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Nasal Substitution, Contrast Preservation and the Inventory

0.0 Pre(r)amble

0.1 Convention vs. Computation; Memorization vs. Derivation

0.2 On *whatsisface* and *whachamacallit*

1.0 Introduction

1.1 *Background*

Several analyses of "Nasal Substitution" in Austronesian languages have been offered in the OT literature, some (e.g. Pater 1999) having considerable influence on the development of the theory.

A recent survey article by Blust (2004) shows these theories to be empirically inadequate. His conclusion is that morphophonology can be arbitrary on a massive scale due to historical change.

A recent/recently revived approach to the grammar (Blevins 2004) posits:

(i) The generative component of phonology is less disciplined than commonly assumed.
(ii) Phonology is not markedness-driven and not heavily constrained by cognitive capacities, i.e., UG may safely be ignored.
(iii) Rather, phonology is constrained by *paths of change* which are in turn largely determined by perception, in particular, misperception.

1. 2 *This talk*

I present a case study of broad-scale cross-linguistic variation in the morphophonology of a single inherited affix PMP **maŋ*-. I argue that while the language faculty indeed has a large capacity for storing "crazy" rules, much of the craziness appears sane in its paradigmatic context. I argue against a purely syntagmatic analysis of NS (Pater 1999, 2001; Archangeli, Moll & Ohno 1998) and also against the purely historical/evolutionary approach (Blust 2004) in favor of an analysis that takes contrast preservation into account.

[1] Thanks to Junko Ito, Armin Mester and Jaye Padgett for helpful discussion.

2.0 Some data and previous approaches

2.1 *Just the facts*

A prefix of the shape **maŋ*- Actor Voice (≈ distributive, iterative, pluractional) is reconstructable to Proto-Malayo-Polynesian and is seen to trigger a wide range of allophony in the daughter languages that preserve it.

Table A. Indonesian/Malay NS alternations:[2]

	voiceless	voiced
stops	/meŋ+pukul/ → [memukul] 'to hit' /meŋ+tulis/ → [menulis] 'to write' /meŋ+kutuk/ → [meŋutuk] 'to curse'	/meŋ+baca/ → [membaca] 'to read' /meŋ+duduki/ → [menduduki] 'to sit on' /meŋ+garis/ → [meŋgatal] 'to itch'
fricatives	/meŋ+sapu/ → [meñapu] 'to sweep' /meŋ+hukumi/ → [meŋhukumi] 'to judge'	
nasals		/meŋ+matikan/ → [mematikan] 'to kill' /meŋ+nikah/ → [menikah] 'to marry' /meŋ+ñala/ → [meñala] 'to burn' /meŋ+ŋerikan/ → [meŋerikan] 'to horrify'
affricates	/meŋ+cakul/ → [meñcakul] 'to shovel'	/meŋ+juduli/ → [meñjuduli] 'to title'
liquids		/meŋ+latih/ → [melatih] 'to practice' /meŋ + rasa/ → [merasa] 'to feel'
glides		/meŋ+warnahi/ → [mewarnahi] 'to color'

Basic observations:
(i) Voiceless Cs, unlike voiced Cs, tend to delete, /c/ and /h/ being the exceptions.
(iii) Affixal nasal dissappears in front of certain Cs (liquids, nasals, glides)

2.2 *Pater (1999)*

Pater proposes a constraint *NT, violated by nasal+voiceless-stop clusters. *NT is claimed to be phonetically grounded in the difficulty of quickly raising the velum to produce a voiceless stop after a nasal (Huffman 1993, Hayes 1999, Hayes & Stivers 1995).
Also supported by some cross-linguistic evidence:

Post-nasal voicing	NT → ND	(*Japanese*, *Puyo Ponga Quechua*)
Nasal Deletion	NT → T	(Kelantan Malay, *Swahili*)
Denasalization	NT → TT	(Toba Batak, Itawis, *Kaingang*)

Following Lapoliwa (1981), Pater takes NS to be the result of coalesence -

/m_1 e_2 $\mathbf{N}_3$/ + /$\mathbf{p}_4$ u_5 k_6 u_7 l_8/

↘ ↙

[m_1 e_2 $\mathbf{m}_{3,4}$ u_5 k_6 u_7 l_8] 'to hit'

Tableau 1. Pater's (1999) NT analysis

[2] *c* = voiceless palatal affricate; *j* = voiced palatal affricate; *y* = palatal glide, *?* = glottal stop.

