NOTES ON KONJO PHONOLOGY

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The phonology of Konjo (a member of the Makasar Family of languages, South Sulawesi stock) is one of the more complicated on the island of Sulawesi. These notes, detailed but not exhaustive, discuss such interesting phenomena as assimilation and gemination processes. The study frequently shows the need for further investigations, whether historical-comparative, morphological or syntactic, for this phonology cannot stand by itself. The framework, a modified standard generative approach, is adequately free of technical difficulties so that the reader may reformulate the ample data in his own theoretical preference.

0 Introduction[1]

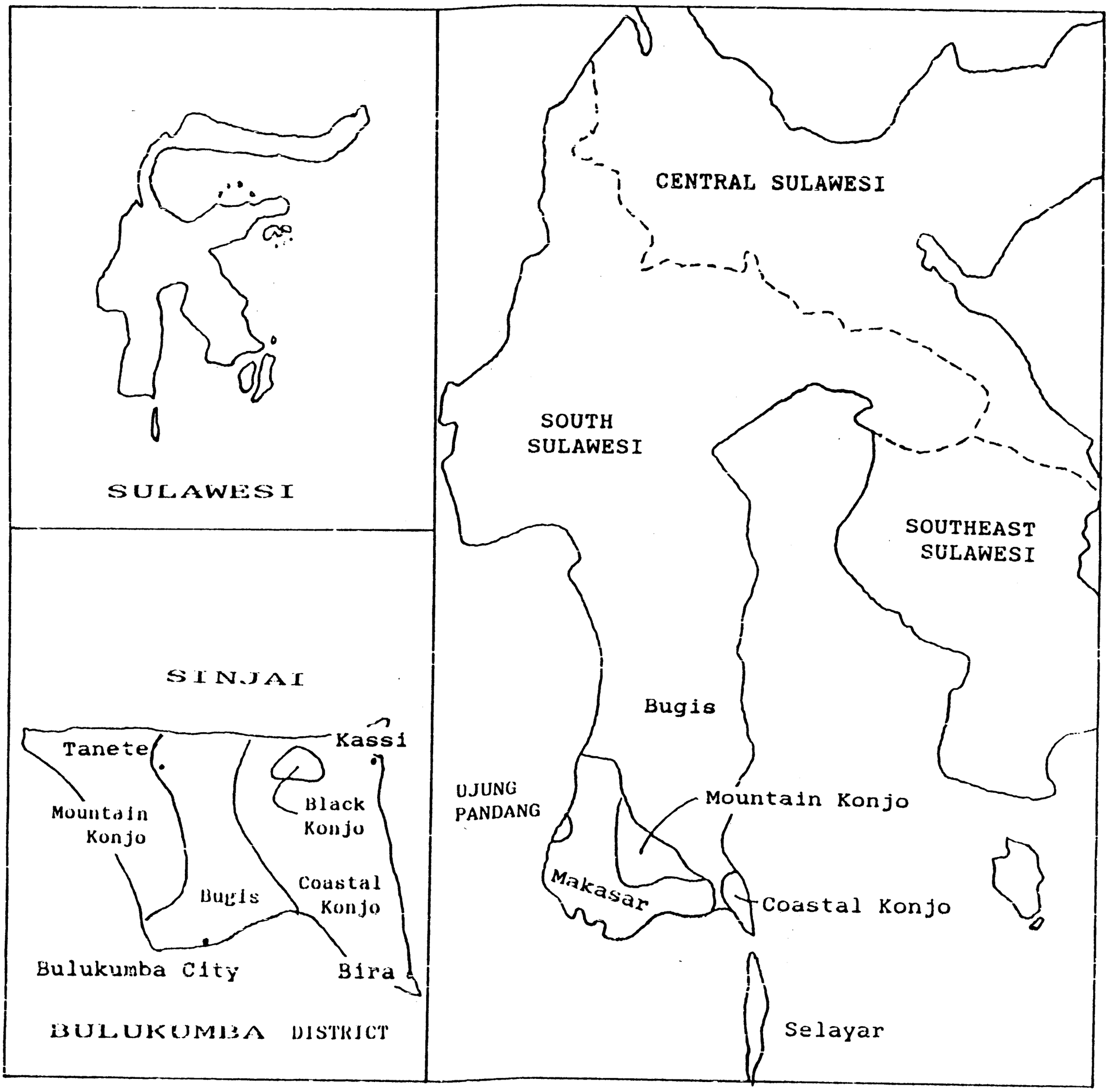
Konjo designates the language of some 200,000 people living in South Sulawesi. It lies between the dominant Bugis and Makasar languages, and has frequently, especially for socio-political reasons, been called a dialect of Makasar. Konjo shares a number of features with both Bugis and Makasar, but as a member of the Makasar family of languages (Grimes and Grimes, 1987), it is more closely related to Makasar (and family member Selayar). (Bugis is not a member of the Makasar family.) Konjo and Makasar are end points of a dialect chain, separated lexico-statistically at about 70%.

Within Konjo there are two major dialects, here termed mountain and coastal Konjo (after Grimes and Grimes). In terms of mutual intelligibility and lexico-statistics (75%), they should be considered separate languages. (There is minimal chaining between them.) However, their phonologies are nearly identical. (With only minor morphophonemic, morphological and syntactic differences, the factor which makes them distinct is their vocabularies.)

These notes reflect the coastal Konjo language situation. Coastal Konjo is itself a dialect chain running north and south. The changes are small between adjacent communities. The whole chain represents a divergence of perhaps 10-15%. The most marked differences are at the northern and southern extremes. At the northern end lies the culturally distinct Tana Toa area. In the south the Ara and Bira areas are distinct, showing an increasing affinity with insular Selayar to the south. Again, the differences noted are largely lexical. The field work giving rise to these notes was done in the twin villages of Jannaya and Kalimporo in Kajang subdistrict. Just to the northwest lies Tana Toa.

1 Segmental Phonology

The segmental phonology of Konjo is rather straightforward. The following chart gives the phonetic values as they appear to the researcher on early contact. Other phonetic detail will be discussed in the course of this paper.



Map of Konjo Language

	bilabial	dental	alveolar	alveo-palatal	palatal	velar	glottal
voiceless stop	p	t				k	ʔ
voiced stop	b		d			g	
voiceless affricate				č			
voiced affricate				ǰ			
nasal	m		n		ñ	ŋ	
semivowel					y		
fricative		s					h
trill			r				
lateral			l				

Chart 1a. Phonetic Values of the Konjo Language (Consonants)

	front	central	back
high	i		u
mid	e	ə	o
low		a	

Chart 1b. Phonetic Values of the Konjo Language (Vowels)

At an underlying level there are seventeen consonantal segments and five vowel segments in the language. The particular segments are those that head the columns in the following fully-specified (less those values not relevant for specifying given sounds) distinctive feature matrix for Konjo.

	i	e	a	o	u	p	t	c	k	b	d	j	g	m	n	ñ	ŋ	r	l	s	h	ʔ
syllabic	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
sonorant	+	+	+	+	+	−	−	−	−	−	−	−	−	+	+	+	+	+	+	−	−	−
consonantal	−	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	−	−
continuant						−	−	−	−	−	−	−	−							+	+	−
delayed release						−	−	+	−	−	−	+	−									
nasal	−	−	−	−	−									+	+	+	+	−	−	−		
anterior						+	+	−	−	+	+	−	−	+	+	−	−	+	+	+		
coronal						−	+	+	−	−	+	+	−	−	+	+	−	+	+	+		
high	+	−	−	−	+	−	−	+	+	−	−	+	+	−	−	+	+	−	−	−	−	−
low	−	−	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+
back	−	−	+	+	+	−	−	−	+	−	−	−	+	−	−	−	+	−	−	−	−	−
round	−	−	−	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
voiced	+	+	+	+	+	−	−	−	−	+	+	+	+	+	+	+	+	−	−	−	−	−
lateral																	−	+				

Chart 2. Fully-specified Distinctive Feature Matrix for Konjo Segments

2 Phonetic Miscellania

The main contribution of these notes will be the part that identifies the processes operating on underlying forms and resulting, when the derivation has run its course, in surface phonetic representations. However, it is appropriate to make a number of comments on phonetic matters at the outset. Not everything mentioned here will be handled in the rules given later, nor will everything covered in those rules be given preview here.

The semivowel /w/ does not occur. /w/ is represented in correspondence sets by /h/ and /b/. Makasar /bawi/ 'pig', Konjo /bahi/; Makasar /bawa/ 'mouth', Konjo /baba/. [y] arises only by epenthesis at morpheme boundary. What is /y/ in other languages is usually borrowed into the Konjo language as /j/ and a putative proto-/y/ has become /j/ in Konjo. Makasar /kayu/ 'wood', Konjo /kaju/.

The underlying set [+anterior, +coronal] is represented by dental [t] and [s], and alveolar [d], [n], [r] and [l]. /r/ is phonetically a trill; /rr/ a trill of longer duration. The sequence /nr/ is [n^dr], hereafter represented only as [nr].

Root words of two and three syllables are common. Root words of four or five syllables are not uncommon, e.g., [bìnsaléssere] 'a kind of parrot'. Words with derived and inflected affixes may number seven or more syllables. See the discussion on stress for instances of the latter.

There is phonetic alternation between [a] and [ə], the latter occurring before phonetic geminates. Actually there are three vowel heights for /a/: low, before single consonant segments or nongeminate sequences; raised, before voiceless geminates and nonnasal sonorant geminates; and schwa before nasal geminates. A few nongeminate sequences show a raised vowel, [lá^ntaŋ] 'deep'. Thus,

(1)	/a/	[a]	[bátu]	'rock'	[máka] (ordinalizer)
		[a^]	[bá^ttu]	'come from'	[numá^kkala] 'to laugh'
		[ə]	[bə́nne]	'seedrice'	[məŋŋaŋ] 'weary'

Hereafter both [ə] and [a^] will be represented as [ə].

/e/ also has variants, [ɛ] (lax) before nasal-stop sequences and in open syllables and [e] (tense) elsewhere, even before geminate stops and geminate nasals.

(2)	[bɛ́mbɛ]	'goat'	[kɛ́kɛ]	'to dig'
	[dɛ́ppa]	'kind of cake'	[kɛ́kke?]	'torn'
	[bɛ́nteŋ]	'pillar'	[lɛ́lleŋ]	'do repeatedly'

Hereafter both [e] and [ɛ] will be represented by [e].

Some free variation has been noted, but has not been mapped either geographically or sociolinguistically. There is variation between /l/ and /n/ in a few words, such as [talía], [tanía] 'not', the latter perhaps being from neighboring Bugis. There is some hint of the typical Austronesian /i/ and /e/ as well as /u/ and /o/ variation, but quite minimally. For example, [mía?], [méa?] 'to speak' as well as [ambáoŋ], [ambáuŋ] 'to rise'. Yet there are minimal pairs as [páo] 'mango' and [páu] 'to report' that permit no variation. Finally, there is more widespread variation between /c/ and /s/ as in [čídoŋ], [sídoŋ] to sit'.

The five vowels may appear in sequence, that is, without intervening consonant, according to the following array:

V_1 \ V2	i	e	a	o	u
i	--	ie	ia	io	iu
e	--	--	ea	eo	--
a	ai	ae	--	ao	au
o	oi	oe	oa	--	--
u	ui	ue	ua	--	--

Chart 3. Possible Konjo Vowel Sequences

These are real sequences of vowels and not merely diphthongs. When the stress is on the first of these in root forms, the addition of a stress-changing suffix will shift the stress to the second member of the pair. See the discussion of stress for details. Sequences of like vowels arising through morpheme concatenation are disallowed by either of two rules, Vowel Degemination or Vowel Glottalization, both rules maintaining the preferred CV syllable structure. Potential /ei, ou, uo/ sequences might be disallowed because of phonetic nearness; indeed /ie/ is found in only a few root words, and thus the symmetry is nearly complete; an example of this is /rie?/ 'to be', a high frequency word. What is interesting in this regard is that adjacent root syllables, whether their vowels are separated by one or two consonant segments, also largely conform to this putative word (root) structure constraint against /ei, ie, ou, uo/ sequences. Thus there are no roots with adjacent [ou], for example, and to date our collection of several thousand roots shows only five instances of [...oC_1u...], for example, /pa+ropu/ 'robber'.

In addressing our dictionary database in the preparation of Appendix One, we observed some interesting patterns. For example, the vowel sequence /ae/ with following glottal is rare, but with following /ŋ/ is common, whereas the vowel sequence /ai/ is rare with following /ŋ/ but common with following glottal. Clearly a kind of complementarity exists, for whatever reasons. Indeed adjacent sequences of vowels are themselves relatively rare, having been recorded in just over 200 roots to date. Combinations with /a/ are most common, whereas /e/ and /o/ least common, a proportion which corresponds roughly to that of single vowel occurrences. These occurrences and nonoccurrences are interesting. Whether they are explainable phonetically or are idiosyncratic to Konjo or areal languages remains to be determined.

3 Syllabification

A casual look at Konjo utterances shows a rather uncomplicated structure to the sequencing of segments. The seventeen consonantal and five

vowel segments combine in very restricted ways to form larger units of speech. (See Appendix One for exhaustive examples of positions of segments within the word.)

Word initially at most a single consonant segment may occur. Glottal stop occurs optionally and variably in this position phonetically, but it is of no systematic significance. Later morphophonemic evidence will be given for this claim. Thus only sixteen consonantal segments occur word initially. (See the distinctive feature matrix of Chart 2 above for an inventory of occurring segments.) Any of the five vowel segments may occur initially in the word.

Word finally only [ŋ] and [ʔ] have phonetic representation among consonant segments. Any of the five vowel segments may occur word finally.

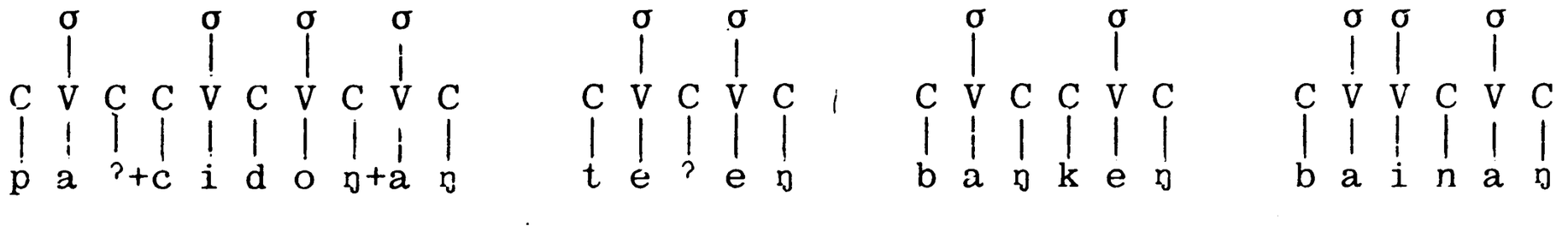
Within morphemes and across morpheme boundaries at most two consonants may be juxtaposed in sequence. This will be discussed at length in these notes, for much bears on such sequences. However, here we only want to address the issue of syllabification.

After the concatenation of morphemes and the application of certain rules, we have for [pàtyčidóŋaŋ] 'chair', (literally) 'place of sitting', [téʔeŋ] 'tea', [báŋkeŋ] 'leg' and [baínaŋ] 'a kind of starfruit', following Clements and Keyser (1983):

(3)

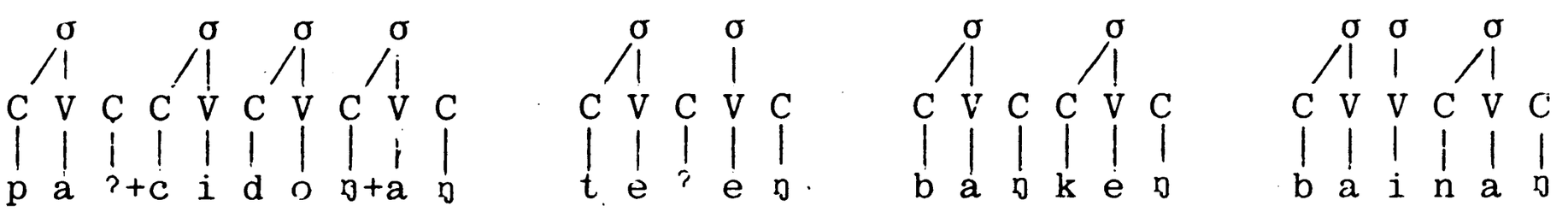
Each vowel is a peak; each consonant segment a nonpeak. (Epenthetic [y], the only segment of any question, functions as a nonpeak in Konjo; see below for discussion.) In order to form syllables, each V or peak is attached to a syllable node.

