More on Austronesian nasal substitution: Three non-canonical cases*

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1 Introduction

Austronesian nasal substitution is a phonological process that is familiar to most students of phonology (cf. Pater 1999; Kager 1999:ch. 2).

Nasal substitution (NS): The stem-initial consonant is replaced by a homorganic nasal (1a).[1]

Nasal assimilation (NA): The prefix-final nasal assimilates in place to the stem-initial obstruent but does not replace it (1b).[2]

Malay provides a canonical case of NS/NA in Austronesian languages.

(1) Malay

a. **NS** when the stem begins with **voiceless** obstruents

/məŋ- + pilih/	→	[mə**m**ileh]	'to choose'
/məŋ- + tulis/	→	[mə**n**ules]	'to write'
/məŋ- + sokoŋ/	→	[mə**ɲ**okoŋ]	'to support'
/məŋ- + kira/	→	[mə**ŋ**irə]	'to count'

b. **NA** when the stem begins with **voiced** obstruents

/məŋ- + bəli/	→	[mə**mb**əli]	'to buy'
/məŋ- + dapat/	→	[mə**nd**apat]	'to get'
/məŋ- + zakat/	→	[mə**nz**akat]	'to donate'
/məŋ- + gali/	→	[mə**ŋg**ali]	'to dig'

Optimality theoretic (OT) accounts of NS/NA

Pater (1999, 2001); Archangeli et al. (1998); Zaharani (2005) among others

Blust (2004)

Presents more detailed empirical facts and variations amongst individual languages that have never/seldom been considered by phonologists working within OT.

> '[R]ecent attempts to discover a motivation for nasal substitution within the framework of Optimality Theory are inadequate, and are likely to remain so in any currently conceivable version of the theory' (73).

As an alternative account, he suggests that 'AN [= Austronesian − HN] nasal substitution began . . . as an arbitrary product of history' (136) (cf. Blevins 2004).

The goal of this paper

To propose an OT analysis of three of the problematic cases pointed out by Blust (2004) and show that they are explainable within OT and no diachronic explanation is necessary.

1. Labial-coronal-velar cline of susceptibility to NS:
   In languages in which NS occurs not only with stems beginning with voiceless obstruents but also with stems beginning with a voiced obstruent, there is a unilateral implicational relation regarding which voiced obstruent(s) undergo(es) NS (section 3).

2. Distantly conditioned NS:
   In some languages, the occurrence/non-occurrence of NS is conditioned by the presence of a nasal + obstruent cluster within the stem (section 4).

3. Prosodically conditioned NS:
   Monosyllabic roots do not undergo NS (section 5).

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[1] The same process is also referred to as 'coalescence' or 'fusion' in the literature.

[2] Blust (2004) uses the term 'nasal accretion'.

Qualification

Some stems do not undergo NS or exhibit NS only optionally for reasons which are not purely phonological.

(2) NA instead of NS in recent borrowings in Malay

/məŋ- + proses/	→	[mə**mp**roses]	'to process' (from English)
/məŋ- + takrif-kan/	→	[mə**nt**aʔrifkan]	'to define' (from Arabic)
/məŋ- + stabil-kan/	→	[mə**ɲs**tabilkan]	'to stabilise' (from English)
/məŋ- + karaoke/	→	[mə**ŋk**araoke]	'to sing karaoke' (from Japanese)

(3) Optional NS in Tagalog (DeGuzman 1978)

/paŋ- + pataj/	→	[pa**m**ataj] ∼ [pa**mp**ataj]		'something to kill with'
/paŋ- + takip/	→	[pa**n**akip] ∼ [pa**nt**akip]		'something for covering'
/paŋ- + salaʔ/	→	[pa**n**alaʔ] ∼ [pa**ns**alaʔ]		'something for filtering'
/paŋ- + kajod/	→	[pa**ŋ**ajod] ∼ [pa**ŋk**ajod]		'something for scraping'

These cases are not considered in this paper. See DeGuzman (1978) and Zuraw (2000) for discussions of how to account for the optionality of NS like (3).

