

**Infixation, blocking, and back-copying in Muna:  
 an OT-account of allomorphy selection and reduplication**

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1. Introduction

Goal: to develop a comprehensive account of

- (i) the selection of irrealis allomorphs
- (ii) the four patterns that emerge when the irrealis is applied to reduplicated stems

2. The Muna language

- genetic affiliation: Muna < Sulawesi < Western Malayo-Polynesian < Austronesian
- spoken in Indonesia, on the island Muna (and surrounding islands) south-east of Sulawesi, as well as in eastern parts of the neighbouring island Buton
- about 227,000 speakers, of which about 150,000 speak ‘Standard Muna’
- source: the grammar by van den Berg (1989)

Some phonological background:

(1) phoneme inventory (according to van den Berg 1989: 16):

vowels	front	central	back
high	i		u
medium	ɛ		•
low		a	

consonants	bi-labial	labio-dental	dental	alveolar	velar	uvular	glottal
plosive	p b		dʃ	t d	k g		
prenasalised	mp mb			nt nd	ŋk ŋg		
nasal	m			n	ŋ		
trill				r			
frikative		f		s		ʕ	h
prenasalised				ns			
lateral				l			
approximant	w						
implosive	ɔ						

left: voiceless, right: voiced

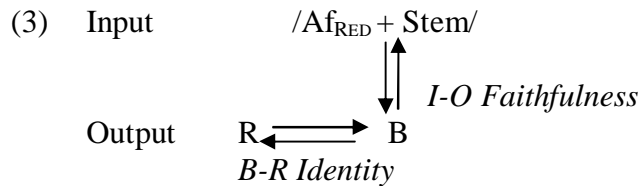
- prenasalised stops and fricatives *mp, mb, nt, nd, ŋk, ŋg*, and *ns* are analysed as complex phonemes
- no codas or consonant clusters
- there are no diphthongs or long vowels
- V-syllables tend to occur only root-finally
- most word stems are disyllabic.

### 3. Reduplication

#### 3.1. The correspondence approach to reduplication:

- (2) Given two strings  $S_1$  and  $S_2$ , *correspondence* is the relation  $\mathfrak{R}$  from the elements of  $S_1$  to those of  $S_2$ . Elements  $\alpha \in S_1$  and  $\beta \in S_2$  are referred to as *correspondents* of one another when  $\alpha \mathfrak{R} \beta$ .

McCarthy & Prince's (1999: 87) basic model:



#### 3.2. Three Muna reduplication patterns

(i) monosyllabic reduplication: the initial syllable of the base is copied:

- (4) ne-la-late-mo (van den Berg 1989: 358)  
 3PL.REAL-RED-live-PERFECT  
 'they were living'

(ii) total reduplication: the entire base (morphologically simple or complex) is copied:

- (5) andoke-a-ndoke (van den Berg 1989: 329)  
 RED-ART-monkey  
 'Mr. Monkey'

(iii) foot reduplication: the initial foot of the base is copied

Foot reduplication can be said to be the standard type. It covers (among other idiosyncratic meanings) the following functions:

- with verbs: progressive aspect, resulting state of a physical movement, purposelessness of an action, intensification, focus on the event, plurality of the subject or object
- with nouns: plural, personification (of animals), various
- with question words: ', distributivity'

- (6) a. ne- mpali- mpali  
 3SG.REAL- RED- stroll  
 'he strolls about, walks around'

- b. ndiwa-ndiwawa  
 RED-yawn  
 'yawning'

- c. neha- nehamai  
 RED- where  
 'wherever'

(van den Berg 1989: 25, 326-328):

- (7) RED = FT: The reduplicant is a foot.  
 (8) MAX-BR: Every segment of the base has a correspondent in the reduplicant.

*neha-nehama*i > *nehama*i-*nehama*i : RED = FT >> MAX-BR  
*neha-nehama*i > *neha-neh*a: MAX-IO >> MAX-BR

- (9) {RIGHT, LEFT}-ANCHOR(S<sub>1</sub>, S<sub>2</sub>):  
 Any element at the designated periphery of S<sub>1</sub> has a correspondent at the designated periphery of S<sub>2</sub>.