(4)



The next step is for consonants to the left to be attached to the syllable node so long as no specific (Konjo) language constraints are violated. The results are as follows:

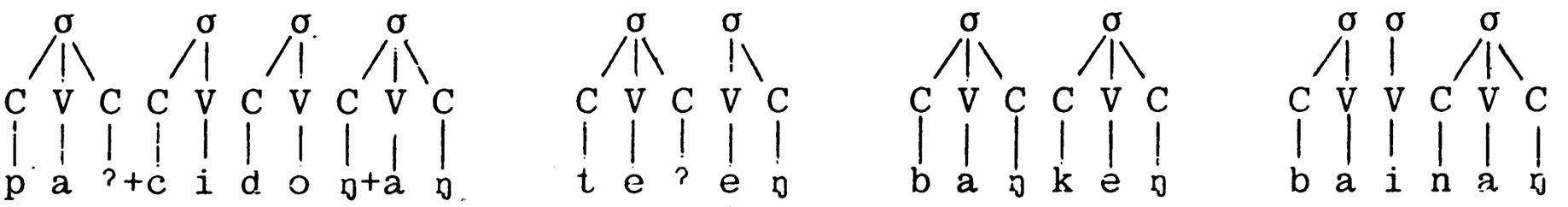
(5)



The glottal in 'chair' and the first ŋ in 'leg' are not attached to their respective second syllable nodes in the preceding step because both violate the constraint in Konjo against consonant clusters word initially. The glottal in 'tea' is not attached to the second syllable node for that would violate the constraint against having a word begin with a glottal.

The final step is to attach all unattached segments to a syllable node to their left (that is, the syllable node receives attachments from unattached consonants on the right):

(6)



From these steps to determining syllabification a number of items may be observed: First, a single consonant syllabifies with a following vowel; second, except that /ʔ/ is allowed only as a syllable closure. This particular syllabification with glottal, though it is exceptional to that

of all other intervocalic segments, is consistent with word-final glottal occurrence and its absence word initially: [té?.eŋ] and [pá?.a?] 'chisel'. Third, a sequence of consonants is only allowed across syllable boundaries. Fourth, syllable structure ignores morpheme boundaries.

4 Vowel Copy

Having to this point given the underlying segments of Konjo, which include /?/, and having discussed briefly the structure of the syllable, we are now in a position to discuss two interrelated matters: our justification for positing glottal as an underlying segment and the status of the monosyllable.

First we discuss the status of the monosyllable. There are no phonetic monosyllabic representations in the language that may stand alone as a phonological word. Such monosyllabic morphemes as /ri/ (all-purpose preposition) 'in', 'with', 'to', 'at', 'by' and /ka/ 'because' are phonologically bound to what follows them.

What we do find is a restricted class of phonetically disyllabic words in which glottal stop occurs between identical vowels. Some of these are borrowed as shown in (7); others are apparently native (8).

(7) [lé?eŋ] 'glue, paste' source: Indonesian 'lem'
[té?e?] 'to type' source: Indonesian '(ke)tik'

(8) [sé?e?] 'cough'
[bá?a] (contradictory response particle)

In each of the borrowed forms, the source of the borrowing is monosyllabic. If we assume the underlying forms of all these words are monosyllabic, the limited distribution of intervocalic glottal can be accounted for. The following rule of Vowel Copy (9) operates on underlying monosyllabic roots and gives disyllabic phonetic representations. Underlying forms for (7-8) are /leŋ/, /te?/, /se?/, /ba/.

(9) **Vowel Copy:** $\#\ C_o\ V\ C_{o\#} \rightarrow 1\ 2\ 3 \begin{bmatrix}\text{-consonantal}\\ \text{-continuant}\end{bmatrix} 3\ 4\ 5$

1 2 3 4 5

(The vowel of monosyllabic roots is copied and a glottal stop inserted between the now two identical vowels.) To the degree that there is any impression at all, the glottal appears to close the stressed syllable, though possibly the glottis is closed as coda and released as onset. Alternatively this rule could be restricted only to copying the vowel, glottal insertion being accomplished by an altered form of Vowel Glottalization (74) below.

We may ask concerning the motivation for such a rule as vowel copy. It appears to us that within the phonology of Konjo, the reason is to provide a penultimate vowel to carry stress. This is not unlike pitch accent in Greek (Helen Miehle - personal communication). This is not to claim that there are not languages with a general penultimate stress rule for multisyllabic words that do not also stress monosyllabic forms. In Konjo, however, this is not so. There may be a wider areal or Austronesian characteristic that we are not aware of. It is clear that in Indonesian nonborrowed, monosyllabic forms are almost nonexistent.

Now we may turn to the question of our justification for taking glottal as underlying. A look through Appendix One: Segment Positions within Words, quickly suggests a complementary distribution for [k] and [?] in that [k] appears word initially and medially, but not finally. Glottal has no word-initial occurrence, the very restricted medial occurrence just discussed above, and a strong showing word finally. Furthermore, in clusters (to be discussed below) a complementary predictability obtains. Since we have shown that intervocalic glottal is supplied by vowel copy,

the complementarity is complete. Thus [tékeŋ] 'to sign' and [té?eŋ] 'tea' are not evidence for contrast, but rather arise from quite different underlying forms, /tekeŋ/ and /teŋ/, respectively.

Perhaps this complementarity argument may be further strengthened by historical arguments which we have yet to look into. Indeed Makasar has a different distribution of [k] and [?] in identical environments, so that in Makasar we find [apbáluka] 'I sell' where in Konjo we find [apbálu?a], from /balu?/ 'sell' in both cases.

Our reason for positing underlying glottal in Konjo is based on the naturalness of the resulting rules. As will be developed below, there is a strong set of assimilation processes operating in Konjo. With underlying glottal, these are a natural set. If we take /k/ as the source of phonetic glottal, we have to introduce a rule of dissimilation to get the same surface forms.

For the surface forms [pb] and [pp] as in [tápbu] 'sugarcane' and [čúppaŋ] 'frog', for example, we may choose either glottal or /k/ as underlying the first segment in each case. (Anything else fails as will become clear later.) If we choose the underlying sequence /kb/ for [pb], we are forced to write a rule dissimilating the value for consonantal; i.e., /kb/ is ++ for consonantal, but in deliberate to normal speech we find [?b], which is -+ for consonantal. Such a rule would have to be blocked in normal to fast speech, since we find [pb], again ++ for consonantal. If our criterion is fewer and more natural rules, we posit an underlying glottal.

5 Consonant Clusters

As we have already observed, the only phonetic consonantal representations found word finally are [ŋ] and [?], as in [bíriŋ] 'edge' and [ǰúku?] 'fish'.

5.1 Clusters with oral stops and nasals

Utterance medially the following subset of phonetic clusters occurs (the remaining phonetic clusters will be introduced presently):

(10)

pp			mp
?b	~	pb	mb
?m	~	pm	mm
tt			nt
?d	~	td	nd
?n	~	tn	nn
t^{y}č			ñč
?ǰ	~	t^{y}ǰ	ñǰ
?ñ	~	tyñ	ññ
kk			ŋk
?g	~	kg	ŋg
?ŋ	~	kŋ	ŋŋ

The initial column and their alternates represent in the first case deliberate to normal speech and in the case of the alternates normal to fast speech. Of course where no alternate is given the single representation is that of all kinds of speech. We should note too that without instruments to test our transcriptions, it may be that there is a simultaneous glottal closure and assimilation to the point of articulation of following segment rather than just the latter.

The phonetic clusters in (10) above are illustrated by the following

intramorphemic examples:

(11)	[čúppaŋ]		'frog'	[támpo]	'proud'
	[tá?bu]	~ [tápbu]	'sugarcane'	[tímbo]	'grow'
	[čó?mo?]	~ [čópmc?]	'fat'	[kəmmu?]	'lukewarm'
	[héttu]		'time'	[kantíaŋ]	'to hold'
	[sikí?di]	~ [sikítdi]	'a little'	[kóndo]	'egret'
	[pa?níki]	~ [patníki]	'fruit bat'	[tənniŋ]	'sweet'
	[mátʸča]		'clever'	[móñčoŋ]	'green'
	[rá?ǰiŋ]	~ [rátʸǰiŋ]	'difficult'	[íñǰo]	'that' (demonst.)
	[ká?ñi?]	~ [kátʸñi?]	'wing'	[məññaŋ]	'stop'
	[dəkka]		'walk'	[tóŋko?]	'close'
	[galí?gi]	~ [galíkgi]	'shudder'	[láŋga]	'prop up'
	[pó?ŋolo]	~ [pókŋolo]	'dull'	[məŋŋaŋ]	'tired'

For the above forms two analyses suggest themselves. The first possible analysis is one in which the (intramorphemically) underlying forms are homorganic clusters. The underlying segments are as in (12) below, where columns A and B present alternative subanalyses:

(12)	A	B	
	pp		mp
	pb	bb	mb
	pm		mm
	tt		nt
	td	dd	nd
	tn		nn
	tʸc	cc	ñc
	tʸj	jj	ñj
	tʸñ		ñn
	kk		ŋk
	kg	gg	ŋg
	kŋ		ŋŋ

B is a more abstract analysis than A, its underlying forms never finding surface representation. It represents native-speaker intuition as to what the shape of root forms should be, even that of newly literate Konjo speakers. It happens to be very nearly identical with the orthographic form of the language. We dismiss it out of hand, for its double voiced stops not only do not themselves appear in the language, but leave us with sometimes two surface forms (10) to derive.

Column A forms are a serious candidate for the underlying form of Konjo clusters. Their chief appeal is their nearness to surface representations. Indeed with a (12A) analysis every underlying form is also the surface representation of normal to fast speech. We are left only with the need to derive the deliberate to normal speed speech forms of (11) whose first segment is always a glottal stop. Such might be done by Preglottalization rule (13) below:

(13) **Preglottalization:**

$$\begin{bmatrix} C \\ -voiced \end{bmatrix} \text{---> [-consonantal] } /\_\_\_\_ \begin{bmatrix} C \\ +voiced \end{bmatrix}$$

(This rule formalizes a process that makes a voiceless stop into a glottal stop in clusters where the second member is a voiced stop (whether nonnasal or nasal). Redundancy rules would fill in other relevant values, for

example, [+low]. No rule is needed to derive the third column in 12, for the surface forms and the putative underlying forms are identical.)

It should be noted that this analysis posits the fast-speech forms as underlying and derives the slower speech forms by rule (13).

A second analysis is that of (14) in which the first member of each underlying cluster is either glottal or [ŋ].

(14)

ʔp	ŋp
ʔb	ŋb
ʔm	ŋm
ʔt	ŋt
ʔd	ŋd
ʔn	ŋn
ʔc	ŋc
ʔj	ŋj
ʔñ	ŋñ
ʔk	ŋk
ʔg	ŋg
ʔŋ	ŋŋ

In this analysis the first member in each cluster is identical with either of the two possible word-final consonant representations, [ʔ] and [ŋ]. In fact a monolingual, but literate Konjo, if asked to read or recite any of the forms in (11), but told to stop after the syllable closed by the first member of the consonant sequences here under discussion, would end all such syllables either with [ʔ] or [ŋ]. This is analytical speech, one step slower than that of deliberate speech.

If we are to choose this analysis we need an assimilation rule to turn underlying glottal and [ŋ] into the proper surface forms, those that are homorganic with the following segment. General Assimilation rule (15) below will derive the observed phonetic representations in (10) from the underlying forms in (14).

(15) **General Assimilation:**

$$[-\text{syllabic}] \longrightarrow \begin{bmatrix} +\text{consonantal} \\ \alpha\text{anterior} \\ \beta\text{coronal} \end{bmatrix} \quad / \_\_\_ \quad \begin{bmatrix} -\text{syllabic} \\ \alpha\text{anterior} \\ \beta\text{coronal} \end{bmatrix}$$

(This rule makes any nonvocalic segment (glottal and [ŋ] here) agree with a following consonantal segment in point of articulation. [+consonantal] brings glottal into the oral cavity. Redundancy rules adjust such features as [low, back], etc. In other respects (nasality, voicing) no change takes place. See below for the specification for the feature continuant.)

We note here that this analysis posits "analytical" speech forms as underlying and derives fast speech forms. We will return below to the matter of the relationship between speed of utterance and surface representation.

The two analyses presented above both more or less handle the data of (11), that of intramorphemic clusters. We may look at the same range of clusters, but now across morpheme boundaries. (16) gives intermorphemic examples for the same phonetic clusters of (10).

(16)

[əppáñǰa]	'to fish with net'	[ampéla?i]	'(I) discard it'
[a?báča] ~ [apbáča]	'to read'	[ambúaŋ]	'to drop s.t.'
[a?mía?] ~ [apmía?]	'to speak'	[ə̀mmeái]	'to urinate on s.t.'
[əttáǰaŋ]	'to wait for'	[ànɪəppúsi]	'to complete s.t.'
[a?déppo?] ~ [atdéppo?]	'to dike up'	[andídi?]	'to shiver'
[à?naŋkála] ~ [àtnaŋkála]	'to plow'	[ənnánro]	'to keep'

[at^{y}čála?]	'to hook s.t.'	[àñčalúŋi]	'to bridle (horse)'
[a?ǰámma?] ~ [at^{y}ǰámma?]	'to tattle'	[añǰáma]	'to work'
[a?ñáha] ~ [at^{y}ñáha]	'to breathe'	[əññóa-ñóa]	'to guzzle'
[ə́kkalaháki]	'to shepherd'	[àŋkaluppái]	'to forget s.t.'
[a?gére?] ~ [akgére?]	'to slit throat'	[aŋgóra]	'to yell at s.o.'
[a?ŋóe?] ~ [akŋóe?]	'to bellow'	[əŋŋú?ma?]	'to make strapping'

All the forms in (16) have a morpheme boundary between the segments thus clustered. Additionally, all data cited are grammatical, but sometimes only in a wider context. Thus for [ampéla?i], the [am] allomorph is required with a definite subject and a definite object, as with [inə́kke ampéla?i] 'I discard it' (1sPRO VRt+discard+3A).

The two initial morphemes are /a?/, the intransitive verbalizer prefix, and /aŋ/, the transitive verbalizer prefix. We may justify the underlying form /aŋ/ by reference to its interaction with vowel-initial roots, as in [əŋŋə́lle] 'to take' from /aŋ+alle/. /a?/ is a bit harder to justify, as its behavior before vowel-initial roots produces, for example, [əmméntəŋ] 'to stand' from /a?+əŋtəŋ/. We take /a?/ as underlying because a part of the surface representations shows this form unchanged. By applying a rule of assimilation we can get the alternate forms.

The phonetic clusters within morphemes (11) are identical with those across morpheme boundaries (16), for this initial subset of data. Thus there is independent evidence for positing a rule of the sort given in (15), General Assimilation, for intermorphemic alternations. Rule (13), Preglottalization, is needed only to derive surface forms by the first analysis given above; it has no independent status. We thus follow the second analysis (14) which makes the first segment of all underlying consonant sequences within morphemes either /?/ or /ŋ/.

We also find examples illustrating General Assimilation root or utterance finally, as with [anə́kku] 'my child' from /ana?/ 'child' and /ku/ (1sPO) and [buhúnna] 'his well' from /buhuŋ/ 'well' and /na/ (3sPO).

