

DJINANG VERB MORPHOLOGY

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1. INTRODUCTION

Djinang¹ is a suffixing language of north-central Arnhem Land. It is spoken by approximately 300 people, most of whom live on the mainland south of the Crocodile islands and west of the Glyde river.² Djinang has been classified (Voegelin and Voegelin 1977) as one of the Murngic group of languages in the Pama-Nyungan family.

The purpose of this paper is to describe the morphology of Djinang verbs, and by means of morphophonemic rules, to reduce the seventeen observed verb classes to three major classes. A second purpose is to obtain a minimal set of distinctive features suitable for handling the phonological concepts of contrast, natural classes, and morphophonemic rules, as pertains to the analysis of Djinang verbs presented in this paper.

The verb morphology data described in this paper was collected during a two-week period, for a workshop held by the Summer Institute of Linguistics in Darwin, 1977. Appreciation is expressed to Thomas Mulumbuk and John Weluk for their valuable assistance in providing data during the workshop. The corpus of verbs was enlarged during a further seven months of fieldwork during 1978. I extend thanks to Manbarrarra and Jack Merrichi who both contributed data during that time. I am indebted to Joyce Ross who provided an explanation of the semantics of the tense/aspect³ system of Gumatj, another Murngic language. This was the information I needed for an adequate understanding of the semantics of the various tense/aspect suffixes of Djinang.

I also thank Alan Healey for useful suggestions about the presentation of charts; and George Huttar for suggesting the use of the features 'distributed' and 'peripheral', as well as his valuable assistance with advice on presentation and on the analysis itself.

2. ORTHOGRAPHY

The following symbols are used for Djinang phonemes:

CHART 1: CONSONANT PHONEMES

	labial	apico- alveolar	apico- postalveolar	lamino- postalveolar	velar
voiceless stops	p	t	rt	ch	k
voiced stops	b	d	rd	j	g
nasals	m	n	rn	ny	ng
laterals		l	rl		
glides and rhotics	w	rr	r	y	

The apico-alveolar rhotic, rr, is trilled.

CHART 2: VOWEL PHONEMES

	non-back	back
non-low	i	u
low		a

Disambiguation of potentially ambiguous clusters of symbols is achieved by placing a period, ., between them.

3. SEMANTIC CATEGORIES OF SUFFIXES

Djinang verbs are comprised of a stem followed by an obligatory tense/aspect/mood suffix,⁴ which in turn may optionally be followed by the suffix -ban.⁵ As the latter leads to no subclassification of verbs, I will not deal with it any further in this paper.

There are twelve semantic categories for every verb, which are coded by seven different suffixal forms. Consequently, five of the forms each code two different semantic categories, as outlined in Table 1.

TABLE 1: SEMANTIC CATEGORIES OF SUFFIXES

	non-past	
	non-past irrealis ⁶	
yesterday past ⁷		present continuous
today past continuous		remote past continuous
imperative		yesterday past irrealis
today past irrealis		remote past irrealis
today past		remote past

The suffix coding non-past irrealis undergoes precisely the same morphophonemic processes as does the suffix coding today past irrealis and remote past irrealis. For the three major verb classes, it takes the forms: -nyirgi (classes I and III), and -rnirgi (class II).⁸ The suffix coding non-past irrealis and the suffix coding today past irrealis undergo essentially the same morphophonemic processes. Since they both lead to the same verb subcategorisation, I have omitted one (the non-past irrealis) from further consideration in this paper.

For the purpose of brevity of reference, subsequent references to a suffix will be by just one of the semantic categories appropriate to it. The categories chosen, with abbreviatory conventions in parentheses, are as follows: non-past (non-pst), yesterday past (y-pst), today past continuous (t-pst-cont), imperative (imp), today past irrealis (t-pst-irr), and today past (t-pst).

4. VERB CLASSES

The charts in this section present a description of the different groups of verbs. When reading the charts, the following points should be borne in mind.

- (a) Differentiation between groups of verbs is based on there being at least one significant difference in either the stem or in the set of inflectional suffixes.
- (b) Only the final portion of the stem is given in the second column of each table, since this is the part of the stem governing the morphophonemic processes.
- (c) The number of verbs in the data corpus which function according to the pattern of a given group is stated in parentheses in the second column.
- (d) Braces around several phonemes indicate which phonemes occur at that position within the stem.

(e) If there is a change in the stem occurring in conjunction with a given suffix, the stem change is cited below that suffix.

(f) Information too detailed for inclusion in the charts is given in the form of footnotes.

(g) The symbol 'Ø' represents a zero morpheme (in the charts) or a zero segment (in the morphophonemic rules).

(h) The order of presentation of the suffixes in each of charts 3, 4, and 5, or elsewhere in this paper, has no significance whatsoever.

CHART 3: CLASS I VERBS

group	stem ending	non-pst	y-pst	t-pst-cont	imp	t-pst-irr	t-pst
1	$\begin{Bmatrix} t & n \\ r t & r d & r n & r \end{Bmatrix} i$ mi, ra, rru (28)	-gi	-mi	-nyi	-wi i# → u# ⁹	-nyiri	-ngili
2	$\begin{Bmatrix} k \\ g \end{Bmatrix} \begin{Bmatrix} u \\ a \end{Bmatrix}$, gi ¹⁰ (15)	-ngi	-mi	-nyi	-wi i# → u#	-nyiri	-ngili
3	r, rr (6)	-gi	-i-mi	-i-nyi	-u-wi	-i-nyiri	-i-ngili
4	pi, bi (7)	-gi	-mi b → p	-nyi	-wi i# → u#	-nyiri	-li
5	chi, ji (71)	-gi	-mi	-nyi i# → Ø# ¹¹	-wi i# → u#	-nyiri i# → Ø# ¹¹	-li
6	irregular ¹² (2)	-Ø ¹³	-mi	-nyi	-wi i# → u#	-nyiri	-li i# → a#
7	bu (5)	-ngi	-mi	-nyi	-wi	-nyiri	-pirni ¹⁴
8	nya (3)	-ngi	-mi	-nyi	-wi	-nyiri	-ngirni

CHART 4: CLASS II VERBS

group	stem ending	non-pst	y-pst	t-pst-cont	imp	t-pst-irr	t-pst
9	$\begin{Bmatrix} b & j \\ m & \end{Bmatrix}_{irr}$ (7)	-gi rr → ∅	-nmi rr → ∅	-ni rr → ∅	-rri rr → ∅	-rnir rr → ∅	-jini
10	chi (3)	-gi	-nmi	-ni	-rri	-rnir	-jini
11	girr (3)	-gi	-nmi rr → ∅	-ni rr → ∅	-rri rr → ∅	-rnir rr → ∅	-jini
12	$\begin{Bmatrix} p & \\ b & l \end{Bmatrix}_i$ (11)	-gi	-nmi	-ni	-rri	-rnir	-ni
13	$\begin{Bmatrix} ch & \\ j & ng \end{Bmatrix}_{il}$ (4)	-gi	-nmi l → ∅	-ni l → ∅	-rri l → ∅	-rnir l → ∅	-ni l → ∅

CHART 5: CLASS III VERBS

group	stem ending	non-pst	y-pst	t-pst-cont	imp	t-pst-irr	t-pst
14	$\begin{Bmatrix} b & & k \\ m & n & rn & ng \\ & l & \end{Bmatrix}_i$ (16)	-ji	-∅	-nyi	-yi	-nyiri	-ni
15	$\begin{Bmatrix} & ch & k \\ m & & ng \end{Bmatrix}_{irri}$ (6)	-ji	-∅	-nyi	-yi	-nyiri	-ni rri → ∅
16	rri (2) stems in this group have the form CVrri ¹⁵	-ji	-∅ ¹⁶	-nyi ¹⁶	-yi	-nyiri	-nyini ¹⁶
17	chi, ji (26)	-ji	-rri	-nyi i → ∅ ¹¹	-yi	-nyiri i → ∅ ¹¹	-ni

Inspection of the imperative column for charts 3, 4, and 5, clearly shows that there are only three different forms for the imperative suffix: -wi for chart 1, -rri for chart 2, and -yi for chart 3. Furthermore, when the form of the imperative changes, there is a correlative change in the other columns also. It is for these reasons that I have postulated just the three major verb classes as exemplified by charts 3, 4, and 5. The implication of this is that the alternations between groups within a class are predictable by rule; hence in section 6. I shall present morphophonemic rules to handle the alternations.

The rules in section 6. will be written using distinctive features, so in section 5. I shall first give an inventory of the distinctive features needed.

