MADURESE REDUPLICATION REVISITED*

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Madurese is an Austronesian language spoken in the eastern part of Java and the surrounding smaller islands, in the Republic of Indonesia. The earliest work that I am aware of was by A. Vreede (1874-1876 and 1882-90) and by Elsevier-Stokmans and Marinissen (1880). The most serious work on Madurese written during the Dutch period--a grammar in two volumes (1897): an introduction and a study of Madurese phonology and a study of word formation and syntax--was by H. N. Kiliaan. Kiliaan also wrote an excellent dictionary, published in 1904. Another dictionary, much less useful than Kiliaan's, was written by A. Penninga and H. Hendriks, and published in 1913. Little of value was published about Madurese from the 1920s to the 1950s. Most of the books of this period were practical lessons for Dutch planters and administrators trying to learn the language. Examples are: Sos-rodanoekoesoemo, (1921); Elsevier-Stokmans and J. C. P. Marinissen (1930); Penninga and Hendriks (1937, 2nd ed. 1942); Penninga and Hendriks (1937), and Wirjowidjojo (1939). The only work of scientific interest from this period is an article by Berg (1941), which contained a section on Madurese sounds and spelling. Wirjoasmoro (1950) was the only work on the language written in Madurese itself.

The next phase of Madurese studies began in the early 1960s. In his bibliographical study of the languages of Java and Madura, Uhlenbeck (1964:176) summarized the situation up to that point by saying: "After Kiliaan no linguists have done any extensive work on Madurese." My own dissertation covering Madurese phonology and morphology (Stevens 1968) was completed in 1964 but not published until four years later. Although Madurese had been mentioned in Wilbur's dissertation on reduplication phenomena (1973:18, 40-1), little interest was paid to the language between the early 1960s and the early

1980s, when it suddenly became an important source of examples in discussions of reduplication. The study of reduplication as part of a more general theory of phonology first appeared in an important article by Marantz (1982) on the phonology of reduplication, where Madurese was mentioned as exhibiting a unique form of reduplication. Since then, examples from Madurese have frequently appeared in the phonological literature in reference to two issues. The first issue is the phonetics and phonology of the unusual kind of vowel harmony found in this language; some work on this topic can be found in Anderson (1991), Stevens (1985), Trigo (1987), Trigo (1989), Cohn (1991), and most recently Cohn (1993). The second topic is reduplication; some work on this topic can be found in Marantz (1982), Stevens (1985), McCarthy & Prince (1986), Kiparsky (1987), and Weeda (1987). It is the topic of reduplication that is the subject of this paper. This topic was also treated descriptively by Pratista (1984) and by Moehnilabib (1979).

Before examining the Madurese system of reduplication, it will be necessary to look at more general aspects of Madurese phonology. The Madurese system of consonants is richer than that of the closely related languages--Javanese, Sundanese, Balinese and Indonesian/Malay. These other languages have two series of stops; Madurese has three: voiceless unaspirated, voiceless aspirated and voiced. The origin of this three-way distinction is controversial. For some proposals see Stevens (1966).

Figure (1) is a chart of the Madurese consonant system. The symbols used here are slightly different from those used in my dissertation (Stevens (1968) and from those used by other writers on Madurese, for example, those used by Weeda (1987).

The meaning of the abbreviations in this chart are: vls = voiceless; unasp = unaspirated; asp = aspirated.

(1)

bilabial	dental	alveolar	palatal	velar	glottal	features
p	t	ṭ	c	k		vls unasp
pʰ	tʰ	ṭʰ	cʰ	kʰ		vls asp
b	d	ḍ	j	g		voiced
m	n		ñ	ŋ		nasal
	s					fricative
	r l					liquids
w[1]			y		ʔ h[2]	glides

This is the set of native consonants. Other consonants have been introduced in loan words. Note that in native words /y/ is the only glide at the underlying level; even so, it is restricted to morpheme-final position, as in *laŋŋoy* 'swim'. When not in this position it is the result of some phonological rule in the language or it is clearly a borrowing, such as in *raʔyat* 'the people'. The phonetic glides /y, w/, however, all occur at the phonetic level as the result of a rule of glide insertion, and this rule plays an important part in the reduplication process to be described below. All consonants but glottal stop can also occur geminated.

