Reduplication in Leti

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0. Introduction

In this article we present an analysis of reduplication facts in Tutukeian-Letinese, Leti for short.[1] We will show that the facts are rather straightforward once it is understood how Leti reduplication interacts with two independent phonological processes of the language: metathesis and fusion.

After some preliminary remarks about syllable and root structure in Leti in section 2, section 3 offers a brief discussion of the metathesis and fusion facts, following and somewhat modifying an analysis proposed in Van der Hulst & Van Engelenhoven 1995 (henceforth VDH and VE). In section 4 we turn to the reduplication data.

Leti is an Austronesian (Central Malayo-Polynesian) language and is spoken on the island of Leti which is situated off the easternmost tip of Timor. The language has about 600 speakers, the majority of whom are around sixty to seventy years old. The data analyzed in this article come from Van Engelenhoven (1995).

2. Basic phonology

In this section we provide some basic facts about the phonological structure of Leti. For a more detailed description we refer to Van Engelenhoven (1995) and to VDH and VE.

The segmental inventory of Leti (excluding a few loan phonemes) is displayed in (1). The high vowels /i/ and /u/ occur as glides /y/ and /w/ if they do not form the syllable peak and precede a non-high vowel.

[1] We are grateful to Aone van Engelenhoven for answering some questions we had about the reduplication patterns.

(1) a consonants

p		β	m			
t	d	s	n	l	r	
k						

b vowels (all long and short)

i		u
e		o
ɛ	ɔ	
a		

At the surface Leti seems to allow for the phonotactic patterns that are given in the first column of (2). These patterns suggest that Leti has branching onsets (2a), closed syllables (2b,c) and complex nuclei (2d,e):

(2)	a	complex onsets	#CCV	#C∅.CV
	b	intervocalic clusters	VCCV	V.C∅.CV
	c	closed syllables	VC#	V.C∅#
	d	long vowels	VV	V.∅V
	e	consonant-glide-vowel sequences	CGV	V.CV

Despite these variable surface patterns VDH and VE argue that Leti can be analyzed as a language with syllables that are strictly CV. The second column in (2) shows the analysis of the surface patterns in the first column as proposed by VDH and VE. In their view, the deviations of the strict CV pattern are only apparent. The strict CV-analysis that they propose relies on the presence of empty syllabic positions (in 2a-d) and on the analysis of a post-consonantal glide as a pre-consonantal vowel. The pre-consonantal vowel surfaces as a post-consonantal glide through a process which we call fusion (cf. section 3.2 below).

Given the strict CV-analysis referred to in the previous section, Leti roots are minimally bisyllabic. Some have a consistent bisyllabic CVCV structure, others are trisyllabic and surface in two forms, namely CVC∅CV and CVCVC∅. The trisyllabic roots are involved in a process of metathesis (cf. section 3.1). We characterize the root as forming (minimally) a trocheic Foot (CVCV) or (maximally) a trocheic FootPlus (CVCVCV); cf. Van der Hulst and Klamer (to appear). Stress falls on the first root vowel, except when this is an empty vowel position.

3. Metathesis & fusion

We now turn to the two processes that seem to 'obscure' the regular reduplication facts. These processes are called 'metathesis A' and 'metathesis B' in VDH and VE and 'internal' and 'external' metathesis in Van Engelenhoven 1995. This terminology suggests that these processes are variants of the same process, which is not the case. To avoid confusion we will therefore distinguish these two pro-

cesses by referring to the first one as 'metathesis' (section 3.1), calling the second one 'fusion' (section 3.2).

The present section draws on Van VDH and VE, although we slightly alter the view on the lexical representation of Leti forms. In particular, we do not assume that lexical representations involve so-called 'plane segregation' (cf. McCarthy 1989), but rely on storing both allomorphs. Constraints on the output determine the selection of allomorphs.

3.1 Metathesis. The data presented in (3) involve metathesis. The first column, headed 'final', presents the forms as they surface at the end of a phonological phrase, in the second column their phrase-medial form is given. We will return to this below.