5. THE DISTINCTIVE FEATURE SET

The majority of the distinctive features are required for establishing contrast between sound classes, but I give a further six features which are non-contrastive (at the systematic phonemic level) but which nevertheless are necessary for the morphophonemic rules and for deriving phonetic representations. At the time of writing, the phonology of Djinang has not been fully studied. It is therefore to be expected that further features than are given in this paper will be seen to be necessary for characterising sounds at the phonetic level.

TABLE 2: THE DISTINCTIVE FEATURE SET

contrastive		non-contrastive
syllabic	peripheral	segment
		continuant
distributed	anterior	high
sonorant	nasal	long
lateral	back	round
low	voice	delayed release

I have characterised the feature 'peripheral' as follows (compare McKay 1975:30):

peripheral sounds are produced with a primary obstruction that is located at an extremity of the oral cavity; non-peripheral sounds are produced without an obstruction at an extremity of the oral cavity.

Thus 'non-peripheral' sounds correspond closely to 'coronal' sounds as defined by Chomsky and Halle (1968:304). However, the feature 'coronal' is not well-suited to a description of Djinang.

Firstly, the definition of the feature 'coronal' states that the raising of the tongue blade is the important factor in the production of coronal sounds. This is not the case in Djinang lamino-postalveolars. It is the area of the tongue to the rear of the blade (the front of the dorsal region) which is the significant lower articulator in the case of the lamino-postalveolars. For such sounds, the blade is frequently not in contact with the upper articulator, in fact, it is often in

contact with the lower teeth while the primary stricture is in the postalveolar position.

Secondly, the class of non-coronal consonants in Djinang would be comprised of the labials, velars, and glides (and perhaps the other lamino-postalveolars also, if the definition of coronal sounds given by Chomsky and Halle is closely adhered to). No morphophonemic process or structural constraint so far discovered requires the delimitation of such a class of sounds (or classes of sounds, allowing for the inclusion of the other lamino-postalveolars). In section 6. it will be shown that a better grouping of sounds would be to combine labials and velars,¹⁷ and separate /y/ (together with the other lamino-postalveolars) from the velars by the same feature.

For the reasons just given, the feature 'peripheral' is used in this paper. Its main advantages are that it gives groupings of sounds which are similar (though not identical) to the grouping of sounds defined by the feature 'coronal' (with opposite value) without the necessity of specifying the posture of the tongue. And also, that it combines the labials with the velars while separating the velars from the lamino-postalveolars (including the glide /y/).

Others have used the feature 'peripheral' in describing Australian languages (McKay 1975; Wood 1977; Sharpe 1972:14; Crowley 1976:25), presumably for the same or similar reasons to those that I have given for Djinang.

The feature 'distributed' was set up (Chomsky and Halle 1968:312) to handle retroflexion, and also apical versus non-apical articulation of consonants. This is a feature of considerable importance in Djinang, and in other Australian languages (Wood 1977; Huttar and Kirton 1978; Huttar 1976). It is defined in the following manner:

Distributed sounds are produced with a constriction that extends for a considerable distance along the direction of the air flow; nondistributed sounds are produced with a constriction that extends only for a short distance in this direction.

(Chomsky and Halle 1968:312)

In order to be able to specify values of this feature for vowels, it is necessary to slightly modify the definition given above for 'non-distributed' so that it reads as follows:

non-distributed sounds are produced without a constriction that extends for a considerable distance along the direction of the air flow. Hence vowels are [-distributed].

It is of interest to consider the groupings of sounds that are obtained using the features in Table 2. Chart 6 is a restatement of the consonant chart (Chart 1) in terms of distinctive features.

CHART 6: CONSONANT CONTRASTS

		+periph		-periph			
		+dist		+dist		-dist	
		+ant	-ant	+ant	-ant	+ant	-ant
-son	-vce	p	k		ch	t	rt
	+vce	b	g		j	d	rd
+son	+nas	m	ng		ny	n	rn
	+lat					l	rl
	-syll						
	-nas						
	-lat	w			y	rr	r

Some of the systematic gaps in Chart 6 are of interest. Gupapuyngu, in the same group of languages as Djinang and spoken by a considerable portion of Djinang speakers, has an interdental (i.e. lamino-alveolar) order of sounds (orthographically *th*, *dh*, and *nh*). This order is non-peripheral, distributed and anterior, which fills the holes in the obstruent and nasal sections of the chart. The morphophonemic data for Djinang velars (*k*, *g*, and *ng*) has resulted in them being specified as [+distributed], and the reasons for doing so will be made clear in section 6.

In Chart 6, consider the class of non-distributed sounds (the apico-alveolars and apico-postalveolars). The claim that the apico-alveolars are not differentiated from the apico-postalveolars by the feature 'distributed', but rather by the feature 'anterior', is worth some consideration here. It might seem that the apico-alveolars should be [+distributed] and the apico-postalveolars [-distributed], due to the fact that the apico-postalveolars are apical, while the apico-alveolars are sometimes articulated with the tongue blade as well as the tip.

The apico-alveolars are not [+distributed], which can be shown by observing how the Gupapuyngu sound system is modified by Djinang speakers when the latter borrow Gupapuyngu words. Since Djinang has no interdental order, Djinang speakers must substitute a 'phonologically close' equivalent for a Gupapuyngu interdental.

What is observed is that Gupapuyngu interdentals become Djinang lamino-postalveolars, rather than apico-alveolars. With respect to their points of articulation, the lamino-postalveolars are more 'distant' from the interdentals than are the apico-alveolars. Hence, if the alveolars are assumed to be [+distributed], as are the lamino-

postalveolars, why then do the Gupapuyngu interdentalals not become Djinang apico-alveolars? It must be concluded that interdentalals and lamino-postalveolars share a phonological property that does not occur in apico-alveolars. And since interdentalals are [+anterior] and lamino-postalveolars are [-anterior], it must be concluded that it is the feature 'distributed' which separates the apico-alveolars from the interdentalals and lamino-postalveolars.

An implication of this is that Djinang speakers perceive the difference between distributed versus non-distributed sounds as more significant phonologically than differences in the point of articulation (I suspect that this is true of most Australian languages). Such a conclusion is evident because membership in the [+distributed] class of sounds is retained at the expense of a greater-than-expected change in the point of articulation, when Gupapuyngu interdentalals become Djinang lamino-postalveolars. The feature 'anterior', rather than the feature 'distributed' is therefore a 'low level' feature which serves to separate apico-alveolars from apico-postalveolars.

Some examples are as follows:

Gupapuyngu	Djinang	English gloss
rarranhdharr	rarranyjarr	'dry season'
nhäma	nyangi	'see, look at'
nhina	nyiniji	'sit, stay, be'
nhuman	nyumigi	'smell, be odourous'
dha wirrirri'yun	jarlwirrijigi	'slip down'
dhanara	janngira	'request to go'
dhang'i'yun	jan.gichigi	'embrace'
ganangathala	garnangarchili	'small fresh water pool'
ngadhakthun	nganyjarchigi	'get into trouble'
djalathang	chalachang	'south, cold weather'

Further evidence for the similarity of interdentalals to lamino-palatalals comes from Galpu (Wood 1977:25), another of the Yolngu¹⁸ languages. Wood states that when certain verbal and case suffixes occur in a post vowel/liquid/semi-vowel position, lamino-postalveolar affricate and interdental stop both become the lamino-postalveolar glide /y/.

Further evidence again comes from Djinang, Galpu and Gupapuyngu, namely, that liquids occur only in the class of non-distributed (i.e. apical) sounds. This completes the discussion of the feature 'distributed'.

Lastly, to enable phonetic representations, the following rules are required after lexical insertion and before the morphophonemic rules.

(a) All non-low vowels are specified as [+high] by a rule:

$$\begin{bmatrix} +\text{syll} \\ -\text{low} \end{bmatrix} \rightarrow [+high]$$

Later rules convert high vowels in stressed syllables to [-low, -high], and may also add length as well ([+long]). The details are given in 'Djinang Phonology' (see pp.1-71 in this volume).