Madurese has only four underlying vowels--a front unrounded vowel which ranges in pronunciation from [i] to [ɛ]; a back rounded vowel which ranges in pronunciation from [u] to [ɔ]; a lower back unrounded vowel which ranges in pronunciation from [ɤ] to [a]; and a higher back unrounded vowel which ranges in pronunciation from [ɨ] to [ə]. Each vowel has two main pronunciations (I ignore other minor variants)--one that is higher and tense and one that is lower and lax. The surface form, i.e., the actual pronunciation, is determined by the nature of the preceding consonant in a way that I will explain below. I take the lower or lax set to be the basic pronunciation, that is, the underlying pronunciation, since the lower or lax pronunciations are those which occur in word-initial position and so are not affected by the nature of the preceding

sound. In certain environments these lower or lax vowels are raised and tensed by a rule of vowel tensing or raising, which I will call vowel tensing/raising, abbreviated VTR, since both tensing and raising are involved. The phonetic nature of this process has recently been examined by Trigo (1989) and by Cohn (1991) and more recently by Cohn (1993). Since the tensing or raising process is not the focus of this paper, I will not attempt to go beyond the description I have given in previous work (Stevens 1980 and 1985).

In chart (2) I show the variation in vowel pronunciations:

(2)

underlying	lax/lower	tense/higher
e	ɛ	i
ə	ə	ɨ
o	ɔ	u
a	a	ʏ

VTR takes place after voiced and aspirated consonants and is iterative from left to right, within a morpheme or across a morpheme boundary, through any number of nonnasal sonorants, i.e., liquids and glides, or zero, and through the fricative /s/ if and only if it is at a morpheme boundary (for details of the latter process see Stevens (1980)). For a different view, see Cohn (1993). Everywhere else, the vowels remain lax and lower. Examples of these environments are given in (3) through (7) below (examples are taken from Stevens 1985).

In the examples given in (3) the conditions for VTR are not present; all vowels are lax.

(3)

	underlying	derived by VTR	gloss
a.	esse	ɛssɛ	contents
b.	əla	əlla[3]	already
c.	oreɳ	ɔrɛɳ	person
d.	ale?	alɛ?	younger sibling

In the examples given in (4) VTR applies only once for each environment, after a voiced or aspirated obstruent.

(4)

	underlying	derived by ATR	gloss
a.	kʰose	kʰusɛ	gums
b.	bato	bʏtɔ	stone
c.	pʰakʰos	pʰʏkʰus	good

In the examples given in (5) the rule applies iteratively within a morpheme, i.e. through a nonnasal sonorant (liquid or glide), a sequence of nonnasal sonorants or through adjacent vowels.

(5)

	underlying	derived by ATR	gloss
a.	baras	bʏrʏs	healthy
b.	cʰela	cʰilʏ	tongue
c.	pʰao	pʰʏu	shoulder
d.	ballo	bʏllu	eight
e.	bəli	bɨlli	buy

In the examples given in (6) the rule also applies iteratively through a nonnasal sonorant (liquid or glide), sequence of nonnasal sonorants or /s/ at a morpheme boundary.

(6)

	underlying	derived by ATR	gloss
a.	cʰa-lao?	cʰʏlʏu?	to the south
b.	ɳ-aɳkʰoy-e	ɳaɳkʰuyi	to use
c.	kərpʰoy-na	kərpʰuyyʏ[4]	his water buffalo
d.	ka-pʰakʰos-an	kapʰʏkʰusʏn	goodness

Compare the last example, where the /s/ is at a morpheme boundary and so VTR takes place through the /s/, to (4a) *kʰose → kʰusɛ* where the /s/ is not at a morpheme boundary

and so tensing/raising does not take place through the /s/.

Several other phonological rules exist in Madurese. Two have already been mentioned in footnotes above. There also exists a glide insertion rule (GI) which applies before the vowel tensing rule. A glottal stop is inserted between like vowels; between unlike vowels, however, if the first vowel is nonlow, a glide of the same rounding as the first vowel is inserted, i.e., VV → VyV if the first vowel is the front unrounded /e/, and VV → VwV if the first vowel is the back rounded /o/. Note that in the eastern dialect of Madurese, the one that is the basis of everying I have written, there is no underlying /w/ in native words. Underlying /w/ exists largely in words borrowed from Arabic, such as *wakkel* 'representative,' but many speakers Madurese this to *bakkel*. All cases of historic /w/ became /b/ in Madurese, but /w/ still exists phonetically as a result of the glide insertion rule. After glide insertion has applied, VTR will affect the entire sequence of vowel-glide-vowel as mentioned in the VTR rule given above. Examples appear in (7). Both within a morpheme and across a morpheme boundary VTR applies iteratively, i.e. it keeps on applying from left to right until the end of the word is reached.