Input: {meŋ$_1$, p$_2$ukul}	DEP	IDENT I→O [NAS]	MAX	ROOT-LIN	IDENT [OBS VOICE]	*NT	LIN
a.✓mem$_{1,2}$ukul							*
b. mem$_1$p$_2$ukul						*!	
c. mep$_1$p$_2$ukul		*!					
d. mem$_1$b$_2$ukul					*!		
e. mep$_2$ukul			*!				
f. meŋ$_1$ep$_2$ukul	*!						

2.3 *Pater (2001)*

It is observed that *NC runs into some problems:

(i) Not operative in roots, e.g. /empat/ [empat] 'four'.
(ii) Nor with multiple prefixes e.g. /mem-per-/[memper] 'ACT+CAU'
(iii) (Perceived) problem in Muna. NS is not triggered by contact.

Pater amends the theory to make it sensitive only to the left edge of roots.
The account of the voicing asymmetry now relies on pharyngeal expansion. Segments that coalesece must agree for the feature [±Expanded Pharynx].

[+Expanded Pharynx]: voiced obstruents
[-Expanded Pharynx]: voiceless obstruents, nasals
(cf. Trigo 1991, Steriade 1995)

Pater's 2001 analysis is more complex because it takes into account differences between stem internal clusters and two types of heteromorphemic clusters. The motivation behind the pattern is now linked to maintaining a CRISP EDGE (Ito & Mester 1999) between the stem and a prefix. Assimilation of the affixal nasal coda to the stem onset violates CRISP EDGE. But when the affixal coda and the stem onset coalesce into one segment CRISP EDGE is not violated. Coalesence occurs to avoid a CRISP EDGE violation but is blocked when the two relevant segments do not agree for the feature [±Expanded Pharynx].

This is a much more indirect and less intuitive way of achieving the results. Making intramorphemic nasal assimilation the trigger for NS is not supported by the facts (see Pangasinan below where assimilation does not occur at all).

2.4 *Persistent problems*

2.4.1 Abberant phonemes - All of the above analyses still fail when faced with the full inventory of phonemes. Stem-initial /c/ and /h/, both voiceless, do not delete as expected. Nasal deletion with /l/, /r/ and /w/ is not accounted for either.

2.4.2 <u>Coalesence must be better articulated</u> – In consonantal coalesence we still need to specify which segments donate which features.

(a) *meŋ- pata*→ *memata* (affix: [±nasal, ±voice] stem: [αplace])
(b) *meŋ- pata*→ *mebata* (affix: [±voice] stem: [±nasal, αplace])
(c) *meŋ- pata*→ *mekata* (affix: [αplace] stem: [±nasal, ±voice])

Pater adopts IDENT constraints to maintain features as necessary but this still underdetermines the output (cf. Pater 1999 fn.16).

2.4.3 <u>Place asymmetries</u> - Another problem, discussed in detail by Blust and only mentioned passingly in Pater 2001, is the widespread presence of mysterious place asymmetries in NS.

common: /maŋ + bata/ → [mamata]
less common: /maŋ + data/ → [manata], /maŋ + gata/ → [maŋata]

2.4.4 <u>A mirror-image case of voice asymmetry</u> – Mori is totally unpredictable from any of the above *NC/*CC-based accounts:

/maŋ + bata/ → [mabata]; /maŋ + pata/ → [mampata] (hypothetical roots)

2.5 *Blust (2004)*

Blust denounces the enterprise of seeking universal principles for all morphophonological alternations. In the case of NS, we may be dealing with an arbitrary innovation.

> "…because synchronic alternations in phonology represent the pure or restructured residue of historical changes, it follows that some synchronic phonological processes may not be motivated by any kind of physiological or cognitive universal….There is no a priori reason why we need to assume that nasal substitution has *any* linguistic motivation – it may simply have been an arbitrary innovation in PMP [Proto-Malayo-Polynesian] that allowed a system of verbal distinctions to be efficiently expressed and distinguished from verbs affixed with, for example, *man-." (Blust 2004:136)

There are certainly languages whose alternations appear to resist any kind of general account. Thus, I also take the totally uncontroversial position that some alternations must be stipulated. What I am arguing against is the idea that a morphophonological system across hundreds of languages can be characterized by arbitrary innovation since this implies persistent and unprincipled innovation across time and space. Universal principles must be *at least* emergent in variation.

3.0 Contrast preservation as key

3.1 *Basic machinery: MAX [±feature] versus UNIFORMITY*

MAX[±F] constraints regulate the input-output correspondence of features such as [+voice] and [+nasal] separately from the segments they are associated with in the input (Lombardi 2001). Features may be thought of as auto-segments as in autosegmental phonology (but not necessarily w/ tier-structure).

