dictionary (Meakins et al., 2013)

(45) Bi-consonantal clusters in Gurindji – bolded clusters also appear word-finally

	p	t	ɸ	k	m	n	ɲ	ŋ	l	r	w	j
p	pp	pt	pɸ	pk							pw	pj
t	tp	tt	tɸ	tk	tm			tŋ	tl		tw	tj
ɸ	ɸp	ɸt	ɸɸ	ɸk	ɸm			ɸŋ			ɸw	
k	kp	kt	kɸ	kk	km	kn	kɲ	kŋ	kl		kw	kj
m	mp	mt		mk	mm		mɲ		ml		mw	
n	np	nt	nɸ	nk	nm		nɲ	nŋ			nw	
ɲ	ɲp	ɲt	ɲɸ	ɲk	ɲm		ɲɲ	ɲŋ			ɲw	
ɲ	ɲp	ɲt	ɲɸ	ɲk	ɲm	ɲn	ɲɲ	ɲŋ		ɲr	ɲw	ɲj
ŋ	ŋp	ŋt	ŋɸ	ŋk	ŋm		ŋɲ	ŋŋ			ŋw	
l	lp	lt	lɸ	lk	lm		lɲ	lŋ			lw	
l	lp	lt	lɸ	lk	lm			lŋ			lw	lj
ʌ	ʌp		ʌɸ	ʌk	ʌm			ʌŋ			ʌw	
r	rp	rt	rɸ	rk	rm		rɲ	rŋ	rl	rr	rw	rj

(46) Triconsonantal clusters in Gurindji

		p	ɟ	k	m	ŋ	l	w
ɟ	ɟ			ɟɟk				
	p	lpp	lpɟ	lpk				lpw
	l	lkp	lkɟ	lkk				
	ŋ	lŋp	lŋɟ	lŋk	lŋm			lŋw
	p	lpp		lɟk				lɟw
	l	lkp	lkɟ	lkk				
	ŋ	lŋp		lŋk	lŋm			
ʎ	p			ʎpk				
	k			ʎkk	ʎkm			
	p	rpp		rpɟ	rpm	rpŋ	rpl	
	r	rkp	rkɟ	rkk	rkm	rkŋ		rkw
	ŋ	rŋp		rŋk				

☉ All exceptions (boxed) are derived by reduplication; bases for many but not all are in the dictionary

- * lamlam ‘placenta’
- * wumwumpu ‘sing over and over, sing a number of things’
- * wanwan ~ wanwan ‘look around carefully’
- * wulŋaŋwulŋaŋ ‘earless dragon or lizard’
- * riŋriŋkara ‘sob, cry unconsolably’
- * wanaŋwanaŋ ‘shake head from side to side, like when you say no’
- * wurŋwuriŋ ‘catch fish by stirring up water with bushes or rolling spinifex in water’
- * ruŋruŋkara ‘continually barking’
- * jiŋjiŋ ‘make noise over and over’
- * wiŋwiŋ ‘persuade again and again’
- * walaŋwalaŋ ~ walaŋwalaŋ ‘generic term for any small plant’

☉ Arabana-Wangkankurru (Hercus, 1994:52): pm, tm, tr, mp, ɲɲ, np, nt, ntr, nk, nm, ɲɲ, ɲc, ɲk, ɲm, ɲt, lp, lt, ltr, lk, ʎp, ʎc, ʎk, ʎd, rp, rɲ, rc, rk

☉ Kalkatungu (Blake, 1979:11): mp, ɲɲ, np, nt, nk, nm, nŋ, ɲp, ɲt, ɲk, ɲm, ɲŋ, ɲc, ɲk, ɲt, lp, lt, lk, lm, lŋ, ɲp, ɲt, ɲk, ɲm, ɲŋ, ʎc, rp, rk, rm, rŋ

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