5.2 Clusters with [r l s]

To the data already considered we may now add a second subset. The material to be discussed here relates to three additional consonant segments, /r l s/. Consider the phonetic clusters of (17):

(17)	rr	?r ~ tr	nr
	ll	?l ~ tl	
	ss		ns

The clusters above occur intramorphemically as illustrated in (18):

(18)	[pə́rriŋ]	'k.o. bamboo'	[sé?re] ~ [sétre]	'one'	[gánraŋ]	'drum'
	[tə́llu]	'three'	[lá?laŋ] ~ [látlaŋ]	'shade'		
	[gə́ssiŋ]	'healthy'			[bánsa]	'similar to'

The data above illustrate some interesting developments. First, we earlier observed that word finally the only consonants to occur are /?/ and /ŋ/. Our choice of the same underlying segments as the first (syllable-closing) segment for the consonant sequences of (10) (as displayed in (14)) showed

some structural consistency. That consistency is now weakened by the first column examples in (18) above, which show a possibility of syllable-final [r l s]. Phonetic representations do not always reflect underlying regularity, but at least for the data with [r] above, there already seems to be place for first position underlying /ʔ/ and /ŋ/. We tentatively accept the need to add /rr ll ss/ to our inventory of underlying consonant clusters. We shall return to syllable final /r l s/ presently.

The second development we observe is that there are some phonetic holes. Do these represent underlying gaps as well?

Let us look at phonetic representations for the same clusters intermorphemically.

(19)

[aʔríʔbaʔ] ~ [atrípbaʔ] 'to fly'	[anrúiʔ] 'to pull'		
[əllíli] 'to veer'	[aʔlága] ~ [atlága] 'to quarrel'		
[əssə́ssa] 'to wash clothes'		[ansúroi] '(I) order him'	

(18) and (19) show that with the exception of [rr], every phonetic cluster involving [r l s] intramorphemically is also found intermorphemically. [rr] does not occur across morpheme boundaries.

The two members of each row in (19) represent a word-initial /aʔ/ or /aŋ/ morpheme, as clarified by the following: [əllíli] represents /aŋ+lili/ while [əssə́ssa] represents /aʔ+sassa/.

In order to capture the process by which /ŋl/ becomes [ll] we posit rule (20) Lateralization:

(20) **Lateralization:** [+nasal] ---> [+lateral] / ____ [+lateral]

(A nasal segment becomes lateral before another lateral.) Underlyingly /ŋ/ is the only nasal to precede /l/ in sequence. It may be that /ŋ/ becomes a velar lateral by the application of (20), then becomes [l] by late-applying redundancy rules. Alternatively, if (20) is ordered after (15) General Assimilation, /ŋ/ has already become [n] prior to the application of (20). We tentatively take this second approach.

All intramorphemic occurrences of [ll] probably arise from /ll/. There is no reason to posit /ŋl/ within morpheme roots. It would be interesting to find cognates with /nl/ intramorphemically in other South Sulawesi languages to check the historical development of the sequence; to date we have no examples.

The other process observed in (19) is /ʔs/ becoming [ss]. To formalize the process, we might suggest rule (21) Spirantization:

(21) **Spirantization:**

$$\begin{bmatrix} -\text{consonantal} \\ -\text{continuant} \end{bmatrix} \text{---} > \begin{bmatrix} +\text{consonantal} \\ +\text{continuant} \end{bmatrix} / \_\_\_ \begin{bmatrix} -\text{sonorant} \\ +\text{continuant} \\ +\text{anterior} \end{bmatrix}$$

(Simply stated: glottal becomes [s] before /s/. Full values for the features anterior and coronal would later be supplied by redundancy rules.) Rule (21) must apply before (15) General Assimilation. The reverse order of application would fully bleed (21) of any input, for (15) changes all glottals to [t] before /s/.

Alternatively, we may formulate rule (22) Assibilation and order it following General Assimilation (15).

(22) **Assibilation:**

$$\begin{bmatrix} -\text{continuant} \\ -\text{nasal} \\ +\text{anterior} \\ +\text{coronal} \end{bmatrix} \text{---} > [+\text{continuant}] / \_\_\_ \begin{bmatrix} -\text{sonorant} \\ +\text{continuant} \\ +\text{anterior} \end{bmatrix}$$

(Simply stated: /t/ becomes [s] before /s/.)

The differences between rules (21) and (22) are minimal. First, (21) is simpler than (22) by one feature. Both relate crucially to General Assimilation, Spirantization necessarily preceding it and Assibilation necessarily following it. Since both are kinds of assimilation processes anyway and since rule application tends to be maximized, we take here a third alternative, that of making General Assimilation more general so that it will directly change glottal to [s] before /s/. We may do this simply by adding to the form of (15) the variable feature [γcontinuant] to both the structural change and the environment segment. This assures us of glottal becoming [t] before /t/ and [s] before /s/. (See Appendix Two.)

There is no reason to posit the underlying sequence /ʔs/ intramorphemically. In borrowings from Indonesian the sequence ks (the k is [k] and not glottal before [s]) becomes /ss/ in Konjo. Thus siksa 'torture' is borrowed into Konjo and lexicalized as /sessa/ 'to be burdened'; paksa 'necessity', 'force' as /passa/ 'to force'. Incidentally, that Indonesian syllable-final k is normally glottal, but here [k] is a different strategy to avoid the same glottal-s sequence.

5.2.1 Final /r l s/

Before we continue with other consonant sequences in Konjo, it is appropriate here to return to the observation made at the beginning of this section, that sequences of [rr ll ss] introduce the fact of syllable-final /r l s/ in addition to /ʔ ŋ/, whereas only the latter have been observed to occur word finally. How is this imbalance to be explained? Consider the following data:

(23)

[píkkiri]	'stingy'	[ródili]	'carry on end of stick over shoulder'	[nípisi]	'thin'
[lísere]	'seed'	[ápele]	'memorize'	[kékese]	'dig with hand'
[báñara]	'to pay'	[jámala]	'naughty'	[kápasa]	'cotton'
[ənnoro]	'to go via'	[pótolo]	'pencil'	[lótloso]	'to fray'
[páuru]	'shingle of thatch'	[búnrulu]	'brush'	[gámbusu]	'stringed instrument'

These data, arranged in three columns each reflex of which has [r] [l] or [s] as its final consonant segment, display two regularities. The first regularity is that each item here is stressed on its antepenultimate syllable. This is significant because in the later discussion of stress, it will be seen that stress is added by rule to the penultimate syllable. (We have already seen that Vowel Copy (9) creates disyllabic forms of monosyllabic roots, ostensibly providing a second syllable for penultimate stress.)

The second regularity is that the final two vowels in each reflex are identical, i...i, e...e, a...a, o...o, or u...u. This echo vowel, sometimes called paragogic in descriptions of other local Austronesian languages, can be created by rule (24) Echo Vowel from underlying word-final /r l s/.

(24) **Echo Vowel:**

$$V\begin{bmatrix} +\text{consonantal} \\ +\text{continuant} \end{bmatrix} + \Big]_{\text{root}} Y \quad \text{---> } 1\ 2\ 1\ 3\ 4$$

1 2 3 4 where Y ≠derivational affix.

(This rule states that a root-final /r l s/ is padded with a vowel identical to that which precedes it, except when followed by a derivational affix. That is, this rule is blocked from applying when affixal material of a derivational nature follows the root; thus /leŋbar/ ---> [lémbara] 'to carry items on both ends of pole', but /leŋbar+aŋ/ ---> [lembáraŋ] 'pole for such carrying'.)

This rule (24) allows for a much simpler stress rule (to be presented later), if it is ordered after Stress.

We should note that borrowings ending in r, l, s give evidence for Echo Vowel. Thus Indonesian kantor > [kántoro] 'office'; botol > [bótolo] 'bottle'; kertas > [karáttasa] 'paper'.

We should also note that not all reflexes with [r l s] as the final consonant segment derive by way of Echo Vowel, even if the final two vowels are identical. Thus, [bičára] derives from underlying /bicara/ 'speak'. That this is not exceptional is seen in the penultimate stress placement.

We now see that indeed underlyingly we have five possibilities word-finally, /ʔ ŋ r l s/. The structural balance of syllable and word-final segments is maintained, though it gets lost at the surface.

5.3 Clusters with [h]

Before we may look at the data involving clusters with [h], it is necessary to go back and look at some detail previously ignored.

The data on intermorphemic clusters above were generally taken from the interaction of two grammatical morphemes with following roots, namely, /aʔ/, an intransitive verbalizing prefix, and /aŋ/, a transitive verbalizing prefix. Several clusters, however, show alternations, not previously presented. Limited to concatenation of roots with /aŋ/ only, we find added to the expected phonetic representations of row (25) those of (26).

(25) mp nt ŋk ns

(26) mm nn ŋŋ ññ

The phonetic clusters of (26) are illustrated by the following data, all given in "full verb form"[2].

(27)	[ə̀mminə́haŋ]	'to follow'	[əmmə́laʔ]	'to discard'
	[ənnápbaŋ]	'to fell'	[ənníhara]	'to throw'
	[əŋŋánre]	'to eat'	[ə̀ŋŋalə́ttaʔ]	'to gnaw'
	[əññéŋka]	'to stop by'	[əññábuŋ]	'to soap'

Thus we find both (28) and (29) for the same root /pinahaŋ/ 'to follow.'

(28)	[ə̀mminə́haŋŋa]	/aŋ +pinahaŋ +a/	'I follow'
		VRt follow 1sA	
(29)	[inə́kke ə̀mpinə́haŋko]	/inakke aŋ +pinahaŋ +ko/	'I follow you'
		1sPRO VRt follow 2fA	

The difference between the strings containing the two clusters [mm] and [mp] here is roughly that between the undefined terms "transitive indefinite" and "transitive definite". There is no need to arbitrarily tag one grammatical function of /aŋ/ as triggering one phonetic realization, and a second function as triggering the other realization, if the whole string subject to segmentation rules can be marked, for there are grammatical morphemes present in the string triggering [mp] (especially, definite object) not present in that triggering [mm].

The phonetic alternation shown above is limited to the voiceless stops [p t k] and [s], and, as we shall now see, [h]. These form a natural class designated by [-sonorant, -delayed release, -voiced] that also includes glottal, which in Konjo does not occur morpheme (or root) initially as

other class members do. The phonetic representations of these two grammatical functions of /aŋ/ fall together in roots beginning with all other consonant segments. See Chart 5 below and its single footnoted exception.

The alternations just discussed share phonetic turf, as it were, with other forms. Thus intermorphemic clusters [mm nn ŋŋ ñ̃ñ̃] might represent either roots with initial /p t k s/, respectively, or those with initial /m n ŋ ñ/. There are a number of diagnostics by which we may determine the root-initial segment. For (30) we may elicit (31), thus clarifying (32) as the root form and not (33).

(30) [əŋŋánrea] /aŋ +ʔanre +a/ 'I am eating.'
VRt eat 1sA

(31) [ápa nukánre] /apa nu +kanre/ 'What are you eating?'
what 2fE eat

(32) /kanre/ 'root to eat' (33) */ŋanre/

(The root or underlying forms of (27) are as follows: /pinahaŋ/ 'to follow'; /pelaʔ/ 'to discard'; /taʔbaŋ/ 'to fell'; /tihar/ 'to throw'; /kaŋre/ 'to eat'; /kalaʔtaʔ/ 'to gnaw'; /seŋka/ 'to stop by'; /sabuŋ/ 'soap'.)

With some full forms we find unexpected roots, notably those with initial /h/. We find the three phonetic clusters of (34) as illustrated by (35).

(34) [ʔb mm ŋh]

(35) [aʔbájua kadéra] 'I am making a chair.'
[əmmíntiŋŋa lóka] 'I am carrying bananas (hanging from hand).'
[inə́kke aŋhójai èmberéina] 'I am looking for his pail.'
/inakke aŋ +hoja +i eŋber +na/
1sPRO VRt look for 3A pail 3PO

Diagnostically we may determine all such roots to be h-initial. But why it is that such roots show three phonetic manifestations as in Chart 4 below, we may only speculate.

/h/	"b-like" (voiced)	"p-like" (voiceless)
labial	[ʔb]	[mm]
velar	[ŋh]	

Chart 4. Root-initial Phonetic Representation of /h/

1. /h/ is "b-like", for in the combination /ʔ+h/ (intransitive) its representation is [ʔb]. There is evidence here that needs to be sorted out diachronically. Thus Makasar has [báji?] while Konjo has [háji?], both meaning 'good'. Further, within Konjo itself we have alternations of the following type: /halli/ root, 'to buy'; [əmməlli], full transitive verb form; /balli/, 'price'. Why /h/ should be altered at all might stem from its value as [+continuant] being juxtaposed to [-continuant] for /ʔ/. Though sequences of oral cavity segments do show this juxtaposition (compare English [st] 'steer' and [ts] 'catsup' (by one pronunciation)), it is the deft tongue as articulator that makes it possible. According to our understanding, physiologically it is much more difficult to make such a transition entirely in the larynx without aid from the oral cavity and empirically much rarer among world languages. Thus the stage is set for a boost from the Konjo oral cavity. But what articulatory position shall it be? Of the four in Konjo /p t c k/, /t/ and /k/ differ from /h/ in

five features; /c/ differs from /h/ in six features; but /p/ only in four features. Bilabial similarity to /h/ explains the choice.

But why voiced [b] should be the phonetic realization we may only make a plausible diachronic effort at explanation at this point. Areal languages and dialects show correspondences among /b/ and /w/ and /h/. As has already been noted above for Konjo, nouns from the same root are found with initial /b/ while their verbal counterparts are often /h/. Thus there is analogical pressure for voiceless /h/ to be realized as voiced [b].

2. /h/ is "p-like", for in the combination /ŋ+h/ (transitive indefinite) its representation is [mm]. Of course [mm] is not voiceless at all, but as voiced [mm nn ŋŋ **ññ**] arise from the combination of the transitive indefinite function of /aŋ/ and following root-initial voiceless /p t k s/, respectively, so [mm] also arises from /aŋ/ in combination with /h/ (become p-like).

3. /h/ is velar, becoming [ŋh] in combination with preceding /aŋ/ (transitive definite). Of course /h/ as [-anterior, -coronal] fits very well with /ŋ/ of the same values for those two features. Why the phonetic representation is velar, not becoming [mp], we have nothing to suggest.

To account for the processes demonstrated by the data in this subsection, we need to posit several rules. We first treat the alternations in (26-27). What we want is a rule which will turn /ŋ/ and following /p t k s h/ into [mm nn ŋŋ **ññ** mm], respectively.

If we ignore the /ŋh/-become-[mm] data for the time being, we may formalize the other alternations in a rule (36) Obstruent Nasalization.

(36) **Obstruent Nasalization:**

$$\begin{bmatrix} -\text{sonorant} \\ -\text{delayed release} \\ -\text{voiced} \\ \langle +\text{continuant} \rangle \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{nasal} \\ \langle -\text{anterior} \rangle \end{bmatrix} \; / \; X]+ \underline{\quad}\; \text{affix} \begin{bmatrix} +\text{transitive} \\ -\text{definite} \end{bmatrix}$$

(This rule makes the three voiceless stops /p t k/ become their corresponding nasals following the indefinite function of the /aŋ/ prefix, and in the case of /s/ makes it both nasal and [-anterior], that is [ñ], in the same conditioning environment.[3] The diacritical marking on the affix [+transitive, -definite] probably needs to be revised. What is meant is that this rule applies to any string containing the transitive verbalizing prefix /aŋ/ that has no definite object - an indefinte object is permitted.)[4]

The other process observed here in the data is that necessary to labialize /h/ (34-35). Since the data show an alternation wider than merely that of /ŋ+h/ to [mm], if we can labialize /h/, Obstruent Nasalization above will automatically take care of /ŋ+h/ (become /ŋ+p/) becoming [mm].

First we handle the subset, /ʔ+h/ ---> [pb]. This is a strange change indeed, but it is part of the adjustment or assimilation prosess of synchronic Konjo. We may make our rule a bit simpler if we let (15) General Assimilation turn glottal into [p]. As written General Assimilation will turn glottal into [k] before /h/ (both [k] and [h] sharing the feature specification [-anterior, -coronal], so we must order our effort at H-labialization before General Assimilation, so that we get, not [k], but [p].

(pre-37) **H-labialization:**

$$\begin{bmatrix} -\text{syllabic} \\ -\text{consonantal} \\ +\text{continuant} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{continuant} \\ +\text{anterior} \\ +\text{voiced} \end{bmatrix} \; / \; \begin{bmatrix} -\text{consonantal} \\ -\text{continuant} \end{bmatrix} \underline{\quad}$$

(This very specific rule turns /h/ into [b] following glottal.)