Instead of two input segments corresponding to a single output segment, we can simply take the affixal coda -*ŋ* to delete.

The [+voice] and [+nasal] features of this segment are more persistent and surface on the stem-initial C if possible.

There is still the IDENT family of constraints which is violated by differences between input segments and ouput segments for a given feature.

Tableau 2. Voiceless-initial input evaluated by the MAX/DEP[F] system

Input: maŋ, tata	MAX x-slot AFF	MAX [nas] AFF	MAX [voice] AFF	DEP [nas]	DEP [voice]	IDENT [voice] ROOT	IDENT [nasal] ROOT
a. ma[nata]	*					*	*
b. man[tata]							
c. man[data]					*	*	
d. ma[tata]	*	*	*				
e. ma[data]	*	*				*	
f. man[nata]				*	*		
g. mat[tata]		*	*				

Tableau 3. Voiced-initial input evaluated by the MAX/DEP[F] system

Input: maŋ, data	MAX x-slot AFF	MAX [+nas] AFF	MAX [+voice] AFF	DEP [nas]	DEP [voice]	IDENT [voice] ROOT	IDENT [nasal] ROOT
a. ma[nata]	*		*				*
b. man[tata]			*			*	
c. man[data]							
d. ma[tata]	*	*	**			*	
e. ma[data]	*	*	*				
f. mad[data]		*				*	

This provides for a much more concrete analysis than consonantal coalesence. We can predict what features are lost, what features are persistent and from which input segment a feature is inherited. Crucially, we can frame NS as a result of the deletability of the affix coda and not a general property of morpheme junctures. This is important since we often find languages that have other nasal final prefixes which do not show the same effects as maŋ. E.g., the Tagalog comparitive:

Tagalog

/maŋ- + talo/ → [manalo]   /siŋ- + talino/ → [sintalino] (**sinalino*)

AV.INF defeat 'to win'   CMPRT intelligent 'as intelligent'

Note that the winner in T2 and T3 is the most faithful candidate, but the most faithful candidate is obviously not always the real winner in NS.

For our purposes, [nt] will be penalized by a generalized constraint on voice agreement in C clusters.

Because /m/, /n/, /ñ/, /ŋ/ are also [+stop], MAX[manner]STEM goes unviolated when a stem-initial stop picks up the [+nasal] feature. Simply because there are no segments in the inventories here that are [+nasal, +lateral], [+nasal, +glide] etc., we predict the class of segments which are "incompatible" with NS.

Tableau 4. The articulated MAX[manner] system

Input: maŋ, lata	MAX [+liquid] ROOT	MAX [+laryng] ROOT	MAX [+glide] ROOT	MAX [+affric] ROOT	MAX [+fric] ROOT	MAX [+stop] ROOT
a. man[lata]						
b. ma[nata]	*					
Input: maŋ, hata	MAX [+liquid] ROOT	MAX [+laryng] ROOT	MAX [+glide] ROOT	MAX [+affric] ROOT	MAX [+fric] ROOT	MAX [+stop] ROOT
a. maŋ[hata]						
b. ma[ŋata]		*				
Input: maŋ, yata	MAX [+liquid] ROOT	MAX [+laryng] ROOT	MAX [+glide] ROOT	MAX [+affric] ROOT	MAX [+fric] ROOT	MAX [+stop] ROOT
a. man[yata]						
b. ma[nata]			*			
Input: maŋ, cata	MAX [+liquid] ROOT	MAX [+laryng] ROOT	MAX [+glide] ROOT	MAX [+affric] ROOT	MAX [+fric] ROOT	MAX [+stop] ROOT
a. man[cata]						
b. ma[nata]				*		
Input: maŋ, sata	MAX [+liquid] ROOT	MAX [+laryng] ROOT	MAX [+glide] ROOT	MAX [+affric] ROOT	MAX [+fric] ROOT	MAX [+stop] ROOT
a. man[sata]						
b. ma[nata]					*	
Input: maŋ, tata	MAX [+liquid] ROOT	MAX [+laryng] ROOT	MAX [+glide] ROOT	MAX [+affric] ROOT	MAX [+fric] ROOT	MAX [+stop] ROOT
a. man[tata]						
b. ma[nata]						

Note: This rules out a grammar that allows both
/maŋ + kata/ → [maŋkata] and /maŋ + hata/ → [maŋata]

Only MAX[+fric]ROOT is commonly violated. Root-initial /s/ almost always surfaces as [n] or [ñ] under NS.