Organisation of the paper

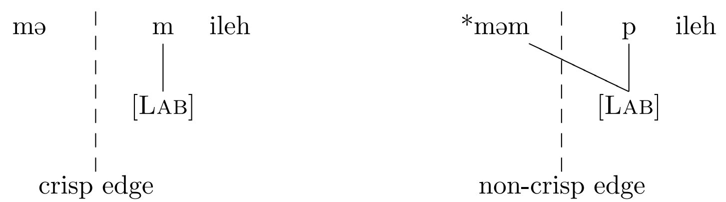
- Section 2: An overview of Pater's (2001) analysis of Austronesian NS, which this paper inherits as the basis of analysing new data.
- Section 3: Labial-coronal-velar cline of susceptibility to NS.
- Section 4: Distantly conditioned NS.
- Section 5: Prosodically conditioned NS.
- Section 6: Conclusion.

2 Pater (2001)

- NS in Austronesian languages happens to satisfy the requirement that the left edge of a Prosodic Word (PrWd) not be linked to another element outside of the PrWd. Itô and Mester (1999) refer to such a non-linked edge as being 'crisp'.
- Following Cohn and McCarthy (1998), it is assumed that the left edge of the PrWd coincides with the left edge of the root.
- NS creates a crisp edge (4a).
- NA creates a non-crisp edge (4b) because the nasal of the prefix and the stem-initial obstruent share a place feature.

(4) /məŋ- + pilih/ 'to choose' (Malay)

a. Nasal substitution b. Nasal assimilation



(5) CrispEdge[PrWd] (Pater 2001)
No element belonging to a Prosodic Word may be linked to a prosodic category external to that Prosodic Word.

- NS satisfies CrispEdge[PrWd] (4a) but violates Uniformity.
- NA violates CrispEdge[PrWd] (4a) but satisfies Uniformity.

(6) Uniformity (McCarthy 1995)
No element of S_2 has multiple correspondents in S_1.
For $x, y \in S_1$ and $z \in S_2$, if $x\Re z$ and $y\Re z$, then $x = y$.

In order for NS to occur, CrispEdge[PrWd] must be ranked over Uniformity.

(7) CrispEdge[PrWd] ≫ Uniformity

/məŋ$_1$- + p$_2$ilih/	CrispEdge[PrWd]	Uniformity
☞ a. məm$_{1,2}$ileh		*
b. məm$_1$p$_2$ileh	*!	

Adoption of CrispEdge[PrWd] allows one to account for why NS only occurs at the prefix-root boundary.

(8) Malay

a. NA instead of NS within root
/əmpat/ → [ə**mp**at]$_{\mathrm{PrWd}}$ 'four'

b. NA instead of NS between prefixes
/məŋ- + pər- + bəsar-kan/ → mə**mp**əː[bəsaːkan]$_{\mathrm{PrWd}}$ 'to enlarge'

NA is simply handled by the constraint NasAssim:

(9) NasAssim (Pater 2001)[3]
A nasal must share place features with a following consonant.

NasAssim is ranked above CrispEdge[PrWd].

(10) Malay *məmbəli* 'to buy'
NasAssim ≫ CrispEdge[PrWd]

	/məŋ- + bəli/	NasAssim	CrispEdge[PrWd]
☞	a. məmbəli		*
	b. məŋbəli	*!	

The asymmetry between voiced and voiceless obstruents, i.e. that only voiceless obstruents undergo NS (cf. (1)), is captured by means of an obstruent-specific voicing feature, the Pharyngeal Expansion (PE) feature, adopted from Steriade (1995).

- Nasals and voiceless obstruents: [−PE]
- Voiced obstruents: [+PE]

Pater makes use of an identity constraint with respect to this feature.

(11) Ident[PharExp]
Correspondent segments have identical values for feature [PharExp].
If $\alpha \Re \beta$ and α is [γPharExp], then β is [γPharExp].

- NS of voiceless obstruents is possible because the nasal and the following obstruent are both [+PE] (12a).
- NS does not occur with voiced obstruents because the PE feature of them is incompatible with that of nasals (12b).

[3] As Pater admits, this definition is simplified. At least, it must be restricted so that it only applies to a nasal in the coda position.

