

The End of the Word in Makassar Languages*
Hasan Basri (Tadulako University), Ellen Broselow (Stony Brook University),
and Daniel Finer (Stony Brook University)

1. Introduction

The Makassar languages, spoken in South Sulawesi (Celebes), Indonesia, include Makassarese (also called Lakiung), Selayarese, and Konjo.¹ All three languages are characterized by distinct classes of affixes which exhibit various differences in phonological patterning, some of which are illustrated by the Konjo data in (1):

(1) Konjo

- | | |
|------------|--|
| a. dínjɪŋ | ‘cool’ |
| b. dínjɪŋi | ‘make cool’ (-i transitivizer) |
| c. dínjɪŋɪ | ‘he/she/it/they is/are cold’ (-i absolutive) |

While the two affixes in (1b) and (1c) are segmentally identical, they are associated with different phonological effects. First, both the bare stem (1a) and the form affixed with the transitivizing suffix (1b) receive (normal) penultimate stress, while the third person absolutive affix in (1c) falls outside the stress domain. Second, the stem-final nasal is realized as a singleton before the transitivizer in (1b) but as a geminate before the absolutive marker in (1c). We will argue, following earlier proposals, that the distinct phonological patterns associated with the two affix classes reflect the different ways in which the affixes are incorporated into prosodic structure (Mithun and Basri 1986, Aronoff et al. 1987, Friberg and Friberg 1991, McCarthy and Prince 1994, Basri 1999, Selkirk 1999, Basri et al. 2000). Affixes like the transitivizing *-i* are true suffixes, which adjoin to a stem and form part of the same morphosyntactic and prosodic word as their host. Affixes like the absolutive *-i* are phrasal clitics which fall outside the morphosyntactic and prosodic word.

Makassarese and Selayarese have been the focus of considerable attention (Mithun and Basri 1986, Aronoff et al. 1987, McCarthy and Prince 1994, Basri 1999, Selkirk 1999, Basri et al. 2000), much of it directed at the interface between morphosyntactic and prosodic structure. While Konjo shares with Selayarese and Makassarese many of the patterns distinguishing suffixes and clitics, Konjo exhibits additional complex patterns involving

* Portions of this paper were presented at AFLA VII at the Free University of Amsterdam and at the Long Island Sound meeting at Yale University, and we are grateful to audiences there for comments and discussion. This work was supported in part by NSF grant #SBR-9729108 to Ellen Broselow and Daniel Finer, co-PIs. Particular thanks are due to two reviewers and to Yunju Suh, whose perceptive comments have considerably improved this paper. Our greatest debt of gratitude goes to Lisa Selkirk, whose work inspired us to examine the phonology-syntax interface in Makassar languages and with whom we have had many discussions of this material; only her modesty prevents her from being considered a coauthor.

¹The Makassarese group (part of the Austronesian family) also includes Turatea and Bantaeng. These two languages are less well described than Makassarese, Selayarese, and Konjo.

gemination that are not attested in the other two languages. We will argue that the Konjo gemination data provide additional support for the analysis of the relationship between morphosyntactic and prosodic structure that has been proposed for the other two languages.

We begin with a review of the suffix/clitic contrasts in Makassarese and Selayarese, noting similarities and differences among the three languages. In section 3 we outline the Konjo gemination facts and offer an analysis of these patterns in terms of constraints making reference to right edges of prosodic words (PWds) and right edges of stems. We argue that the gemination found at the right edge of a PWd in Konjo is reminiscent of the phenomenon of intrusive [r] found in many dialects of English (McCarthy 1993).

2. Suffixes vs. Clitics in Makassar Languages

In this section we review evidence for the morphosyntactic and prosodic structure of suffixes and clitics in Makassarese, Selayarese, and Konjo. We propose an analysis of the behavior of these affixes with respect to stress, epenthesis, and the alternation of velar and glottal stop, grounded in different structures.

2.1. Syntactic Behavior

The differing behaviors of suffixes and clitics with respect to stress and gemination, illustrated in (1), as well as the other differences in phonological behavior that will be discussed in the following sections correlate with a difference in syntactic patterning.

The class of true suffixes includes transitivizers, comparatives, and benefactives, while the class of phrasal clitics includes absolutive markers and aspectuals. While true suffixes always appear attached to a stem, phrasal clitics are mobile, generally appearing in sentential second position (Friberg 1996, Basri 1999, Finer 2000, 2002). For example, the Konjo and Selayarese absolutives appear following the verb in (2a,3a) but following the fronted prepositional phrase in (2b,3b). Interlinear glosses have been regularized, using the following abbreviations: ERG (ergative), ABS (absolutive), ITR (intransitive), TR (transitive), PREP (preposition), DEF (definite) COMP (comparative).