(b) The 'delayed release' feature is given a positive value for lamino-postalveolar non-continuants by the following rule:

$$\begin{bmatrix} -\text{periph} \\ +\text{dist} \\ -\text{cont} \end{bmatrix} \rightarrow [+del \text{ rel}] / \text{ ______ } [+syll]$$

(c) The feature 'round' is given a positive value for the phonemes /w/ and /u/ by the rule:

$$\begin{bmatrix} +\text{cont} \\ -\text{low} \\ +\text{back} \end{bmatrix} \rightarrow [+round]$$

6. CONSTRAINTS AND MORPHOPHONEMIC PROCESSES

6.1. PRELIMINARY DISCUSSION

Before the morphophonemic rules for each class are given, there are some important observations to be made from Charts 3, 4, and 5. In the today-past column of Chart 3 it can be seen that the final four segments of the verb¹⁹ take the form:

$$(1) \begin{bmatrix} +\text{dist} \\ -\text{cont} \\ \alpha\text{nas} \\ \alpha\text{back} \end{bmatrix} i \begin{bmatrix} -\text{dist} \\ +\text{son} \end{bmatrix} i, \text{ where } \alpha = + \text{ or } -$$

The set of sounds occurring as the first consonant of the constraint (1) is:

$$\left\{ \begin{array}{cc} p & ch \\ b & j \end{array} \right\} \quad ng$$

The phonemes /m/, /k/, and /g/, are excluded from this set, while the data does not indicate whether or not the phoneme /ny/ should be included. Group 6 verb stems are assumed to be a small class having partly irregular properties, and will be excluded from consideration in the statement of rules which pertain to the today-past and also to the non-past.

Considering the today-past column of Chart 4, it is seen that an almost identical constraint obtains:

$$(2) \left\{ \begin{array}{l} +dist \\ -cont \\ anas \\ \alpha back \\ +ant \\ +lat \end{array} \right\} i \left[\begin{array}{l} -dist \\ +son \end{array} \right] i, \quad \text{where } \alpha = + \text{ or } -$$

The set of sounds occurring as the first consonant in the constraint (2) is:

$$\left\{ \begin{array}{ll} p & ch \\ b & j \\ & ng \end{array} \right\}$$

The phoneme /l/ is included here on the basis of one stem, /kali/ 'have, possess'. At this stage in my knowledge of Djinang, it is not clear whether the behaviour of this stem mirrors an underlying regularity (and hence warrants inclusion in the above set of sounds), or is irregular (which is what I suspect is the case). In the latter case, constraints 1 and 2 would be identical. Henceforth I will treat this stem as irregular.

Considering the today-past column in Chart 5, there is a similar constraint to constraints 1 and 2, except that more phonemes may occur as the first consonant of the constraint than for constraints 1 and 2. In this case the constraint is:

$$(3) \left\{ \begin{array}{l} [-cont] \\ [+lat] \end{array} \right\} i \left[\begin{array}{l} -dist \\ +son \end{array} \right] i$$

where the rhotics (/rr/ and /r/²⁰) may not occur in the first consonant position in constraint 3. In fact, the morphophonemic rules for the today-past category in class III verbs conspire to prevent */rrini/ being a realisation of constraint 3.

The constraints 1, 2, and 3, are the unifying factor behind the various morphophonemic rules for the today-past alternations in each verb class. When morphophonemic rules affect verbs inflected for the today-past, the morphophonemic rules conspire to ensure that a constraint similar to (1) is satisfied, irrespective of the verb class involved. The constraint which is involved is a generalisation of constraints 1 and 2 as follows:

$$(4) \left[\begin{array}{l} +dist \\ -cont \end{array} \right] i \left[\begin{array}{l} -dist \\ +son \end{array} \right] i$$

Constraint 4 allows the phoneme sequence /mini/ to occur (group 15 verbs in class III) as well as the phoneme sequences permitted by constraints 1 and 2. As examples, consider group 13 of Chart 4, and groups 15 and 16 of Chart 5.

rule 1 transitivity protection (precedes rule 2)

$$\emptyset \rightarrow \begin{bmatrix} -\text{periph} \\ +\text{dist} \\ +\text{cont} \end{bmatrix} / \begin{bmatrix} +\text{periph} \\ +\text{ant} \\ +\text{nas} \end{bmatrix} [-\text{back}] \text{ — }]_{\text{vsI}} + \begin{bmatrix} -\text{syll} \\ +\text{rnd} \end{bmatrix}$$

rule 2 vowel insertion (precedes rule 3)

$$\emptyset \rightarrow \begin{bmatrix} +\text{syll} \\ +\text{high} \end{bmatrix} / [+ \text{son}] \text{ — }]_{\text{vsI}} + \begin{bmatrix} +\text{dist} \\ +\text{son} \end{bmatrix}$$

rule 3 vowel rounding

$$[+\text{high}] \rightarrow [\text{arnd}] / \begin{bmatrix} \text{ — } \\ +\text{syll} \end{bmatrix}]_{\text{vsI}} + \begin{bmatrix} +\text{cont} \\ \text{arnd} \end{bmatrix}, \text{ where } \alpha = + \text{ or } -$$

(A redundancy rule: $[+\text{syll}, +\text{high}, \text{arnd}] \rightarrow [\alpha \text{back}]$, where $\alpha = +$ or $-$, determines whether the output of rule 3 is /i/ or /u/.)²¹

rule 4 i-deletion (precedes rule 5)

$$[-\text{back}] \rightarrow \emptyset / \begin{bmatrix} +\text{dist} \\ \alpha \text{ant} \\ -\text{son} \\ -\text{back} \end{bmatrix} \text{ — }]_{\text{vs}} + \begin{bmatrix} +\text{dist} \\ \alpha \text{ant} \\ +\text{nas} \\ -\text{back} \end{bmatrix}, \text{ where } \alpha = + \text{ or } -$$

rule 5 consonant deletion

$$[-\text{syll}] \rightarrow \emptyset / [-\text{son}] \text{ — } [+ \text{nas}]$$

rule 6 devoicing

$$[-\text{son}] \rightarrow \begin{bmatrix} -\text{voice} \\ -\text{del rel} \end{bmatrix} / \text{ — } [-\text{syll}]$$

rule 7 velar softening

$$[-\text{son}] \rightarrow [+ \text{son}] / \begin{bmatrix} +\text{dist} \\ -\text{cont} \end{bmatrix} [+ \text{back}]]_{\text{vsI}} + \begin{bmatrix} \text{ — } \\ +\text{back} \\ +\text{voice} \end{bmatrix}$$

rule 8 gi-suffix deletion (precedes rule 9)

$$\begin{bmatrix} -\text{son} \\ +\text{back} \\ +\text{voice} \end{bmatrix} [-\text{back}] \rightarrow \emptyset / \begin{bmatrix} -\text{son} \\ +\text{back} \\ +\text{voice} \end{bmatrix} [-\text{back}]]_{\text{vsI}} + \text{ — } \#$$

rule 9 gi-stem deletion

$$\begin{bmatrix} -\text{son} \\ +\text{back} \\ +\text{voice} \end{bmatrix} [-\text{back}] \rightarrow \emptyset / \text{ — }]_{\text{vsI}} + \emptyset \#$$

rule 10 ngi-deletion

$$\begin{bmatrix} +nas \\ +back \end{bmatrix} [-back] \rightarrow \emptyset / \begin{bmatrix} +dist \\ -son \\ -back \end{bmatrix} [-back]]_{vsI} + \text{---}$$

rule 11 lateral shift (precedes rules 13 and 14)

$$\begin{bmatrix} +ant \\ +lat \end{bmatrix} \rightarrow \begin{bmatrix} -dist \\ -ant \\ +nas \end{bmatrix} / \begin{bmatrix} +dist \\ -cont \\ -back \end{bmatrix} [+back]]_{vsI} + [-syll][+syll] \text{---}$$

rule 12 peripheral hardening (precedes rule 13)

$$\begin{bmatrix} +son \\ +back \end{bmatrix} \rightarrow \begin{bmatrix} -son \\ -back \\ -voice \end{bmatrix} / \begin{bmatrix} +periph \\ +ant \\ -son \\ +voice \end{bmatrix} [+back]]_{vsI} + \begin{bmatrix} \text{---} \\ +periph \\ -cont \end{bmatrix}$$

rule 13 labial rounding

$$[-son] \rightarrow [+rnd] / [+seg] \begin{bmatrix} \text{---} \\ +periph \\ +ant \\ +voice \end{bmatrix} [+back] + [-son]$$

(A redundancy rule, $[-syll, +rnd] \rightarrow [+son]$, is also required since there are no labialised obstruents in Djinang.)