(12) a. √Ident[PharExp]

N_1 T_2 → $N_{1,2}$
[−PE] [−PE] [−PE]

b. *Ident[PharExp]

N_1 D_2 → $N_{1,2}$
[−PE] [+PE] [−PE]

In Malay, Ident[PharExp] is ranked above CrispEdge[PrWd]. Thus, NS will never occur with voiced obstruents.

(13) Ident[PharExp] ≫ CrispEdge[PrWd]

	/məŋ- + bəli/	Ident[PharExp]	CrispEdge[PrWd]
☞	a. məmbəli		*
	b. məməli	*!	

NS of voiceless obstruents never incurs a violation of Ident[PharExp], wherever in the hierarchy it may be ranked. Thus, NS occurs.

(14) Ident[PharExp] ≫ CrispEdge[PrWd]

	/məŋ- + pilih/	Ident[PharExp]	CrispEdge[PrWd]
	a. məmpileh		*!
☞	b. məmileh		

In some languages (e.g. Tagalog), both voiced and voiceless obstruents undergo NS.[4] Such languages can be accounted for by switching the order of Ident[PharExp] and CrispEdge[PrWd] in the hierarchy, i.e. CrispEdge[PrWd] ≫ Ident[PharExp].

(15) CrispEdge[PrWd] ≫ Ident[PharExp]

a. Nasal + voiced obstruent

	$N_1 + B_2$	CrispEdge[PrWd]	Ident[PharExp]
☞	a. $M_{1,2}$		*
	b. M_1B_2	*!	

b. Nasal + voiceless obstruent

	$N_1 + P_2$	CrispEdge[PrWd]	Ident[PharExp]
☞	a. $M_{1,2}$		*
	b. M_1P_2	*!	

[4] Pater abandoned the *NC̥ account in Pater (1999) in favour of the analysis summarised here to accommodate this fact.

(16) Tagalog *mamili* 'to go shopping' cf. Malay *məmbəli* (13)

	/maŋ$_1$- + b$_2$ili/	CrispEdge[PrWd]	Ident[PharExp]
☞	a. mam$_{1,2}$ili		*
	b. mam$_1$b$_2$ili	*!	

3 Labial-coronal-velar cline of susceptibility to NS

Fact

- According to Newman (1984:Fig. 22) and Blust (2004:103), a generalisation can be made regarding the possibility of NS for different obstruents in Austronesian languages.
- The generalisation takes the form of a unilateral implication.
  - When NS occurs with *g* in a language, it also occurs with *p, t, s, k, b, d*.
  - When NS occurs with *d* but not with *g*, it also occurs with *p, t, s, k, b*.
  - When NS occurs with *b* but not with *d, g*, it also occurs with *p, t, s, k*.
- Variation is found only within voiced obstruents and voiceless obstruents always behave as a group (except for *ʧ* and *h*).

(17) Labial-coronal-velar cline of susceptibility to NS

	Consonants replaced by nasals						
Language	p	t	s	k	b	d	g
Malay, Pangasinan	+	+	+	+	−	−	−
Sama Badjao, Bikol	+	+	+	+	+	−	−
Cebuano, Ilokano	+	+	+	+	+	+	−
Kalinga, Bario Kelabit	+	+	+	+	+	+	+

Pater (2001)

Aware of this pan-Austronesian pattern:

> 'The intermediate cases, in which replacement of voiced obstruents is limited to labials, or labials and coronals, might also be accounted for in this way, given an appropriate constraint to block velars (and coronals) from undergoing the process.'

However, as Blust (2004) criticises, he does not propose a concrete analysis.

My analysis

- The general constraint Ident[PharExp] can be split into place-specific subconstraints such as Ident[PharExp/Lab] and Ident[PharExp/Cor].
- Since there seems to be no exception to the generalisation above in the 48 Austronesian languages[5] examined by Blust (2004), the relative ranking among the place-specific Ident[PharExp] subconstraints are fixed as in (18) across Austronesian languages.