The next subset is /ŋ+h/ --> [mm]. This process (no more natural than the preceding) may be made more palatable by intermediately deriving /ŋp/ from /ŋ+h/ and then letting Obstruent Nasalization (36) apply, giving us /ŋm/ to which General Assimilation will apply, resulting in [mm].

We observe a parallel change now between the process before us, /ŋ+h/

--> [ŋp], and that covered in (pre-37), H-labialization, viz., /ʔ+h/ --> [ʔb]. Following glottal we get a voiced segment, and now here following /ŋ/ we get a voiceless segment. We may account for both changes by an amended rule of H-labialization which is sensitive to the preceding segment, whether /ŋ/ or /ʔ/. The change needed is one of dissimilation of voicing, so that following voiceless /ʔ/ we get the voiced segment [b], whereas following the voiced nasal segment /ŋ/ we find voiceless [p]. The rule as amended follows:

(37) **H-labialization:**

$$\begin{bmatrix} -\text{syllabic} \\ -\text{consonantal} \\ +\text{continuant} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{continuant} \\ +\text{anterior} \\ \alpha\text{voiced} \end{bmatrix} \; / \; \begin{bmatrix} -\text{continuant} \\ -\alpha\text{voiced} \end{bmatrix} \; \underline{\quad}$$

condition: must not apply in strings containing definite object.

(This rule makes /h/ become [b] following glottal, and [p] following /ŋ/.) Strings that contain a definite object must not undergo (37), for such sequences must show the sequence [ŋh] and not [mm]. This restriction on the applicability of H-labialization is not the same as the restriction on Obstruent Nasalization (36). In the former case (36) the restriction to affixes that are [+transitive, -definite] is to affect the whole natural class /p t k s h ʔ/, though glottals never occur in that structural description and /h/ has been changed to [p] by prior application of H-labialization.

5.4 Another phonetic cluster [mm]

We have one more intermorphemic cluster that belongs by analogy to those discussed above, viz., [mm]. It does not fit with any of the three previous sources of the same representation. That is, it does not arise from /ŋ+m/ as in [ə̀mmaéi] 'to come towards s.t.' (root /mae/ 'to come'), nor from /ŋ+p/ as in [əmmáke] 'to make' (root /pake/) nor from /ŋ+h/ as in [əmmúbusu] 'to put cleaned rice into water' (root /hubus/). Note the following forms where it does occur.

(38)	[əmmíkkiri]	'to tremble (of skin)'
	[əmménteŋ]	'to stand'
	[əmmánnoro]	'to go by way of'
	[əmmónaŋ]	'to float'
	[əmmúruŋ]	'to sound, race motor'

The diagnostic for these intransitive forms shows their roots to be /iʔkir/, /eŋteŋ/, /aŋnor/, /onaŋ/ and /uruŋ/, all vowel initial. With intransitive /aʔ/ plus vowel-initial root we are left to derive our surface [mm] forms from /ʔ+V/.

We suggest the following ad hoc rule to formalize this unnatural process, Glottal Nasalization (39). A later rule (58) doubles the /m/.

(39) **Glottal Nasalization:**

$$\begin{bmatrix} -\text{consonantal} \\ -\text{continuant} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{nasal} \\ +\text{anterior} \\ -\text{coronal} \end{bmatrix} \; / \; \underline{\quad} \;] + \text{V}$$

/aʔ/ prefix

(Rule (39) states that the glottal of the /aʔ/ prefix becomes [m] before a vowel initial root.)[5]

The unnaturalness of this rule is motivation for us to look into historical and areal relationships for the purpose of understanding better the larger picture of which this is a part. Five brief observations/questions

follow which may be fruitful points of departure in further investigation. 1. [mm] from /ʔ+V/ may result from analogy to [ŋŋ] from /aŋ+Root/. 2. In glottal becoming [m], there is some parallel to h-labialization where /ŋ+h/ becomes [mm] and /ŋ+h/ becomes [ʔb], also both involving a change from glottal positions to bilabial articulation. 3. Might Konjo /aʔ/ be related to something like Indonesian ber, an analogous morpheme beginning with a labial stop? 4. Might the [ŋŋ]:[mm] couplet be related to n and m in verb morphologies in Central Sulawesi languages? 5. The Konjo lexicon is rather thin on m-initial root forms. How does this relate?

5.5 Summary of consonant clusters

We have seen a number of phonetic consonant clusters operating in the language. The following rules summarize the processes at work.

1. General Assimilation (15)
2. Lateralization (20)
3. Obstruent Nasalization (36)
4. H-labialization (37)
5. Glottal Nasalization (39)

The following Chart 5 summarizes the clusters discussed in the preceding section.

	/aʔ/ intransitive	/aŋ/ transitive indefinite	/aŋ/ transitive definite
p	pp	mm	mp
b	pb	mb	mb
m	pm	mm	mm
t	tt	nn	nt
d	td	nd	nd
n	tn	nn	nn
č	t^yč	t^yč[6]	ñč
ǰ	t^yǰ	ñǰ	ñǰ
ñ	t^yñ	ññ	ññ
k	kk	ŋŋ	ŋk
g	kg	ŋg	ŋg
ŋ	kŋ	ŋŋ	ŋŋ
r	tr	nr	nr
l	tl	ll	ll
s	ss	ññ	ns
h	pb	mm	ŋh
V	mm	ŋŋ	ŋŋ

Chart 5: Root-initial Segment Phonetic Representations in Combination with Preceding /aʔ/ and /aŋ/.

We should address briefly why it is that we choose to lexicalize roots with intramorphemic two-segment consonant sequences (other than /rr ll ss/ as having the first member of each set /ʔ/ or /ŋ/. Since these are invariable, why choose an underlying form that differs from the surface? First, let us ask, what other underlying form might we choose? For nasals the choice is clearly the stop homorganic to the following consonant; thus, for example, /mp nr ñǰ ŋk/. But the choice is not so clear for sequences whose first member is not a nasal, and especially those whose second member is a voiced stop. In trying to pick the 'correct' underlying representa-

tion here, we are forcibly reminded that there is indeed variation; thus for [-nasal] - [-sonorant, +voiced] sequences, we find for example both [ʔb] and [pb]. So we are left to decide on either of these as underlying, or perhaps even to side with native speaker intuition and go with /bb/! It is natural for sounds to assimilate to adjacent sounds, especially in faster speech modes. Thus it is better to take the phonetic representation of slow speech, [ʔb], and assure by rule its assimilation to [pb], than it is to do the opposite, a far less natural process. Second, we choose the underlying forms for these sequences that we do, because every rule needed to get them from underlying to surface representation is already independently motivated.

Returning to assimilation for a moment, we observe impressionistically that the assimilation process for glottal doesn't happen at the same time for differing environments. In slow speech the assimilation process is complete only before voiceless segments [-voiced], that is, before /p t c k s/. (Notice that /h/ becomes [b] before this process takes place.) In moderate speech we find assimilation complete also for glottal before the sonorants [+consonantal, +sonorant], that is, before /m n ñ ŋ r l/. Finally in fast speech we find assimilation of glottal complete before the voiced stops [-sonorant, +voiced], that is, before /b d j g/. Schematically it appears to us to look something like the following:

<table>
<tr><td rowspan="2"></td><td colspan="3">speed of utterance</td><td rowspan="2">conditioning segments</td></tr>
<tr><td>slow</td><td>moderate</td><td>fast</td></tr>
<tr><td rowspan="4">/ʔ/ ---></td><td colspan="3">p,t,ty,k,s</td><td>[-voiced]</td></tr>
<tr><td>(no change)</td><td colspan="2">p,t,ty,k</td><td>[+sonorant]</td></tr>
<tr><td colspan="2">(no change)</td><td>p,t,ty,k</td><td>[+voiced
-sonorant]</td></tr>
</table>

Chart 6: Initiating Speeds of Utterance for Glottal Assimilation to Take Place.

The question arises, how might we capture these differences in a formal way? It appears to us that the answer probably lies in a theory of universal phonetics and thus need not be addressed by the grammar of Konjo. (Alternatively, this might be handled by variable rules a la Labov.)

Finally, notice that, except for /h/, there is a striking parallel here with what happens in Indonesian when meng- precedes p, t, k and s-initial roots. The difference is that in Konjo the obstruent, having conditioned the assimilation of the preceding nasal, becomes itself the corresponding nasal (resulting in gemination), whereas in Indonesian it is deleted. Alternatively it could be said that after nasal assimilation the stop is deleted, as in Indonesian, and then a process at work generally in Konjo (to be presented later) geminates the nasal. The /s/-to-[ñ] correspondence (rather than /s/-to-[n]) is more widespread than Konjo. It occurs also in Indonesian.

6 Gemination and Related Processes

There are a number of processes in Konjo that relate to an extensive phenomenon of gemination. These will be discussed in this section.

6.1 Glottal strengthening

Observe the following data (40):

(40)	[ríe?]	'to be'	[riékiɣi]	'there still is'
	[téke?]	'to carry on saddle'	[tekékaŋ]	'load carried on saddle'
	[pánra?]	'ruined'	[ə̀mmanráki]	'to ruin'
	[lúmpa?]	'to jump'	[áko ?lumpə́kki]	'don't jump'
	[kéo?]	'to call'	[keókaŋŋa]	'call s.o. for me'
	[háɣi?]	'good'	[haɣíkaŋ]	'better'

Each line in (40) pairs a glottal-final root with a form using that root and some suffix. Important for our purposes now is the fact that glottal word finally is strengthened to a [k] in those forms followed by certain suffixes. Stress shift is also apparent. This is a wider phenomenon than that of glottal-to-[k] strengthening, as seen in (41) where root-final vowel or [ŋ] shows the same stress shift. It is clear enough that stress shift conditions glottal strengthening, but we cannot say that it is the presence of stress on the immediately preceding vowel that is the specific conditioner, as shown in (42) where two following suffixes pull the stress off the root entirely to the vowel immediately following the root-final glottal. It seems rather that the absence of stress on the root penultimate vowel is what is significant.

(41)	[áko taɣéŋŋia]	'don't wait for me'	from /tajaŋ/	'to wait for'
	[letléŋaŋ]	'it is blacker'	from /le?leŋ/	'black'
	[áko maéi]	'don't come'	from /mae/	'come'
	[putéaŋ]	'whiter'	from /pute/	'white'

(42) [ɣáko pə̀ppetəkkéŋŋia] 'don't make porridge for me' from /peta?/ 'porridge'

The effective set of derivational suffixes in Konjo is two: /aŋ/ and /i/. The former covers many functions, including benefactive, comparative, nominalizer, adverbializer. The latter also does multiple service including functions of prohibiting, transitivizing, perpetualizing. (These also combine with certain prefixes in other derivational functions.) These two suffixes, as well as the inflectional (nonclitic, stress-shifting) warning suffix /a/, are those which activate glottal strengthening. (For ease of discussion, all glottal-strengthening and stress-shifting affixes will be referred to as derivational affixes hereafter.) Other inflectional endings, which we take to be clitics, do not affect stress shift and do not cause glottal strengthening.

We formulate in rule (43) below Glottal Strengthening:

(43) **Glottal Strengthening:**

$$\begin{bmatrix} -\text{continuant} \\ -\text{consonantal} \end{bmatrix} \text{---} > \begin{bmatrix} +\text{consonantal} \\ +\text{back} \end{bmatrix} \; / \; \overset{V}{\underline{\quad\quad}}^{+} \; \Big] X \Big]_{root}$$

X = one or more derivational affixes

(This rule states that a root-final glottal becomes [k] when followed by one or more derivational affixes.) We might have preceded the structural description with $\begin{bmatrix} V \\ -\text{stress} \end{bmatrix} C_o$, but that is clearly redundant information, for derivational affixes do cause the stress to shift from expected root penultimate position.

Glottal Strengthening does not apply to forms resulting from Vowel Copy, for the glottal introduced there is not morpheme final.

We earlier stated that underlying final glottal was to be preferred over an underlying /k/, because the overall rules would be fewer and more natural. If we had chosen underlying /k/ as basic, we wouldn't have needed this rule (43), but would have needed a rule of word-final glottalization.

6.2 A-gemination

Now consider the following sets of data:

(44)

[ǰáko aǰérri?i]	'don't teach him'	[əŋŋáǰarai]	'he teaches'
[ǰáko nùməkkálli]	'don't laugh'	[ànuməkkalai]	'he laughs'
[bàlabássəŋŋa]	'draw a line for me'	[àpbalábasako]	'you draw a line'
[áko ?lisákki]	'don't step on it'	[atlísa?a]	'I step (on s.t.)'

(45)

[áko tihárri?i]	'don't throw it'	[áko beséri?i]	'don't argue with him'
[áko əssálli?i]	'don't (ceremonially) blow on him'		
[áko báñǰu?-bañǰúli]	'don't joke around'		
[áko təlléssi?i]	'don't let it live'	[áko bollósi?i]	'don't mill it'
[áko atákki?i]	'don't roof it'	[áko kəllíki]	'don't put up a fence'

(46)

[ènnahárria]	'I am spreading (s.t.) out'
[áko tàhərrí?i (jukúkku)]	'don't scatter (my fish)'
[áko kapélli ...]	'don't make (s.t.) too thick'
[áko kàpəllí?i]	'don't make (everything) so thick'
[kùtəppákki?i]	'I do (s.t.) directly'
[kùtəppəkkíaŋŋi]	'I do (s.t.) directly for him'

(47)

[məŋŋáŋŋəŋŋi]	'he is more tired (than)'
[áko tàpbaŋáŋŋia]	'don't cut it down for me'
[diŋíŋaŋŋi]	'he is colder (than)'

(48)

[bàtaráyya]	'the corn'	[boláyya]	'the house'
[nùmatʸčáyya]	'the clever one'	[makáyya]	'lest that'
[bìasáyya]	'usually'	[aláyya]	'ginger root'

In data set (44) we observe an alternation between each of [r l s] and their doubling, respectively, as well as (glottal become) [k] and its doubling. The environment for these changes is first of all root final. That (root) morphemes may end in /r l s ?/ (as well as /ŋ/) was discussed in 5.2.1.

Second, the gemination observed only occurs before certain affixes. These are the derivational affixes discussed above, viz., /i/ and /aŋ/. The first entry of each pair contains the required affix, the prohibitivizing function of /i/ and the benefactive function of /aŋ/, in these examples. Homophonous [i] as third person absolutive inflectional ending has no such geminating effect, as seen in several second items of the paired examples.

Data set (45) shows a third conditioning effect, that of a preceding /a/. In the examples this vowel is always raised to [ə], a process that will be discussed later. Notice that in the second member of each pair, another vowel, whether [i e o u], does not effect gemination.

Finally, in data set (46) observe that the gemination is independent

of stress on the preceding (root-final) vowel. In the second item of each pair two derivational affixes occur, pulling the word stress to the following syllable, that is, to the vowel of the first derivational suffix.

We may now formulate a rule called A-gemination, given in (pre-49) below.

(pre-49) **A-gemination:**

$$\begin{bmatrix} V \\ +low \end{bmatrix}_1 \quad \begin{bmatrix} -syllabic \\ -nasal \end{bmatrix}_2 \quad +X_{3\ 4} \qquad \text{---> } 1\ 2\ 2\ 3\ 4$$

where X = derivational affix

(This rule states that morpheme final /r l s ʔ >[k]/ (the only nonnasal segments that occur morpheme finally) are doubled when preceded by the vowel /a/ and followed by a derivational affix.) Since there are no [ʔʔ] sequences in Konjo, Glottal Strengthening must apply first, changing glottal to [k].

We might expect that final /ŋ/ also geminates, thus making for a full set of final consonant segments that effects gemination. And that is what we find with slightly different conditioning factors. Data set (47) shows that final /ŋ/ responds to gemination when preceded by the vowel /a/, when followed by derivational affixes[7], but not when the stressed vowel follows the [ŋ] in question, as seen by the Konjo phrase for 'don't cut it down for me.'

We may modify (pre-49) to include the data involving final /ŋ/ as in (49) below:

(49) **A-gemination:**

$$\begin{bmatrix} V \\ +low \end{bmatrix}_1 \quad \begin{bmatrix} -syllabic \\ <+nasal> \end{bmatrix}_2 + \begin{bmatrix} V \\ <-stress> \end{bmatrix}_{3\ 4} \ X_5 \ \Big] \text{---> } 1\ 2\ 2\ 3\ 4\ 5$$

derivational affix

(This final form of the rule states that a morpheme-final consonant segment geminates when preceded by the vowel /a/ and followed by a stress-shift affix, but, specifically in the case of [ŋ], the following vowel must not be stressed.)