rule 14 stem unrounding

$$[-low] \rightarrow [-rnd] / \# \begin{bmatrix} +periph \\ +ant \\ -son \end{bmatrix} \text{---}]_{vsI} + \begin{bmatrix} +periph \\ +ant \\ -son \\ -voice \end{bmatrix}$$

rule 15 ji-deletion (precedes rule 17)

$$\begin{bmatrix} -periph \\ +dist \\ -son \\ +voice \end{bmatrix} [-back] \rightarrow \emptyset / \left\{ \begin{bmatrix} +dist \\ +ant \\ -son \end{bmatrix} [-back] \right\} \left[\begin{bmatrix} +lat \end{bmatrix} ([-back]) \right]]_{vsII} + \text{---}$$

rule 16 rr-deletion

$$\begin{bmatrix} -dist \\ +ant \\ +cont \\ -lat \end{bmatrix} \rightarrow \emptyset / \begin{bmatrix} +dist \\ -cont \\ -back \end{bmatrix} [-back] \text{---}]_{vsII} + \begin{bmatrix} -son \\ +back \\ +voice \end{bmatrix}$$

rule 17 consonant deletion before apical sonorants

$$[-syll] \rightarrow \emptyset / \text{---} \begin{bmatrix} -syll \\ -dist \\ +son \end{bmatrix}$$

rule 2 vowel insertion (precedes rule 3)

$$\emptyset \rightarrow \left[\begin{array}{c} +\text{syll} \\ +\text{high} \end{array} \right] / \left[+\text{son} \right] \text{ ______ } \left]_{\text{vsI}} + \left[\begin{array}{c} +\text{dist} \\ +\text{son} \end{array} \right]$$

$$\emptyset \rightarrow \left\{ \begin{array}{c} i \\ u \end{array} \right\} / \left[+\text{son} \right] \text{ ______ } \left]_{\text{vsI}} + \left\{ \begin{array}{cc} m & w \\ ny & \\ ng & \end{array} \right\}$$

rule 3 vowel rounding

$$\left[+\text{high} \right] \rightarrow \left[\text{arnd} \right] / \left[\text{ ______ } \right]_{\text{vsI}} + \left[\begin{array}{c} +\text{cont} \\ \text{arnd} \end{array} \right], \text{ where } \alpha = + \text{ or } -$$

$$i \rightarrow u / \text{ ______ } \left]_{\text{vsI}} + w$$

Rules 1, 2, and 3, deal with the imperative, and include the vowel insertions for group 3 stems. Preceding the imperative suffix, a stem final /i/ vowel changes to /u/; but after a stem final transitivity morpheme, /mi/, the glide /y/ is inserted to prevent rule 3 from altering the transitivity morpheme.

rule 4 i-deletion (precedes rule 5)

$$\left[-\text{back} \right] + \emptyset / \left[\begin{array}{c} +\text{dist} \\ \alpha \text{ant} \\ -\text{son} \\ -\text{back} \end{array} \right] \text{ ______ } \left]_{\text{vs}} + \left[\begin{array}{c} +\text{dist} \\ \alpha \text{ant} \\ +\text{nas} \\ -\text{back} \end{array} \right], \text{ where } \alpha = + \text{ or } -$$

$$i \rightarrow \emptyset / \left[\begin{array}{cc} \{p & b\} \\ \{ch & j\} \end{array} \right] \text{ ______ } \left]_{\text{vs}} + \left[\begin{array}{c} m \\ ny \end{array} \right]^{23}$$

rule 5 consonant deletion

$$\left[-\text{syll} \right] + \emptyset / \left[-\text{son} \right] \text{ ______ } \left[+\text{nas} \right]$$

$$C \rightarrow \emptyset / \text{stops ______ nasals}$$

rule 6 devoicing

$$\left[-\text{son} \right] \rightarrow \left[\begin{array}{c} -\text{voice} \\ -\text{del rel} \end{array} \right] / \text{ ______ } \left[-\text{syll} \right]$$

$$\text{stops} \rightarrow \left[\begin{array}{c} -\text{voice} \\ -\text{del rel} \end{array} \right] / \text{ ______ } c$$

Rules 4, 5, and 6, involve the today past continuous and today past irrealis categories for group 5 verb stems, and the yesterday past category for group 4 verb stems. When an obstruent (i.e. a stop) is followed by /i/, and then by a suffix beginning with a nasal which is homorganic to the preceding obstruent, the /i/ vowel is deleted (rule 4). Also, when the outcome of this rule results in an obstruent - obstruent cluster preceding the nasal, the second obstruent of the cluster is

deleted. Rule 5 has been generalised to apply to any consonant because it thereby captures a more general sequential segment constraint. Finally, lamino-postalveolar obstruents (rule 6) do not have a delayed release (in fact, they are unreleased) when followed by a consonant; while voiced obstruents become voiceless under the same conditions. These three rules apply equally well to group 17 verb stems in class III.

rule 7 velar softening

$$[-\text{son}] \rightarrow [+ \text{son}] / \begin{bmatrix} +\text{dist} \\ -\text{cont} \end{bmatrix} [+ \text{back}]]_{\text{vsI}} + \begin{bmatrix} \text{---} \\ +\text{back} \\ +\text{voice} \end{bmatrix}$$

$$g \rightarrow ng / \left\{ \begin{matrix} p & \text{ch} & k \\ b & j & g \end{matrix} \right\} \left\{ \begin{matrix} u \\ a \end{matrix} \right\}]_{\text{vsI}} + \text{---}$$

rule 8 gi-suffix deletion (precedes rule 9)

$$\begin{bmatrix} -\text{son} \\ +\text{back} \\ +\text{voice} \end{bmatrix} [-\text{back}] \rightarrow \emptyset / \begin{bmatrix} -\text{son} \\ +\text{back} \\ +\text{voice} \end{bmatrix} [-\text{back}]]_{\text{vsI}} + \text{---} \#$$

$$gi \rightarrow \emptyset / gi]_{\text{vsI}} + \text{---} \#$$

rule 9 gi-stem deletion

$$\begin{bmatrix} -\text{son} \\ +\text{back} \\ +\text{voice} \end{bmatrix} [-\text{back}] \rightarrow \emptyset / \text{---}]_{\text{vsI}} + \emptyset \#$$

$$gi \rightarrow \emptyset / \text{---}]_{\text{vsI}} + \emptyset \#$$

Rules 7, 8, and 9, handle the alternations in the non-past category, bearing in mind that the zero allomorph in group 6 is not assumed to be phonologically conditioned. The alternation /g/ → /ng/ in the suffix, for groups 2, 7, and 8, is sensitive to the consonant in the preceding syllable, as well as to the vowel. Either one of these is not a sufficient conditioning factor by itself, as can be seen from groups 1, 4, and 5. Rules 8 and 9 handle the deletions required by footnote 10.

rule 10 ngi-deletion

$$\begin{bmatrix} +\text{nas} \\ +\text{back} \end{bmatrix} [-\text{back}] \rightarrow \emptyset / \begin{bmatrix} +\text{dist} \\ -\text{son} \\ -\text{back} \end{bmatrix} [-\text{back}]]_{\text{vsI}} + \text{---}$$

$$ngi \rightarrow \emptyset / \left\{ \begin{matrix} p & \text{ch} \\ b & j \end{matrix} \right\} i]_{\text{vsI}} + \text{---}$$

rule 11 lateral shift (precedes rules 13 and 14)

$$\begin{bmatrix} +\text{ant} \\ +\text{lat} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{dist} \\ -\text{ant} \\ +\text{nas} \end{bmatrix} / \begin{bmatrix} +\text{dist} \\ -\text{cont} \\ -\text{back} \end{bmatrix} \begin{bmatrix} +\text{back} \end{bmatrix}_{\text{vsI}} + [-\text{syll}][+\text{syll}] \text{ ---}$$

$$l \rightarrow r_n / \left\{ \begin{bmatrix} b \\ n_y \end{bmatrix} \left\{ \begin{bmatrix} u \\ a \end{bmatrix} \right\} \right\}_{\text{vsI}} + \text{CV} \text{ ---}$$

rule 12 peripheral hardening (precedes rule 13)

$$\begin{bmatrix} +\text{son} \\ +\text{back} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{son} \\ -\text{back} \\ -\text{voice} \end{bmatrix} / \begin{bmatrix} +\text{periph} \\ +\text{ant} \\ -\text{son} \\ +\text{voice} \end{bmatrix} \begin{bmatrix} +\text{back} \end{bmatrix}_{\text{vsI}} + \begin{bmatrix} +\text{periph} \\ -\text{cont} \end{bmatrix}$$

$$ng \rightarrow p / \begin{bmatrix} b_u \end{bmatrix}_{\text{vsI}} + \text{---}$$

rule 13 labial rounding

$$[-\text{son}] \rightarrow [+r_{nd}] / [+seg] \begin{bmatrix} +\text{periph} \\ +\text{ant} \\ +\text{voice} \end{bmatrix} \begin{bmatrix} +\text{back} \end{bmatrix} + [-\text{son}]$$