(2) Konjo Phrasal Clitics (Friberg 1996, Basri field notes)

a. am-malli-**ko** juku? ri pasara sikarie?
 ITR- *buy*-2ABS *fish* PREP *market* *yesterday*
 ‘You bought fish at (the) market yesterday’

b. ri pasara-**ko** am-malli juku? sikarie?
 PREP *market*- 2ABS ITR- *buy* *fish* *yesterday*
 ‘At (the) market, you bought fish yesterday’

(3) Makassarese (Basri field notes, 1998)

a. am-malli-**a?** juku? ri pasarak-a subaŋŋi
 ITR-*buy*-1ABS *fish* prep *market*-DEF *yesterday*
 ‘I bought fish at (the) market yesterday.’

b. ri pasarak-**a?** am-malli juku? subaŋŋi
 PREP *market*-1ABS ITR-*buy* *fish* *yesterday*
 ‘At (the) market, I bought fish yesterday’

- c. Konjo: Absolutives
 -a (first person singular)
 -ko (second person singular)
 -ki (second person honorific)
 -i (third person)
 Aspectual: *-ma*

2.2. Prosodic Structure

We will assume that true suffixes attach directly to a stem to form a single morphosyntactic word, a process designated *affixation to stem* by Selkirk (1999). Phrasal clitics, in contrast, are not part of the morphosyntactic word; they constitute functional category items (FNC) which attach directly to the phonological phrase (Selkirk's (1999) *affixation to word*). Thus, a morphosyntactic word (MWord) constitutes a prosodic word (PWord), and clitics are independent of their stems in terms of both morphosyntactic and prosodic word structure. The relationship between the morphosyntactic and prosodic structures is dictated by alignment constraints such as the following, from Selkirk 1995:

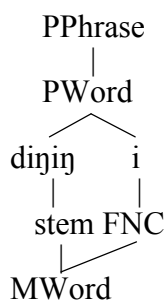
(7) Prosodic Word Alignment

Align (PWd, L/R; Lex L/R): The left/right edge of a prosodic word must be aligned with the left/right edge of a lexical category.

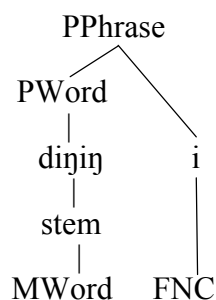
Exemplary structures for the Konjo forms (1b) *dinij* (*dinij* 'cool/cold' plus transitivity suffix *-i*) and (1c) *dinijji* (*dinij* plus third person absolute clitic *-i*) are given below:

(8) Morphosyntactic and prosodic structure

a. true suffix



b. phrasal clitic



In the following sections we will examine the behavior of suffixes and clitics with respect to a number of phonological patterns: stress, vowel epenthesis, consonant place alternations, and consonant gemination, and will argue that the different patterns exhibited by suffixes and clitics are consistent with the morphosyntactic and prosodic structures posited above.

2.3. Stress

Stress in all three languages normally falls on the penultimate syllable, regardless of syllable makeup, as illustrated by data from Selayarese:

- (9) Selayarese
- | | |
|--------------|-----------------|
| a. sampúlo | 'ten' |
| b. palóla | 'eggplant' |
| c. balíkaʔ | 'arm' |
| d. barámbaŋ | 'chest' |
| d. kalihára | 'ant' |
| e. kalumánti | 'big black ant' |
| f. katiŋálo | 'fly' |

Stress may be analyzed as the realization of a bisyllabic trochaic foot aligned with the right edge of the PWd. We assume the following constraints:

- (10) a. FTBIN, FTFORM=TROCH: All feet are bisyllabic and trochaic.
 b. ALIGN (PWD, R, FT, R) : The right edge of a prosodic word must be aligned with the right edge of a foot.

The constraints requiring feet to be bisyllabic and trochaic are undominated in these languages. All lexical category words contain at least two syllables, and monosyllabic borrowed words are augmented to reach the bisyllabic minimum (Basri 1999, Broselow 1999, Friberg and Friberg 1991), consistent with the requirement that a lexical word must also be a prosodic word.²

As mentioned above, true suffixes fall inside the stress domain while phrasal clitics fall outside it. Again, this is consistent with the claim that while the stem plus suffix combination constitutes a single prosodic word, clitics do not form a prosodic word with a preceding stem. Below, curly brackets indicate PWd edges, while parentheses indicate foot edges. Suffixes are separated from the preceding material by a dash, while clitics are preceded by =:

²Two major strategies are used to augment borrowed monosyllables, illustrated by the rendering of Bahasa Indonesia [seŋ] and [gol] as [séʔeŋ] ‘pliers’ and [gólo] ‘ball’; see Broselow 1999 for an analysis of these facts.