(3) *Metathesis*

	final	*medial*	
a	pɛnta	pɛnat	'grass'
	kuksi	kukis	'sandwich'
	βarnu	βarun	'(kind of) pigeon'
b	βu:ra	βuar	'mountain'
	ru:ni	ruin	'dugong'
	lo:tu	lout	'servant'
	la:ra	la:r	'Anona squamosa'
	nu:nu	nu:n	'banyan'
c	anni	anin	'wind'
	βɛnna	βɛnan	'kill'

VDH and VE propose an analysis for these facts which is based on the idea that Leti has only CV-syllables. In addition, they suggest that the template for stems that are involved in this type of phonological alternation is fixed: /CVCVCV/. The alternating forms are a result of the fact that empty nuclei are not tolerated (or licensed) phrase-finally, so that the forms in the first column in (3) end in a full vowel. In (4) we give the representation of some of the words that are involved in this metathesis alternation. (4a) are phrase-final allomorphs, (4b) are phrase-medial allomorphs.

(4) a *final*

```
p ɛ n  t a
| | |  | |
c v c v c v

n u    n u
| |    | |
c v c v c v

r u    n i
| |    | |
c v c v c v

β ɛ  n  n a
| |  |  | |
c v  c v c v
```

b *medial*

```
p  ɛ n a t
|  | | | |
c  v c v c v

n  u  n
|  /\ |
c v c v cv

r u  i n
| |  | |
c v c v c v

β ɛ n a n
| | | | |
c v c v c v
```

Following the theory of Government Phonology (Kaye, Lowenstamm and Vergnaud 1990), we assume that empty V-positions must be licensed. Licensing can take place via Proper Government which holds if the empty V-position is followed by a filled V position in the next syllable (5a). In other words, two empty V-positions cannot occur in sequence (5b):

(5) a

```
V C V
|   |
∅   α
↑___|
```

b *

```
V C V
|   |
∅   ∅
```

An ungoverned, and thus unlicensed empty V-position violates the Empty Category Principle (ECP). A representation containing an unlicensed empty V-position is therefore illformed. However, the V-position can be 'saved' by phonetically realizing the empty position. Standard Government Phonology does not consider 'saving' an empty V-position as a choice that languages can make or not, but rather as 'what will automatically happen': an unlicensed V-position must always be realized. Realization may take place in various ways: by producing a 'neutral' vowel sound or inserting a vowel element. We argue that Leti uses a third strategy: it chooses a different allomorph, i.e. one that does not incur the violation.

We will now explain the column headings 'final' and 'medial' in (3). According to Van Engelenhoven (1995), the 'final' forms occur when the relevant words occur phrase-finally, whereas the 'medial' forms occur in phrase-medial position (except in a number of context that we will mention below). VDH and VE now claim that the distribution of final and medial forms can be understood if the

domain of Proper Government is taken to be the phrase. In that case, final forms end in a filled V-position because within the phrase there is no filled V-position following the empty position to license it. When a word occurs phrase-medially, however, the final empty V-position is followed by a filled V-position so that it is licensed. In certain phrase-medial positions the 'final' form occurs, whereas the expected 'medial' form is considered illformed. This is, for instance the case when the following word starts with a consonant cluster (cf. (2a) above), as represented in (6):

(6) [penØta CØC.....] $_{\text{phrase}}$
*[penatØ CØC.....] $_{\text{phrase}}$

VDH and VE show that in such cases the following word has an empty V-position in its initial syllable. In such a configuration the empty V-position of the 'medial' form cannot be licensed, and thereby this form is ruled out as an illformed one and the 'final' form is used as the only one available.

Standard Government Phonology also allows, as a parametric option, empty positions to be licensed by being domain final. In Leti, crucially, this option does not hold at the phrase level.

Lexical items with a CVCV structure (such as *lopu* 'dolphin' and *koni* 'grasshopper') do not show metathesis. They differ from forms like those in (3) (e.g. *kuksi ~ kukis* 'sandwich') in having a bisyllabic template rather than a trisyllabic one.