$$b \rightarrow w / \left\{ \begin{bmatrix} C \\ V \end{bmatrix} \right\} \text{ --- } \left\{ \begin{bmatrix} a \\ u \end{bmatrix} \right\} + \left\{ \begin{bmatrix} p \\ r_d \\ ch \end{bmatrix} \right\}$$

rule 14 stem unrounding

$$[-\text{low}] \rightarrow [-r_{nd}] / \# \begin{bmatrix} +\text{periph} \\ +\text{ant} \\ -\text{son} \end{bmatrix} \text{ --- }]_{\text{vsI}} + \begin{bmatrix} +\text{periph} \\ +\text{ant} \\ -\text{son} \\ -\text{voice} \end{bmatrix}$$

$$u \rightarrow i / \# b \text{ --- }]_{\text{vsI}} + p$$

Rules 10 through 14 are required for the alternations within the today past category. Rule 11 changes the lateral /l/ into the retroflex nasal /r_n/. The rule assumes that the conditioning factor is the final syllable of the verb stem, with the intervening /ngi/ syllable not having any conditioning effect. It might appear that to handle the presence of /ngi/ in the today past as an insertion might be preferable, since then the conditioning factor in rule 11 would become the preceding syllable. However, this change would alter rule 10 unacceptably. Consider rule 10 as it stands. The conditioning factor in it is the presence of a stem final syllable having the form of a non-back distributed obstruent followed by /i/. This is clearly in agreement with constraint 1 mentioned in the preliminary discussion, section 6.1. Changing rule 10 to a rule for insertion of /ngi/ gives rule 10':

$$\emptyset \rightarrow ng\ i \ / \left\{ \begin{array}{l} \{u\} \\ \{a\} \\ C \\ \{k\} \\ \{g\} \\ \{m\} \\ [-syll] \\ [-dist] \end{array} \right\} i \left. \right]_{vsI} \left[\begin{array}{l} + \text{---} \\ t\text{-pst} \end{array} \right]$$

The environments specified by rule 10' are all the environments occurring in the data that do not conform to the shape of constraint 1. Clearly, this fails to express a significant generalisation and is therefore unacceptable.

Rules 12, 13, and 14, deal with the today past alternations for group 7 verb stems. Thus /ng/ hardens to become /p/ (rule 12), and then the outputs of rule 12 undergo either rule 13, which rounds /b/ to become /w/, or rule 14, which unrounds /u/ occurring in 'short' (i.e. one syllable) stems. Rule 13 applies not only to group 7 stems (group 7 stems are of form #CVCbu#, or #bu#), but within verb stems (and possibly elsewhere) also. An example of the latter case is the verb *rdabachigi* 'look back', from which is derived the verb *rdabardabachigi* 'look back repeatedly'. In fast speech, the latter verb is often realised as *rdawardawachigi*. Rule 13 has been generalised (i.e. it has fewer features) to account for this change, as well as for the changes in group 7 stems outlined in Chart 3.

The change /b/ → /w/ does not occur with the stem #bu#, and this change is blocked by including the feature [+segment] in the environment of rule 13. If this change were not blocked for the stem #bu#, then the principal phonetic identificational cue for that stem would be obscured. By this I am assuming that the language will not tolerate the application of a morphophonemic rule that seriously modifies the stem. This helps to explain not just the behaviour for the stem #bu#, but also the behaviour in the today past category for group 16 verb stems in class III. In the latter case, rule 19 changes the first stem vowel (these stems are disyllabic) in order to block a later rule (rule 20) which would otherwise delete the second syllable of the stem and thus obscure some of the identificational cues of that stem. Nevertheless, the stem #bu# must be modified because when inflected for today past it is homophonous with *bupirni* 'mosquito'. The only reasonable strategy is to change the stem vowel; hence rule 14 unrounds the stem vowel /u/ in order to produce the vowel /i/, which is the unmarked vowel (phonologically speaking) in Djinang.

6.3.2. Class II Verbs

rule 15 ji-deletion (precedes rule 17)

$$\begin{bmatrix} \text{-periph} \\ \text{+dist} \\ \text{-son} \\ \text{+voice} \end{bmatrix} [-\text{back}] \rightarrow \emptyset / \left\{ \begin{bmatrix} \text{+dist} \\ \text{+ant} \\ \text{-son} \\ \text{+lat} \end{bmatrix} [-\text{back}] \right\} \text{vsII} + \text{---}$$

$$ji \rightarrow \emptyset / \left\{ \begin{bmatrix} p \\ b \\ i \end{bmatrix} (i) \right\} \text{vsII} + \text{---}$$

rule 16 rr-deletion

$$\begin{bmatrix} \text{-dist} \\ \text{+ant} \\ \text{+cont} \\ \text{-lat} \end{bmatrix} \rightarrow \emptyset / \begin{bmatrix} \text{+dist} \\ \text{-cont} \\ \text{-back} \end{bmatrix} [-\text{back}] \text{---} \text{vsII} + \begin{bmatrix} \text{-son} \\ \text{+back} \\ \text{+voice} \end{bmatrix}$$

$$rr \rightarrow \emptyset / \left\{ \begin{bmatrix} b \\ m \end{bmatrix} j \right\} i \text{---} \text{vsII} + g$$

rule 17 consonant deletion before apical sonorants

$$[-\text{syll}] \rightarrow \emptyset / \text{---} \begin{bmatrix} \text{-syll} \\ \text{-dist} \\ \text{+son} \end{bmatrix}$$

$$\left\{ \begin{bmatrix} l \\ rr \end{bmatrix} \right\} \rightarrow \emptyset / \text{---} \left\{ \begin{bmatrix} n \\ rr \end{bmatrix} rn \right\}$$

Various analyses were considered for this class. There are problems because, as shown on Chart 4, group 13 stems are cited with /l/ occurring stem finally, while stems in groups 9 and 11 are cited with /rr/ occurring stem finally. It is not possible to handle the presence of stem final /l/ and /rr/, as phonologically governed insertions.

To see this, consider groups 9, 12, and 13. The environment, /ji___#, is required as part of an /l/ insertion rule and also as part of an /rr/ insertion rule (groups 9 and 13). In addition, /rr/ is inserted in group 9 in the environment, /bi___#, but fails to be inserted in group 12 in the same environment.

Another problem is whether the initial syllable, /ji/, of the today past suffix is a part of the suffix as shown in Chart 4, or rather the result of an insertion rule. Consider the following analyses:

(1) Treat /ji/ as part of the today past suffix; with /l/ and /rr/ both occurring stem-finally at the systematic phonemic level.

(11) Treat /ji/ in the today past category, and the 'stem final' occurrence of /rr/, as the result of insertion rules. Here, /l/ occurs stem finally at the systematic phonemic level.

Analysis (ii) requires the following:

- (a) Group 10 stems undergo insertion of /rr/, along with groups 9 and 11 stems, to allow insertion of /ji/ for the today past category to be governed by the occurrence of a stem final consonant.
- (b) The stem final /rr/ in group 10 must be deleted after /ji/ insertion has occurred, but not so with groups 9 and 11.
- (c) To make the rules 'work', one lexical item in group 9 has to be treated as containing a stem final /rr/ at the systematic phonemic level, namely, the stem /balibirr/ '*extinguish*'. Otherwise, it would not be possible to give a reasonable explanation for the insertion of /ji/ before the today past suffix, -ni, in group 9, when such insertion is lacking in group 12.
- (d) Group 13 behaviour requires a deletion rule to delete occurrences of stem final /l/ in all categories except the non-past. The rule is in agreement with constraints on consonant clusters however (see Appendix 1).
- (e) Five rules are needed for class II stems.

Comparing analysis (ii) with analysis (i), the latter has the following advantages:

- (a') It is not necessary to assume that /rr/ occurs stem finally for stems in group 10. Thus avoidance of homophony with the today past category is achieved by the different shape of the today past suffix.
- (b') The stem /balibirr/ ceases to be an 'exception' in group 9, since all verb stems in this group now have stem final /rr/ at the systematic phonemic level.
- (c') Although more deletions are required for analysis (i), the rules involved express more of the general constraints on consonant clusters (in particular, that clusters of two apical sonorants are illegal).
- (d') Only three rules are required, instead of five.
- (e') There is a formal similarity between rule 15 for deleting /ji/ from the today past suffix in class II, and rule 10 for deleting /ngi/ from the today past suffix in class I. This similarity would be obscured if analysis (ii) were adopted.