(18) Ident[PharExp/Dors] ≫ Ident[PharExp/Cor] ≫ Ident[PharExp/Lab]

[5]This number accounts for about 10 per cent of all Austronesian languages that have productive NS.

- The different ranges of NS for voiced obstruents are accounted for by the interaction between this set and CrispEdge[PrWd].

(19) a. CrispEdge[PrWd] ≫ Ident[PharExp/Dors] ≫ Ident[PharExp/Cor] ≫ Ident[PharExp/Lab]
→ NS for all voiced obstruents (Kalinga, Bario Kelabit)

b. Ident[PharExp/Dors] ≫ CrispEdge[PrWd] ≫ Ident[PharExp/Cor] ≫ Ident[PharExp/Lab]
→ NS for voiced obstruents except *g* (Cebuano, Ilokano)

c. Ident[PharExp/Dors] ≫ Ident[PharExp/Cor] ≫ CrispEdge[PrWd] ≫ Ident[PharExp/Lab]
→ NS for voiced obstruents except *d, g* (Sama Badjao, Bikol)

d. Ident[PharExp/Dors] ≫ Ident[PharExp/Cor] ≫ Ident[PharExp/Lab] ≫ CrispEdge[PrWd]
→ No NS for voiced obstruents (Malay, Pangasinan)

(20) NS pattern of a language whose constraint ranking is (19c):
Ident[PharExp/Dors] ≫ Ident[PharExp/Cor] ≫ CrispEdge[PrWd] ≫ Ident[PharExp/Lab]

$/\eta_1 + b_2/$	Ident[PharExp/Dors]	Ident[PharExp/Cor]	CrispEdge[PrWd]	Ident[PharExp/Lab]
☞ a. $m_{1,2}$				*
b. m_1b_2			*!	
$/\eta_1 + d_2/$				
c. $n_{1,2}$		*!		
☞ d. n_1d_2			*	
$/\eta_1 + g_2/$				
e. $\eta_{1,2}$	*!			
☞ f. η_1g_2			*	

4 Distantly conditioned NS

Fact

There are a few languages in which occurrence or non-occurrence of NS is determined not by the kind of stem-initial obstruent that immediately follows the nasal of the prefix, but by a stem-medial factor.

Ngaju Dayak

- NS for stems beginning with voiced obstruents takes place only when the stem contains a nasal + obstruent cluster (21a).
- When the stem does not contain a nasal + obstruent cluster, NA, but not NS, takes place (21b).
- For stems beginning with voiceless obstruents, NS happens regularly.

(21) Ngaju Dayak (Dempwolff 1922:195ff)

a. Stems containing a nasal + obstruent cluster

/maŋ- + buŋkus/	→	[ma**m**uŋkus]	'to wrap into bundle'
/maŋ- + dindiŋ/	→	[ma**n**indiŋ]	'to make walls'

b. Stems not containing a nasal + obstruent cluster

/maŋ- + bohol/	→	[ma**mb**ohol]	'to knot'
/maŋ- + dawa/	→	[ma**nd**awa]	'to accuse'

Mori Bawah and Timugon Murut

A similar but slightly different pattern is found in Mori Bawah and Timugon Murut.

- NA takes place when the stem does not contain a nasal + obstruent cluster like Ngaju Dayak (22b).
- However, when the stem contains a nasal + obstruent cluster, the nasal of the prefix is deleted unlike Ngaju Dayak (**Nasal Deletion**; henceforth **ND**) (22a).

(22) Mori Bawah (Mead 1998:100)

a. Stems containing a nasal + obstruent cluster

/moŋ- + piŋko/	→	[mo**p**iŋko]	'to finish off'
/moŋ- + tampele/	→	[mo**t**ampele]	'to hit, smack'

b. Stems not containing a nasal + obstruent cluster

/moŋ- + paho/	→	[mo**mp**aho]	'to plant'
/moŋ- + tunu/	→	[mo**nt**unu]	'to roast, grill'

Pater (1999, 2001)

- Although Blust (2004) brings up these cases to argue against Pater (1999), they actually support Pater's (2001) revised analysis.
- In these cases, NS and ND occur to avoid multiple occurrences of nasal + obstruent cluster. In Pater's (2001) analysis, NS is motivated by the CrispEdge[PrWd] constraint, which militates against an occurrence of a nasal + obstruent cluster at the PrWd boundary (= the prefix-root juncture).