3.2 Fusion. We now turn to fusion, which can be viewed as a type of phonological liaison. The data in (7) illustrate the phenomenon:

(7) *Fusion*

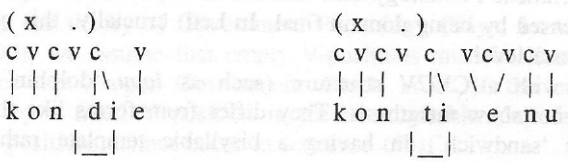
koni 'grasshopper'	+ de	'once'	→ kondie	[kondye]
pipi 'goat'	+ do	'then'	→ pipdio	[pipdyo]
asu 'dog'	+ de	'once'	→ asdue	[asdwe]
lopu 'dolphin'	+ do	'then'	→ lopduo	[lopdwo]
kai 'wages'	+ de	'once'	→ kadie	[kadye]
rou 'motive'	+ de	'once'	→ rodue	[rodwe]

The phenomenon at issue involves the high vowels /i/ and /u/. These vowels emerge as secondary articulations on the consonant that follows them in the input forms. /u/ and /i/ are lost if the vowel in the following syllable is high (i.e. also /u/ or /i/). In that case there is no fusion effect (cf. (8a) below). The vowel /a/ completely disappears, i.e. it does not leave a trace in the neighbouring syllable (cf. 8b). If the following word starts with a vowel, the high vowel shows up as an onset glide (cf. 8c):

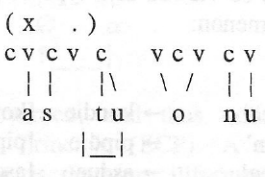
(8) a koni 'grasshopper' + di 'now' → [kondi]
asu 'dog' + di → [asdi]
tβa:lu 'we (inc) throw it' + ti 'to' → [tβa:lti]
b rɔna 'pot' + de 'once' → [rɔnde]
c ma:nu 'bird' + enu 'turtle' → [ma:nwenu]

According to VDH and VE, fusion is triggered by the delinking of a vowel melody from its V-position if this position is metrically weak — a post-tonic environment in the examples in (7) and (8). In the analysis of glide vowel nuclei, they assume that fusion also takes place pretonically, i.e. the postconsonantal glide is analyzed as a preconsonantal vowel surfacing as secondary articulation on the preceding consonant (cf. (2e) above). An illustration of this case is (18) below. Leti fusion is illustrated in (9), the dotted line indicates fusion:

(9) a konide → [kondye] b koni Te:nu → [kon tye:nu]
'grasshopper once' 'Teunese grasshopper'



c asu to:nu → [astwo:nu] 'dog pool'



The vowel melody that fuses with the following consonant leaves behind an empty V-position that is properly governed by the next vowel. For further details about Leti fusion we refer to VDH and VE (1995). We now turn our attention to the reduplication data.

4. Reduplication

Van Engelenhoven (1995) presents a somewhat complicated picture of Leti reduplication which suggests that reduplication takes place to the right, i.e., the reduplicated part is a *suffix* to its base. There are cases, however, where he has to assume that reduplication is leftward, i.e. *prefixing* to the base. Our proposal

is that Leti reduplication is prefixing only — it uniformly takes place to the left of the base. The reduplicant prefixes to the main stress foot and copies segmental material from it.

Leti reduplication has various functions which are given in (10):

(10) a Category change (V → N, V → A, N → A)
b Relativizations
c Diminutives
d Iterative aspect

In the remainder of this paper we will discuss representative examples of Leti reduplication. They are given in (11):