(7)

	underlying	glide insertion	VTR	gloss
a.	leer	leʔer	lɛʔɛr	neck
b.	baa	baʔa	bʏʔʏ	flood
c.	baraa	baraʔa	bʏrʏʔʏ	eclipse
d.	seaɳ	seyaɳ	seyaɳ[5]	afternoon
e.	rop^{h}ea	rop^{h}eya	rɔp^{h}iyʏ	wife
f.	baḍa-a	baḍaʔa	bʏḍʏʔʏ	there will be
g.	p^{h}ərse-e	p^{h}ərseʔe	p^{h}ɨrsɛʔɛ	clean!

Another rule that applies after glide insertion is Nasal Spread. Nasality spreads rightwards from a nasal consonant until it reaches a consonantal segment, i.e., it spreads through vowels and glides (both oral and laryngeal), affecting all non-

consonantal segments in its path. Two examples are given in (8). Nasalized vowels will never be tense since nasals never trigger tensing. Nasalized vowels, however, tend to be slightly higher than their nonnasalized lax equivalents.

(8)

	underlying	glide insertion	nasal spread	gloss
a.	moa	mowa	mõw̃ã	face
b.	neat	neyat	nẽỹãt	intention

Madurese also has a rule of nasal substitution (NS) which is similar to the rule found in Indonesian, Tagalog and most of the western Austronesian languages. The part of the rule that is of interest here replaces a stem-initial unaspirated stop (and less commonly a stem-initial voiced stop) with its homorganic nasal[6] after a prefix consisting of or ending in an underspecified nasal, which I will write as N. For stems beginning with voiced stops, this rule applies to some morphemes (I call these the nasal type); but in the majority of cases of stems which begin with voiced stops and for most stems which begin with aspirated stops, the nasal prefix surfaces simply as the vowel a- (I call these the nonnasal type). There are a few other minor types and some dialect variation which need not concern us here. This nonnasal or vowel form of the prefix also appears when the stem begins with a nonsyllabic sonorant, i.e., a nasal or a liquid.

Examples of both of these types are given in (9) below.

(9)

	underlying	surface	gloss	stem type
a.	N-aku	ŋākɔ	confess	vowel
b.	N-totop	nɔ̃tɔ̃p	close	voiceless
c.	N-rosak	arɔsak	break	liquid
d.	N-ñata-ak^{h}e	añãta?ak^{h}i	prove	nasal
e.	N-ṭ^{h}aar	aṭ^{h}ʏ?ʏr	eat	aspirated
f.	N-bəle	mə̃llɛ	buy	voiced (nasal)

g.	N-bale?	abʏli?	turn over	voiced (non-nasal)

Whether the stem is of the nasal type or the nonnasal type can affect the quality of the vowels in the stem. For example, forms (9f) and (9g) have the same underlying vowel in the last syllable, but the surface pronunciation of this vowel is different: (9f) begins with a voiced stop, which would trigger VTR. Nasal Substitution, however, changes the voiced stop to a nasal and so VTR does not apply in this case. (9g), on the other hand, is an example of the nonnasal type (the prefix surfaces as the vowel a-) and so the stem-initial voiced consonant remains to trigger VTR.

Another example, where the two forms are inflected forms of the same root, is given in (10):

(10)

	underlying	NS	VTR/surface[7]	gloss
a.	e-bəle	----------	ɛbɨlli	be bought
b.	N-bəle	məle	məllɛ	buy

The consequences of whether the root is a nasal type or a nonnasal type of Nasal Substitution also affects the nasality of the vowels, as can be seen by comparing (10a) with (10b). Because of this difference, the first vowel of the root in (10a) is oral, but in (10b) it is nasal, and as will be seen below, such differences can have consequences for the form of the reduplication.

Madurese first appeared in the modern literature about phonological theory in Marantz's 1982 article. In this revolutionary approach to reduplication, Marantz suggested that reduplication is just like normal affixation, in this case the affixation of a CV skeleton to a stem. The phonemic melody of the stem is then copied onto the affixed CV skeleton and linked to its C and V slots by assocation rules. A simple example is found in the Philippine language Agta. The stem takki 'leg' is reduplicated to taktakki 'legs' as in the following (Marantz 1982:446):

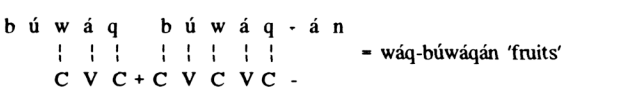
(11)

Note that the affixed morpheme appears to the left of and on the same tier as the stem, and that the unattached melodic units go unrealized.

Marantz's analysis, although widely accepted, could not account for the apparent overapplication of some phonogical rules, where a rule appears to apply to both copies of the reduplicated material, although the proper environment is met in only one of the two copies. This is frequently the case in Madurese and closely related languages.