My analysis

- The difference between languages like Ngaju Dayak and the majority of Austronesian languages lies in the domain that is sensitive to a constraint that disfavours a non-crisp edge.
- Languages like Ngaju Dayak are more sensitive to non-crisp edges than the other Austronesian languages in that they dislike non-crisp edges anywhere in the word. The relevant OT constraint then is CrispEdge[σ].

(23) CrispEdge[σ] (cf. Itô and Mester 1999)
A syllable has crisp edges.

- Even though non-crisp edges are disfavoured in general, the stem can still contain a nasal + obstruent cluster as shown in (21a) and (22a).
- The number of nasal + obstruent clusters must be considered as well.
- Claim: Multiple nasal + obstruent clusters are avoided by the self-conjunction of the markedness constraint CrispEdge[σ].[6]

(24) CrispEdge[σ]^2
A word may not contain more than one non-crisp edge.

- In languages like Ngaju Dayak, this constraint is ranked over Ident[PharExp], which in turn dominates a more relaxed version of CrispEdge, i.e. CrispEdge[PrWd].
- Thus, NA is blocked and NS takes place when the stem contain a nasal + obstruent cluster.

(25) Ngaju Dayak:
CrispEdge[σ]^2 ≫ Ident[PharExp] ≫ CrispEdge[PrWd] ≫ Uniformity

i. Stems not containing a nasal + obstruent cluster

/maŋ$_1$- + d$_2$awa/	CrispEdge[σ]^2	Ident[PharExp]	CrispEdge[PrWd]	Uniformity
☞ a. man$_1$d$_2$awa			*	
b. man$_{1,2}$awa		*!		*

[6]See Alderete (1997) and Itô and Mester (2003) for other uses of self-conjoined markedness constraints.

ii. Stems containing a nasal + obstruent cluster

/maŋ$_1$- + d$_2$in$_3$d$_4$iŋ/	CrispEdge[σ]^2	Ident[PharExp]	CrispEdge[PrWd]	Uniformity
a. man$_1$d$_2$in$_3$d$_4$iŋ	*!		*	
☞ b. man$_{1,2}$in$_3$d$_4$iŋ		*		*
c. man$_1$d$_2$in$_{3,4}$iŋ		*	*!	*
d. man$_{1,2}$in$_{3,4}$iŋ		**!		**

The violation of CrispEdge[σ]^2 in (24ii-a) could be resolved by deleting the nasal of the prefix. However, this is not an available option. Therefore, the anti-deletion constraint Max is ranked over CrispEdge[σ]^2.

(26) Ngaju Dayak:
Max $\gg$ CrispEdge[σ]^2 $\gg$ Ident[PharExp] $\gg$ CrispEdge[PrWd] $\gg$ Uniform

/maŋ$_1$- + d$_2$indiŋ/	Max	CrispEdge[σ]^2	Ident[PharExp]	CrispEdge[PrWd]	Uniformity
☞ a. man$_{1,2}$indiŋ			*		*
b. mad$_2$indiŋ	*!				

In contrast, the deletion of the nasal of the prefix is the best option in Mori Bawah (see (22a) above). This can be accounted for if Max is ranked at a lower position in the hierarchy in this language.

(27) Mori Bawah:
CrispEdge[σ]^2 $\gg$ Ident[PharExp] $\gg$ CrispEdge[PrWd] $\gg$ Uniformity $\gg$ Max

/moŋ$_1$- + p$_2$iŋko/	CrispEdge[σ]^2	Ident[PharExp]	CrispEdge[PrWd]	Uniformity	Max
a. mom$_1$p$_2$iŋko	*!		*		
b. mom$_{1,2}$iŋko				*!	
☞ c. mop$_2$iŋko					*

How common is distantly conditioned NS?

- Distantly conditioned NS is very rare in the Austronesian family.
- The phenomena known as Meinhof's Law in Bantu languages may involve a similar mechanism as presented here. (Blust (2004:124), however, states that the resemblance is superficial.)
- This rarity is probably related to the use of self-conjunction of markedness constraints.