- (11) a. Selayarese
 (bám̩baŋ)} ‘hot’
 bam(bám̩-i)} ‘make hot’ (-i TR)
 (bám̩baŋ)}=i ‘he is hot’ (=i 3rd person ABS)
- b. Makassarese
 (lóm̩po)} ‘big’
 lom(póm̩-aŋ)} ‘bigger’ (-aŋ COMP)
 (lóm̩po)}=ma=ko ‘you are already big’ (=ma aspectual, =ko 2 sg. ABS)
- c. Konjo
 (hájiʔ)}³ ‘good’
 ha(jík-aŋ)} ‘better’ (-aŋ COMP)
 (hájiʔ)}=a ‘I am good’ (=a ABS)

The right PWd boundaries, represented by curly brackets, are aligned with the right edge of the bisyllabic trochaic foot that determines the location of stress. Phrasal clitics are therefore not part of the PWd containing the stem. These clitics cannot, however, constitute PWds on their own. Clitics are monosyllabic and therefore fall below the minimal word size. Furthermore, even a sequence of two clitics (as in the Makassarese example in (11b) *lóm̩po}*=ma=ko ‘you are already big’), which could in principle support a bisyllabic foot, fails to attract stress. The absence of stress on clitic sequences is consistent with the structure posited in (8b) in which a clitic is part of the phonological phrase but not part of a prosodic word: a metrical foot must be aligned with the right edge of a prosodic word, but the clitic sequence contains no PWd edge.

2.4. Copy Vowel Epenthesis

A second difference between suffixes and clitics involves the appearance of epenthetic vowels. As has been well established (Mithun and Basri 1986, Aronoff et al. 1987, Friberg and Friberg 1991, Alderete 1999b, McCarthy 1998, Broselow 1999, 2008), the final vowel of words with antepenultimate stress is epenthetic. Stems undergoing vowel epenthesis share three characteristics: they constitute the only monomorphemic words with antepenultimate rather than penultimate stress; their final syllable begins with one of the three consonants [r,l,s]; and they end in a vowel which is identical to the vowel preceding this [r,l,s]:

- (12) Selayarese r/l/s-final stems
- | | | |
|--------------|------------|------------|
| a. sáhala | /sahal/ | 'profit' |
| b. lám̩bere | /lamber/ | 'long' |
| d. sússulu | /sussul/ | 'burn' |
| e. páʔrisi | /páʔris/ | 'painful' |
| f. maŋkásara | /maŋkasar/ | 'Makassar' |

³[j] indicates a voiced palatal stop.

Vowel epenthesis after stem-final [r,l,s] is motivated by the fact that the only permitted word-final codas in all three languages are velar nasal and glottal stop. (Word-internally, a coda nasal is homorganic with a following consonant, and a sequence of glottal stop-voiceless consonant is realized as gemination of the second consonant.) The restrictions on possible codas prevent stems ending in [r,l,s] from surfacing faithfully, and these stems undergo copy vowel epenthesis when the stem-final consonant would otherwise surface in coda position.⁴ The epenthetic status of the final copy vowel is supported by the disappearance of this vowel before a vowel-initial suffix. Lexical vowels, in contrast, remain before vowel-initial suffixes:

(13) Epenthetic vs. Lexical Vowels (Selayarese)

a. Epenthetic vowel

lámber	‘long’	/lamber/
lambér-aŋ	‘longer’	/lamber-aŋ/

b. Lexical vowel

tirére	‘thirsty’	/tirere/
tiréré-aŋ	‘thirstier’	/tirere-aŋ/

In Makassarese, both a copy vowel and a word-final glottal stop are inserted in [r,l,s]-final forms. We discuss the insertion of glottal stop in section 2.5.2. Aside from this difference, the three languages repair [r,l,s]-final stems in the same manner:

(14)	a. Selayarese:	bótolo	‘bottle’	/botol/
	b. Konjo:	bótolo	‘bottle’	/botol/
	c. Makassarese:	bótolo?	‘bottle’	/botol/

Further evidence for the analysis of forms with antepenultimate stress as derived from consonant-final stems is the fact that the presence of [r,l,s] flanked by identical vowels is a necessary but not sufficient condition for antepenultimate stress (for example, alongside Selayarese *sáhala* ‘profit’ (12a) we find *sahála* ‘sea cucumber’). We adopt the analysis of the connection between antepenultimate stress and word-final epenthesis suggested by Alderete (1999a, 1999b), which relies on the following constraint banning epenthetic vowels from the main stress foot:

(15) HEAD-DEP (Alderete 1999a, 1999b, see also Broselow 1999, 2008):

Every vowel contained in the head foot in the output must have a correspondent in the input.