Not every /a/ conditions following gemination even if other conditions are met. We should rather say that there are perhaps other conditions that squelch it. It seems that a preceding nasal-stop sequence and a glottal-voiced stop sequence (those perceived as /bb dd jj gg/ by native speakers) override any doubling effect, though there are counterexamples. Thus, /luŋpaʔ/ 'jump' gives [lumpákəŋŋa] 'jump for me', but /tuŋpaʔ/ 'close' gives [tumpákkəŋŋa] 'close it for me'. It appears that nearly minimal pairs show contrast. However, overwhelmingly the sequences just stated stop the expected doubling. More investigation is needed. Suffice it to say at this point, that some variation between words built on the same root and some variation among speakers may indicate that this is a change in process.

A-gemination gets its name from its main conditioning factor, the preceding triggering [a]. This brings to light an interesting circularity, or rather, mutually conditioning environments. /a/ conditions gemination; gemination conditions /a/ (in A-raising below). This is interesting in that historically and synchronically geminate sequences give rise to centralized [a]. Now in certain environments /a/ is geminating certain following consonantal segments.

6.3 Y-epenthesis

Our preceding discussion of gemination has shown doubling of four underlying consonant segments, /r l s ŋ/, and doubling of (underlying glottal become) [k]. There is one other segment that is doubled: y introduced by epenthesis.

Consider data set (48) above. These data are for the most part based on roots that end in /a/, though there are some interesting exceptions. Thus we have /bola/ 'house' and [bolə́yya] 'the house'. (The definitizing /a/ usually is added to vowel-final roots with no other change noted than a stress shift, as in [ə́llo] 'day', [əllóa] 'the day'.)[8] In [nùmatʸčə́yya] /a/ is suffixed to the root /maʔca/ with preceding relativizing /nu/ to form a definite relative clause. [makə́yya] and [bìasə́yya] become adverbial in nature by the presence of the suffix /a/.

The two exceptions each deserve comment. [bàtarə́yya] 'the corn' comes from the root /batar/ 'corn'. With this and all [+continuant, +consonantal] segment-final roots (/r l s/), a definitizing /a/ is added only after the application of the Echo-Vowel rule (24) which, when the echo vowel is [a], gives rise to the data under discussion here. (When the echo vowel is something else, say [o], the addition of the definitizing /a/ affix acts normally, shifting the stress; thus /botol/ 'bottle', [bòtolóa] 'the bottle'.)

The other exception in the data set is [alə́yya] ginger'. This is the only case in the language known to us of a nonepenthetic [y]. It seems that the underlying form should be /alaya/ requiring the positing of an underlying segment /y/, something not done at the beginning of this paper, due to its single occurrence. When 'ginger' is definitized, we get [àləyyə́yya]. It is instructive to note that when /tai/ 'feces' is definitized, we find [taía]. The difference is clear: the [y] is [-syllabic] and does not carry stress, whereas the [i] is [+syllabic] and may carry stress. 'Ginger' is underlyingly /alaya/ and not /alaia/.

We may now formalize Y-epenthesis in rule (50).

(50) **Y-epenthesis:**

$$\emptyset \text{ ---> } \begin{bmatrix} \text{-syllabic} \\ \text{-consonantal} \\ \text{+high} \\ \text{-back} \end{bmatrix} \; / \; \begin{bmatrix} \text{+syllabic} \\ \text{+low} \end{bmatrix} + \_\_\_ \; \begin{bmatrix} \text{+syllabic} \\ \text{+low} \end{bmatrix} \; [\text{+definite}]$$

(This rule states that [y] is inserted following a morpheme-final [a] and before the definitizing /a/ suffix. Since we have noted that the suffix /a/ under discussion also adverbializes, calling it definitizing is not adequate, but we leave it at that here.) Observe that Echo Vowel (24) must precede this rule, for some /a/'s crucial to Y-epenthesis are supplied by the former.

Interestingly, there are no single [y] representations in the language. That is to say, every single [y] is preceded by [a] and followed by a morpheme break (which in turn is followed by another vowel [a]). Thus [y] is everywhere subject to A-gemination which produces [yy]. The only observation necessary is that "definitizing" /a/ is a stress-shift affix only with vowel-final (and /r l s/-final) roots.

We may ask whether the rule in (50) has to be so specific. Suffice it to say that there are forms like [atlámpaʔa] 'I go' from /aʔ+lampa+a/, the final /a/ being 1sA, where a glottal stop is inserted, rather than [y]. This will be discussed below.

6.4 A-raising

Frequently in the data cited above, but especially in data sets (44-48), we observe an [ə] representation. This occurs regularly before

phonetic geminates whether root internally as in (51) below or those that straddle morpheme boundaries as in (52):

(51) [mə́ŋŋaŋ] 'tired'
[pə́rriŋ] 'a kind of bamboo'
[rə́ppuŋ] 'to gather'

(52) [anə́tta] 'your child' /ana?/ 'child', /ta/ 2hPO
[əŋŋínraŋ] 'to borrow' /iŋraŋ/ 'borrow, debt', /aŋ/ VRt
[əppə́llu] 'to cook' /pallu/ 'to cook', /a?/ VRi

The question is, is this a sixth vowel or an allophone of one of the five we have already noted?

A few points may be made for a sixth vowel. First, neighboring Bugis has such a sixth vowel, though Makasar doesn't. Second, there are one or two cases that would fit better with a sixth vowel. Take, for example, the fortuitous minimal pair [lə́ttaŋ] 'carbuncle' and [látaŋ] 'forehead'. Third, there are a few cases where there is evidence of such a representation other than before phonetic geminates, especially before nasal-stop clusters. For example, [lə́ntaŋ] 'deep'. This may be contrasted with such words as [hámbaŋ] 'hot' where we find [a] and not [ə].

Still, overwhelmingly the [ə] vowel representation shows complementary distribution with [a]. Other vowels appear before phonetic geminates, [a] never does, with one or two 'forehead-' like exceptions. Thus we have [ítte] 'to see', [akgénna] 'until', [póssi?] 'navel', [kúttu] 'lazy' but [nə́ssa] 'obvious'.

The vowel, which we take to be /a/, is fully raised to a central [-low] vowel before the geminate nasals. Before other cooperating geminates, it is slightly lower. (We will ignore how this difference in height might be captured in a rule.) How do we indicate the conditioning environment? (53) below shows those geminates that actually condition the raising of /a/.

(53) [pp mm tt nn ñ̃ñ̃ kk ŋŋ rr ll ss]

This set does not form a natural class. If, however, [čč] were admitted then we can describe the set as [asonorant, avoiced]. But since [čč] is really [tštš], we are no longer dealing with phonetic geminates, and furthermore this sequence does not appear in Konjo. Thus within Konjo phonology, we do have a natural class.

We may now formalize a rule of A-raising as in (54) below:

(54) **A-raising:**

$$\begin{bmatrix} \cdot V \\ +low \end{bmatrix}_1 \; C_2 \; C_3 \; \longrightarrow \; \begin{bmatrix} 1 \\ -low \end{bmatrix} \; 2 \; 3$$

where 2=3

(This rule states that /a/ is raised whenever it is followed by a sequence of two identical consonants.) We have to order this rule after the assimilation processes so that all identical sequences arising through derivation may become imput to this rule.

6.5 ŋ-gemination

There appears to be another kind of gemination process operative in Konjo that is different from A-gemination.[9] Observe data set (55) below:

(55) [əŋŋúppa] 'to find' /aŋ+u?pa/
[búhuŋŋa] 'the well' /buhuŋ+a/
[tájəŋŋi] 'he waits' /tajaŋ+i/

The data show that morpheme-final /ŋ/ geminates when a following morpheme is vowel initial. This happens even between words, albeit closely related words only, as we observe in (56):

(56)	[púaŋ ŋəllóŋ]	title + name	/puaŋ#alloŋ/
	[báǰuŋ ŋútaŋ]	'vegetable makings'	/baǰuŋ/ 'ingredients'
			/utaŋ/ 'vegetables'

Both of the foregoing show gemination even in deliberate speech.

This gemination process is only left to right. That is, the triggering /ŋ/ must end the first morpheme and not begin the second. Thus when the adjective prefix /a/ is affixed to an /ŋ/-initial root, there is no gemination. /a/ and /ŋiŋir/ 'bored' result in [aŋíŋiri]. /allo/ 'day' and the completive suffix /mi/ combine without genimation in the longer phrase [sikúraŋ ŋəllomi] 'how many days already'.

(Apparent exceptions are not exceptions but members of another subregularity. Thus with numbers and certain question words, there are actually two sets, one ending with /ŋ/ and triggering gemination; the other without /ŋ/ and not a conditioner of gemination. The former, for example /sikuraŋ/, treats the following noun as a classifier, [sikúraŋ ŋóto luránta] 'how many carfuls of your passengers?' while the latter does not, [sikúra óto] 'how many cars?' But note that this is really not an exception at all. It would be only if there were a final /ŋ/ that did not trigger gemination in the environment of a following vowel-initial root.)

We see in data set (57) below an apparent exception to ŋ-gemination that has already partly been accounted for, in terms of A-gemination.

(57)	a.	[pàkadiŋíŋəŋŋa]	'cool it for me'	/paka+diŋiŋ+aŋ+a/
	b.	[kùdiŋíŋi?i]	'I cool it (ceremonially)'	/ku+diŋiŋ+i+i/
	c.	[pàkatarəŋŋəŋŋa]	'sharpen it for me'	/paka+taraŋ+aŋ+a/

Specifically, a. and b. do not show doubling of root-final /ŋ/ while c. does. Root-final /ŋ/ in c. is doubled because it fits the structural description of A-gemination (49) that requires the post-root segments (VX) to be a derivational affix. A. and b. do not show root-final gemination of /ŋ/: they fail to meet the structural description of A-gemination in that they have no preceding conditioning /a/. And we must see that they also fail to undergo ŋ-gemination by restricting it to apply to nonderivational affix environments only.

We formulate below in (58) ŋ-gemination:

(58) **ŋ-gemination:**

[+nasal] + V X ---> 11234
1 2 3 4 where 34 ≠ derivational affix

(This rule takes any morpheme-final nasal and doubles it when the following morpheme begins with a vowel; the following morpheme may not be a derivational affix.) Those nasals so found are underlying /ŋ/ and the output of Glottal Nasalization (rule (39) above). We illustrate this latter case with [əmmənteŋ] 'to stand'. This is derived from underlying /a?/ intransitive verbalizer and /eŋteŋ/. Glottal Nasalization turns this into an intermediate /am+eŋteŋ/ which ŋ-gemination and other rules take and give us our surface form, that with [mm].

It is instructive to see how the two rules, ŋ-gemination and A-gemination, work on a representative set of data.

(59)	a.	/aŋ+alle/	--->	[əŋŋálle] 'take'
	b.	/diŋiŋ+i/	--->	[díŋiŋŋi] 'it is cold'
	c.	/buhuŋ+a/	--->	[búhuŋŋa] 'the well'
	d.	/baǰuŋ+utaŋ/	--->	[báǰuŋ ŋútaŋ] 'vegetable makings'
	e.	/maŋŋaŋ+aŋ+i/	--->	[məŋŋáŋŋəŋŋi] 'he is more tired'
	f.	/pa+aŋ+pela?+aŋ/	--->	[pèmmelákkaŋ] 'trash can'
	g.	/pa+a?+tajaŋ+aŋ/	--->	[pètta**ǰ**áŋŋaŋ] 'place of waiting'
	h.	/pa+a?+tajaŋ+aŋ+ku/	--->	[pètta**ǰ**aŋáŋku] 'my place of waiting'

A.-d. and the second gemination in e. are accomplished by application of ŋ-gemination, whereas the first gemination in e. and both f. and g. are effected by A-gemination. H. shows a case where stress on the syllable following a nasal blocks A-gemination. Gemination of the same segment would take place by ŋ-gemination, except that ŋ-gemination has the condition that the following morpheme not be derivational. A-gemination with the designation that the following morpheme be a derivational affix includes /aŋ/. Therefore if the two rules were ordered disjunctively, A-gemination applying before ŋ-gemination, the condition on the latter could be dropped for these data. If the condition were dropped and the rules were not ordered as suggested, ŋ-gemination could apply to both parts of e. as well as to g. (and h. as above). We may not drop the condition on ŋ-gemination, however, due to cases like a. and b. in (57) which do not fit the structural description of A-gemination and to which ŋ-gemination must not apply. This similarity causes us to ask whether the processes involved aren't actually one and the same. Though they share obvious similarities, their differences speak for their separation.

7 Stress

Konjo has regular rule-governed stress. The regularities and apparent exceptions fit well within a straightforward statement. Let us examine several data sets, each showing its own regularity.

(60) [gálaŋ] 'wet-rice field' [kóko] 'garden, dry field'

(61)
[haǰíkaŋ]	'to be better (than)'	/haji?/	'good'	/aŋ/	CPR	
[àlluárri]	'to widen something'	/luar/	'wide'	/aŋ/	VRt	/i/ TZR
[áko ?lampái]	'don't go' /ako/ PRB	+2fA	/lampa/	'to go'		/i/ PRB
[ballóna]	'how beautiful'		/ballo/	'good'		/na/ 3PO

(62)
[ríepmi]	'he is here already'	/rie?/	'to be'	/mi/	3CMP
[máeko]	'come here'	/mae/	'come'	/ko/	2fA
[lípa?a]	'the sarong'	/lipa?/	'sarong'	/a/	DET

(63) [pókŋolo] 'dull' [húntulu] 'to find' [dápara] 'floor'

(64) [pá?] ~ [pá?a?] 'chisel' [téŋ] ~ [té?eŋ] 'tea'

(65) [teré?] ~ [teré?e?] 'truck' [saláŋ] ~ [salá?aŋ] 'plastic hose'

(66) [atlíŋ] ~ [atlí?iŋ] 'to abstain from' [anté?] ~ [anté?e?] 'where?'

(67) [bo?bó?] ~ [bo?bó?o?] 'book'[10] [bópbo?] 'cavity in mortar'

(68) [maró?] personal name, vocative [hamó?] personal name vocative
[halinó] ~ [halinó?o] personal name, vocative
[sompilí] ~ [sompilí?i] personal name, vocative

The first of the data sets above (60) illustrates the predominant case, that of roots being stressed on their penultimate syllable. The second set, in (61), shows forms that have an addition of a derivational affix that generally effects a shift in stress from the penultimate syllable of the root form to the penultimate syllable of the derived word. Then with (62) we find cases of inflectional endings that are generally clitics in Konjo. That is, the inflectional ending is not treated as existing for purposes of stress placement.

The next data set (63) illustrates forms that are stressed on their antepenultimate syllable. These have already been discussed above where we introduced the rule Echo Vowel (24). To this point we have seen reflexes stressed on their penultimate syllable. By ordering Main Stress (below)

before Echo vowel, we will place stress on the penultimate syllable of the underlying root form (those forms ending in /r l s/. Application of Echo Vowel will add the final vowel, effectively making the reflex an antepenultimate stressed form.[11]

Data set (64) represents application of the rule presented above as Vowel Copy (9) to monosyllabic roots. In our discussion of Vowel Copy above, it was noted that a variable glottal is inserted between the copied vowel and its original. If that glottal is missing, the resulting juxtaposed vowels degeminate (see Vowel Degemination below (75)). Acoustically stressed vowels are more salient, and among the parameters producing this saliency is length. So even though there is a degemination, if separating glottal isn't present, there appears to be a bit of length. It is difficult to tell whether degeminated vowels, where the retained vowel is stressed, are any longer than any single stressed vowel.

The items in data set (65) appear irregular because, while being disyllabic, they receive stress on their final syllable. Why in the first alternate pronunciation is the last syllable stressed? Our explanation for this is that these forms are underlyingly /treʔ/ and /slaŋ/[12] and, by a rule of obstruent-sonorant declustering, become as first given above.