- (10) Ranking responsible for foot reduplication in Muna:  
 ANCHOR-BR(L), RED = FT, NO-CODA >> MAX-IO >> MAX-BR

- (11) candidate selection for foot reduplication

	RED-nehama	ANCHOR- BR(L)	RED = FT	NO-CODA	MAX-IO	MAX-BR
a	<b>F</b> <i>neha-nehama</i> i					***
b	<i>neha-neh</i> a				*!***	
c	<i>neham-nehama</i> i			*!		**
d	<i>nehama</i> i- <i>nehama</i> i		*!			
e	<i>hama-nehama</i> i	*!*				***

#### 4. *um*-allomorphy with simple verb stems

Irrealis mood is, for one major verb class, expressed by the infix *um*- and its allomorphs:

- with vowel-initial verb stems the allomorph *m*- is prefixed.
- with most consonant-initial verb-stems, by contrast, *um*- is infixal
- with initial voiceless labials (the segments *p*- and *f*-) “nasal substitution” occurs
- with voiced labial or nasal(ized) stops any realisation of the irrealis is blocked.

- (12) irrealis with non-reduplicated verb-stems:

	realis:		irrealis:		
a.	<i>ala</i>	‘take’	<i>m-ala</i>	‘will take’	= prefixation
b.	<i>solo</i>	‘flow’	<i>sumolo</i>	‘will flow’	= infixation
c.	<i>foni</i>	‘climb’	<i>moni</i>	‘will climb’	= nasal substitution
d. (i)	<i>baru</i>	‘be happy’	<i>baru</i>	‘will be happy’	= blocking
(ii)	<i>ndiwawa</i>	‘yawn’	<i>ndiwawa</i>	‘yawn’	

Description: *um*-, *m*- and ‘zero’ are phonologically conditioned allomorphs of irrealis

Representation: *um*- is the form that we take to be underlying.

We follow the radical OT-practise of deriving alternating forms by constraints.

Benefit: the form inventory is characterized by the constraint-ranking, that is, the grammar, rather than being stipulated in terms of individual entries

Expense: we have to employ four morpheme-specific constraints

#### 4.1. Prefixation

(13) ONSET [*um-*]                      The affix *um-* is always preceded by an onset.

*mala* > *umala*, ?*umala*:              DEP-IO, ONSET [*um-*] >> MAX-IO

#### 4.2. Infixation

(14) ALIGN-*um*-L:                      Align the left edge of *um-* with the left edge of the PrWd.

*sumolo* > *umsolo*, *usolo*:              NO-CODA, ONSET [*um-*] >> ALIGN-*um*-L

*sumolo* > *molo*:                          IDENT-IO >> ALIGN-*um*-L

#### 4.3. Nasal substitution

(15) \* [<sub>PRWD</sub> LABIAL/NASAL ...-*um-*]:  
   Avoid *um-* after a labial or nasal in the same prosodic word.

With initial voiceless labials, nasal substitution is better than infixation or blocking:  
*moni* > *fumoni*/*fonumi*:              \* [<sub>PRWD</sub> LABIAL/NASAL ...-*um-*] >> IDENT-IO, MAX-IO

(16) MAX-IO[u[labial, nasal]]  
   The features [labial, nasal] of the irrealis marker are realised in the output.

*moni* > *foni*:                              MAX-IO[u[labial, nasal]] >> IDENT-IO

#### 4.4. Blocking

*baru* > *bumaru*, *barumo*, *bamu*:  
   \* [<sub>PRWD</sub> LABIAL/NASAL ...-*um-*] >> MAX-IO[u[labial, nasal]]

(17) IDENT-I<sub>[voiced stop]</sub>O:  
   For voiced stops, any feature specification of the input must be preserved in the output correspondent.

With initial voiced labials (as well as with initial nasals), blocking is better than nasal substitution or prenasalization:

*baru* > *maru*, *mbaru*:                      IDENT-I<sub>[voiced stop]</sub>O >> MAX-IO[u[labial, nasal]]

IDENT-I<sub>[voiced stop]</sub>O violation.