This constraint dominates ALIGN-R (PWD, FT), and therefore chooses the footing (*bóto*)l_Q, in which the main foot contains only lexical vowels, over *bo(*tólo*), with normal penultimate stress:

⁴See McCarthy 1998, Broselow 1999 for competing analyses of why the lexicon does not appear to contain stems ending in any consonants other than [ŋ,ʔ,r,l,s].

(16) Stress with epenthetic vowels

/botol/ ‘bottle’	FTBIN, FT TROCH	HEAD-DEP	ALIGN(PWD,R, FT, R)
a. bo(tólo)		*!	
☞ b. (bóto)lo			*

The interesting feature of copy vowel epenthesis for the purposes of this paper involves the behavior of [r,l,s]-final stems before true suffixes and clitics. In all three languages, an epenthetic vowel is present before a clitic, even when the clitic begins with a vowel. Below we provide data from Selayarese and Konjo, postponing discussion of the parallel Makassarese data to the following section:

(17) Selayarese

- a. lámbusu} ‘straight’ (/lambus/)
 b. lambús-aŋ} ‘straighter’
 c. lámbusu}=a ‘I am straight’

(18) Konjo

- a. jámmara} ‘dirty’ (/jamar/)
 b. jammárr-i} ‘make dirty’
 c. jámmara}=i ‘he is dirty’

The gemination of [r] before the transitivizing suffix in Konjo is discussed in section 3. The question we focus on at this point is why vowel epenthesis is found in (17c) and (18c), when [r,l,s] could simply be syllabified as onsets to the following clitic-initial vowel (that is, why (17c) and (18c) are not realized as **lambus-a* and **jammarr-i*, respectively.⁵

To account for this, we adopt the suggestion of Selkirk (1999) that a set of Output-Output constraints (Benua 1995) demands identity between the isolation form of a morphosyntactic word and all its surface exponents (that is, forms containing the same syntactic features). The retention of the epenthetic vowel in the preclitic form is due to the following constraint:

- (19) O-O(WORD)MAX(V): Where two strings *S* and *S'* are in an O-O_{Mword} correspondence relation and *S* is the base and *S'* is the affiliate of that correspondence relation, a vocalic segment *s'* belonging to *S'* must have a vocalic segment to which it corresponds in *S*.

⁵An alternative analysis would prevent syllabification of [r,l,s] as onset to a clitic by banning syllabification which crosses a PWD boundary, although constraints banning such syllabification would need to be ranked so as to allow cases discussed below in which syllabification across PWD boundaries does take place. We will not pursue this approach here.

The epenthetic vowel is necessary in the base form to prevent [r,l,s] from surfacing in coda. This vowel therefore appears in the base-plus-clitic forms as well.⁶

(20) Selayarese: stem plus clitic

/lambus/ = a	*[r,l,s]CODA	O-O(WORD)MAX(V)	DEP(V)
a. lambus] _{wd} =a		*!	
↵ b. lambusu] _{wd} =a			*

In contrast, no epenthetic vowel appears with true suffixes, as the output-output constraint is irrelevant in this case:

(21) Selayarese: stem plus suffix

/lambus-aŋ/	*[r,l,s]CODA	O-O(WORD)MAX(V)	DEP(V)
↵ a. lambus-aŋ] _{wd}			
b. lambusu-aŋ] _{wd}			*!

The identity between the isolation form and the preclitic form (as opposed to the presuffixal form) supports the claim that a stem-suffix sequence constitutes a single morphosyntactic (and therefore prosodic) word, in contrast to a stem-clitic sequence.

2.5. Velar Stop-Glottal Stop alternation

2.5.1. Lexical Glottal Stop

A third diagnostic for suffix vs. clitic involves the alternation between velar and glottal stops. Recall that codas are limited to velar nasal and glottal stop. In all three languages, a stem-final glottal stop surfaces as [k] before a true suffix:

(22) a. Selayarese:

bákkaʔ } ‘big’
 bakkák-aŋ } ‘bigger’

b. Konjo

hájiʔ } ‘good’
 hajík-aŋ } ‘better’

c. Makassarese

bájiʔ } ‘good’
 bajík-aŋ } ‘better’

⁶For convenience, we assume that copy vowel epenthesis involves insertion of an additional vowel slot, violating DEP(V). Under an alternative view, presented in Kitto and de Lacy 1999, copy vowel epenthesis involves copying of a base vowel, violating INTEGRITY. Nothing in our arguments hinges on this distinction.