(11)	*Reduplication*		*Root form*	
a	palpyali	'raft'	pali	'to float'
	wɛrwɛra	'watery'	wɛra	'water'
	olwolu	'which is sold'	olu	'sell'
	sɔpsɔpna	'servant'	sɔpna ~ sɔpan	'order'
b	sɔsɔpna	'which is ordered'	sɔpna ~ sɔpan	(idem)
	lululi	'taboo (adj)'	luli	'taboo'
	titikli	'kick for a while'	tikli ~ tikil	'kick'
c	mtatwa:tu	'afraid'	mta:tu ~ mtaut	'to be afraid'
	kririta	'low'	kri:ta ~ kriat	'to be slow'
d	pɛppɛrta	'heavy'	ppɛrta ~ ppɛrat	'to be heavy'
e	tuɔtɔna	'the questioned'	tuɔna (/utona/)	'to question'
f	mwomodi	'which you carry'	mu - odi	'you (sg)-carry'
	vavata	'fourth'	vo - ata	'ordinal prefix-four'

In the remainder of this paper we will show that despite surface appearances, Leti employs only two reduplicative prefixes:

(12) a CV = syllable
b CVCV = foot

We will now discuss the forms in (11), starting with those in (11a). The reduplicative prefix is CVCV here and the diagrams in (13) illustrate the interaction between this CVCV reduplicative template and the independent phonological process of fusion:

(13) a. c v c v - c v c v b. c v c v - c v c v
p a l p i a l i w ɛ r w ɛ r a

c. c v c v - c v c v
o l u o l u

In (13a) the final vowel /i/ of the reduplicant surfaces as a secondary articulation on the initial stem consonant /p/, result: [py]. (13b) illustrates that /a/'s do not show up as secondary articulations - they are lost. (13c) shows that the final vowel of the reduplicant can fill the initial onset position of the stem.

Verbs can undergo both CV and CVCV reduplication, whereas nominal bases only use the CVCV form productively. In some cases the distinction between CV and CVCV reduplications is neutralized on phonological grounds, as will be demonstrated in (16) below. First we consider a case of simple CV-reduplication — the form *sOsOpna* in (11b), represented as (14):

(14) c v - c v c v c v
s ɔ s ɔ p n a

Given the fusion facts of forms like those in (13) above, we would expect to find cases like *ssupna*, a CV-reduplication of the hypothetical form *supna* in which the reduplicant vowel has fused and disappeared; or cases like *sswapna*, where the reduplicated vowel has not disappeared. What we find, however, is that in a CV-reduplication the high vowel is contained, both when the prefix attaches to CVCV roots, as in (15a), and when it attaches to the CVCVCV roots that are subject to metathesis, as in (15b):

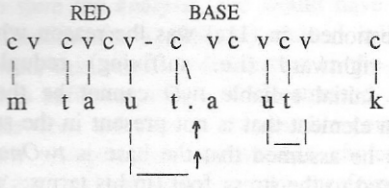
(15) a. c v - c v c v b. c v - c v c v c v
l u l u l i t i t i k l i

That is, we did not find cases where fusion applied to the final vowel of a CV reduplicant. This might indicate that the first CV syllable of reduplicant morphemes is stressed. Another interpretation could be that in such cases fusion

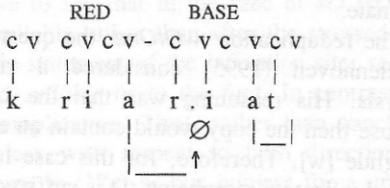
would destroy too much of the identity between the reduplicant and the base. If this interpretation is correct, such an effect could be used to argue in favor of an Optimality theoretic approach (cf. Prince and Smolensky (to appear)), though we will not present such an analysis here. (Other data relevant to OT-explorations will be discussed below).

The examples *mta-twa:tu* (root: *mta:tu* ~ *mtaut*) and *kri-rita* (root: *kri:ta* ~ *kriat*) in (11c) show that the domain where the reduplicative morpheme prefixes to is the main stress foot. A representation of the forms is given in (16). The foot is *tau* in (16a) and *ria* in (16b), i.e. the initial and final consonants of the roots in (16) are considered not to belong to the stress foot:

(16) a.



b.



The initial CV-syllable in (16a,b) consists of the first consonant and an empty vowel position. This is a consequence of the the analysis that VDH and VE have proposed for 'complex onsets' like /mt/ and /kr/ which entails that these clusters are analysed as containing an empty V-position (cf. (2a)). In cases where stems are preceded by morphological prefixes, the reduplicant occurs after the prefix.