(69) **Obstruent-sonorant Declustering:**

$$\#\begin{bmatrix}-\text{syllabic}\\-\text{sonorant}\end{bmatrix}\begin{bmatrix}-\text{syllabic}\\+\text{sonorant}\\-\text{nasal}\end{bmatrix}\ V \quad \text{---}> \quad 12434$$

1 2 3 4

(This rules states that a word-initial obstruent-sonorant cluster is declustered by placing a copy of the vowel first occurring after the cluster between the two segments so clustering.) Our explanation becomes plausible in light of these words being Dutch (via Indonesian) borrowings (earlier Indonesian alternate trik has now been replaced by truk). Vowel Copy applies first to give /treʔeʔ/ and /slaʔaŋ/. We might expect a leveling to occur that would reorder Obstruent-sonorant Declustering before Vowel Copy. Then the main stress rule (to be given below) would have a penultimate vowel to stress. Vowel copy would have then been bled of some input.[13]

The forms given in (66) above show another apparent exception. That these words are stressed on their ultima is explained by their first syllables in the forms given above actually being separate morphemes. The underlying forms are respectively /aʔ+liŋ/ and possibly /aŋ+teʔ/. (See concluding remarks below for an alternative analysis of [anté?].) Thus vowel copy (9) as originally given must be altered from preceding word boundary (#) to preceding morpheme boundary (+). (See Appendix Two.) What this says for our formulation of Main Stress below is that penultimate stress must never occur before the word root. But it need not be put into the rule, because Vowel Copy makes all roots disyllabic, providing that it precedes the main stress rule.

The forms in data set (67) appear to be a minimal pair, with the first item 'book' being exceptional. The explanation here is that the second item is a true two-syllable root, while the first is a reduplication on the root /boʔ/, likely a borrowing from Dutch. Again this single syllable root undergoes Vowel Copy, because in the underlying form its reduplicated form is separated from it by a morpheme boundary, /boʔ+boʔ/. It has been claimed that reduplication is an addition of an affix, a claim congruent with the facts of stress assignment on the Konjo form of 'book'. (As with a number of Konjo reduplications, the unreduplicated form has no representation in the language.)[14]

The final data set (68) illustrates final-syllable stress on vocatives. This is regular. Notice, however, that in the last two personal names, each longer than disyllabic, there is an alternative pronunciation. It almost seems as if Vowel Copy operates on these, as elsewhere on monosyllablic or otherwise ultimate-stressed forms, to undo the effect of syllable-final stress. (Disyllabic personal names, indeed anything being addressed, also occasionally show the expansion effects of Vowel Copy.)

We may now formulate Main Stress (70) that accounts for each of the regularities and subregularities noted above.

(70) **Main Stress:**

$$V \text{ ---> } [1\text{stress}] \; / \underline{\quad} \; C_o \langle V \; C_o \rangle \;] \quad \langle\text{-vocative}\rangle$$

(This rule says that a vowel receives primary stress when it occupies the penultimate syllable nucleus in a nonvocative utterance. When the form is vocative, the ultimate vowel is stressed.) The reflexes in the foregoing data sets depend crucially on the ordering Vowel Copy, Main Stress, Echo Vowel. When the last phonetic syllable(s) are clitic, they are not counted in determining the stress. This is accomplished, according to Mohanan (1986), by adding the outer lying inflectional affixes in a different strata from that in which the derivational affixes are added. The stress and related rules would apply to the earlier strata. As we noted in note **9**, we are unsure as to how this applies to certain forms.

Following are several examples of secondary stress in Konjo with roots underlined:

(71) [na<u>ísse?</u>i] 'He knows (how to do) it.'

[làna<u>ísse?</u>i] 'He will know (how to do) it.'

[tàlana<u>ísse?</u>i] 'He doesn't know (how to do) it.'

[làna<u>patʸ ǰotʸ ǰóka</u>ŋŋa] 'He will point it out for me.'

[tàlana<u>patʸ ǰotʸ ǰóka</u>ŋ] 'He did not point it out.'

[nàku<u>pasíssekk</u>i] 'Then I will introduce you.'

[tàla<u>kupasíssekk</u>i] 'I did not introduce you.'

(72) **Secondary stress:**

$$V \text{ ---> } [2\text{stress}] \; / \; \#C_o \underline{\quad} (C_oV)_1C_o \; \begin{bmatrix} V \\ 1\text{stress} \end{bmatrix}$$

(This rule puts a [2stress] on the first syllable of any word that is removed at least one syllable from the primary stress.)

8 Vowel Sequences

The juxtaposing of vowels at morpheme boundary shows some interesting characteristics. We will first look at sequences of up to four like vowels and the phonetic representations that result. The vowel in question is /i/: (from left) the first is root final, the second is transitivizing /i/, the third is prohibitivizing /i/ and the final is inflectional third person /i/ (representing subject or object, depending on context) or its homophonous, mutually-exclusive twin definite /i/.[15] The data are as found in (73).

(73) a. [méǰaŋ kùsatrí] 'I stand beside a table.'
/mejaŋ ku+ sa?ri+i/
table 1sE side TZR

b. [áko àŋhəllí rìpasaréyya] 'Don't buy at the market.'
/ako aŋ+ halli+i ri pasar +a/
PRB+2fA VRt buy PRB at market DET

c. [numári?i] 'He runs.'
/numari+i/
run 3A

d. [ǰáko satrí?i] 'Don't stand beside (it).'
/jako sa?ri+i +i/
PRB+2fA side TZR PRB

e. [nàsatrí?i] 'He stood beside it.'
/na+sa?ri+i +i/
3E side TZR 3A

f. [áko həllí?i rìtokóna] 'Don't buy it at his store.'
/ako halli+i +i ri toko +na/
PRB+2fA buy PRB 3A at store 3PO

g. [ǰáko satrí?i meǰáŋku] 'Don't stand by my table.'
/jako sa?ri+i +i +i meja+ku/
PRB+2fA side TZR PRB 3A table 1sPO

In order to single out the material under focus, we include the relevant material in Chart 7 below. The stress indicated here is as it would be applied by Main Stress on a wholly underlying string. (The stress for c. is on the root; see (73c).) Deleted vowels are shown by an overstrike slash. Glottal insertion is also noted.

r					
o		t			
o	v	r	v	p	t
t	o	a	i	r	i
-	w	n	z	o	z
f	e	s	i	h	i
i	l	i	n	i	n
n		t	g	b	g
a		i		i	3
i		-	i	-	i A
a.		í		ɨ	
b.		í			ɨ
c.		i			? i
d.		ɨ		í ? i	
e.		í		ɨ	? i
f.		í			ɨ ? i
g.		ɨ		í	ɨ ? i

Chart 7: Summary of Morphophonemic Changes to Sequences of Identical Vowels.

With respect to glottal insertion, we may state its domain by noting that a glottal is inserted between any two word-final identical vowels, if both are affixal or if the final is inflectional. It is interesting to note that in the speech of Konjo young people, this has been generalized to inserting a glottal between any two identical word-final vowels, adding a. and b. to c. through g. That a glottal is inserted between the /i/'s of the transitivizing and prohibitivizing grammatical functions in d., but not in g., is most likely because there is already a glottal in the latter. Two such in succession (*[i?i?i]) probably is a performance difficulty the language avoids. We may formalize this in (74).

(74) **Vowel Glottalization:**

$$\emptyset \text{ ---> } \begin{bmatrix} -\text{consonantal} \\ -\text{continuant} \end{bmatrix} / \begin{bmatrix} V \\ \alpha\text{high} \\ \beta\text{low} \\ \gamma\text{back} \end{bmatrix} \text{ —— } \begin{bmatrix} V \\ \alpha\text{high} \\ \beta\text{low} \\ \gamma\text{back} \end{bmatrix} \#$$

Condition: 1. Both V's are affixal
or 2. Final V is inflectional

(This rule states that word-final identical vowels are separated by a glottal stop when either of the two conditions is met.)[16]

Vowel Copy is a type of this process, but it not only puts a glottal between two like vowels, it creates one of the twins. It might be possible to restrict Vowel Copy merely to copying vowels and have the glottal inserted by an altered form of Vowel Glottalization, but we have chosen not to, mainly because Vowel Copy applies inside the root, whereas Vowel Glottalization applies between certain final identical vowels.

The other kind of process observed in (73) is vowel deletion or degemination. In the data presented it is simpler to state than is Vowel Glottalization. In any string of two or more identical vowels, all but the stressed ones are deleted. Of course, an intervening glottal disqualifies a sequence of identical vowels. Thus (74) must apply first, then our formulation of Vowel Degemination below (75).

(75) **Vowel Degemination:**

$$\begin{bmatrix} V \\ \alpha\text{high} \\ \beta\text{low} \\ \gamma\text{back} \\ -\text{stress} \end{bmatrix} \text{ ----> } \emptyset \begin{bmatrix} V \\ \alpha\text{high} \\ \beta\text{low} \\ \gamma\text{back} \end{bmatrix}$$

(This rule states that given a string of identical vowels, the unstressed one, whether it is the first or second of the string, will be deleted.) Is it necessary to mention stress? Yes, so that the unstressed vowel of such a sequence will be deleted. If both are unstressed, it is immaterial which is deleted. Stress has to be added before Vowel Glottalization and Vowel Degemination apply or the wrong stress would result, as with (73e). Had not stress been placed before deletion of the vowel in that reflex, it would later be placed one syllable to the left, a position not in accord with the data.

Vowel Degemination will apply differently when the stem-final vowel is not /i/ and/or when the inflectional ending is not /i/, but say /a/. With analogous paradigms to that of (73), Vowel Degemination would find appropriate structural descriptions only for the identical transitivizing and prohibitivizing /i/'s of g.

Vowel Degemination is a much more general rule than Vowel Glottalization, not only occurring after the root, but elsewhere. The following data set (76) illustrates this fact:

(76) /na+ agre?/ ---> [nánre?] 'that which isn't'
that not

/ku+ ukir/ ---> [kúkiri] 'I write.'
1sE write

/si+ isse?+ki / ---> [sissekki] 'We know each other.'
REC know 1pA

/ka+ ma?ca+ aŋ/[17] ---> [kàmatʸčáŋ] 'cleverness'
NRa clever NRs

/si+ isse?+na/ ---> [sissétna] 'his acquaintance'
REC know 3PO

These data show degemination of a similar sort. The only difference is seen in the last item where there is loss of vowel from a sequence of two unstressed vowels. Our rule above does not indicate whether the retained vowel is stressed or not and thus applies to this case as well.

In a few cases we find an inflectional clitic, which fits with preceding morphemes grammatically and would normally pattern with them phonologically, especially for purposes of stress assignment, instead being attached phonologically to what follows. Thus, [nə́ssami] '(it is) already clear' /nassa+mi/, but [nə́ssa mí̀ntu] 'that is already clear' /nassa mi+intu/. This is an application of Vowel Degemination across a grammatical word boundary. The facts are a bit more complicated than this, but we ignore the complications here.

There is a related process of vowel loss. When even different vowels stand next to each other across word boundary, but within some yet to be determined unit of speech, perhaps syntactic, the second such vowel is lost. Observe the following:

(77) /apa iŋjo/ ---> [apáñǰo] 'What is that?'
what that

/iŋni allo+a/ ---> [ìnnilló͡a] 'today'
this day DET

The rule is straightforward, the governing unit of speech isn't.

(78) **Vowel Loss:** V ---> Ø / V # ___ X] unit?

(This rule says that the second of two vowels concatenated across word boundary is deleted within a unit of yet undiscovered character.) It appears that unlike earlier rules of this section which appear to be rather late ordered, pronunciation rules, Vowel Loss has to apply earlier, at least before Main Stress so that only one main stress is placed. This rule appears to alter the domain of phonological word, actually fusing two potential words into a single phonological word.

Another phonological process is seen in data like the following:

(79) /tau+ a / ---> [tó͡a] 'the person/people'
person DET

/jai?+na/ ---> [jétna] 'his sewing'
sew 3PO

What is necessary for this process to work is stress on the second segment of an /au/ or /ai/ sequence. A monophthongization or coalescence occurs, resulting in the phonetic representations shown. This rule follows stress assignment.

(80) **Coalescence:**

$$\begin{bmatrix} V \\ +low \end{bmatrix}_1 \begin{bmatrix} V \\ +high \\ \alpha back \\ +stress \end{bmatrix}_2 \quad \text{---} > \quad \emptyset \begin{bmatrix} 2 \\ -high \\ \alpha back \end{bmatrix}$$

(This rule deletes the /a/ of an /au/ or /ai/ sequence, compensatorily lowering the surviving vowel from high to mid.)

9 Evidence for Vowel-initial vs. Glottal-initial Morphemes

In the discussion of which segments may occupy which positions in the

syllable, morpheme and word, it was stated that morpheme initially glottal is absent. What is the evidence for this, if it is sometimes observable phonetically? There are two pieces of evidence. First, though glottal occurs morpheme finally and is retained before a vowel-initial following morpheme, there is no parallel evidence that such happens word initially. Thus we have /balla?/ 'house' and following definitizing /a/ resulting in [bálla?a], or /sipa?/ 'tasty' and following 3A /i/ showing [sípa?i], in both cases the glottal is retained. But morpheme initially, there is no evidence of glottal between morphemes. /eja/ 'red' with the adjective full-form prefix /a/ added shows [aéǰa], not *[a?éǰa]. Second, like vowels in the language are separated by glottal in certain restricted cases (as in Vowel Glottalization above) or are subject to Vowel Degemination. Never is a glottal at morpheme boundary disregarded by Vowel Degemination looking for an applicable structural description.

(81)	underlying	/malla?+ a /	--->	[mə́lla?a]	'I am afraid.'
		be afraid 1sA			
	rule-supplied	/aŋ+ halli+i /	--->	[əmmə́lli?i]	'He buys.'
		VRt buy 3A			

Thus when we find /na+aŋre?/, 'that not' ---> [nánre?], it is confirming evidence that there is no underlying glottal morpheme initially in the language.

10 Reduplication

Reduplication in Konjo is quite regular. Roots reduplicated take prefixes on the reduplicated first, and suffixes on the original second part. The only note worth making of phonological interest is that since in reduplication only the first two syllables of the root are represented in the first part of the reduplicated complex, the overage is represented by a glottal at the place of loss of segments. Note the following, with overage begun with a vowel, a consonant segment, and two consonant segments, respectively.

(82)	/maraeŋ/	'different'	[màra? maráeŋ]	'various'
	/baŋjul/	'to joke'	[bàñǰu? báñǰulu]	'kidding'
	/taruŋku/	'prison'	[tàru? tarúŋku]	'local jail'

Note that though /baŋjul/ is underlyingly only two syllables, its final /l/, which cannot be final and is usually removed from final position by insertion of an echo vowel, is here replaced by glottal, as if it were [báñǰulu]. Two-syllable words with /r/ and /s/ also act similarly, whereas glottal and /ŋ/ finals are repeated in full:

(83)	/lamuŋ/	'to plant'	[làmun lámuŋ]	'plants'
	/paŋce?/	'small'	[pàñčeʔ páñčeʔ]	'tiny'

There seems to be a stronger boundary here than merely a morpheme boundary, for the assimilation process seems only to be slight. Thus the glottal with [bàñǰu? báñǰulu] doesn't become [p] as it normally might be expected to. Also with [làmun lámuŋ], the /ŋ/ assimilates to the point of articulation of following /l/, but lateralization does not apply.

11 Order of Rules

Every rule of these notes is related by order to at least some other rule. But two rules, each related as preceding a third rule, may show no

ordering relationship with respect to themselves. In the following Chart 8 the rules of Konjo are presented and numbered. Only those sets connected by a down arrow are in fact ordered with respect to each other.