This alternation reflects a distributional restriction of glottal stop to coda and velar stop to onset position.⁷ We will assume that this alternation is motivated by the following constraints:⁸

- (23) a. ONSET: Syllables must have onsets.
 b. *[ʔ]ONSET: Glottal stops cannot occur in syllable onset.

The complementary distribution of glottal stop and [k] breaks down in one context, however; in Selayarese and Konjo, final glottal stop is retained before a phrasal clitic:

- (24) a. Selayarese:
 bákkaʔ} ‘big’
 bakkák-aŋ} ‘bigger’
 bákkaʔ}=a ‘I am big’
- b. Konjo
 hájiʔ} ‘good’
 hajík-aŋ} ‘better’
 hájiʔ}=a ‘I am good’

In contrast, Makassarese maintains the prohibition on glottal stops in all prevocalic contexts, before both suffixes and clitics:

- (25) Makassarese
 bájiʔ} ‘good’
 bajík-aŋ} ‘better’
 bájik}=a? ‘I am good’

We assume that in Makassarese, the surfacing of the stem-final consonant as glottal stop is an effect of the constraints ONSET and *[ʔ]ONSET, which together force the stem-final consonant into onset position, where it is realized as the legal onset [k]. In Selayarese and Konjo, where glottal stop surface before clitics, some other constraint must override either ONSET or *[ʔ]ONSET. We follow Selkirk 1999 in viewing the retention of glottal stop in preclitic forms as another reflection of the mandate for identity between all exponents of morphosyntactic words containing the same syntactic features, expressed in the following constraint:

⁷In all three languages, intervocalic glottal stop is possible in some monomorphemic words when the flanking vowels are identical (e.g. Konjo *teʔeŋ* ‘tea’, Friberg and Friberg 1991). In the three languages in question, subminimal foreign CVC words are generally adapted as CVʔVC, with insertion of glottal stop and a copy vowel (Broselow 1999).

⁸This is a special case of the constraints posited by Basri (1999), Parker (2001), and Smith (2002) requiring onset consonants to have a specified place feature.

- (26) O-O(WORD)IDENTPLACE(CONS) (Selkirk 1999): Where two strings S and S' are in an O-O_{Mword} correspondence relation and S is the base and S' is the affiliate of that correspondence relation, a consonantal segment s' belonging to S' must be identical in place feature composition to the segment s to which it corresponds in S .

In Makassarese, this constraint is ranked too low to force correspondence between the basic and derived forms:

(27) Makassarese

/bajiʔ/ = aʔ <i>good</i> + 1 st ABS clitic base: [bájiʔ]	*[ʔ]ONSET	ONSET	O-O(WORD)IDENTPLACE(CONS)
↵ a. báji.k=aʔ			*
b. báji.ʔ=aʔ	*!		
c. bájiʔ. =aʔ		*!	

In Selayarese and Konjo, however, the output-output constraint must be ranked high enough to force glottal stop to surface even before a vowel-initial clitic. Whether the glottal stop surfaces as a coda (violating ONSET) or as an onset to the following clitic (violating *[ʔ]ONSET) depends on the relative ranking of these constraints:

(28) Konjo, with ranking *[ʔ]ONSET >> ONSET

/hajiʔ/ = a <i>good</i> + 1 st ABS clitic base: [hájiʔ]	O-O(WORD)IDENTPLACE(CONS)	*[ʔ]ONSET	ONSET
a. háji.k=a	*!		
b. háji.ʔ=a		*!	
↵ c. hájiʔ. =a			*

(29) Konjo, with ranking ONSET >> *[ʔ]ONSET:

/hajiʔ/ + a <i>good</i> + 1 st ABS clitic base: [hájiʔ]	O-O(WORD)IDENTPLACE(CONS)	ONSET	*[ʔ]ONSET
a. háji.k-a	*!		
↵ b. háji.ʔ-a			*
c. hájiʔ. -a		*!	