Distantly conditioned NS in Malay?

- No obvious distantly conditioned NS has been reported for Malay.
- However, CrispEdge[σ]^2 appears to be operative in optional NS in stems beginning with the voiceless palatal affricate *ʧ*, which generally does not undergo NS unlike *p, t, s* and *k*.
- Stems that undergo NS frequently often contain a nasal + obstruent cluster (28).

Table 1: Frequencies of NS and NA of ʧ-starting roots that contain a nasal + obstruent cluster

	NS	NA	% of NS	cf.
ʧambah 'bud'	8	258	3.01	ʧabaŋ
ʧaŋkuk 'hook'	27	38	41.54	ʧakup
ʧantum 'to joint together'	12	383	3.04	ʧatur
ʧinta 'love'	341	439	43.72	ʧipta
ʧondoŋ 'slanting'	9	74	10.84	
ʧonteŋ 'smudge'	18	247	6.79	ʧoreŋ
ʧontoh 'example'	19	371	4.87	
ʧuŋkil 'to dig'	24	358	6.28	ʧukur

Table 2: Frequencies of NS and NA of ʧ-starting roots that do not contain a nasal + obstruent cluster

	NS	NA	% of NS
ʧabaŋ 'branch'	0	26	0.00
ʧakup 'to scoop; to seize'	0	144	0.00
ʧatur 'chess'	1	92	1.08
ʧipta 'creative power'	0	426	0.00
ʧoreŋ 'long scratch'	0	25	0.00
ʧukur 'to shave'	16	236	6.35
ʧukup 'enough'	2	307	0.65
ʧulik 'abduct(or)'	1	179	0.56

(28) Occasional nasal substitution in stems beginning with *ʧ* in Malay

/məŋ- + ʧinta/	→	[mə**ɲʧ**inta] [mə**ɲ**inta]	∼	'to love'
/məŋ- + ʧondoŋ/	→	[mə**ɲʧ**ondoŋ] [mə**ɲ**ondoŋ]	∼	'slanting'
/məŋ- + ʧaŋkuk/	→	[mə**ɲʧ**aŋkoʔ] [mə**ɲ**aŋkoʔ]	∼	'to hook'

Google search

- Conducted on 25 April 2009.
- Restricted to `.my` websites.
- 22 most frequent roots with a nasal + obstruent cluster were examined.
- Forms with no suffix, the suffixes *-kan* and *-i* are considered.
- Result (the 8 roots where NS occurs most frequently): Table 1 .
- Similar roots without a nasal + obstruent cluster were also examined for the purpose of comparison (Table 2).

5 Prosodically conditioned NS: Monosyllabic roots

Fact

- Monosyllabic roots are usually not subject to NS.
- Blust (2004): Out of the 13 languages that have monosyllabic content roots,
  - NS occurs in 3 languages: Tausug, Iban and Palauan.
  - In the other 9 languages, a vowel is epenthesised between the root and the nasal-ending prefix.

(29) Indonesian

/məŋ- + ʧat/	→	[məŋəʧat]	'to paint'[7]
/məŋ- + tes/	→	[məŋətes]	'to test'
/məŋ- + pos-kan/	→	[məŋəposkan]	'to post'

(30) Balinese (Blust 2004:108)

/ŋ- + ʧet/	→	[ŋəʧet]	'to paint'
/ŋ- + koh/	→	[ŋəkoh]	'to be reluctant'
/ŋ- + teh-aŋ/	→	[ŋətehaŋ]	'to make tea'

Pater (1999, 2001)

Not discussed at all.

Blust (2004)

- Blust (2004:109–110) states that the vowel epenthesis is to 'ensure that the affixed forms . . . would contain at least two syllables'.
- However, this does not explain why the third example in (30) (i.e. *ŋətehaŋ*) involves vowel epenthesis rather than NS, for the stem to which *ŋ-* attaches to, namely *tehaŋ*, already contains two syllables.

[7] The form with NA, i.e. [mə**ɲʧ**at], is also used for this form, but less frequently.