For these reasons I prefer analysis (i), which is embodied in rules 15, 16, and 17.

Rule 17 expresses the fact that consonants may not occur preceding apical sonorant consonants (see Appendix 1). Rule 16, namely,

$$rr \rightarrow \emptyset / \left\{ \begin{smallmatrix} b & j \\ m & \end{smallmatrix} \right\}_i \text{ — }]_{\text{vsII}} + g$$

is designed to delete stem final /rr/ in the non-past category for group 9 stems. This rule indirectly expresses the fact that a */gigi/ sequence occurring word finally and across a verb stem-verb suffix boundary²⁴ is unacceptable. For class I stems, where this sequence potentially arises in group 2, the sequence is avoided by the application of rules 8 and 9. However, for class II stems, failure to delete stem final /rr/ in group 11 when non-past suffixation occurs accomplishes the avoidance of a */gigi/ sequence²⁵ across the stem-suffix boundary.

6.3.3. Class III Verbs

rule 18 rri-insertion

$$\emptyset \rightarrow \left[\begin{smallmatrix} -\text{dist} \\ +\text{ant} \\ +\text{cont} \\ -\text{lat} \end{smallmatrix} \right] [-\text{back}] / \left[\begin{smallmatrix} -\text{periph} \\ +\text{dist} \\ -\text{son} \end{smallmatrix} \right] [-\text{back}] \left[+ \text{ — } \# \right]_{\text{y-pst}}$$

$$\emptyset \rightarrow rri / \left\{ \begin{smallmatrix} ch \\ j \end{smallmatrix} \right\}_i \left[+ \text{ — } \# \right]_{\text{y-pst}}$$

In the yesterday past category, if the allomorph -rri were not suffixed by rule 18 to stems in group 17, then it would be very easy to confuse yesterday past inflection with non-past inflection for verb stems in this group. Thus rule 18 performs a disambiguation function.

The alternations for group 17 stems in the today past irrealis and today past continuous categories have already been handled by rules 4, 5, and 6, which apply to verb classes I and III, and vacuously to verb class II. At this stage it appears that these alternations occur in order to obtain natural rhythmic patterns in an utterance. Rhythmic patterns are dealt with in 'Djinang Phonology' (see pp.1-71 in this volume).

rule 19 vowel change (precedes rules 20 and 21)

$$[+\text{syll}] \rightarrow [+low] / \# \left[\begin{smallmatrix} +\text{dist} \\ -\text{cont} \end{smallmatrix} \right] \left[\begin{smallmatrix} - \\ -\text{back} \end{smallmatrix} \right] \left[\begin{smallmatrix} -\text{dist} \\ +\text{ant} \\ +\text{cont} \\ -\text{lat} \end{smallmatrix} \right] [-\text{back}]]_{\text{vsIII}} + \left\{ \begin{smallmatrix} \emptyset \\ [+nas] \end{smallmatrix} \right\} [-\text{back}] \} \#$$

$$i \rightarrow a / \# \left\{ \begin{smallmatrix} j \\ ng \end{smallmatrix} \right\} \text{ — } rri]_{\text{vsIII}} + \left\{ \begin{smallmatrix} \emptyset \\ n \\ ny \end{smallmatrix} \right\}_i \} \#$$

rule 20 rri-deletion

$$\begin{bmatrix} -\text{dist} \\ +\text{ant} \\ +\text{cont} \\ -\text{lat} \end{bmatrix} [-\text{back}] \rightarrow \emptyset / \begin{bmatrix} +\text{dist} \\ -\text{cont} \end{bmatrix} [-\text{back}] \text{ --- }]_{\text{vsIII}} + \begin{bmatrix} -\text{dist} \\ +\text{nas} \end{bmatrix}$$

$$\text{rri} \rightarrow \emptyset / \left\{ \begin{matrix} \text{ch} & \text{k} \\ \text{m} & \text{ng} \end{matrix} \right\}_i \text{ --- }]_{\text{vsIII}} + \text{n}$$

rule 21 nyi-insertion

$$\emptyset \rightarrow \begin{bmatrix} -\text{periph} \\ +\text{dist} \\ +\text{nas} \end{bmatrix} [-\text{back}] / \begin{bmatrix} -\text{syll} \\ \alpha \text{dist} \end{bmatrix} [\alpha \text{back}] \begin{bmatrix} -\text{dist} \\ +\text{ant} \\ +\text{cont} \\ -\text{lat} \end{bmatrix} [-\text{back}]]_{\text{vsIII}} + \text{ --- } \begin{bmatrix} -\text{dist} \\ +\text{nas} \end{bmatrix}$$

where $\alpha = +$ or $-$

$$\emptyset \rightarrow \text{nyi} / \left\{ \begin{matrix} \left\{ \begin{matrix} j \\ \text{ng} \end{matrix} \right\} \left\{ \begin{matrix} u \\ a \end{matrix} \right\} \\ -\text{syll} \\ -\text{dist} \end{matrix} \right\}_i \text{ rri }]_{\text{vsIII}} + \text{ --- } \text{n}$$

Rules 19, 20, and 21, handle the alternations in the today past category. From Chart 5 it is clear, by examining groups 15 and 16, that the verb final sequence */rrini/ is illegal. This sequence is avoided by deleting the stem final syllable, /rri/, in group 15 (rule 20), whereas in group 16 a transition syllable, /nyi/, is inserted between the stem and the suffix (rule 21). To explain the significance of these rules, and rule 19 in particular, it is necessary to consider groups 15 and 16 more closely.

Group 15 stems have the form #CVC{m, ng, ch}irri#, or #CVkirri# (one example only of the latter in the data). Group 16 stems have the form #CVrri# (only two examples in the data). In the latter group, one stem is #ngurri# 'sleep, lie down', and the other is #jirri# 'stand up, be awake'. When yesterday past, today past continuous, or today past suffixation occurs (see footnote 16 and Chart 5), the stem #jirri# changes to #jarri#. It is this vowel change which gives a significant clue to the conditioning factors which are in operation for the today past alternations. It appears, from the shapes of the stems in groups 15 and 16, that the length of the stem is an important factor. Also, it can be seen that the changes which occur produce verb final sequences of the form:

$$(4) \begin{bmatrix} +\text{dist} \\ -\text{cont} \end{bmatrix}_i \begin{bmatrix} -\text{dist} \\ +\text{son} \end{bmatrix}_i,$$

which was cited in section 6.1. as a generalisation of the word level structural constraints applying to the today past category in class I

and class II verbs. Although constraint 4 does not apply throughout class III verbs for the today past alternations (see group 14, Chart 5), it would seem that it does govern the form of phonological processes when they do occur. Thus rule 19 contains, among other things, the stem length conditioning factor; while rules 20 and 21 contain elements of the word level constraint 4.

Rule 20 asserts that when constraint 4 can be satisfied by deletion of /rri/, deletion occurs irrespective of the length of the stem. Rule 21 states that /nyi/ is inserted in all cases where deletion of /rri/ would not satisfy the constraint 4, irrespective of the length of the stem. Rule 19 asserts that if rule 20 were permitted to apply to short stems, then deletion of /rri/ would result in the loss of important phonetic identificational cues. In such cases, the first stem vowel, /i/, must change to /a/ to ensure the subsequent application of rule 21 rather than rule 20 (i.e. insert /nyi/ rather than delete /rri/). This is further evidence that the claim, in section 6.3.1., that 'the language will not tolerate the application of a morphophonemic rule that seriously modifies the stem', is a reasonable one. Alternatively, if this claim is taken as self-validating, then it lends support to the rules for alternations involving 'short' stems in the today past category for classes I and III verbs (see the discussion of rule 14 in section 6.3.1.).

These rules are assumed to constitute the best explanation for the today past alternations in class III. In addition, it should be noted that rule 19 explicitly states that the vowel change occurs only when the suffix is a zero morpheme or a monosyllable. I have no explanation for why this should be so.

Lastly, rule 21 predicts what should happen to a stem of form #[-syll, -dist]irri# when today past suffixation occurs. When $\alpha = -$, in rule 21, the rule is:

$$\emptyset \rightarrow \text{nyi} / \left[\begin{array}{c} \text{-syll} \\ \text{-dist} \end{array} \right] \text{irri} \Big]_{\text{vsIII}} + \text{---} \text{ n}$$

Although no stem having this form has yet been observed, there is no structural constraint prohibiting the occurrence of such a stem.