At this point we do not have evidence to determine the full rankings of the onset-related constraints, though we will return to this question in section 3.3.3. In either case, the output-

output constraint is ranked highly enough in Selayarese and Konjo to preserve a stem-final glottal stop before clitics but not before true suffixes:

(30) Rankings

- a. Makassarese: $*[?]_{\text{ONSET}}, \text{ONSET} \gg \text{O-O(WORD)IDENTPLACE}$
 b. Selayarese, Konjo: $\text{O-O(WORD)IDENTPLACE} \gg *[?]_{\text{ONSET}}$ and/or ONSET

2.5.2. Epenthetic Glottal Stop

In 2.4 we saw that whereas a copy vowel is inserted after stems ending in [r,l,s] in all three languages, Makassarese additionally inserts a glottal stop following the copy vowel (Aronoff et al. 1987, McCarthy and Prince 1994); cf. *bótolo* ‘bottle’ in Selayarese and Konjo, *bótolo?* ‘bottle’ in Makassarese). In Makassarese an epenthetic glottal stop, like a lexical glottal stop, is realized as [k] before a vowel, whether that vowel is contained in a suffix or a clitic:

- (31) Makassarese
 rántasa?} ‘dirty’ (stem /rantas/)
 rantás-aŋ} ‘dirtier’
 rántasak}=a? ‘I am dirty’ (*rantás}=a)

Makassarese glottal stop epenthesis was analyzed by McCarthy and Prince (1994) as an effect of a constraint which requires prosodic words to end in a consonant. Makassarese, unlike Selayarese and Konjo, ranks this constraint above DEP(C), which forbids consonant insertion:

(32) Presence vs. Absence of Epenthetic Glottal Stop

a. Constraints

FINAL-C: A prosodic word must end in a consonant.

DEP(C): Any consonant in the output must have a correspondent in the input.

b. Rankings

Selayarese, Konjo: $\text{DEP(C)} \gg \text{FINAL-C}$

Makassarese: $\text{FINAL-C} \gg \text{DEP(C)}$

The epenthetic glottal stop appears in Makassarese only after stems ending in [r,l,s] – that is, stems that undergo vowel epenthesis – while stems that end in a vowel underlyingly do not undergo glottal stop epenthesis, even though they violate FINAL-C. McCarthy and Prince ascribe the failure to epenthesize a consonant after vowel-final stems to a constraint ALIGN-STEM-RIGHT which requires the right edge of a stem to be coterminous with the right edge of a syllable. We will assume a slightly different version of this constraint, a categorical Anchor constraint rather than a gradient alignment constraint:

- (33) ANCHOR-RIGHT (STEM, SYLLABLE): The segment at the right edge of the (morphosyntactic) stem must be at the right edge of a syllable.

Glottal stop epenthesis after a vowel-final stem would violate the Anchor constraint. Stems ending in [r,l,s], however, can never satisfy this constraint, as [r,l,s] cannot surface in coda position:

(34) Makassarese epenthetic glottal stop

	ANCHOR-RIGHT (STEM, SYLLABLE)	FINAL-C	DEP(C)
vowel-final stem: /batu/ ‘boat’			
↻ a. batu		*	
b. batu?	*!		*
[l]-final stem: /botol/ ‘bottle’			
a. botolo	*	*!	
↻ b. botolo?	*		*!

Epenthetic glottal stop appears in a second context, reduplication. All three languages prefix a bisyllabic reduplicant to express notions such as diminutive or lack of intensity or seriousness (Basri 1999). A stem of two syllables is copied in its entirety, as in Makassarese *batu-batu* ‘small stones’ (Aronoff et al. 1987, McCarthy and Prince 1994). However, the upper limit of two syllables on reduplicants forces incomplete copying of longer bases. In all three languages, incomplete copying is associated with the appearance of a glottal stop at the right edge of the reduplicant, as in *balaʔ-baláo* ‘toy rat.’ McCarthy and Prince (1994) point out that incomplete reduplication provides a second context in which the constraint demanding that the right edges of stems be coterminous with the right edges of syllables cannot be satisfied, allowing FINAL-C to be decisive.⁹ We will see in the next section that FINAL-C and ANCHOR-R(STEM,SYLL) are also instrumental in accounting for Konjo gemination.

2.6. Summary

This section has outlined three diagnostics for true suffixes vs. phrasal clitics: stress, copy vowel epenthesis, and the velar stop-glottal stop alternation. In the following section we will consider additional diagnostics involving consonant gemination which are specific to Konjo.