3.2 *Place asymmetries and *MERGE*

X-slot (timing slot) deletion occurs much more frequently with voiced labial stops than voiced alveolar and velar stops (Newman 1984, Blust 2004):

common: /maŋ+bata/ → [mamata]
less common: /maŋ+data/ → [manata], /maŋ+gata/ → [maŋata]

[g] is more marked than [b] because, with velar closure, the intra-oral space available for voicing is reduced. Given an asymmetry in deletion we would expect [g] to delete and [b] to remain. But this is the opposite of what we commonly find in Austronesian. Blust (2004) states:

> "There is no obvious phonetic basis for this difference – because velars have the shortest duration of voicing, if anything, *g* would be expected to behave more like a typical voiceless stop in terms of prefixal allomorphy than *b* or *d*."

All the indicators then suggest that this is not a phonetically motivated phenomenon.

<u>A striking fact about NS</u>: It neutralizes constrasts in the root.

Batad Ifugaw /maŋ+mala, pala, bala/ → [mamala]

<u>The proposal</u>: Place asymmetries in NS are a result of limiting contrast neutralization (cf. Lubowicz 2003).

Table B. Typical Central Philippine obstruent inventory:

[m]	[n]	[ŋ]	
p	*t*	*k*	*?*
b	*d*	*g*	
m	*n*	*ŋ*	
	s		

(/l/ /w/ /y/ /h/ not included as they are protected by MAX[manner] as shown above)

If a language with the above inventory limits its mergers so that no more than three input segments can surface as a single output segment then we expect that labials will all be able to merge while one segment from the alveolar set and velar/glottal set will be unable to merge with the rest of its group.

Table C. A common NS correspondence set

labial		coronal		velar/glottal	
p m b	→ [m]	t n s	→ [n]	k ŋ ?	→ [ŋ]
		d	— [d]	g	— [g]

We can now predict that if a language shows place asymmetries in NS, these differences should partly follow from the inventory.

<u>Three components:</u>
The MARKEDNESS constraints relevant to *maŋ*- affixation (e.g. *CODA, *CC, AGREE[voi]) conspire to delete the nasal coda.

The FAITHFULNESS constraints conspire to maintain the manner and voicing features of the affixal coda on the adjacent segment (the stem onset).

The paradigmatic *MERGE constraint blocks deletion when contrast neutralization meets its threshold. <u>The blocked form will be that which can create the most harmonic scenario according to the markedness constraints</u>.

> *MERGE – A contrast between two members of a paradigm in the input corresponds to a contrast in the output. (subject to self-conjunction)

Tableau 5. Labial scenarios

Input: maŋ, pata maŋ, bata maŋ, mata	*MERGE
i. mamata mamata mamata	**
ii. mampata mambata mammata	
iii. mamata mambata mamata	*
iv. mampata mamata mamata	*
v. mamata mamata mammata	*
vi. mambata mambata mamata	*

MARKEDNESS wants (a)

FAITHFULNESS wants (b)

Too much contrast is lost when MARKEDNESS is fully satisfied but MARKEDNESS violations can be attenuated by limited merger (c-f). Language particular rankings will decide which scenario is the most harmonic.

3.3 *What's in a paradigm?*

For our purposes its simply all instantiations of a given affix (*maŋ-*) plus a root.

{AFF$_x$ + √ $_{1,}$ AFF$_x$ + √ $_{2,}$ AFF$_x$ + √ $_{3...}$}
not {AFF$_x$ + √ $_{1,}$ AFF$_y$ + √ $_{1,}$ AFF$_z$ + √ $_{1...}$} (although this is the typical paradigm)

However, I am not claiming that reference has to be made to actual roots.
Rather, we can simply make reference to the initial consonants.
Thus, this is a paradigm over the phonemic inventory, not over the lexicon.

3.4 *Combinatorial typology*

Using the following constraints we can predict several attested patterns.

MAX x-slot AFF – Violated by a timing slot associated with an affixal segment in the input which has no correspondent in the output.

MAX [+nas] – Violated by a [+nasal] autosegment in the input which has no correspondent in the output

MAX [+voi] – Violated by a [+voice] autosegment in the input which has no correspondent in the output

IDENT [place] ROOT – The place feature of an input segment in the root is identical to its place feature in the output.

*CC – sequences of consonants at syllable margins are prohibited

AGREE [voice] – The members of a CC cluster agree in their voice feature.

*GEM – Violated by CC clusters that share all features.

Undominated constraints in the following grammars:

DEP[voice/nasal] Every voice/nasal autosegment in the output has a correspondent in the input.