Marantz's article (1982:451) specifically characterizes Madurese as "an example of a reduplicating prefix which links to phonemic melodies from right to left.", i.e., because the reduplicated part is at the end of the stem (but is prefixed to the stem), Marantz concluded that the reduplication process in this language is the opposite of most languages: the rule works from right to left instead of from left to right. The example given by Marantz is: (his number (30)) seen in (12) below:[8]

(12) búwáq-án 'fruit'



Mester (1988) accounts for reduplication processes in a three-dimensional framework. He claims that reduplicative templates are morphemes synchronous with the base skeleton, reduplicative templates are directly associated with the base melody, i.e., as a single melody associated with two skeleta, and that the linearization of these representations is an instance of Tier Conflation, which takes place at the end of each level. The affix is lined up with the root material according to language- or morpheme-specific rules.

In this paper I would like to try to apply this approach to the problem of reduplication in Madurese. In my 1985 paper I expressed doubts that Madurese reduplication could be

described in terms of Marantz's affixation theory of reduplication. I now believe, however, that it is possible to account for reduplication and related phenomena in this language by following Mester's approach (for an attempt to apply this model to Indonesian reduplication see Sanchez and Stevens 1991) and suggestions made by McCarthy and Prince (1986: 62).

Let us first look at the data. There are three types of reduplication in Madurese. The first type is full or word-level reduplication (Rw), which involves reduplication of all material up to but not including such suffixes such as *-na* 'his/her'. For example: *paɳlatʰin* 'servant'; *paɳlatʰin-paɳlatʰin* 'servants' and when the suffix *-na* is added *paɳlatʰin-paɳlatʰin-na* 'his servants'. This type occurs in many other languages in the area. The second type is initial syllable reduplication (Ris), which involves reduplication of the first CV. For example: *noles* 'write' and *nonoles* 'keep on writing'. This type also occurs frequently in related languages. The third type, the type that is the subject of this paper, is what I originally called end reduplication but now would prefer to call 'final syllable reduplication' (Rfs), in which the final syllable of the root is reduplicated and prefixed somewhere in the word. For example: *boa* [buwɤ] 'fruit' and [wɤʔ-buwɤʔɤʔɤn] 'various kinds of fruit'. The latter is the most frequent type of reduplication in the language and the type that makes Madurese unique; as far as I know, no other language in the area has final-syllable reduplication, and it is this type that I will examine in detail below.

Final-syllable reduplication resembles two truncation or shortening phenomena also found in Madurese in two ways: 1. truncation to the same syllable that we would find in Rfs reduplication, except that the truncation appears by itself, unattached to any other material, for example: a set of numbers using in rapid counting: *settoɳ* → [tɔɳ] 'one'; *ɖoaʔ* → [wɤʔ] 'two'; and shortened forms of kinship terms used as vocatives: such as *anaʔ* → [nāʔ] 'child'. 2. truncation to the same syllable that we would find in Rfs and then the truncated form is used as the first member of a compound, for example: *oreɳtoa* 'old

person' but *reɳtoa* 'parents' and *osap laṭe* 'wipe lip' but *sap-laṭe* 'handkerchief'. If these two processes are the same as Rfs, the same proposal should also be able to account for all three processes. I will provide more evidence below in support of statements made by McCarthy & Prince (1986) and by Weeda (1987) that Rfs reduplication is not the same as true truncation.

If reduplication is simply a type of affixation, there are four aspects of Madurese final-syllable reduplication that require explanation. 1. what exactly is copied and what is not? 2. what is the relationship of Rfs to other affixes, i.e., what is the position of the reduplicated syllable in relation to other prefixes and and how are suffixes treated when combined with reduplication? 3. what is the relationship, if any, of Rfs to the phonogical rules briefly outlined above? and 4. what is the relationship, if any, of Rfs to truncation?

Let us start by looking at the data. By itself reduplication in Madurese, as in related languages, carries the meanings, among others, of frequency of action and to do the action in a nondirected way. Reduplication frequently also cooccurs with other prefixes and suffixes. In such cases the meaning of the whole often can not be determined by adding up the meanings of the parts. For example, Rfs combines with the suffix -an to mean 'collective plural' (see the example given above). It is impossible to assign part of this meaning to the Rfs and part to the suffix. Another example is Rfs-N-pa- meaning 'to pretend to do the action', for example, *Rfs-N-pa-pʰoṭʰo* → [ṭʰu-māpʰuṭʰu] 'to pretend to be stupid'. Again the meaning of the whole cannot be derived from the meaning of the parts.