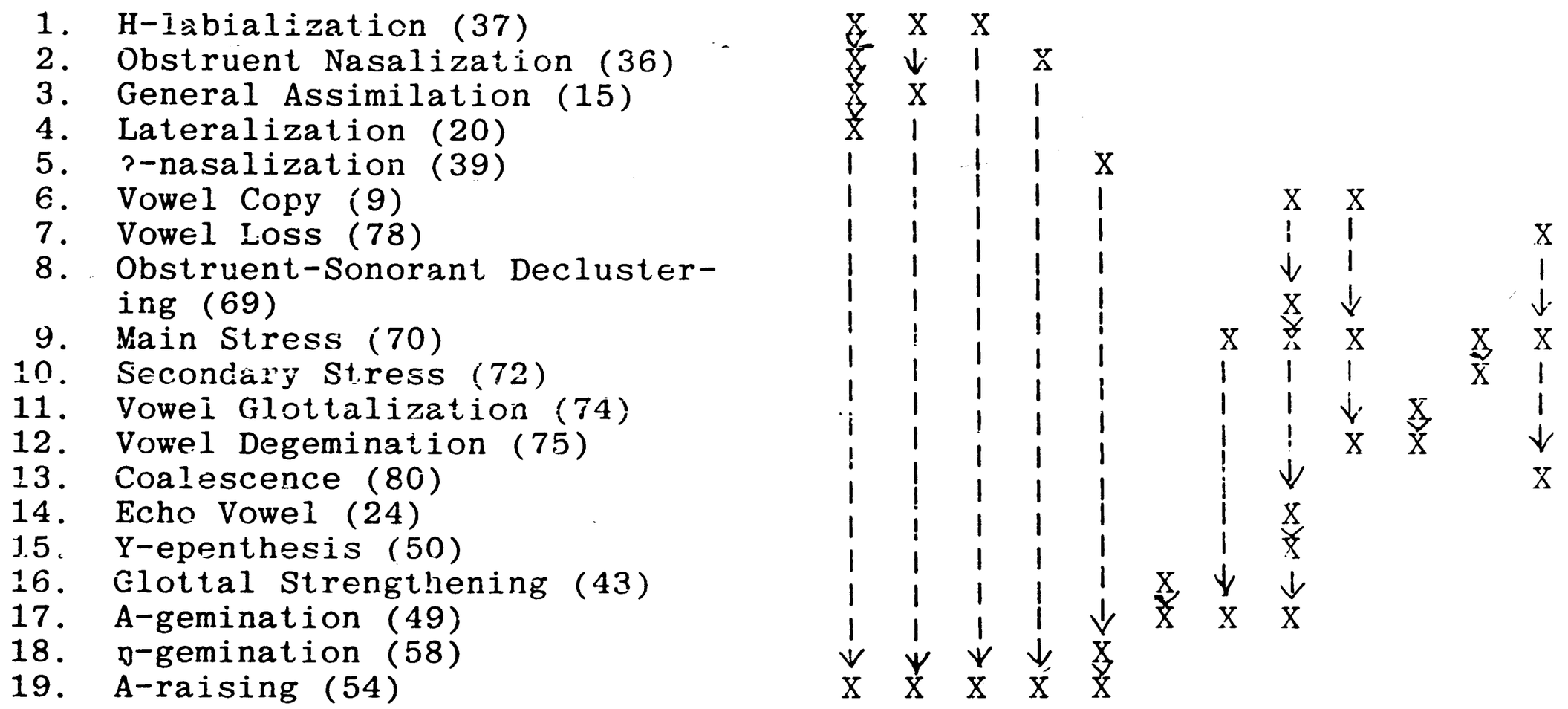


Chart 8: Demonstrated Orders between Rules

Thus H-labialization must apply before General Assimilation; similarly General Assimilation must precede Lateralization. Therefore we can conclude that H-labialization applies before Lateralization, but there is no set of data requiring this. Only direct line connection implies a necessary relationship of the order given. Main Stress precedes both Vowel Degemination and Coalescence, but we are unable to say anything relative to the order of the latter two.

Appendix Two lists the rules encountered in these pages in the above order and with all adjustments discussed in the text.

12 Sentence Contours

Konjo sentences show both patterns of rising and falling intonation. In sentences with falling intonation, in addition to word stress (basically primary only, but sometimes also secondary), there is also sentence stress. The chief manifestation of sentence stress is a slowing of the cadence or sentence beat. In statements the word in focus, often a preposed noun, not infrequently the verb itself, bears the sentence stress. In content (wh-type) questions it is the question word that receives sentence stress. In imperatives the verb usually receives sentence stress, but this can be overridden by special focus.

Only yes/no questions have rising intonation. The sentence stress coincides with the rising intonation on the last word of the sentence. Tag questions undergo both falling and rising intonation. The statement portion falls and the tag rises. The statement portion acts as statements above with respect to sentence stress.

The following examples have the word stress shown by an acute accent and the sentence stress underlined.

Statements:

[átraʔa ə̀ppilá ǰara bičára kóñ ǰo] I want to study Konjo.

[rìballátnu] At your house.

[kúlle tótɣǰi] Sure.

[séŋkamaki púaŋ] Stop and visit, sir.

[ínni əllóa hámbəŋŋi] Today is hot.

[biǰénna nàpənnapbéŋŋaŋ lóka] He is cutting bananas for his family.

[béllo] Good.

Tag questions:

[kóndo arénna dí?] That's an egret, right?

Imperatives:

[áraki èmmantéŋŋi ribálla?a] Don't stay at home!

[dáhu sá?a] Give it to me!

Content questions:

[antékki piláǰara] Where are you studying?

[ápa kùtulúŋaŋki] What can I help you with?

[ápa íñǰo] What's that?

[sìkuréyya nàkippəmmúla] When will you begin?

[apántu kiháǰu púaŋ] What are you doing, sir?

[anté? pakúa púnna àna?-ána? nìkutá?naŋ] And how is it if children are addressed?

[sikúrami] How many?

[inái nàpənːapbéŋŋaŋ lóka] Who is he cutting down bananas for?

[əŋŋúrai nánre? iáli naúraŋ] Why didn't he accompany Ali?

Yes-no questions:

[kúlleǰa nutúluŋ]	Can you help me?
[məllimmaki əmmántaŋ kúnni máe]	Have you lived here a long time?
[máemmaki búntiŋ]	Are you already married?
[ríepmo anátta]	Do you already have children?
[kaléntaǰi ríe? kúnni máe əmmántaŋ]	Are you coming to live here alone?
[ètteléssiǰi tùtoáta]	Are your parents still living?
[əkkúlleki àpbičára kóñǰo]	Do you know how to speak Konjo?
[háǰi?]	Is it good?

13 Concluding Remarks

Much has been said about Konjo phonology in the preceding pages. Though refinement and elucidation may be expected, we can be grateful for the explicitness required by the theory of generative phonology (Chomsky and Halle 1968) that has pushed us this far. The preceding notes raise new questions that, among other directions, will take us into historical linguistics and morphology and syntax.

For example, we noted that a two-way dividing of consonant sequences into first member glottal and /ŋ/ gives way to a three-way division for /r l s/; thus, /ŋr ʔr rr/. Has there been a phonemic split in the two-way division schema that has given rise to three-way division or has phonemic merger occurred in the latter to give rise to the former? The neutralization of /ʔs/ and /ss/ as well as of /ll/ and /ŋl/ may have something to say here, as well as the fact that /rr/ only follows /a/=[ə] whereas /ll/ may follow any vowel.

The constant reference to the distinction between derivational and inflectional suffixes pushes us into morphology. We already made reference to the fact that definitizing /a/ is ignored for purposes of assigning stress when it follows roots ending in glottal and /ŋ/, but is counted as a syllable when the root is vowel final. A problem not greatly different is the variation observed in possessive pronoun suffixes when attached to word-final roots. Whereas for adjectives the form is invariantly [ku], as in [ána? bùrutnéku] 'my son (male child)', for nouns it is [ŋku] or [ku], as in [bùrutnéŋku] 'husband (my man)'. The problem is that it is only partly rule governed. Thus, root-final glottal always becomes [k] before [ku], and root-final /ŋ/ always shows [ŋku]. But vowel-final roots take either [ŋku] or [ku], so that we get [kakáŋku] 'my older sibling' from /kaka/ but [boláku] 'my house' from /bola/. /a/-final roots show such variation, wheres /u/-finals are almost entirely found with [ŋku]. Note further the problems that roots subject to echo vowels display: /a/ definitizing takes stress as if the /r l s/ roots are vowel final, thus /kalor+a/ 'the river' becomes [kàloróa], whereas with possessive pronouns we have [kku] as in [kàlorókku] 'my river', though clearly there is no underlying glottal.

There are a number of forms, among them [ambáuŋ] 'to rise', [ambúa]

'to bear fruit', [amb́óro] 'to swell', [anŕío] 'to bathe', [antáile] '(to be) over there', [anté?] 'where?', [ansúlu?] 'to go out' and [antáma?] 'to enter', all of which, while semantically intransitive, show something similar to the transitive prefix form /aŋ/. We wonder if these forms don't show a residual prenasalized stop, the nasal element of which now being syllabified by the placement of initial [a]. Related Selayar, which still shows limited prenasalized segments, may offer reconstruction help.

Thus there is much ground to be cleared before all aspects of Konjo phonology have been laid bare, both those that are in a real sense pure phonology, as in the previous pages, and in the interaction of phonology with the rest of the grammar.

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Notes

1. We gratefully acknowledge the input of Kathy Houlihan, Helen Miehle, Ülo Sirk, and Jim Sneddon. We especially want to single out John Clifton for his beyond-the-call-of-duty consulting which changed the face of the entire presentation. We took the advice of several to publish our data without the advantages of current phonological advance (lexical phonology, CV phonology, metrical phonology, autosegmental phonology) on the understanding that interesting data, clearly presented, will be useful regardless of their theoretical orientation.

2. We distinguish between "root verb form", "full verb form", and "reduced full (verb) form". The full verb form is the root with either the intransitive verbal prefix /a?/ or the transitive verbal prefix /aŋ/ with whatever morphophonemic changes are necessary. Some roots have both intransitive and transitive full verb forms with minimal, but normal, differences in meaning between them, e.g. [ὲkkaláhiŋ] and [ὲŋŋaláhiŋ] 'to carry child in arms'. Some roots have taken special meaning twists with either /a?/ or /aŋ/, e.g. [əkkánre] 'to destroy by fire, to burn' vs. expected [əŋŋánre] 'to eat'. Some roots take only the intransitive /a?/ as in [əkkádo] 'to nod' while others take only transitive /aŋ/ as in [əŋŋókko?] 'to bite'. Permitted forms usually follow semantic expectations. The reduced full form replaces the /a/ of the prefix with a prefixed ergative person marker as in [ánre? kutlámpa] 'I do not go' from intransitive [atlámpa] 'to go' and [ánre? nuŋŋánre] 'you aren't eating' from transitive [əŋŋánre]. Root verb forms show no verbalizing prefixes, as [nùkaláhiŋ], [nukánre], [nukókko?], [nukádo], each of the above forms with prefixed 2fE grammatical only in context.

3. While /t/ becomes [n], /s/ becomes [ñ]. That the expected [ñč] is missing (see note 6), being instead realized as [ʔč], may be related to the occurrence of the phonetic realization of /s/ in the [-anterior, +coronal] position.

4. Since we don't want to unnecessarily create an /aŋ$_1$/ (indefinite) and "/aŋ$_2$/" (definite) distinction, rather than giving definite /aŋ/, say "/aŋ$_2$/" (that which results in [mp], for example, rather than [mm]) a minus rule feature [-obstruent nasalization], we may try a syntactic approach, indicating that a certain syntactic feature (here [+definite object]) marks the verb as [+definite], a specification that would make the current rule inapplicable.

5. We have not dealt with a related phenomenon in this paper wherein the glottal of the prefix /taʔ/ NVOL (and other meanings) becomes [r] when concatenated to vowel-initial roots. Thus with /alle/ 'to take' we find [tarálle] 'taken'. Note the similarity to Indonesian ter-.

6. This position, that of transitive indefinite meaning with /c/-initial roots, shows no [ñč]. All such expected forms instead show phonetic [tʸč]. This is anomolous; both [ʔč] and [ñč] occur, but [ñč] only with the meaning 'transitive definite'. Perhaps there is a diachronic explanation.

7. The final [i] in the Konjo forms represented by 'he is more tired (than)' and 'he is colder (than)' is inflectional. That the preceding [ŋ] is doubled is handled by another process formulated below as (general or) ŋ-gemination.

8. When glottal and /ŋ/-final root nouns are definitized, the /a/ affix is added to the root. There is no geminating of the final consonant segment. There is also no stress shift. Thus, [ǰáraŋ] 'horse', [ǰáraŋa] 'the horse'; [lípaʔ] 'sarong'; [lípaʔa] 'the sarong'. ([ǰáraŋŋa] in the speech of young adults; see (55) and note 9.)

9. The speech of older adults shows restricted gemination. This is clearly a process that is being made more general. We will not discuss this here, but hope to address this and other social/geographical dialect differences in a separate paper.

10. The alternate representations in data sets (64-67) show some variation based on speakers' ages. These bear more investigation.

11. We note here in passing, without offering a solution, a difficulty based on the following phonetic representations of the root /kalor/ 'river': [kàlorótna] 'its river', [kàloróa] 'the river'. If in fact Stress applies before Echo Vowel, we have to say something about the 'abnormal' stress on these words, though superficially they are regular. We are currently unsure how the strata of Mohanan (1986) apply to this problem. (Incidentally, the glottal in the Konjo reflex for 'its river' is historically nonsurprising, but adds a bit of complication for a description of this language.)

12. These possibilities are not handled in our treatment of syllabification above, because of their obvious borrowed status.

13. There is some evidence in the speech of younger Konjo that these have been relexicalized as, for example, /tereʔ/, which then receives normal penultimate stress. For such speakers the preceding rule doesn't exist.

14. Mountain Konjo shows a stress on both root and reduplication; thus [bóʔoʔ-bóʔoʔ].

15. There are certain diagnostics that can show this to be the order of the morphemes.

16. The glottal insertion rule is relevant to juxtaposed like vowels. We have observed that the following also occurs, but we will not deal with it by rule: A string of any vowel and following 1sA suffix /a/ undergoes Vowel Glottalization. However, this does not apply with the 3A suffix /i/. Thus /i+a/ becomes [iʔa], but /a+i/ becomes [ai].

17. In the speech of the younger generation, this is beginning to show as [kàmatʸčáʔaŋ].

LIST OF ABBREVIATIONS

A	Absolutive (+person) (-a, -ki, -ko, -i)
CMP	Completive
CPR	Comparative
DET	Determiner
E	Ergative (+person) (ku-, ki-, nu-, na-)
NVOL	Nonvolitional
NRa	Nominalizer, adjective
NRs	Nominalizer suffix
PO	Possessive (+person)
PRB	Prohibitive
PRO	Pronoun (+person)
REC	Reciprocal action
TZR	Transitivizer
VRi	Verbalizer, intransitive
VRt	Verbalizer, transitive
1s	First person singular
1p	First person plural
2h	Second person honorific
2f	Second person familiar
3	Third person

Appendix One: Segment Positions Within Words

The segments on the left are given as phonemic forms, but this does not mean that all of these are underlying forms. All examples are given in phonetic representation.