Although the reduplications given in Van Engelenhoven (1995) are in the phrase-final metathesis form, the author informed us that all Leti reduplications can also occur in the 'medial' form. That is, a reduplication like *kri-ri:ta* in (16b) is the 'final' form, but there is also a medial reduplication form *kri-riat*. This is indicated by the short dotted line between the two final vowel positions involved in metathesis.

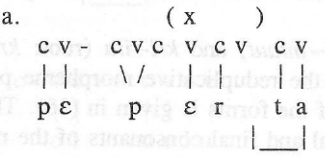
The examples in (16) show that the melodic material of the reduplicant is the melody of the base stress foot in its 'medial' form (*mtaut* and *kriat* here). The arrow in (16a) indicates the fusion of the final vowel /u/ of the reduplicant with the stem-initial consonant, in (16b) this fusion causes the loss of /a/. As a result, it seems as if we are dealing with CV-reduplication in (16b). And indeed, in this example the distinction between foot and syllable reduplication is neutralised, which shows that the distinction between CVCV and CV- reduplication is neutralised as a result of the phonological process of fusion.

Note that we have to state explicitly that the rightmost consonant of a CVCVCV root does not belong to the stress foot. There is evidence that the final consonants of CVCVCV roots are remnants of earlier suffixes.

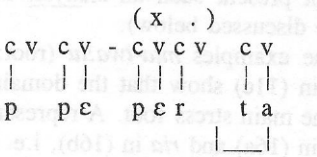
The form in (11d), *pE-ppErta* 'heavy' is represented in (17a). In this form, reduplicative CV-prefixation to the stress foot is blocked. If the reduplicant CV

would prefix to the stress foot, we would expect the complex onset to split up (analogous to the consonant clusters in (16)), resulting in the illformed reduplicative form *ppE-pErta* of (17b):

(17) a.



b. *



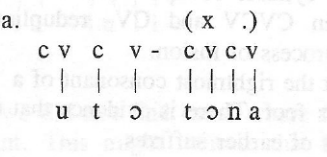
(17b) is illformed because the CV-reduplicative prefix is unable to attach to the CVCV foot. We analyse the blocking as an OCP-effect caused by the initial stem geminate.

The reduplication *twOtOna* 'the questioned' in (11e) was the reason why Van Engelenhoven (1995) considered a rightward (i.e. suffixing) reduplication analysis. His reasoning was that the initial syllable *twO* cannot be the copy because then the copy would contain an element that is not present in the stem — the glide [w]. Therefore, for this case he assumed that the base is *twOna* while the reduplicative morpheme *tO* is suffixed to the stress foot (in his terms: 'infixed before the stem-final consonant').

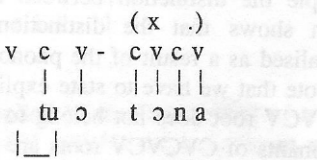
In this analysis it is necessary to stipulate that the secondary articulation of the initial consonant of the base *twOna* is lost in the reduplicative morpheme *tO*, though this could perhaps be motivated by the fact that crosslinguistically CV-reduplicants very often seem to lose their 'complexities'. The fact that Van Engelenhoven's analysis uses infixing before the final consonant of the base we do not consider an objection. In our analysis too it is necessary to exclude the final consonant of the base from the reduplication process (cf. e.g. (16a)).

In Van Engelenhoven's analysis, then, the reduplicant is suffixed to the stress foot. In our analysis, a form like *twOtOna* is analyzed as follows. We assume that the input form of the stem is *utOna*, which surfaces as *twOna* as a result of fusion; in this case fusion involves a pretonic high vowel. Given the input form *utOna*, reduplication involves CV-prefixation (*tO*) to the stress foot *tOna*, resulting in *u-tO-tOna*. The initial high vowel [u], which is in a weak metrical position is subject to fusion and this results in the surface form *tuO-tOna*. The process is illustrated in (18a,b):

(18) a.



b.