3. Konjo Gemination

Konjo exhibits two phenomena which are not attested in either Selayarese or Makassarese. The first, dubbed *ŋ-gemination* by Friberg and Friberg (1991), affects velar nasals followed by clitics. The second, Friberg and Friberg’s *A-gemination*, affects consonants followed by true suffixes but not clitics. We will argue that these two gemination processes are responses to two previously motivated constraints, each dictating a relationship

⁹While neither Selayarese nor Konjo inserts glottal stop after [r,l,s]-final stems, these languages do have epenthetic glottal stop in incomplete reduplicants. We can account for this difference by assuming that in Selayarese and Konjo, the constraint FINAL-C outranks DEP(C)B-R, which demands that any segment contained in the reduplicant also be contained in the base.

between morphosyntactic and phonological structure. Gemination at the right edge of the prosodic word (η -gemination) is motivated by the FINAL-C constraint, while PWd-internal A-gemination is motivated by the constraint ANCHOR-RIGHT(STEM,SYLLABLE).

Our investigation of Konjo gemination is indebted to Friberg and Friberg's (1991) lucid and insightful discussion of this phenomenon. Examples in the following sections are taken from Hasan Basri's (1998) field notes or from Friberg and Friberg (1991).

3.1. Overview: Konjo η -Gemination and A-Gemination

The process of η -gemination is illustrated in (29), where the final nasal of the stem *din η* 'cool' surfaces as a singleton before the transitivizing suffix in (29a) but as a geminate before the phonologically identical absolutive clitic in (29b):

(35) η -gemination: stem-final C

- a. *din η -i* 'cool (something)' (-i TR) b. *din $\eta\eta$ =i* 'it is cold' =-i ABS)

$$\begin{array}{c} \sigma \} \sigma \\ | \quad \wedge \\ i \quad \eta - i \end{array}$$

$$\begin{array}{c} \sigma \} \sigma \\ \wedge \quad \wedge \\ i \quad \eta = i \end{array}$$

Again, the curly brackets in (35) indicate the right edge of the prosodic word, as indicated by stress on the penultimate syllable within the PWd.

Velar gemination is not limited to stem-final consonants. The final nasal of the comparative/benefactive/nominalizing suffix *a η* also geminates in a pre-clitic environment:

(36) η -gemination:

- a. *din η -a $\eta\eta$* }=i 'he is colder (than)'
cool/cold -COMP= 3rd ABS

- b. *paka-din η -a $\eta\eta$* }=a 'cool it for me'
 imperative- *cool/cold*-benefactive=1st ABS

In contrast, A-gemination applies only to consonants followed by a true suffix: to undergo A-gemination, a consonant must be stem-final and must be followed by a vowel within its own PWd. Friberg and Friberg identify a third condition that must be met: a geminating consonant must be preceded by the vowel [a]:¹⁰

(37) a. A-Gemination (Friberg and Friberg 1991)

- tará $\eta\eta$ -i* } 'make (something) sharp'
sharp-TR

b. failure of A-Gemination after vowel other than [a] (Friberg and Friberg 1991)

- din η -i* } 'make (something) cold'
cool/cold-TR

¹⁰As discussed below, Basri found that his informants are no longer bound by this condition.

Both gemination processes may apply in a single form. In (38), the true suffix (the benefactive *-aŋ*) provides the context for A-gemination of the final consonant of the stem /*tarəŋ*/, while the clitic (absolute =*a*) provides the context for *ŋ*-gemination of the PWD-final consonant.

- (38) Both *ŋ*-gemination and A-gemination (Friberg and Friberg 1991)
paka-tarəŋŋ-aŋŋ }=*a* ‘sharpen it for me’
 imperative-*sharp*-benefactive=*1st* ABS

The [a] before the geminate surfaces as a schwa, a fact we will return to below.

While *ŋ*-gemination is limited to velar nasals, any stem-final consonant is subject to A-gemination in the proper context. Recall that Konjo, like Selayarese and Makassarese, exhibits a regular alternation between glottal stop in coda position and [k] in onset. With stem-final glottal stops, gemination is accompanied by change in place:

- (39) a. A-gemination before true suffix
lumpákk-i } ‘jump (on something)’ (stem /*lumpa?*/)
jump-TR
- b. No A-gemination before a clitic
lúmpa? }=*i* ‘he jumps’
jump=*3rd* ABS

For Friberg and Friberg’s (1991) speakers, A-gemination of glottal stop, like that of velar nasal, is limited to post-[a] context:

- (40) Failure of A-gemination following vowel other than [a] (Friberg and Friberg 1991)
hajík-i } ‘make good’ (stem /*hají?*/)
good-TR
- tekék-aŋ* } ‘to carry on saddle / load carried on saddle’ (stem /*teke?*/)
carry on saddle-Nominalizer