MAX x-slot ROOT: Every timing slot associated with the root in the input has a correspondent in the output.

MAX[+nas]ROOT: Every nasal autosegment associated with the root in the input has a correspondent in the ouput.

MAX[+voi]ROOT: Every voicing autosegment associated with the root in the input has a correspondent in the ouput.

Basic Typology:

{*CC >> MAX[+nas]AFF, MAX[+voi]AFF, MAX x-slot}
Deletion with all stem onsets (unprotected by MAX-manner)

{MAX[+voi]AFF >> *CC >> MAX[+nas], MAX x-slot}
No deletion with voiced stem onsets.

{ MAX x-slot >> *CC, MAX[+nas]AFF, MAX[+voi]AFF}
No deletion with all stem onsets.

The following Tausug (Southern Philippines) scenario is optimal given the inventory and ranking below. We can verify this by trying to fix the violations. There should be no way to improve a single candidate below without decreasing the overall harmony of the scenario.

Tableau 6. Tausug optimal scenario (undominated: AGREE[voice], MAX[+nas], DEP-V)

Input:	**Output:**	*MERGE[2]	IDENT [place] ROOT	*CC	MAX [voi] AFF	MAX x-slot AFF	*GEM
i. maŋ+t	man					*	
ii. maŋ+d	mand			*			
iii. maŋ+s	man					*	
iv. maŋ+n	maŋn						
v. maŋ+j	manj			*			
vi. maŋ+p	mam					*	
vii. maŋ+b	mam				*	*	
viii. maŋ+m	maŋm			*			
ix. maŋ+k	maŋ					*	
x. maŋ+g	maŋg			*			
xi. maŋ+ŋ	maŋŋ						*
xii. maŋ+?	maŋ		*			*	
xiii. maŋ+l	manl			*			
xiv. maŋ+w	maŋw			*			

When MAX[+nas]AFF and MAX[+voi]AFF are dominated by *CC and dominate the relevant IDENT ROOT constraints, scenario (I) will always win out over (II). This is an unexpected prediction that ensues from separating MAX[+voi] and MAX[+nas].

Tableau 7. A clusterless language with NS

Input:	**Output:**	*CC	MAX[+nas]AFF	MAX[+voi]AFF
I. ✓meŋ+b	meb		*	*
meŋ+p	mem			
II. meŋ+b	mem		*	*
meŋ+p	mep			*!

Mukah Melanau instantiates this ranking.

Tableau 8. Mukah Melanau optimal scenario (Undominated: *CC, DEP-V. Liquids omitted)

Input:	**Output:**	*MERGE[2]	MAX [+nas] AFF	MAX [+voi] AFF	IDENT [place] ROOT	MAX x-slot AFF
i. meŋ+p	mem					*
ii. meŋ+b	meb		*	*		*
iii. meŋ+m	mem		*	*		*
iv. meŋ+t	men					*
v. meŋ+d	med		*	*		*
vi. meŋ+s	meñ				*	*
vii. meŋ+n	men		*	*		*
viii. meŋ+j	mej		*	*		*
ix. meŋ+ñ	meñ		*	*		*
x. meŋ+k	meŋ					*
xi. meŋ+g	meg		*	*		*
xii. meŋ+ŋ	meŋ		*	*		*

In Tombonuwo, CC clusters are also ruled out but epenthesis can save the affixal coda when its features can't be transferred. Thus, both features of /-ŋ/ are preserved in all cases.

Tableau 9. Tombonuwo optimal scenario (Undominated: *CC. Liquids omitted)

Input:	**Output:**	MAX [+nas] AFF	MAX [+voi] AFF	DEP-V	MAX x-slot AFF	*MERGE
i. moŋ+p	mom				*	
ii. moŋ+b	moŋob			*		
iii. moŋ+t	mon				*	
iv. moŋ+d	moŋod			*		
v. moŋ+s	mon				*	
vi. moŋ+k	moŋ				*	
vii. moŋ+g	moŋog			*		
viii. moŋ+l	moŋol			*		
ix. moŋ+r	moŋor			*		

Tableau 10. Tombonuwo voiceless stem initial

Input: {moŋ, p}	*CC	MAX [+nas] AFF	MAX [+voi] AFF	DEP-V	MAX x-slot AFF
I. ✓mom					*
II. moŋop				*!	