Final-syllable reduplication (Rfs) is a prefix (its exact position in the sequence of morpheme is determined by the other morphemes with which is cooccurs) which is an exact copy of the final syllable of the root after all rules have applied. Some examples follow (taken from Stevens 1985):

(13)

underlying		stem	surface	+Rfs	gloss
a.	kʰoa	kʰoa	kʰuwʏ	wʏ-kʰuwʏ	caves
b.	moa	moa	mõ₩ã	₩ã-mõ₩ã	faces
c.	neat	neat	nɛ̃ɣ̃ãt	ɣ̃ãt-nɛ̃ɣ̃ãt	intentions
d.	maen	maen-an	mãɛ̃n	ɛ̃n-mãɛ̃n-an	toys
e.	taña	a-taña-a	a-tañãʔã	a-ñãʔ-tañãʔã	will ask often
f.	təlo	təlo-ʔ	təllɔʔ	lɔʔ-təllɔʔ	in threes
g.	kʰeba	kʰeba-n^{9}	kʰibʏn	bʏn-kʰibʏn	gift
h.	boa	boa-an	buwʏʔ-ʏn	wʏʔ-buwʏʔʏn	fruits
i.	bəle	e-bəle	ɛ-bɨlli	ɛ-li-bɨlli	be bought
j.	bəle	N-bəle	məllɛ	lɛ-məllɛ	buy often
k.	soon	soon	sɔʔɔn	ɔn-sɔʔɔn	request
l.	soon	N-soon	ñɔ̃ʔɔ̃n	ɔ̃n-ñɔ̃ʔɔ̃n	request often
m.	estre	estre	ɛstrɛ	trɛ-ɛstrɛ	wives
n.	coŋklaŋ	coŋklaŋ-an	cɔŋklaŋ-ãn	klaŋ-cɔŋklaŋ-ãn	gallop
o.	kənʈek	kənʈek-an	kənʈɛkʰ-ʏn	ʈɛk-kənʈɛkʰ-ʏn	little finger

As already mentioned, Marantz (1982) was the first attempt to treat Madurese final-syllable reduplication in the model that he was proposing for reduplication in general. Besides the general problems that Marantz's model faces, his account of Rfs in Madurese also fails because he states (p.451) that "Madurese (Stevens 1968, 34) provides an example of a reduplicating prefix which links to phonemic melodies from right to left. One use of this prefix is to form plurals." For his example see (12) above.

As can be seen from his example, Marantz copies the final CVC of the root from right to left to the skeleton prefixed to the stem. For several reasons, this will not work in

Madurese. The first reason is that Marantz fails to tell us how to derive the stem from which the copy is made. Why should the glottal stop be copied, for example? The second problem, as pointed out by Weeda (1987:1), is that we sometimes find two consonants copied at the beginning of the reduplication. Weeda states "Such a template cannot account for the fact that certain instances of complex onsets are possible,..." Examples are (13m) *estre* [ɛstrɛ] 'wife' reduplicated as [trɛ-ɛstrɛ] 'wives' and (13n) *coŋklaŋ* [cɔŋklaŋ] 'gallop' reduplicated as [klaŋ-cɔŋklaŋãn] 'gallop'. Marantz fails to account for the copying of both consonants at the beginning of the reduplicated piece of the word. It is not possible, in Madurese, to state that the reduplicating template is CCVC because in most other cases the first of the consonants will not reduplicate; an example of this is: *bəŋko* 'house' and *ko-bəŋko* [kɔ-bɨŋkɔ] 'houses' but not [*ŋkɔ-bɨŋkɔ]. It is clear to me that Rfs copies a syllable and not just a random sequence of consonants and vowels. What we have to do is define the nature of this syllable precisely.

The next attempt to account for Madurese final-syllable reduplication is found in McCarthy and Prince (1986: 61-62): they claim that this reduplication is a σ template (i.e., a syllabic template) and that the operation is not true truncation. Finally, Kiparsky (1987: 96-97) implies that Madurese final-syllable reduplication is truncation of a word-level reduplication. Neither of these two works, however, states precisely how to derive these reduplicated forms in Madurese.

In the rest of this paper I would like to argue that Rfs in Madurese is not truncation but rather is an association to a syllabic (σ) template and that, as McCarthy and Prince say (1986: 62), "association begins with the left edge of the root-final syllable and proceeds until the phonemic melody is filled or the independently characterized positions in σ are exhausted."

There are several arguments against equating Rfs, final-syllable reduplication, with truncation of a full reduplication similar to the truncation process mentioned above. The most important argument is that Rfs does not appear in the same place in the string of morphemes as full reduplication.