This prediction of the behaviour of such a stem is based on constraint 4. Rule 20 implies that rri-deletion occurs only when the output will satisfy constraint 4, and nyi-insertion (rule 21) applies otherwise. There are two ways this 'otherwise' condition can be met. One way is for a stem of form #[+dist][+back]rri#. Two such stems occur in the data and are handled by rule 21 with $\alpha = +$. The other way is for a stem of form #[-syll, -dist]irri#, and such a case (should it ever occur) is handled by rule 21 with $\alpha = -$.

7. CONCLUSION

The features 'distributed' and 'peripheral' are not only important for contrastive purposes, but are also very significant as governing factors in morphophonemic processes and in defining natural classes of sounds which occur in those processes and in word level constraints on segment sequences. This conclusion implies that areas of the phonology other than the morphophonemics should also utilise these features as governing factors in processes, for defining natural classes of sounds, and in sequential segmental constraints. Hence, this conclusion constitutes a claim which is open to verification (or refutation) by a study of further aspects of Djinang phonology. This point is taken up in more detail in 'Djinang Phonology' (see pp.1-71 in this volume).

Concerning constraints and rule conspiracies, consider the following:

Although some constraints seem to refer to the morpheme as it appears in the lexicon, other constraints refer to the structure that exists after words have been formed. These constraints refer either to the word or to the syllables that comprise the word.

(Kenstowicz and Kisseberth 1977:149)

We have seen in our discussion of conspiracies, however, that it sometimes makes sense to talk about a constraint and the processes that implement that constraint. It might well be the case that there are static constraints that must be formulated at the morpheme level, and that in addition there are processes that work to enforce these constraints in the course of derivations.

(Kenstowicz and Kisseberth 1977:154)

The rules presented in this paper support these claims, given a morpheme-based lexicon.²⁶

Lastly, by means of the rules and constraints described in this paper, Djinang can be analysed as having just three major verb classes.

N O T E S

1. Sometimes spelt as Yandjinang or Djinhang in the literature.
2. On maps, the Glyde river is often shown as the Goyder. Actually, the Goyder flows into the Arafura swamp, and the Glyde flows from the swamp to the sea.
3. Actually, the suffixes code tense, aspect, and mood information.
4. Except for a small class of verbs which take no inflection at all, and very often occur with an inflected verb having the same meaning.
5. The suffix *-ban* has the meaning '*now*' when the time reference is present time; for past or future times it has the meaning '*then*' or '*at that time*'.
6. The term '*irrealis*' was suggested by A. Capell, in a private communication.
7. The time reference may be from one to many days in the immediate past, so long as a known specific time is being referred to.
8. These three classes will be defined in section 4.
9. After a stem final *mi* syllable, a transition syllable *yu* occurs before the suffix *-wi*, instead of the vowel change *i#* → *u#*.
10. There are two examples in the data, having a stem final *gi* syllable. This syllable is deleted from the stem and there is no suffixation in the non-past category. That is, *yani* and *mini* instead of

*yan.gingi (or *yan.gigi) and *minigingi (or *minigigi) for the non-past inflection. In addition, for today past, minali instead of *minigingili (compare group 6 verbs).

11. The phonemes /j/ or /ch/ are deleted also, if preceded by a stop.

12. By 'irregular' I mean that the behaviour for the non-past and today past categories does not appear to be determinable by reasonable phonological processes. Accordingly, I have treated this as a small group of partly irregular verbs.

13. The stems are giri 'go, do', and nunjirri 'run, do quickly'.

14. Also, /b/ becomes /w/, except for the stem #bu# which gives bi-pirni instead of *wu-pirni.

15. The inflected forms of these two verbs in this group are as follows: jirriji, jarri, jarrinyi, jirriyi, jirrinyiri, jarrinyini 'stand up, be awake'; ngurriji, ngurri, ngurrinyi, ngurriyi, ngurrinyiri, ngurrinyini 'sleep, lie down'. The order of presentation of these verb forms is that of the left to right order of suffix categories in Chart 5.

16. When this suffix occurs, if the vowel /i/ occurs in the first syllable of the stem, that /i/ changes to /a/.

17. There are also non-verbal phenomena which indicate the importance of the peripheral class of sounds. These phenomena are more suited for inclusion in a description of Djinang phonology, and so will not be treated in this paper.

18. Yolngu, meaning 'people', is a word used extensively by Aborigines in northeast Arnhem Land to refer to themselves. Murngic languages, to which group Galpu, Gupapuyngu, and Djinang belong, are often referred to as 'Yolngu' (or 'Yuulngu') languages (Voegelin and Voegelin 1977: 241).

19. In this section, by 'verb' I am referring to the word level construction of stem plus suffix, after all relevant morphophonemic rules have applied.

20. It is not clear from the data whether /r/ patterns identically to /rr/ for verbs in this class. I am presuming identical patterning on the basis of apparent identical patterning in (a) verb stem class I, and (b) consonant clusters (see Appendix 1).

21. Alternatively, linking conventions (Chomsky and Halle 1968) could be used for a redundancy of this type. I will not consider this possibility any further in this paper.

22. Only those phonemes within the natural class that actually occur in the verb data are included in the braces.

23. From Hyman (1975:119), the square bracket notation denotes co-occurrence restrictions. That is, a rule $A \rightarrow B / \begin{bmatrix} C \\ D \end{bmatrix} ___ \begin{bmatrix} E \\ F \end{bmatrix}$ is a conflation of the two rules $A \rightarrow B / C ___ E$, and $A \rightarrow B / D ___ F$.

24. It is permitted to have a /gigi/ sequence across a morpheme boundary within a stem, although I only know of one such case at the present time. It is the class III stem: gurn.gi-girn-ji (literally: *head-having-verbaliser*) which means '*cause (someone) to think*' or '*cause (someone) to consider*'.

25. It could be argued that these two different strategies for avoiding this sequence furnish further evidence that /rr/ occurs stem finally at the systematic phonemic level in group 11 at least.

26. Word level constraints and the processes which conspire to enforce them are a part of Djinang phonological structure irrespective of whether the lexicon is morpheme-based or word-based. It is not my intention to endorse all aspects of Kenstowicz and Kisseberth's (1977) theoretical position.

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APPENDIX 1

Consonant Clusters

In the chart, the symbol 'R' implies that the only examples of such a cluster involve clusters which occur across a reduplication boundary within a stem (whether a noun or verb stem). It can be expected that further fieldwork will add entries to the chart, and that the occurrences of the symbol 'R' will be eliminated in some portions of the chart. In the cluster C_1C_2 , the first consonant, C_1 , is on the left side of the chart, and the second consonant, C_2 , is on the top of the chart.

$C_1 \backslash C_2$		+dist								-dist												
		-son				+son				-son				+son								
		p	ch	k	b	j	g	m	ny	ng	w	y	t	rt	d	rd	n	rn	l	rl	rr	r
+dist	-son	p				+		+	+	+												
		ch	+			+	+	+	+													
		k				R	+	+	+		R					R						
	+son	m	+	+		+	+		+	+												
		ny		+	+		+	+	+													
		ng			+	+	+	+	+	+						R						
	w			+	+	+	+	+														
	y	+	+	+	+	+	+	+		+					R							
-dist	-son	t	+	R	R		+	+														
		rt	+	R	R		+	+							+							
	+son	n	+	+	+	+	+	+	+						+							
		rn			+	+	+	+	+	+	+				+							
		l	+	+	+	+	+	+	+	+	+				+							
		rl	+	+	+	+	+	+	+	+												
		rr	+	+	+	+	+	+	+	+	+	+	+									
		r	+	+	+	+	+	+	+	+	+	R		+								

The rows which represent clusters with the initial segment a voiced obstruent have been omitted because there are no such clusters permitted in the language (see rule 6, an obligatory rule which devoices obstruents which occur cluster-initially).

The following observations can be made from the chart:

- (1) Clusters of form C[-dist, +son] are not permitted.
- (2) Voiced obstruents may not precede another consonant.
- (3) Clusters of form C[-dist, -son] are permitted only when the following conditions obtain: (i) If the first consonant is apical (i.e. [-dist]), the cluster is either a rhotic preceding a homorganic voiceless stop, or an apical non-rhotic sonorant (i.e. n, rn, l, or rl) preceding a homorganic voiced stop; (ii) Clusters of form [+dist] [-dist, -son] are not permitted except across a reduplication boundary (i.e. the reduplication boundary must be ranked with a word boundary, since phonotactic constraints break down across it).
- (4) Statistically, the majority of clusters are comprised of the sequence [+son] [+periph, +dist]. Only slightly less frequent is the sequence [+son] [-periph, +dist]. In the latter sequence, the verbaliser morpheme, -ji, is very productive in the formation of clusters of this type.