Delilkan (2005): A prosody-only account

- Assumptions:
  - The prefix and root belong to separate feet.
  - Both prefixes and suffixes are part of a PrWd.[8]
- Vowel epenthesis takes place for monosyllabic roots to satisfy both of the following two requirements:
  1. Open syllables for the dependent foot (= consisting of prefixes).
  2. Avoid sequences of word-internal monosyllabic feet.

(31) /məŋ- + ʧat/ 'to paint'
a. [(mə.ŋə)(ʧat)]$_{\text{PrWd}}$
b. *[(məɲ)(ʧat)]$_{\text{PrWd}}$

- Problem: A special explanation is necessary for the prefixes ending in a non-nasal consonant such as *bər-*, *tər-* and *pər-*, because vowel epenthesis does not occur when these prefixes are used.

(32) /bər- + ʧat/ → [bərʧat]/*[bərəʧat] 'to be painted'

My analysis

- It is more precise to refer to the root alone rather than the affixed form. That is to say, as a result of epenthesis, a monosyllabic root becomes to be considered disyllabic.
- The disyllabic root minimum follows from obedience to Ft-Bin (cf. Cohn and McCarthy 1998).[9]

(33) Ft-Bin (McCarthy and Prince 1993)
Feet must be binary under syllabic or moraic analysis.

- Cohn and McCarthy (1998):
  1. Ft-Bin is undominated in Indonesian.
  2. PrWd in Indonesian includes suffixes but not prefixes.[10]
  3. Suffixes are not footed. [11]
- Ft-Bin is only satisfied by vowel epenthesis.

(34) a. Epenthesis → √Ft-Bin
mə.[(ŋə.ʧat)]$_{\text{PrWd}}$
mə.[(ŋə.pos|).kan]$_{\text{PrWd}}$
b. No epenthesis → *Ft-Bin
NS: *mə.[(ɲat)]$_{\text{PrWd}}$
*mə.[(mos|).kan]$_{\text{PrWd}}$
NA: *məɲ.[(ʧat)]$_{\text{PrWd}}$
*məm.[(pos|).kan]$_{\text{PrWd}}$
(The symbol '|' marks the right edge of the root.)

- The fact that only the epenthesised form is grammatical means that Ft-Bin dominates the anti-epenthesis constraint Dep.

(35) Ft-Bin ≫ Dep

/məŋ- + ʧat/	Ft-Bin	Dep
☞ a. mə.[(ŋə.ʧat)]$_{\text{PrWd}}$		*
b. mə.[(ɲat)]$_{\text{PrWd}}$	*!	
c. məɲ.[(ʧat)]$_{\text{PrWd}}$	*!	

- Vowel epenthesis with a monosyllabic root only occurs when a nasal-ending prefix is involved, but not when the prefix does not end in a nasal (36a–b) or when a root is used by itself with no prefix (36c).

(36) Indonesian
a. Prefix *di-*
/di- + ʧat/ → [diʧat] 'to be painted'
/di- + pos-kan/ → [diposkan] 'to be posted'

[8]As we shall see shortly, Cohn and McCarthy (1998) propose a different prosodic structure for Indonesian based on the analysis of its stress patterns.

[9]Note that we are concerned not with word minimum. For the stem *poskan* in (32) is already disyllabic, yet epenthesis in observed.

[10]The grouping of 'root + suffix' as opposed to 'prefix + root' is also desirable from morphosyntactic reasons (Son and Cole 2008; Nomoto and Soh 2009).

[11]Under Cohn and McCarthy's analysis, this is because an alignment constraint that requires the right edge of the root to coincide with the right edge of a foot is ranked high. They refer to this constraint as Align-Root-Ft.

(i) Align-Root-Ft (Cohn and McCarthy 1998)
Align(Root, Right; Ft, Right).
"The right edge of every root coincides with the right edge of some foot"—every root ends in foot.

b. Prefix *bər-*
/bər- + ʧat/ → [bərʧat] ‘to be painted’
/bər- + hak/ → [bərhak] ‘to have the right’

c. No prefix
/ʧat/ → [ʧat] ‘paint’
/pos/ → [pos] ‘mail, post’
/hak/ → [hak] ‘right’

- This follows from an undominated constraint which requires the left edge of every root to coincide with the left edge of a PrWd, Align-Wd-L.