Rw, full reduplication, must always appear immediately before what is being copied, a morpheme or a word; Rfs can appear in any position before the root. Its position is determined by the other prefixes in the word. In some cases, two derivatives, one with Rfs and the other with Rw, have the same meaning, but the reduplicated piece is in different places in the sequence of morphemes, for example, both *rəp-sa-karəp* and *sa-karəp-karəp* exist in the meaning 'whatever one wants'; the difference is that the Rfs is positioned in front of the other prefix but the Rw occurs after the other prefix since it must be adjacent to the root. Any attempt to derive Rfs from Rw by a truncation rule would have to account for these differences in position.

In other cases, a derivative with Rfs and one with Rw have different meanings. Thus, from the root *cokor* 'shave' we find two similar derivatives: the first is an instrumental noun *paN-cokor* 'razor'. When reduplicated, Rfs must appear in front of the *paN-* prefix: [kɔr-pañɔkɔr] 'razors'. Rfs cannot appear anywhere else in in the word in this meaning. Rw, on the other hand, must reduplicate the entire noun here: [pañɔkɔr-pañɔkɔr] 'razors'. The second derivative, a deverbal noun, takes the form *pa-N-cokor* '(the act of) shaving'. In this case, Rfs appears between the two prefixes: [pa-kɔr-ñɔkɔr] '(acts of) shaving', but full reduplication must copy the entire root and place the two adjacent to each other: [pa-ñɔkɔr-ñɔkɔr].

Another argument is that full reduplication (Rw) is much less frequent and less productive in Madurese than Rfs. Rw forms rarely appear in the more than 1000 pages of notes that I took in 1960-1962, though they were given when elicited. As far as I know, all cases of Rw have parallel forms with Rfs, but the opposite is not true; there exist forms with Rfs which do not have parallel forms with Rw. The only cases where Rw forms occurred unelicited were in a few constructions which might have been borrowed from Indonesian, for example, *baḍa-baḍa pʰai* = Indonesian *ada-ada saja*. They also occurred in the construction *sa-R-R-na* 'as R as possible,' where R stands for the root; this is possibly also a calque on Indonesian. For example: *sa-pʰakʰos-na* --> [sapʰɤkʰus-pʰɤkʰussɤ] 'as well

as possible' parallel to Indonesian *sebagus-bagusnya* with the same meaning.

Yet another argument against equating Rfs with the truncation process in compounding is that the Rfs reduplicated element behaves like a separate word, i.e., no phonological rules operate across the boundary between the end of the reduplicated syllable and the following sound.[10] In compounds, on the other hand, such rules frequently do operate, for example, a reduced compound such as *sap-laṭe* 'handkerchief' (literally 'wipe + lip') appears as [sapplaɭaṭɛ], following the rule geminating a stop between a vowel and a liquid. This phenemonon does not occur across the boundary between an Rfs syllable and the initial sound of the following morpheme. Another example is *nom-aeɳ* 'a kind of cake,' which surfaces as [nɔmmãẽɳ], showing that several phonological rules operate across this boundary. Another word for handkerchief, *sap-tanaɳ*, literally 'wipe + hand,' surfaces as [sattanãɳ], exemplifying another assimilation which does not occur across the boundary between an Rfs reduplication and the following morpheme. In general, the parts of a compound are much more closely linked phonologically than reduplication is to its stem. Another example is *koːraɳ-acʰar* 'rude,' which surfaces as [kɔraɳãcʰʏr], showing that the rule of nasalization operates across the boundary between the two parts of the compound.

A less compelling argument is that, compared to Rfs and even Rw, truncation is not a very productive process: it is restricted to vocatives, the short forms of the numbers and some compounds; the very few compounds that exist have all been quoted again and again in the literature. A search through Kiliaan's dictionary shows very few such forms. Nontruncated compounds are much more common. In his grammar of Madurese, Kiliaan (pp. 86-87) also quotes truncated forms which are syntactic and not morphological sequences, such as, *tar kamma* 'go where?' from *entar kamma.*

Weeda (1987: 6) also presents several arguments against equating Rfs with truncation. He concludes that "Equating Rfs with compounding should be viewed with suspicion."

I would like to argue that Madurese Rfs, final-syllable

reduplication is an assocation of the root-final syllable to a syllabic template of CCVC, the maximal syllable in Madurese, after all phonological rules have applied. [cf. Cohn's statement (1991: 5) that "Both Nasal Spread and Glide Insertion must precede Reduplication"] and that it works in the following way:

1. Word Formation Rule (WFR): The derived word will consist of a stem, i.e., root (root extensions are included in the root) plus affixes; the reduplication affix will be represented as Rfs and will appear on a separate tier.