#### 4.5. Ranking and evaluation

(18) NO-CODA, \* [<sub>PRWD</sub> LABIAL/NASAL ...-*um-*], ONSET [*um-*], IDENT-I<sub>[voiced stop]</sub>O >> MAX-IO[u[labial, nasal]] >> IDENT-IO >> ALIGN-*um*-L, MAX-IO >> ONSET

(19) prefixation:

	um-ala	No-CODA	* [PRWD LABIAL/NASAL ...-um-]	ONSET [um-]	IDENT-I <sub>[voiced stop]</sub> O	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN-um-L	MAX-IO	ONSET
a	<b>F</b> mala								*	
b	aluma							**!		*
c	ama						*!	*	**	*
d	ala					*!			**	*
e	umala			*!						*
f	amla	*!						*	*	*

(20) infixation:

	um-solo	No-CODA	* [PRWD LABIAL/NASAL ...-um-]	ONSET [um-]	IDENT-I <sub>[voiced stop]</sub> O	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN-um-L	MAX-IO	ONSET
a	<b>F</b> sumolo							*		
b	solumo							**.*		
c	molo						*!		**	
d	somo						*!	**	**	
e	solo					*!			**	
f	umolo			*!			*		*	*
g	umsolo	*!		*						*

(21) infixation with non-initial onsetless syllables:

	um-gaa	No-CODA	* [PRWD LABIAL/NASAL ...-um-]	ONSET [um-]	IDENT-I <sub>[voiced stop]</sub> O	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN-um-L	MAX-IO	ONSET
a	<b>F</b> gumaa							*		*
b	gama							**!	*	
c	gaa					*!			**	
d	maa				*!		*		*	
e	u-maa			*!	*		*			
f	um-gaa	*!		*						

(22) nasal substitution:

um-foni	No-CODA	* [PrWD LABIAL/NASAL ...-um-]	ONSET [um-]	IDENT-[voiced stop]O	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN-um-L	MAX-IO	ONSET
a <b>F</b> moni						*		**	
b foni					*!			**	
c <b>u</b> moni			*!			*		*	*
d <b>f</b> umoni		*!					*		
e fon <b>u</b> mi		*!					***		
f fo <b>n</b> i		*!				*	**	**	
g <b>u</b> mfon <b>i</b>	*!		*						*

(23) blocking:

um-baru	No-CODA	* [PrWD LABIAL/NASAL ...-um-]	ONSET [um-]	IDENT-[voiced stop]O	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN-um-L	MAX-IO	ONSET
a <b>F</b> baru					*			**	
b <b>m</b> aru				*!		*		**	
c <b>u</b> maru			*!	*		*		*	*
d <b>b</b> amu		*!				*	**	**	
e <b>b</b> umaru		*!					*		
f bar <b>u</b> mu		*!					***		
g <b>u</b> mbar <b>u</b>	*!		*						*

## 5. *um-* allomorphy and reduplication combined

(24) irrealis and foot-reduplication combined:

- |    |                |            |                             |
|----|----------------|------------|-----------------------------|
| a. | <i>ala</i>     | ‘take’     | <i>m-<u>ala</u>-ala</i>     |
| b. | <i>solo</i>    | ‘flow’     | <i><u>sumolo</u>-solo</i>   |
| c. | <i>gaa</i>     | ‘marry’    | <i><u>gumaa</u>-gaa</i>     |
| d. | <i>foni</i>    | ‘climb’    | <i><u>moni</u>-moni</i>     |
| e. | <i>baru</i>    | ‘be happy’ | <i><u>baru</u>-baru</i>     |
|    | <i>ndiwawa</i> | ‘yawn’     | <i><u>ndiwa</u>-ndiwawa</i> |

(25) DEP-BR: Every segment of the reduplicant has a correspondent in the base.

*sumolo-solo* > *sumolo-sumolo*:

DEP-IO >> DEP-BR

*sumolo-solo* > *um-solo-solo*:

NO-CODA >> ALIGN-um-L, DEP-BR

## 5.1 Overapplication of nasal substitution to the base

The output form one would expect under ‘normal’ application would be *moni-foni*: the reduplicant is prefixed to the stem and then the irrealis is added by substitution.

(26) overapplication scenario illustrated in derivational terms:

verb stem:	<i>ʔfoniʔ</i>
reduplication:	/foni foni/
prefixing of irrealis:	/um foni moni/
nasal substitution:	/moni foni/
back-copying:	[moni moni]

Back-copying of the irrealis allomorph to the stem does not, however, occur with either prefixation or infixation (cf. 24a,b), not even where the prosodic structure would be optimised, which is clear from the preference of *m-ala-ala* over *mala-mala*.