Tableau 11. Tombonuwo voiced stem initial

Input: {moŋ, b}	*CC	MAX [+nas] AFF	MAX [+voi] AFF	DEP-V	MAX x-slot AFF
I. mom			*!		*
II. ✓moŋob				*	

When *MERGE is ranked low, a single markedness constraint may determine the entire pattern. In Pangasinan, deletion is driven entirely by AGREE.

Tableau 12. Pangasinan optimal scenario (Undominated: MAX[+nas]AFF, MAX[+nas]AFF, AGREE, DEP-V)

Input:	**Output:**	IDENT [place] ROOT	MAX x-slot AFF	CC	MAX [+fric]	*MERGE[2]
i. man+p	mam		*			
ii. man+b	manb			*		
iii. man+m	manm			*		
iv. man+t	man		*			
v. man+d	mand			*		
vi. man+s	man		*		*	
vii. man+n	mann			*		
ix. man+k	maŋ		*			
x. man+g	maŋg			*		
xi. man+ŋ	manŋ			*		
xii. man+?	man	*	*			*
xiii. man+l	manl			*		
xiv. man+r	manr			*		
xv. man+w	manw			*		
xvi. man+y	many			*		

Batad Ifugaw instantiates a pattern in which the more general constraint *CC drives deletion. No clusters surface at the morpheme boundary at all.

Tableau 12. Batad Ifugaw optimal scenario. Undominated: *GEM, *CC, DEP-V,

Input:	**Ouput:**	MAX [+nas]	IDENT [place] ROOT	MAX x-slot AFF	IDENT SEG ROOT	MAX [+fric]	*MERGE[2]
i. maŋ+t	man			*	*		
ii. maŋ+d	man			*	*		
iii. maŋ+n	man	*		*			*
iv. maŋ+p	mam			*	*		
v. maŋ+b	mam			*	*		
vi. maŋ+m	mam	*		*			*
vii. maŋ+k	maŋ			*	*		
viii. maŋ+g	maŋ			*	*		
ix. maŋ+ŋ	maŋ	*		*			*
x. maŋ+?	maŋ		*	*	*		*
xi. maŋ+h	man		*	*	*	*	*
xii. maŋ+l	mal	*		*			
xiii. maŋ+w	maw	*		*			
xiv. maŋ+y	may	*		*			

3.5. *Place shift*

If NS is really constrained by constrast preservation we should also expect to see stem-initial consonants switching place of articulation to become “unsaturated” nasals.

Apparently, place shift is a local phenomenon. The most widely attested shift is /maŋ+s/ → [mañ]. We never find p→ñ, t→ñ or k→ñ. We occasionally find h→ñ/n when s>h historically.

This shift only occurs in languages that already have /ñ/ as a regular phoneme.

In most languages s→ñ aids in constrast preservation since the other palatal consonants are affricates and cannot lose their affricate feature, thus leaving open the phoneme [ñ] for other consonants. This is exemplified by Malay and Makassarese. Similarly, languages like Kapampangan have a palatal nasal but no other palatal consonants and thus an unsturated [ñ].

Table D. Malay/Makassarese mergers

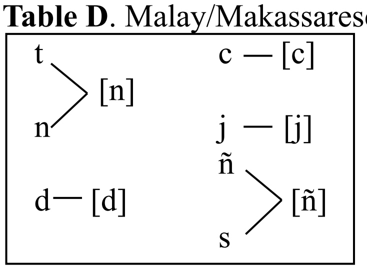
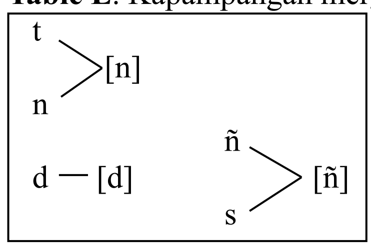


Table E. Kapampangan mergers



Locality might be responsible for /s/ being a better candidate for [ñ] than /t/ since /t/ and /d/ are sometimes described as being dental/apical stops in these languages but /s/ is generally described as an alveolar fricative.

In other languages, s→ñ is purely conventionalized and does not aid in constrast preservation. Such languages include Iban, Sundanese and Balinese.

Place shift is forced if /h/ and /?/ must nasalize since these phonemes have no nasal counterparts in the inventories at hand.

It appears that when a phoneme has no natural nasal counterpart, locality need not be observed. This fact has both cognitive/paradigmatic and historical foundations.

Synchronically, there may be less pressure on an alternation such as h~ŋ/n/ñ/m to “regularize” because there is no regular nasal counterpart for /h/.

Diachronically, these alternations come about as a result of the historical lenitions k>h, s>h and p>h.

Diachrony determines the alternation but synchrony allows it to live.