2. Phonological Rules: Apply all phonological rules to the string.

3. Skeleta: Construct skeleta of Cs and Vs, one for the stem and one for the reduplication affix. The skeleton for Rfs will be CCVC, the maximal syllable in Madurese.

4. Syllabification: Syllabify the root. The rules of syllabification are as follows: syllabify from left to right up to the end of the root.[11] One C between vowels is always the onset of the next syllable except that glottal stop, underlying or derived, is always the coda of the previous syllable.[12] All other derived glides behave like single consonants between vowels and syllabify with the following syllable. If there are two consonants between vowels, the first is the coda of the preceding syllable and the second is the onset of the following syllable. If there are three consonants between vowels, the syllable division is between the first and the second consonant; the first consonant is the coda of the previous syllable and the second and third are the onset of the following syllable.

5. Association: Associate the consonants and vowels of the final syllable of the root from left to right to the σ template of Rfs. Either direction of application will work, but association from left to right is unmarked in the languages of the world; it is not necessary to associate from right to left, as Marantz proposes, since this is highly marked. Details of the association rules will be given below; in particular, if a consonant which cannot appear as the coda of a syllable appears in the coda of Rfs, it will be replaced by the closest consonant which can be a coda. For example, aspirated consonants cannot be the coda of a syllable. They will be

replaced by their unaspirated counterparts. For further discussion of this point see Stevens (1985: 239) and Weeda (1987: 5).

6. Tier Conflation: The final step in the derivation is to move the reduplicated σ to its proper place in the string of prefixes. Since Rfs is a prefix, it will appear somewhere in front of the root. If there are no other prefixes, it will of course be right in front of the root. If there are other prefixes, it will appear somewhere in the string of prefixes. Briefly, the rules for tier conflation are as follows: If there is no other prefix, Rfs goes in front of the root; example [kɔ-bɨɳkɔ] 'houses'. If there is one other prefix which consists of a single vowel, Rfs goes between this prefix and the root; examples: [a-bʏ-ɔbʏ] keep changing' and [ɛ-li-bɨlli] 'be bought often'. If there is one other prefix which consists only of the nasal resulting from NS, Rfs goes in front of this nasal; examples: [lɛ-mə̃llɛ] 'buy often'. If there is one other prefix of the form CV(C), Rfs usually goes in front of this prefix as well; example: [kɔr-pañɔ̃kɔr] 'razors'. If there are two or more additional prefixes, the rules are similar to the ones already given, but they are more complex, and in some cases the Rfs can appear in more than one position without any change in meaning (for details see Stevens: 1968). I will not attempt to describe this aspect of tier conflation in this paper.

7. Rules of the next cycle: These include the rules that apply when certain affixes such as -na 'third singular, definite' are added to the word.

Following are a number of sample derivations illustrating all possible types. For each example, the underlying form is given first, then the derivation is given, following each of the six steps listed above.

Example A: *Rfs + bəŋko* 'houses'

1. WFR

RFS
bəŋko

2. P-rules

Rfs
bɨŋkɔ

3. Skeleta

Rfs
CCVC
b ɨ ŋ k ɔ
CVC CV

4. Syllabification. For ease of reading I have separated the syllables in the stem.

Rfs
σ
CCVC
b ɨ ŋ k ɔ
C V C CV
σ σ

5. Association. Since the final syllable of the root is the form CV, when associating from left to right only the first C and the V associate; the other Cs remain unassociated.

Rfs
σ
CCVC
bɨŋ kɔ
CVC CV
σ σ

6. Tier conflation. Since there are no other prefixes, the reduplicated syllable appears immediately in front of the root: kɔ-bɨŋkɔ

Example B: *RFS + moa* 'faces'

1. WFR

Rfs
moa

2. P-rules

Rfs + mɔʊ̃ã

3. Skeleta

Rfs

CCVC
mɔ̃w̃ã

CVCV

4. Syllabification

Rfs
σ
C C V C
mɔ̃ w̃ã

CV CV
σ σ

5. Association

Rfs
σ
CCVC
| /
mõ w̃ã
| | ||
CV CV
σ σ

6. Tier conflation: w̃ã-mõw̃ã

Example C: Rfs + boa-an 'fruits'

1. WFR:

Rfs

boa-an

2. P-rules:

Rfs

buwɤʔɤn

3. Skeleta

Rfs

CCVC

buwɤʔɤn

CVCVCVC

4. Syllabification. Glottal stop (ʔ) is always in the code of the preceding syllable.

```
Rfs
 σ
CCVC

bu wɤʔ -ɤn

CV CVC VC
 σ σ  σ
```

5.. Association

```
      Rfs
       σ
      CCVC
      ¦ //
bu wɤʔ-ɤn
¦¦ \\\ \\
CV CVC VC
 σ   σ   σ
```

6. Tier conflation: wɤʔ-buwɤʔɤn

Example D. If an oral glide such as a /w/ or a /y/ is generated between the final vowel of the root and the initial vowel of a suffix, this oral glide is not syllabified as part of the root since it is a single consonant between vowels and therefore the glide is not copied in the Rfs. For example, the reduplicated form of *məle-a* [mə̃lleya] 'will buy' is [le-mə̃lleya] and not [ley-mə̃lleya].