APPENDIX 2

Verb Data

In this appendix a list of verbs, each inflected for the non-past category, is given. The non-past suffix is separated from the stem by a hyphen. Beside the citation form of the verb the English gloss is given. Any other comments are stated following the gloss.

In those groups of verbs which do not have a large membership (at the time of writing), all the verbs for that group are listed. When the membership in a group exceeds about 20 verbs, only a selection of the verbs in the group are given. The abbreviation 'etc.' at the end of a list indicates that the list is a sample only; while the absence of 'etc.' signals that all the known forms are listed.

When giving a sample, I have tried to list both long and short stems along with more 'average' length stems. I have also included a selection of 'complex' stems (those with several closed syllables). By so doing, I have attempted to give the reader a sufficient variety of stems so that alternative analyses to the one that I have presented may be tried.

No significance should be attached to the order in which the verbs are listed. Syllabic nasals (all syllabic nasals in Djinang are not phonemic) will be marked by the symbol ',' below the nasal concerned.

In this appendix, 144 verbs are listed, comprising approximately 70% of the corpus on which this paper is based.

Class I group 1

rlurlurlumi-gi	'pull off in strips'
lapmiri-gi	'open'
jiti-gi	'pull'
muchpini-gi	'build'
yigili-gi	'swim, wash'
birru-gi	'bring, take'

ra-gi	'go inside'
warti-gi	'swear at, make trouble'
rindi-gi	'cut off, tear off'
jarlbirni-gi	'push pieces together'
mukmi-gi	'stop talking'
rdiyrdiyimi-gi	'search for head lice'
wali-ki	'crawl' (irregular suffix in non-past)
etc.	

Class I group 2

buchinjirrku-gi	'listen' (lit. ear-self-give)
raku-gi	'catch by a line'
marrika-gi	'wait'
yulgu-gi	'come, meet, arrive'
ga-gi	'bring, take'
milkurru-gi	'mix'
wayku-gi	'stand up, be ready to go'
yani	'send' (stem: yan.gi occurs with suffixes in other categories)

Class I group 3

rarripar-gi	'mend, sew' (lit. edge-spread)
jukmarr-gi	'spit'
marr-gi	'pick up, get, understand'
bar-gi	'rise up (fluid or tide), spread'
jar-gi	'cut, chop'
rar-ki	'roll string on thigh' (irregular suffix in non-past)

Class I group 4

mirnrdirrbi-gi	'eat'
mirnibi-gi	'close'
gaypi-gi	'take away from'
gilibi-gi	'hang up'
rarrigaypi-gi	'share' (lit. take-edge from)
barlpi-gi	'jab, pound, press'
jirrilbi-gi	'drop'

Class I group 5

barlangawji-gi	'flood, smother, surround'
bardiriji-gi	'shoot'
mijirrji-gi	'erase (by rubbing)'
burrjiji-gi	'wipe clean, wipe dry'

wikwikji-gi	'empty, throw away'
gurn.gigirnji-gi	'suggest, cause to think or consider'
michi-gi	'make, create'
yirrarji-gi	'dig for water'
yirrachi-gi	'scratch, shave, scrape'
wupwupji-gi	'blow (with the mouth)'
nguyinyji-gi	'sneeze'
kurchi-gi	'gather, pick up'
murchi-gi	'be sick'
wichi-gi	'shout'
rduchi-gi	'squeeze'
wuywuychi-gi	'shake to and fro' (transitive)
garji-gi	'whisper'
kitkitji-gi	'laugh'
chilchi-gi	'leak'
dapchi-gi	'cramp, feel pain of a wound'
ngamamaji-gi	'make, form'
palpalji-gi	'do something while balancing (e.g. climb)'
nuchi-gi	'urinate'
garrayji-gi	'be good'
jagaji-gi	'take care of'
gururlji-gi	'visit'
chatchatji-gi	'wake (someone) up by shaking'
wukirriji-gi	'write'
pirriji-gi	'wind up'
manbiji-gi	'make hard'
wachi-gi	'protrude'
etc.	

Class I group 6

giri ~ kiri	'go, walk, do'
nunjirri	'run, drive, fly, do quickly'

Class I group 7

yarlbu-ngi	'peel'
rarrigalbu-ngi	'sharpen' (lit. edge-put)
bu-ngi	'hit, kill, make'
galbu-ngi	'put, put down'
marnbu-ngi	'be hard, be hot (sun)'

Class I group 8

manya-ngi	'find, try'
yanya-ngi	'request'
nya-ngi	'see, read, look at, consider'

Class II group 9

jamirr-gi	'steal'
balibirr-gi	'extinguish'
gamirr-gi	'dig'
nyumirr-gi	'smell, be odorous'
ngamirr-gi	'paint'
warrijirr-gi	'ignite'
walijirr-gi	'ask another to walk with oneself'
rurrchimirr-gi	'wash'
rdirnrdimirr-gi	'pinch'
wirrimirr-gi	'scrape, shave bark off a tree, sharpen'

Note: stem final /rr/ of each stem in this group is deleted before all suffixes except today past.

Class II group 10

gachi-gi	'hold, catch, obtain, reach destination, be grouped together'
bach-gi	'cook'
bulchi-gi	'tell'
rirrchi-gi	'roast'

Class II group 11

gilgirr-gi	'hide'
ngagirr-gi	'cover'
yagirr-gi	'put into (a container or bag)'

Note: stem final /rr/ of each stem in this group is deleted before all suffixes except today past and non-past.

Class II group 12

jalchibi-gi	'lift up'
yirrp-gi	'stand up, set straight, position, stop at destination (to do something)'
kali-ki	'possess, have, be married' (irregular suffix in non-past)
barrpi-gi	'rub together'
gurrpi-gi	'chase, follow'
garrpi-gi	'twist, tie'
mildirrp-gi	'show, point at'
marribi-gi	'lose, forget'

Class II group 13

birrinjingil-gi	'turn over, translate'
ngalwarchil-gi	'rest, breathe heavily'
jarrpinjil-gi	'make'
wirnijingil-gi	'bring back, return to original position'

Note: stem final /l/ of each stem in this group is deleted before all suffixes except non-past.

Also, the irregular verb: rani (non-pst), randinmi (y-pst), rarri (imp), ran.girri (t-pst) 'spear, stab', is a class II verb which cannot conveniently be fitted into one of the groups 9 through 13. At the time of writing, I have observed this verb inflected only for the categories listed above.

Class III group 14

nyini-ji	'sit, be'
gubi-ji	'leave alone, go away'
gingi-ji	'think, consider, remember'
bali-ji	'die'
nuki-ji	'suck, ingest'
galmi-ji	'fall, blow down'
milbali-ji	'blink' (lit. eye-die)
yawngi-ji	'be afraid'
wangi-ji	'speak, say'
jabirwangi-ji	'yawn' (lit. mouth-say)
ngurriwangi-ji	'snore' (lit. nose-say)
wirni-ji	'return'
buchalmi-ji	'ask'
galgali-ji	'vomit'
riki-ji	'rain'
walmi-ji	'cross over'

Class III group 15

burrchirri-ji	'burn'
marrngirri-ji	'hear'
walngirri-ji	'dance, play'
yilchirri-ji	'move' (i.e. change the position of)
kukirri-ji	'walk about'
birrmirri-ji	'sing'

Class III group 16

ngurri-ji	'sleep'
jirri-ji	'stand, wake up'

Class III group 17

jalngji-ji	'like, desire, want' (often occurs in the form jal with no inflection)
mirnji-ji	'be cold'
rdardawji-ji	'stop, cease'
jalgiji-ji	'be hurt, hit oneself (in grief), be angry'
yichiji	'nod, give assent' (suffix normally lacking in the non-past. But if suffix is present, verb takes the form yichi-yi-ji)
gapirnji-ji	'be wet'
kumirji-ji	'be cold'
dalwarji-ji	'be lazy'
mardakarrichi-ji	'be angry, seek trouble'
dulpiji-ji	'be sated'
mirigiji-ji	'be bad, be broken, be tired'
ngalbirkiji	'be intensely hungry, be intent on a course of action' (suffix lacking in non-past)
gujirriji-ji	'feel tired'
wurpmji-ji	'be one'

Also, the irregular verb: binji ~ binchi (non-pst), binjirri (y-pst), biniyi (imp), bininyiri (t-pst-irr), binjini ~ binchini (t-pst) 'say as follows, do like this', is a class III verb which cannot be fitted conveniently into one of the groups 14 through 17. At the time of writing, I have observed this verb inflected only for the categories listed above.