4.0 Reanalysis, the inventory, and some non-Austronesian extensions

Because NS is structure preserving (i.e. does not introduce new segments into the inventory) the inventory itself may be responsible for irregularities.

4.2 *Kapampangan*

Kapampangan is the only language in Blust's survey which shows b→m, g→ŋ but d→d. This is explained naturally since it is one of the few languages that both cares about contrast and has historically reanalyzed the *maŋ-* prefix as *man-*.

Undominated: *GEM, AGREE [voice], MAX[+glide], MAX[+liq]

Tableau 13. Kapampangan optimal scenario

Input:	**Output:**	*MERGE[3]	MAX [+nas]	*CC	IDENT [place] ROOT	MAX x-slot AFF	MAX [+voi]	IDENT SEG ROOT
i. man+p	mam					*		*
ii. man+b	mam					*	*	*
iii. man+m	mam		*			*	*	
iv. man+t	man					*		*
v. man+d	mand			*				
vi. man+s	mañ				*	*		*
vii. man+n	man		*			*	*	
viii. man+ñ	mañ		*			*	*	
ix. man+k	maŋ					*		*
x. man+g	maŋ					*	*	*
xi. man+ŋ	maŋ		*			*	*	
xii. man+?	man				*	*		*
xiii. man+l	manl			*				
xiv. man+r	manr			*				
xv. man+w	manw			*				

So **maŋ-* > *man-* has two consequences in Kapampangan: (i) *d→n (ii) ✓g→ŋ

4.3 *Mori + Pamona*

Exactly the opposite output we expect if *NC is a motivating constraint:

/maŋ + pata/ → [mampata]; /maŋ + bata/ → [mabata]

But Barsel 1994 notes 3 kinds of stop in Mori – voiceless, voiced and voiced prenasalized. Thus, the real paradigm looks like:

/moŋ + pata/ → [mompata]
/moŋ + bata/ → [mobata]
/moŋ + mbata/ → [mombata]

The initial stem consonant is always retrievable from the affixed form. *MERGE is active (and unconjoined). AGREE/NT is inactive in the general case. The stem is protected by high ranking MAX/IDENT constraints and thus is never altered. The affixal -*ŋ* deletes with voiced Cs because it would cause merger with the correspondent prenasalized stop.[3]

Tableau 14. Mori Labial scenarios

Input: {moŋ, pata} {moŋ, bata} {moŋ, mbata}	*MERGE	IDENT-ROOT (general)	MAX-C AFF (general)
i. ✓ mompata mobata mombata			 *
ii. momata mobata mombata		*!	
iii mompata mombata mobata		 *!	
iv. mompata mombata mombata	*!		
v. mopata mobata mombata			* *!

Note: although NT is not active in the alternation above, its self-conjoined version NT^2 <u>is</u> active. If a root beginning with a voiceless C contains an NT cluster then the affixal nasal is deleted (cf. Blust 2004 fn.21, Mead 1998:100, Tapehe 1984:31-39). This is best considered a markedness-threshold effect (Ito & Mester 2004).

Root internal NT clusters:

/moŋ + kansai/ → [mokansai] 'to spear' (*moŋkansai)
/moŋ + tampele/ → [motampele] 'to slap' (*montampele)

Root internal ND clusters:

/moŋ + kambera/ → [moŋkambera] 'to fan' (*mokambera)
/moŋ + tonda/ → [montonda] 'to follow' (*motonda)

4.4 *[h]~[labial]: Japanese vs. Selayarese*

The approach taken here may explain other cases of phonetically unmotivated allomorphy. For instance, the Japanese alternations [h]~[b]~[pp].

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[3] Deletion of -*ŋ* occurs in other cases too where it would result in marked clusters, e.g. [nr], [nl] etc.

> Recall that there is no voiced version in Japanese of the allophones of /h/. Why, then, does the Rendaku change [h], [c] and [ɸ] to the voiced bilabial stop [b]? There is a historical reason for this seemingly unexpected result (cf. Vance 1987). It has been claimed that the present glottal fricative /h/ can historically be traced back to the voiceless bilabial stop, /p/, which underwent a historical change, leading to the preent /h/. Given that the origin of /h/ is historically /p/, then, it is not surprising that in contemporary Japanese, Rendaku changes the voiceless allophones of /h/ to [b], i.e. the voiced counterpart of [p]. (Tsujimura 1996:56)

Rendaku is associated with a [+voice] feature on the second member of a compound. When /h/ is the initial consonant, it alternates with [b]. Although, this is an unfaithful mapping place-wise, it is still optimal as it avoids violating *MERGE.