A. Single consonant segments; word initially, medially and finally.

	initial		medial		final	
/p/	páta	'owner'	kápaŋ	'maybe'	-	
	póko?	'tree'	lópi	'boat'		
/t/	táu	'person'	máta	'eye'	-	
	tédoŋ	'buffalo'	póti	'tail'		
/c/	čámba	'tamarind'	póča?	'slimey'	-	
	čúmi?	'charcoal'	líčere	'seed'		
/k/	káu	'you (fam.)'	báku?	'k.o. basket'	-	
	kúñǰo	'over there'	lóko?	'wound'		
/b/	bátaŋ	'stem'	nába	'correct'	-	
	bóhe	'grandparent'	kúbi?	'large knife'		
/d/	dóŋo?	'stupid'	láda	'chili'	-	
	dúmpi	'cake'	kódi	'bad'		
/j/	ǰáraŋ	'horse'	éǰa	'red'	-	
	ǰóŋa	'deer'	háǰi?	'good'		
/g/	gáluŋ	'wet ricefield'	gígi	'tooth'	-	
	gítte	'you (hon.)'	légo-légo	'porch'		
/m/	máte	'dead'	gáma?	'octopus'	-	
	méoŋ	'cat'	láme	'tuber'		
/n/	nə́kke	'I'	tána	'land'	-	
	nátnasa	'sandalwood'	líno	'world'		
/ñ/	ñúñuru	'charred'	ñáñi	'coconut chips'	-	
	ñáha	'inner being'	ñéñe-ñéñe	'mimicry'		
/ŋ/	ŋáse?	'all'	láŋe	'swim'	kə́lloŋ	'neck'
	ŋátŋala	'molar'	bóŋo?	'bee'	táǰaŋ	'wait for'
/r/	ráha	'below'	síri?	'embarassment'	-	
	ríe?	'to be'	póre	'strong'		
/s/	sapíri	'candlenut'	bíse	'oar'	-	
	sóŋo?	'sweat'	tása?	'cooked'	-	
/l/	lát^{y}ču?	'slippery'	baláho	'rat'	-	
	lére	'far'	lólo	'young'		
/ʔ/	-		bá?a	'of course'	léko?	'betel'
			té?eŋ	'tea'	bálla?	'house'
/h/	híraŋ	'female (an.)'	lóhe	'many'		
	húru?	'putrid'	báhi	'pig'		

B. Two-segment consonant sequences

	Intramorphemically		Intermorphemically	
/ʔp/	čə́ppeʔ	'crack'	pəppáñǰa	'fish net'
	ləppoʔ	'explode'	əppéʔru	'to spit'
/ʔb/	lápbu	'long (of things)'	apbáli	'to oppose'
	rípbaʔ	'to fly'	apbíssa	'to wash'
/ʔm/	čópmoʔ	'fat'	apméaʔ	'to speak'
	kapmúruŋ	'nose'	àpminása	'to hope'
/ʔt/	kúttu	'lazy'	əttə́mmaʔ	'to seep in'
	kə́ttere	'to shear'	əttétia	'kiddy-corner'
/ʔd/	lítdeʔ	'seed, kernel'	atdéŋka	'to pound grain'
	čátdi	'small'	atdóŋkoʔ	'to ride'
/ʔn/	sótna	'dream'	àtnaŋkála	'to plow'
	čítnoŋ	'pure'	patníkka	'to marry'
/ʔc/	mátʸča	'clever'	atʸčídoŋ	'to sit down'
	kátʸči	'sour'	atʸčélleŋ	'to peep out at'
/ʔj/	rátʸǰiŋ	'difficult'	atʸǰógeʔ	'to dance'
	títʸǰoʔ	'pierce'	atʸǰémpaŋ	'eat breakfast'
/ʔñ/	kátʸñiʔ	'wing'	atʸñáha	'to breathe'
	métʸñaʔ	'pampered'	atʸñére-ñére	'to mouth off'
/ʔk/	dókkoŋ	'skinny'	əkkélоŋ	'to sing'
	rə́kkiʔ	'to cling to'	əkkádo	'to nod the head'
/ʔg/	bákga	'stupid'	akgálung	'work wetrice-field'
	sakgénna	'until'	akgéreʔ	'to cut throat'
/ʔŋ/	lúkŋe	'yonder'	akŋóroʔ	'to snore'
	pókŋolo	'blunt'	akŋóaʔ	'to open mouth'
/ʔr/	pátre	'hungry'	atrére	'to boil'
	bátraʔ	'powder'	atráka?	'to embrace'
/ʔl/	sátla	'tasteless'	atléha	'balanced'
	čétla	'salt'	atlátlaŋ	'take shelter'
/ʔs/	-		əsséŋka	'stop by'
			əssópbu	'hide oneself'
/ʔh/	-		apbáǰu	'to do'
			apbóǰa	'look for'
/ŋp/	lámpa	'to go'	əmmépu	'shell corn'
	támpo	'proud'	èmmanráki	'to ruin s.t.'
/ŋb/	čámba	'tamarind'	pambáho	'make shallow'
	sómboŋ	'vagina'	ambéta	'to win'
			rúam bátu	'two round objects'
/ŋm/	ǰə́mmu	'guava'	èmmeái	'to urinate on s.t.'
	čə́mmo	'toothless'	pèmmonéaŋ	'container'

/ŋt/	bénteŋ	'pillar'	àntalléssi	'to revive'
	húntulu	'to find'	lamúnta	'your plant'
			sintóa	'as old as'
/ŋd/	kóndo	'egret'	àndiŋíŋi	'to make cool'
	tándaʔ	'sifter'	àndəlléki	'be in front of s.o.'
/ŋn/	ə́nnaʔ	'door'	pənnába	'prove correct'
	ínni	'this'	kakə́nna	'his older sibling'
/ŋc/	móñčoŋ	'turquoise'	àñčidóŋi	'sit on s.t.'
	káñčaŋ	'strong'	àñčetʸčéŋi	'to cheat on s.o.'
/ŋj/	íñǰo	'that'	añǰáiʔ	'to sew'
	kóñǰo	'Konjo'	àñǰumbatáŋŋi	'to bridge s.t.'
/ŋñ/	kə́ññiŋ	'eyebrow'	əññéññeŋ	'jabber'
	ñə́ññaŋ	'to stare'	èññahái	'to breathe on s.o.'
/ŋk/	líŋka	'step'	əŋŋánre	'to eat'
	maŋkásara	'Makasar'	anróŋku	'my mother'
/ŋg/	láŋga	'to prop up'	aŋgíliŋ	'to grind grain'
	bóŋga	'thigh'	aŋgúluʔ	'round'
/ŋŋ/	lə́ŋŋa	'sesame seed'	èŋŋaŋái	'to open mouth wide at s.t.'
	bə́ŋŋi	'night'	táǰəŋŋi	'wait for him'
/ŋr/	mínro	'to return'	anrákaŋ	'make coconut oil'
	tánraŋ	'ladder'	anráiʔ	'west'
/ŋl/	-		əllétleŋ	'blacken s.t.'
			sillómpo	'as big as'
/ŋs/	bánsa	'like, as'	əññáppe	'pick corn'
	lénso-lénso	'beads'	sinsémpo	'as cheap as'
/ŋh/	-		əmmáŋka	'breach a wall'
			əmmálʊʔ	'to roll up'
/rr/	gə́rring	'sick'	-	
	pə́rroʔ	'to squeeze'		
/ll/	pə́llu	'kitchen	-	
	kúlle	'can'		
/ss/	sísiʔ	'corn chaff'	-	
	músseŋ	'lip'		

C. Noncontiguous Vowel Position

	first syllable		second syllable	
/i/	bíǰa	'family'	búntiŋ	'marriage'
	híntiŋ	'carry in hand'	táǰi	'cockspur'
/e/	sémpo	'inexpensive'	də́lleʔ	'fortune'
	péla?	'throw out	páre	'paddy rice'

/a/	ǰála	'fish net'	kála	'scorpion'
	mántaŋ	'to live'	lípa?	'sarong'
/o/	ólo?	'caterpillar'	múko	'tomorrow'
	mónaŋ	'to float'	póŋko?	'lower back'
/u/	búto	'cob'	púlu?	'glutinous'
	dúkku	'to hide'	áhu	'ashes'

D. Vowel Sequences

	Intramorphemically		Intermorphemically	
/ii/	-		numári?i	'he runs'
			áko èmməllí?i	'don't buy'
/ia	ía	'he, she, it'	niálle	'to be taken'
	kambíaŋ	'to hold'	èmməllíaŋŋa	'buy for me'
/io/	anrío	'bathe'	riólo	'before'
	lío-lío	'aim at'	nióndaŋ	'to be chased'
/iu/	kapíu?	'to pinch'	siúraŋ	'with, and'
	číu?	'warble'	niúsiri	'to be chased away'
/ee/	-		-	
/ei/	-		maŋéi	'go s.w.'
			kuíttei	'I see it'
/ea/	tapméa	'to urinate'	antátlea	'I go over there'
	saléaŋ	'bed bug'	setréa	'the one'
/eo/	méoŋ	'cat'	-	
	əlléo?	'to stir'		
/eu/	-		-	
/aa/	-		atlámpa?a	'I go'
			ǰamáŋ	'work'
/ai/	sái?	'coconut shell'	paínuŋ	'give s.o. a drink'
	tái	'feces'	ambétai	'he wins'
/ae/	máe	'come'	naéraŋŋi	'he carries it'
	karáeŋ	'king'	paénteŋ	'to raise up s.t'
/ao/	páo	'manggo'	pàkaóla?	'to make itchy'
	baǰáo	'egg'	aóloŋŋi	'cloudy'
/au/	náuŋ	'down'	pàutráŋi	'to remind'
	páu	'to tell'	naúǰuŋŋi	'he bundles it'
/oo/	-		-	
/oi/	dói?	'money'	nahúnoi	'he killed him'
	atróili	'carry on pole'	apóŋoroi	'he is crazy'

/oe/	bintóeŋ	'star'	-	
	assóe	'walk with hands swinging'	-	
/oa/	tóa	'old'	kokóa	'the field'
	dóaŋ	'shrimp'	alárroa	'I am mad'
/uu/	-		kúkiriʔi	'I write it'
/ui/	rúiʔ	'to pull'	ətt**ú**lu-t**ú**lui	'he is careless in work'
	túiŋ-túiŋ	'flying fish'	nàbətt**ú**ia	'suddenly I was ...'
/ue/	búe	'bean'	-	
	kalúere	'stir vegetables'		
/ua/	kúa	'to say'	napáua	'he told on me'
	pirúaʔ	'vomit'	pànrənnúaŋ	'hope'

Appendix Two - Rules of Konjo Phonology

The following rules are in final form and in the order required for correct application, where that is relevant to any two given rules.

1. **H-labialization:** (37)

$$\begin{bmatrix}-\text{syllabic}\\-\text{consonantal}\\+\text{continuant}\end{bmatrix} \text{ ---> } \begin{bmatrix}-\text{continuant}\\+\text{anterior}\\\alpha\text{voiced}\end{bmatrix} \text{ / } \begin{bmatrix}-\text{continuant}\\-\alpha\text{voiced}\end{bmatrix} \text{ ——}$$

condition: must not apply in strings containing definite object.

2. **Obstruent Nasalization:** (36)

$$\begin{bmatrix}-\text{sonorant}\\-\text{delayed release}\\-\text{voiced}\\\langle+\text{continuant}\rangle\end{bmatrix} \text{ ---> } \begin{bmatrix}+\text{nasal}\\\langle-\text{anterior}\rangle\end{bmatrix} \text{ / } \underset{\text{affix}}{\text{X]+ \_\_\_\_}} \begin{bmatrix}+\text{transitive}\\-\text{definite}\end{bmatrix}$$

3. **General Assimilation:** (15)

$$[-\text{syllabic}] \text{ ---> } \begin{bmatrix}+\text{consonantal}\\\alpha\text{anterior}\\\beta\text{coronal}\\\gamma\text{continuant}\end{bmatrix} \text{ /\_\_\_\_ } \begin{bmatrix}-\text{syllabic}\\\alpha\text{anterior}\\\beta\text{coronal}\\\gamma\text{continuant}\end{bmatrix}$$

4. **Lateralization:** (20)

$$[+\text{nasal}] \text{ ---> } [+\text{lateral}] \text{ / \_\_\_\_ } [+\text{lateral}]$$

5. **Glottal Nasalization:** (39)

$$\begin{bmatrix}-\text{consonantal}\\-\text{continuant}\end{bmatrix} \text{ ---> } \begin{bmatrix}+\text{nasal}\\+\text{anterior}\\-\text{coronal}\end{bmatrix} \text{ /\_\_\_ } \underset{/\text{a}\text{ʔ}/\text{ prefix}}{\text{]}} \text{ + V}$$

6. **Vowel Copy:** (9)

$$+\ C_0\ V\ C_0\#\ \text{---}>\ 1\ 2\ 3\ \begin{bmatrix}\text{-consonantal}\\ \text{-continuant}\end{bmatrix}\ 3\ 4\ 5$$
$$1\ 2^0\ 3\ 4^0 5$$

7. **Vowel Loss:** (78)

$$V\ \text{---}>\ \emptyset\ /\ V\ \#\ \underline{\quad}\ X\Big]_{\text{unit?}}$$

8. **Obstruent-sonorant declustering:** (69)

$$\#\ \begin{bmatrix}\text{-syllabic}\\ \text{-sonorant}\end{bmatrix}\ \begin{bmatrix}\text{-syllabic}\\ \text{+sonorant}\\ \text{-nasal}\end{bmatrix}\ V\ \text{---}>\ 12434$$
$$1\qquad 2\qquad\quad 3\qquad\quad 4$$

9. **Main Stress:** (70)

$$V\ \text{---}>\ [1\text{stress}]\ /\underline{\quad}\ C_0\langle V\ C_0\rangle\ ]_{\langle\text{-vocative}\rangle}$$

10. **Secondary stress:** (72)

$$V\ \text{---}>\ [2\text{stress}]\ /\ \#C_0\ \underline{\quad}\ (C_0V)_1C_0\ \begin{bmatrix}V\\ 1\text{stress}\end{bmatrix}$$

11. **Vowel Glottalization:** (74)

$$\emptyset\ \text{---}>\ \begin{bmatrix}\text{-consonantal}\\ \text{-continuant}\end{bmatrix}\ /\ \begin{bmatrix}V\\ \alpha\text{high}\\ \beta\text{low}\\ \gamma\text{back}\end{bmatrix}\ \underline{\quad}\ \begin{bmatrix}V\\ \alpha\text{high}\\ \beta\text{low}\\ \gamma\text{back}\end{bmatrix}\ \#$$

Condition: 1. Both V's are affixal
or 2. Final V is inflectional

12. **Vowel Degemination:** (75)

$$\begin{bmatrix}V\\ \alpha\text{high}\\ \beta\text{low}\\ \gamma\text{back}\\ \text{-stress}\end{bmatrix}\ \text{---}>\ \emptyset\ \begin{bmatrix}V\\ \alpha\text{high}\\ \beta\text{low}\\ \gamma\text{back}\end{bmatrix}$$

13. **Coalescence:** (80)

$$\underset{1}{\begin{bmatrix}V\\ \text{+low}\end{bmatrix}}\ \underset{2}{\begin{bmatrix}V\\ \text{+high}\\ \alpha\text{back}\\ \text{+stress}\end{bmatrix}}\ \text{---}>\ \emptyset\ \begin{bmatrix}2\\ \text{-high}\\ \alpha\text{back}\end{bmatrix}$$

14. **Echo Vowel:** (24)

$$V\ \begin{bmatrix}\text{+consonantal}\\ \text{+continuant}\end{bmatrix}\ +\ \Big]_{\text{root}}^{Y}\ \text{---}>\ 1\ 2\ 1\ 3\ 4$$
$$1\qquad 2\qquad\quad 3\quad 4$$

where Y≠derivational affix.

15. **Y-epenthesis:** (50)

$$\emptyset\ \text{---}>\ \begin{bmatrix}\text{-syllabic}\\ \text{-consonantal}\\ \text{+high}\\ \text{-back}\end{bmatrix}\ /\ \begin{bmatrix}\text{+syllabic}\\ \text{+low}\end{bmatrix}\ +\underline{\quad}\ \Big[\begin{bmatrix}\text{+syllabic}\\ \text{+low}\end{bmatrix}\Big]_{\text{[+definite]}}$$

16. **Glottal Strengthening:** (43)

$$\begin{bmatrix} -\text{continuant} \\ -\text{consonantal} \end{bmatrix} \text{---} > \begin{bmatrix} +\text{consonantal} \\ +\text{back} \end{bmatrix} / \; V \_\_\_ +\,]_{\text{root}}\, X$$

X = one or more derivational affixes

17. **A-gemination:** (49)

$$\begin{bmatrix} V \\ +\text{low} \\ 1 \end{bmatrix} \begin{bmatrix} -\text{syllabic} \\ \langle +\text{nasal} \rangle \\ 2 \end{bmatrix} + \begin{bmatrix} V \\ \langle -\text{stress} \rangle \\ 4 \end{bmatrix} \begin{matrix} X \\ \\ 5 \end{matrix} \Bigg] \text{---} > \; 1\ 2\ 2\ 3\ 4\ 5$$

derivational affix

18. **ŋ-gemination:** (58)

$$[+\text{nasal}]\ +\ V\ X \quad \text{---} > \quad 11234$$
$$1 \quad\ 2\ 3\ 4$$

where 34 ≠ derivational affix

19. **A-raising:** (54)

$$\begin{bmatrix} V \\ +\text{low} \\ 1 \end{bmatrix} C\ \ C \quad \text{---} > \begin{bmatrix} 1 \\ -\text{low} \end{bmatrix}\ 2\ \ 3$$
$$1\ \ 2\ \ 3$$

where 2=3

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