(37) Align-Wd-L (Cohn and McCarthy 1998)[12]
Align(Root, Left; PrWd, Left)
“The left edge of each root coincides with the left edge of some PrWd.”

(38) Ft-Bin, Align-Wd-L, NasAssim ≫ Ident[PharExp] ≫ CrispEdge[PrWd] ≫ Uniformity ≫ Dep
(Ident[PharExp] is not included in the tableaux because it is irrelevant here. The symbol ‘|’ marks the left edge of the root.)

<table>
<tr><th>i. /məŋ- + ʧat/</th><th>Ft-Bin</th><th>Align-Wd-L</th><th>NasAssim</th><th>CrispEdge[PrWd]</th><th>Uniformity</th><th>Dep</th></tr>
<tr><td>a. məŋ.[(|ʧat)]$_{\text{PrWd}}$</td><td>*</td><td></td><td>*!</td><td></td><td></td><td></td></tr>
<tr><td>☞ b. mə.[(ŋə.|ʧat)]$_{\text{PrWd}}$</td><td></td><td>*</td><td></td><td></td><td></td><td>*</td></tr>
<tr><td>c. mə.[(|ɲat)]$_{\text{PrWd}}$</td><td>*</td><td></td><td></td><td></td><td>*!</td><td></td></tr>
<tr><td>d. məɲ.[(|ʧat)]$_{\text{PrWd}}$</td><td>*</td><td></td><td></td><td>*!</td><td></td><td></td></tr>
<tr><td>ii. /bər- + ʧat/</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>☞ a. bər.[(|ʧat)]$_{\text{PrWd}}$</td><td>*</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>b. bə.[(rə.|ʧat)]$_{\text{PrWd}}$</td><td></td><td>*</td><td></td><td></td><td></td><td>*!</td></tr>
<tr><td>iii. /ʧat/ (no prefix)</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>☞ a. [(|ʧat)]$_{\text{PrWd}}$</td><td>*</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>b. [((k)ə.|ʧat)]$_{\text{PrWd}}$</td><td></td><td>*</td><td></td><td></td><td></td><td>*!</td></tr>
</table>

[12] This constraint is called Align-Wd in Cohn and McCarthy (1998).

6 Conclusion

- The three datasets are explainable within OT by extending Pater’s (2001) analysis with a minimum of additional machinery, and no diachronic explanation is necessary.
- The success of the present analysis lends support to
  - Pater’s (2001) analysis of NS based on CrispEdge[PrWd] and Ident[PharExp]
  - Cohn and McCarthy’s (1998) claims about the prosodic structure of Indonesian
- My analysis of distantly conditioned NS provides another example of self-conjoined markedness constraints in addition to other phenomena discussed by Alderete (1997) and Itô and Mester (1999, 2003), among others.
- This study also serves as a *partial* reply to Blust (2004), who brings up several empirical facts that are not explained by Pater (1999, 2001) and advocates a diachronic account over an OT account.
- Detailed descriptive studies such as Blust (2004) are extremely important for theoretical studies because they provide a number of curious data which would be otherwise missed by theoreticians.

A remark on a diachronic perspective on phonological phenomena

- While other facts pointed out by Blust (2004) could be also explained within the framework of OT, there are indeed phonological phenomena for which a diachronic account is required.
  Example:
  Some languages have two *maN-* prefixes, one with the underlying *maŋ-* and another with the underlying *man-*. Although both ends with the same nasal, only the former triggers NS, but the latter does not.
- However, it is important to keep in mind that productive aspect of synchronic phonological patters cannot be reduced to inheritance from the earlier forms of a language.
  Example:
  In Malay the root *telefon* ‘telephone’ undergoes NS when prefixed by *məŋ-* as in *mə**n**elefon* ‘to telephone’. Obviously, this form was not inherited from Proto-Malayo-Polynesian or Classical Malay.

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