Revisiting Asymmetries in Malay Morphophonology

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Overview

- There are two main asymmetries involving nasal-final prefixes in Malay
  1. processes only happen at prefix-root junctures
  2. these processes are blocked with monosyllabic roots
- These can be explained by
  1. Prespecified features can act as blocking structures (Inkelas and Cho, 1993)
  2. Prosodic structures, including floating mora, can act as blocking structures (Ahmad and Jalaluddin, 2011)
- I formalize these using Boolean Monadic Recursive Schemes, a computational formalism

BMRS

- **B**oolean **M**onadic **R**ecursive **S**chemes (Bhaskar et al., 2020; Chandlee and Jardine, 2021)
- BMRS define string-to-string functions using a collection of functions $\rho = \{\phi_1 \dots \phi_n\}$
- `IF ... THEN ... ELSE ...` syntax is used to define Boolean functions which yield $\top$ or $\bot$ values
- Analyzed simultaneously, no order assigned
- Types of BMRS functions
  1. $f(x)$: input property f at position x, $\top = [+f]$, $\bot = [-f]$
  2. $\phi_f(x)$: output property f at position x
  3. $p(x)$ and $s(x)$: predecessor/successor of x
  4. $\texttt{out}(x)$: whether a position is present in the output

BMRS Demonstration

- Blocking in BMRS
  $\phi_g(x) :=$ `IF blocker THEN` $\bot$ `ELSE ...`
- Licensing in BMRS
  $\phi_g(x) :=$ `IF licenser THEN` $\top$ `ELSE ...`
- Consider the following process
- $\phi_{\texttt{nas}}(x) :=$ `IF` $\texttt{syll}(x)$ `THEN` $\bot$
  `ELSE IF` $\texttt{nas}(x)$ `THEN` $\top$ `ELSE` $\bot$
- $\texttt{syll}(x)$ is a blocking structure for nasality
- Input nasality license output nasality (i.e. Only consonants contrast for nasality)

Nasal Assimilation

- Nasal assimilation happens when a prefix-final nasal comes in contact with a consonant, but it does not happen at other junctures (e.g. root-suffix, compound word boundaries)
- **A solution**: Only prefix-final nasals are underspecified
- We define an underspecified nasal in a way that allows it to be a licensing structure while prespecification acts as a blocking structure (Inkelas and Cho, 1993)

(1)	a.	/pəN-daki/	[pəndaki]	*'climber'*
	b.	/pəN-boroŋ/	[pəmboroŋ]	*'wholesaler'*
	c.	/məN-ʤawab/	[məɲʤawab]	*'to answer'*
	d.	/pəN-gali/	[pəŋgali]	*'digger'*
(2)	a.	/ʤaŋan-lah/	[ʤaŋanlah]	*'do not'*
	b.	/tanam-kan/	[tanamkan]	*'to plant'*
	c.	/ʤam-taŋan/	[ʤamtaŋan]	*'watch'*
	d.	/dalam+guni/	[dalamguni]	*'in sack...'*

Underspecified nasal

- $\texttt{N}(x) :=$ `IF` $\texttt{nasal}(x)$ `THEN`
  `IF` $\texttt{lab}(x)$ `THEN` $\bot$ `ELSE`
  ...
  `IF` $\texttt{dor}(x)$ `THEN` $\bot$ `ELSE` $\top$
  `ELSE` $\bot$

Identify target of assimilation

- $\texttt{NC}(x) :=$ `IF` $\texttt{N}(x)$ `THEN` $\texttt{cons}(s(x))$ `ELSE` $\bot$

Select place to assimilate to (e.g., labial)

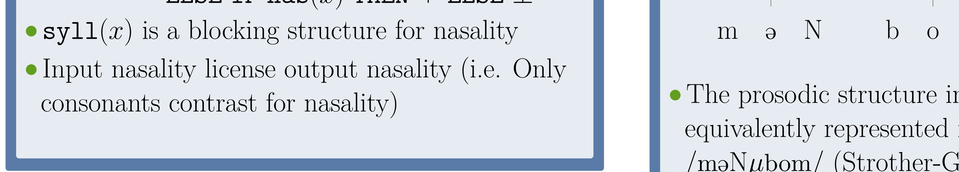
- $\phi_{\texttt{m}}(x) :=$ `IF` $\texttt{NC}(x)$
  `THEN` $\texttt{place}(s(x)) \approx \texttt{lab}$ `ELSE` $\texttt{m}(x)$

Schwa Epenthesis

- Monosyllabic roots are immune to all the nasal-related phenomena described
- Roots in Malay are minimally bisyllabic. Therefore, these monosyllabic roots (mostly of which are loan words) have an underlying representation that has an unsurfaced prosodic mora (Ahmad and Jalaluddin, 2011)

(3)	a.	/məN-bom/	[mərəbom]	*'to bomb'*
	b.	/məN-lap/	[mərəlap]	*'to wipe'*
	c.	/məN-pam/	[mərəpam]	*'to pump'*

(4) Underlying representation



- The prosodic structure in (4) can be equivalently represented in a flat string as /məNμbom/ (Strother-Garcia, 2019)

Identify mora and rewrite as schwa

- $\phi_{\texttt{ə}}(x) :=$ `IF` $\texttt{ə}(x)$ `THEN` $\top$ `ELSE` [`IF` $\texttt{N}(p(x))$ `THEN` $\mu(x)$ `ELSE` $\bot$]
- While described as epenthesis, it can be seen as a rewrite of mora in the input structure as schwa
- These prosodic structures are not licensed in the output

Block mora and other segments to delete

- $\texttt{out}(x) :=$ `IF` $\mu(x)$ `THEN` $\bot$ `ELSE`
  `IF` $\mathbf{B}(x)$ `THEN` $\bot$ `ELSE` $\top$

Nasal substitution

- When coming into contact with a voiceless obstruent, nasal substitution occurs

(5)	a.	/məN-pukul/	[məmukul]	*'to beat'*
	b.	/məN-tutup/	[mənutup]	*'to close'*
	c.	/məN-kira/	[məŋira]	*'to count'*

- Rule based analysis treats this process as two steps: assimilation + post-nasal deletion
- OT treats it as one step where the two segments are fused into one

Conditions for deletion

- $\mathbf{B_1}(x) :=$ `IF` $\texttt{NC}(p(x))$ `THEN` [`IF` $\texttt{voice}(x)$ `THEN` $\bot$ `ELSE` $\top$]
  `ELSE` $\bot$

Block segment in output

- $\texttt{out}(x) :=$ `IF` $\mathbf{B_1}(x)$ `THEN` $\bot$ `ELSE` $\top$
- BMRS tells us that: assimilation and deletion are indeed two separate parts, but evaluation all happen simultaneously

Nasal deletion

- When in contact with a sonorant or non-syllabic high vowel, the assimilated nasal deletes
- Early glide formation (not discussed here) feeds this deletion, therefore the elsewhere case does not apply

(6)	a.	/məN-lompat/	[məlompat]	*'to jump'*
	b.	/məN-uarna-i/	[məwarnai]	*'to color'*

Condition for deletion

- $\mathbf{B_2}(x) :=$ `IF` $\texttt{N}(x)$ `THEN` $\texttt{son}(s(x))$ `ELSE` $\bot$

Block segment in output

- $\texttt{out}(x) :=$ `IF` $\mathbf{B_2}(x)$ `THEN` $\bot$ `ELSE` $\top$