Tableau 15. Japanese Rendaku scenarios

Input: {[+voi], h-} {[+voi], t-} {[+voi], k-}	*MERGE	REALIZE MORPH	IDENT-PLACE
i. ✓ b- d- g-			*
ii. h- d- g-		*!	
iii g- d- g-	*!		
iv g- d- b-			* *!

There are many cases in the literature where historical residue serves no purpose. In many cases, a phonological change is not even constrained syntagmatically from being carried out in the morphologically complex, conservative environment. Under the current analysis, such scenarios are pathological in a way that rendaku is not. The outcome of this pathology may only be emergent in acquisition and change.

Selayarese: certain instances of /h/ have developed from a bilabial fricative (Basri 1999 and p.c). Under NS, these /h/'s surface as [m].

a. /aŋ + hálli/ → [amálli] 'to buy' (*h*<[+lab], cf. Mak. *balli*)
b. /aŋ + húno/ → [amúno] 'to kill' (*h*<[+lab], cf. Mak. *buno*)

But /h/ can also surface in NS and [m].

c. /aŋ + húkkuŋ/ → [aŋhúkkuŋ] ‘to punish’ (loan word – *h* not <[+lab])

Furthermore, [m] also alternates with /p/ in NS. Thus, the h~m connection in Selayarese does not create a better scenario, it is useless residue and thus predicted to be more liable to change then “useful” residue. As predicted, the change p>h is being carried out in NS environments as well.

d. /aŋ + háu/ → [aŋháu] ‘to kiss’ (*h*<[+lab], cf. Mak. *bau*)

4.5 *Irish Eclipsis*

Irish has a morphophonological alternation

<u>Eclipsis correspondents</u> (from Ní Chiosáin 1991:63; Mac Eoin 1993:109-110)

non-eclipsed	p	p^y	t	t^y	k	k^y	f	f^y	*s*	s^y							
eclipsed	b	b^y	d	d^y	g	g^y	v	v^y	*s*	s^y							
non-eclipsed	b	b^y	d	d^y	g	g^y	*l*	l^y	*L*	L^y	*n*	n^y	*N*	N^y	*r*	r^y	*h*
eclipsed	m	m^y	n	n^y	ŋ	$ŋ^y$	*l*	l^y	*L*	L^y	*n*	n^y	*N*	N^y	*r*	r^y	*h*

> “Eclipsis targets [-sonorant] segments and involves a minimal change along the sonority scale defined above. ‘Minimal change’ is defined so as to involve the addition of one specification in a specified direction (more/less sonorous) to the feature representation of the segment undergoing a process that is defined in sonority terms.” Ní Chiosáin 1991:67

But why should certain morphemes trigger ‘minimal change’? The alternations above are handled trivially by taking eclipsis to simply be [+nasal, +voice]. The effect of *MERGE is then to block nasalization of the voiceless consonants since this would result in merging with voiced set.

Tableau 16. Irish Eclipsis

Input: {[+voi, +nas], p-} {[+voi, +nas], b-} {[+voi, +nas], f-}	*MERGE	REALIZE MORPH	MAX [+voi] AFF	MAX [+nas] AFF
i. m- m- m-	 *! *		 *	
ii. m- b- v-		 *!	 *	 * *
iii. ✓ b- m- v-			 *	* *

We also predict that /s/, /h/, /l/, /L/ and /r/ have no eclipsis correspondents since they either have no nasal or no voiced counterpart in the inventory. Stops are the preferred candidates for nasalization because the stop feature can be preserved. The reason that root initial nasals do not denasalize to avoid merger is because MAX[+nas]ROOT is ranked higher than *MERGE, just as it is in Austronesian.

5.0 Conclusion/Post(r)amble

Hopefully, it was shown that *MERGE can play an important role in determining the extent of morphologically triggered neutralization.

One possibly important reward from this line of attack is that we will have a formal way of formally differentiating two kinds of historical residue.

In cases of "useful residue", such as the Japanese *h~b* alternation in rendaku, we may be spared of having to posit covert labial features.

It appears more revealing to try and understand how chaos is constrained by way of features and paradigms rather than to try and define the outer limits of chaos itself (*contra* Hale & Reiss 2001).

The outer limits of chaos may ultimately have very little to do with the language faculty *qua* "linguistic organ" and much more to do with general memory capacity.

The paradigmatic and featural organization of linguistic elements on the other hand, is more likely to be unique to the human language faculty when compared to more general cognitive strategies.

☺ *Thanks for listening!* ☺

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