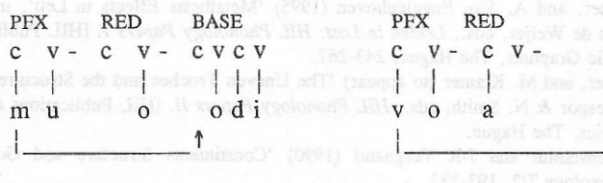


Though Van Engelenhoven's 'rightward infixation' analysis — i.e. suffixing to stress foot diregarding the final consonant of the base — seems a reasonable alternative, it cannot handle all the cases of Leti reduplication that we have discussed. For the form in (17a), 'rightward' (suffixing/infixing) reduplication would predict the wrong form **ppErperta* (cf. 17b)). This case, then, Van Engelenhoven chooses to analyze as 'leftward' (i.e. prefixing) reduplication. In his analysis, therefore, Leti reduplication is bidirectional, whereas in our analysis it is unidirectional: Leti has only prefixing reduplication. Furthermore, Van Engelenhoven's analysis also runs into problems with simple cases like *sOsOpna* (14). If this form were the result of rightward infixation, the reduplicative infix would have to ignore not only the rightmost consonant /n/, but also the consonant preceding that /p/: *sO* [*sO*] *pna*.

To save the analysis, we would have to say that in the case of *sO* [*sO*] *pna* the infixation site is after the stressed syllable rather than after the stressed foot. However, this entails a disjunction in the statement of the infixation site: reduplication is suffixing either to the stressed *syllable* or to the *foot*. In contrast, our analysis does not show a comparable complication. Thus, rather than concluding that the reduplication system has choices with respect to both direction and infixation site, we prefer to take the form in (17a) as our witness for a uniform prefixing-to-foot analysis. Crosslinguistically, reduplicative prefixation to the stress foot seems to be more common in any case.

We conclude with a brief discussion of Leti reduplications that show so called 'reduplicant-to-base copying', or 'retrograde over-copying' (McCarthy and Prince (to appear) discuss similar cases in Chumash and Kihehe). Cases of 'retrograde over-copying' are of special interest because they can be used to motivate a correspondence approach to reduplication as it is proposed within Optimality Theory. Though in this paper we are not concerned with exploring an Optimality Theoretic formalisation of our analysis, the relevant cases are given in (11f), represented in (19a), output forms are given in (19b):

(19) a.



b. [mwomodi] [vavata]

The striking fact about the output forms is the occurrence of the consonants /m/ and /v/ in the base. When a stem begin with a vowel (like *odi* and *ata* here), the reduplicative copy will also begin with a vowel. In case there is another prefix present (*mu* and *vo* here), coalescense takes place so that the first prefix becomes the onset of the reduplicative syllable; this involves the loss of /o/ in /vo-a-vata/,

the second form of (19). Thus, we see that the reduplicative syllable acquires a property that is lacking in the base. This newly acquired property is then copied back into the stem in order to acquire maximal reduplicant-base identity. This happens systematically in Leti. The OT-analysis proposed for such cases applies to the Leti cases as well. Standard derivational accounts face serious problems in dealing with this kind of phenomenon.

5. Conclusions

In this article it was our intention to provide an insightful analysis of reduplication in Leti. First we argued that despite the complex surface patterns, Leti reduplication can be analyzed straightforwardly once the interaction of reduplication with two important phonological processes of the language, metathesis and fusion, is understood. It was shown that Leti has two types of reduplication, foot and syllable reduplication, and that reduplication involves prefixing to the stress foot. An alternative analysis based on rightward or suffixing reduplication was argued to be less preferred on both language-internal and crosslinguistic grounds.

Secondly, our analysis of the Leti reduplication facts crucially relied on the analysis of two other processes in the language, metathesis and fusion, given in Van der Hulst and Van Engelenhoven (1995), and thus supports that analysis.

Finally, we drew attention to cases that involve 'retrograde over-copying' which are crucial in arguing in favor of an Optimality Theoretic approach to reduplicative processes.

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