⇒ The function of back-copying in Muna is indeed that of maximizing the similarity between base and reduplicant, rather than the emergence of structural unmarkedness.

(27) IDENT-BR

Reduplicant correspondents of a base [ $\gamma$ F] segment are also [ $\gamma$ F].

*moni-moni* > *moni-foni*: IDENT-BR >> IDENT-IO

(28) Ranking schema for overapplication:

BR-Identity, Well-formedness >> IO-Faithfulness

(29) Instantiation: nasal substitution with irrealis and reduplication in Muna:

IDENT-BR, \* [<sub>PRWD</sub> LABIAL/NASAL ...-um-] >> IDENT-IO

## 5.2 Ranking and evaluation

Ranking established so far:

(30) NO-CODA, \* [<sub>PRWD</sub> LABIAL/NASAL ...-um-], ONSET [*um-*], IDENT-I<sub>[voiced stop]</sub>O, IDENT-BR, DEP-IO >> MAX-IO[u[labial, nasal]] >> IDENT-IO >> ALIGN-um-L, MAX-IO >> DEP-BR, ONSET

(31) prefixation:

um-RED-ala	No-CODA	* [PRWD LABIAL/NASAL ...- <i>um-</i> ]	ONSET [ <i>um-</i> ]	IDENT- <sub>I</sub> [voiced stop] O	IDENT-BR	DEP-IO	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN- <i>um</i> -L	MAX-IO	DEP-BR	ONSET
a <b>F</b> <u>m</u> ala-ala										*		*
b <u>a</u> luma-ala									** !*		**	**
c <u>a</u> ma-ama								* !*	*	**		**
d <u>a</u> la-ala							* !*			**		**
e <u>m</u> ala-mala						* !*				*		
f <u>a</u> ma-ala					* !*				*	**		**
g <u>u</u> mala-ala			* !*									**
h <u>u</u> mala-umala			* !*			**						**
i <u>a</u> mla-ala	* !*								*	*	*	**

(32) infixation:

um-RED-solo	No-CODA	* [PRWD LABIAL/NASAL ...- <i>um-</i> ]	ONSET [ <i>um-</i> ]	IDENT- <sub>I</sub> [voiced stop] O	IDENT-BR	DEP-IO	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN- <i>um</i> -L	MAX-IO	DEP-BR	ONSET
a <b>F</b> <u>s</u> umolo-solo									*		**	
b <u>s</u> olumo-solo									** !*		**	
c <u>m</u> olo-molo								* !*		**		
d <u>s</u> omo-somo								* !*	**	**		
e <u>s</u> olo-solo							* !*			**		
f <u>s</u> umolo-sumolo						* !*			*			
g <u>m</u> olo-solo					* !*					**		
h <u>s</u> omo-solo					* !*				**	**		
i <u>u</u> -molo-molo			* !*					*		*		*
j <u>u</u> molo-umolo			* !*			*		*		*		*
k <u>u</u> m-solo-solo	* !*		*									*

(33) infixation with non-initial onsetless syllables:

um-RED-gaa	No-CODA	* [PrWd LABIAL/NASAL ...-um-]	ONSET [um-]	IDENT-1 <sub>[voiced stop]</sub> O	IDENT-BR	DEP-IO	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN-um-L	MAX-IO	DEP-BR	ONSET
a <b>F</b> <u>g</u> umaa-gaa									*		**	**
b <u>g</u> ama-gaa									**!	*	*	*
c <u>g</u> aa-gaa							*!			**		**
d <u>g</u> umaa-gumaa						**!			*			**
e <u>m</u> aa-gaa					*!					**		**
f <u>m</u> aa-maa				*!				*		**		**
g <u>u</u> maa-maa			*!	*				*		*		**
h <u>u</u> maa-umaa			*!	*		*		*		*		**
i <u>u</u> m <sup>g</sup> aa-gaa	*!		*									**

(34) overapplication of nasal substitution:

um-RED-foni	No-CODA	* [PrWd LABIAL/NASAL ...-um-]	ONSET [um-]	IDENT-1 <sub>[voiced stop]</sub> O	IDENT-BR	DEP-IO	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN-um-L	MAX-IO	DEP-BR	ONSET
a <b>F</b> <u>m</u> oni- moni								*		**		
b <u>f</u> oni-foni							*!			**		
c <u>m</u> oni-foni					*!					**		
d <u>u</u> moni-moni			*!					*		*		*
e <u>u</u> moni-umoni			*!			*		*		*		*
f <u>f</u> umoni-foni		*!							*		**	
g <u>f</u> oni-foni		*!			*				**	**		
h <u>f</u> umoni-fumoni		*!				**			*			
i <u>f</u> oni-foni		*!						*	**	**		
j <u>u</u> m-foni-foni	*!		*									*