Example E. If a suffix beginning with a vowel is added to a root ending in a voiceless stop, the voiceless stop becomes aspirated. This aspiration, however, is not repeated in the Rfs since aspirated stops cannot end syllables in Madurese. In this case the aspirated stop is replaced by its unaspirated equivalent. For example, in the derivation of [ʈɛk-kənʈɛkʰ-ɤn] 'little finger' from the root *kənʈek*, we would expect the final consonant of the reduplicated syllable to be [kʰ] since that is the final consonant of the root after the aspiration rule has applied. Instead, we find an unaspirated velar stop because aspirated voiceless or voiced stops cannot appear in coda position. Only

unaspirated voiceless stops can appear in this position in the syllable and the unaspirated stop that corresponds to /kʰ is /k/.

Example F. In the case of *Rfs + kʰban* 'gift,' where the root is kheba 'carry,' the *-n* is a root extension, not a separate suffix, and so it is reduplicated along with the final syllable of the root to produce: [bɤn-kʰibɤn]. I will not go through the derivation of this word since otherwise it presents nothing new.

Example G: Rfs + coŋklaŋ-an 'gallop'

1. WFR:

```
      Rfs
coŋklaŋ-an
```

2. P-rules:

```
      Rfs
cɔŋklaŋ-ān
```

3. Skeleta

```
      Rfs
        σ
      CCVC
cɔŋ  klaŋ  -ān
CVC CCVC -VC
```

4. Syllabification. In this case the final syllable of the root fills up all the slots in the maximal syllabic template CCVC. Notice that the process of syllabification stops at the end of the root (and then starts up again, if necessary).

```
          Rfs
           σ
         CCVC
 cɔŋ  klaŋ   -ān
CVC CCVC  VC
 σ     σ    σ
```

5. Association

```
          Rfs
           σ
         CCVC
         ¦¦ //
 cɔŋ  klaŋ  -ān
 ¦\\  \\\  \\
CVC CCVC VC
```

6. Tier Conflation: klaŋ=cɔŋklaŋān

These examples cover all possible cases of Rfs (excluding those in which there is more than one possible linearization). I believe that this approach will account for all

cases of Rfs.

Conclusion: In this paper I have tried to show that Madurese final syllable reduplication cam be analyzed as left-to-right association to a CCVC maximal σ (syllabic) template, and therefore that it is not an example of a highly-marked right-to-left association.

Notes

*An earlier version of this paper was given as Stevens (1991).

1. /w/ is marginal in standard Madurese. In this dialect, it occurs largely in borrowed words, but many speakers replace it with /b/.
2. /h/ is marginal in standard Madurese.
3. The consonant is geminated by a general rule geminating all consonants between /ə/ and another vowel; in this case /əla/ → [əlla].
4. Another rule assimilates the /n/ of the suffix *-na* to all previous consonants except glottal stop.
5. Vowels are pronounced higher before the glide /y/.
6. As in Indonesian, N + stem-initial /s/ → ñ. For an example, see (13l).
7. Several other rules have applied to these forms.
8. Marantz's /q/, taken from the transcription I used in my dissertation, is the glottal stop, equivalent to the more usual phonetic symbol /ʔ/ that I am using in this paper.
9. In this example, the /n/ at the end of the stem is an extension of the root, not a suffix; it is copied in the reduplication because it is part of the final syllable of the root.
10. It is only in very fast speech that we begin to hear assimilation effects between the end of the Rfs and the beginning of the next morpheme. There are also some cases such as *aɖaʔ [aɖɤʔ] 'ahead' and [ɖɤʔ-ɤɖɤʔ]* 'first' in which a rule operates across this boundary because the form has become lexicalized into a single word.
11. It is irrelevant whether the suffixes are also syllabified at

this point or not.

12. Both underlying and derived glottal stops syllabify as the coda of the previous syllable. For example, *soʔe* 'the more,' a word with an underlying glottal stop, syllabifies as [sɔʔ-ɛ].

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