(35) blocking:

um-RED-baru	No-CODA	* [PRWD LABIAL/NASAL ...-um-]	ONSET [um-]	IDENT-I <sub>[voiced stop]</sub> O	IDENT-BR	DEP-IO	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN-um-L	MAX-IO	DEP-BR	ONSET
a <b>F</b> baru-baru							*			**		
b <u>maru</u> -baru					*!					**		
c <u>maru</u> -maru				*!				*		**		
d <u>umaru</u> -maru			*!	*				*		*		*
e <u>umaru</u> -umaru			*!	*		*		*		*		*
f <u>bumaru</u> -baru		*!							*		**	
g <u>barumu</u> -baru		*!							***		**	
h <u>bamu</u> -baru		*!			*				**	**		
i <u>bumaru</u> -bumaru		*!				**			*			
j <u>bamu</u> -bamu		*!						*	**	**		
k <u>umbaru</u> -baru	*!		*									*

## 6. Unification of partial rankings

For the sake of explicitness, the ranking established for irrealis allomorphy in (30) is extended by the constraints in (10) that are responsible for foot reduplication.

When *um-* is infixed into the reduplicant as in *sumolo-solo*, the reduplicant is no longer disyllabic. Therefore RED = FT must be demoted:

*sumolo-solo* > *molo-molo*: IDENT-IO >> RED = FT

*gumaa-gaa* > *gama-gaa*: RED = FT must be ranked at least as low as ALIGN-um-L

complete ranking:

(36) NO-CODA, \* [PRWD LABIAL/NASAL ...-um-], ONSET [um-], IDENT-I<sub>[voiced stop]</sub>O, IDENT-BR, DEP-IO, ANCHOR-BR(L) >> MAX-IO[u[labial, nasal]] >> IDENT-IO >> ALIGN-um-L, MAX-IO, RED = FT >> DEP-BR, ONSET, MAX-BR

(37) prosodically ‘ill-formed’ reduplicant is still optimal with infixation:

um-RED-gaa	(all undominated constraints)	MAX-IO[u[labial, nasal]]	IDENT-IO	ALIGN- <i>um</i> -L	MAX-IO	RED = Ft	DEP-BR	ONSET	MAX-BR
a <b>F</b> <u>g</u> umaa-gaa				*		*	**	**	
b <u>g</u> ama-gaa				**	*!		*	*	
c <u>ma</u> a-maa	*!		*		**			**	
d <u>gaa</u> -gaa		*!			**			**	
e <u>gumaa</u> -gumaa	*!*			*		*		**	

## 7. Conclusion

- One and the same ranking predicts the *um*-allomorphy for both simple and reduplicated verb stem, including blocking and back-copying of the irrealis allomorph to the base.
- Back-copying does not apply where it would improve on the prosody. Rather, its sole function is to enhance the transparency of base and RED. Therefore, it is restricted to nasal substitution, where the irrealis comes without an additional segment.
- The complex allomorphy of the irrealis morpheme *um*- calls for four morpheme-specific constraints. There is no need for different underlying entries.
- Appeal to morpheme-specific versions of well-established markedness constraints enables a uniform account of the four patterns in (12) as well as those in (24). In particular, there is no need for stratal evaluation.

## References

- Berg, René van den (1989): *A grammar of the Muna language*. Dordrecht: Foris Publications.
- McCarthy, John & Alan Prince (1995) Faithfulness and Reduplicative Identity. In: J. Beckmann, S. Urbanczyk & L. Walsh (eds.) *Papers in Optimality Theory*. Amherst: GSLA (= *University of Massachusetts Occasional Papers in Linguistics* 18), 249-384.
- McCarthy, John J. & Prince, Alan (1999): Faithfulness and Identity in Prosodic Morphology. In: René Kager, Harry van der Hulst & Wim Zonneveld (eds.) *The Prosody-Morphology-Interface*, 218-309. Cambridge: Cambridge University Press.