The remaining stem-final consonants, [r,l,s], also surface as geminate following [a] and preceding a true suffix. Recall that stems ending in [r,l,s] undergo epenthesis of a copy vowel. This epenthetic vowel surfaces both when the word is final, and when it is followed by a clitic. However, no copy vowel is inserted when the [r,l,s] is followed by a suffix vowel, and it is in precisely this position that [r,l,s] may undergo A-gemination, as in (41b):

- (41) A-gemination: Stem /*ajar*/ ‘teach’
 a. *aŋŋ-ájara* }=*i* ‘he teaches’
 TR- *teach*=*3rd* ABS
- b. *ajárr-i* } ‘teach (someone)’
teach-TR

Again, A-gemination may fail to apply if the preceding vowel is other than [a], as in Friberg and Friberg's (1991) example *áko bañju? bañjul-i* 'don't joke around' (root /bañjul plus transitivizer).¹¹ This restriction appears, however, to be on the road to extinction; Friberg and Friberg (1991) report a tendency for younger speakers to generalize pre-suffixal gemination to other vowel contexts, and the first author of this paper found that gemination was common regardless of the quality of the preceding vowel, so long as the other conditions were met.

It is tempting to ascribe A-gemination to the presence of a stressed vowel preceding the geminate, since addition of a suffix places the stem-final syllable in penultimate (stressed) position. (Recall that because clitics fall outside the stress domain, a bisyllabic stem preceding a clitic is stressed on its initial rather than its final syllable.) However, Friberg and Friberg (1991) anticipate and dismiss this argument, pointing out that A-gemination occurs even when the addition of two true suffixes moves stress to the right of the geminating consonant, as in (42b):

(42) A-gemination following unstressed vowel (Friberg and Friberg 1991):

a. *áko* } {*kapáll-i*} 'don't make (something) too thick' (stem /kapal/)
neg *thick-TR*

b. *áko* } {*kapall-í-ʔi*} 'don't make (everything) so thick'
neg *thick-TR-perpetualizer*

3.2. Interim Summary: Conditions for Gemination

The following chart summarizes the conditions for the two gemination processes in Konjo:

(43) Summary: Conditions for Gemination (preliminary description)

- a. η -Gemination applies to a velar nasal that is
 - i. before a clitic, and
 - ii. followed by a vowel.
- b. A-Gemination applies to any consonant that is
 - i. before a suffix, and
 - ii. preceded by [a] (for some speakers).

In the following two sections we will develop an analysis of Konjo gemination, addressing the questions of the motivation for the two gemination processes, as well as for the contextual restrictions on each process.

3.3. η -Gemination: FINAL-C Effect

3.3.1. English intrusive [r] as FINAL-C Effect

As discussed in section 2.5.2, the appearance of epenthetic glottal stop at the right edge of [r,l,s]-final stems in Makassarese has been analyzed (McCarthy and Prince 1994) as an effect of the FINAL-C constraint, which requires prosodic words to end in a consonant.

¹¹Friberg and Friberg (1991: 92) also note additional constraints on A-gemination: "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."

FINAL-C is also responsible, according to McCarthy (1993), for the appearance of intrusive [r] in a number of dialects of English. We will argue that the conditions for η-gemination parallel those for intrusive [r]. We begin by briefly reviewing McCarthy’s analysis of intrusive [r].

As is well known, many English dialects typically ban [r] from syllable coda (e.g., *He put the tuna down* and *He put the tuner down* will be homophonic, with no [r] in ‘tuner’). Some r-dropping dialects also show an intrusive [r] following word-final [ə, a, ɔ], as in *He put the tuna[r] away*, which is pronounced in McCarthy’s Eastern Massachusetts dialect as homophonic with *He put the tuner away*. McCarthy notes that this intrusive [r] appears only intervocally, where, he argues, it is ambisyllabic (associated both with coda and with the following onset). This ambisyllabicity protects intrusive [r] from the prohibition on coda [r] that leads to the loss of [r] in, e.g., *tuner down*. However, the intervocalic context is necessary but not sufficient for the appearance of the intrusive [r], which typically appears only when the first vowel is contained in a lexical category word:

(44) Grammatical context for intrusive [r] (McCarthy 1993)

- a. intrusive [r] after LEX
The tuna [r] is...
- b. No intrusive [r] after FNC
*I’m gonna [r] eat.

Appealing to Selkirk’s (1984) insight that in English, lexical word edges are isomorphic with prosodic word edges, McCarthy ascribes intrusive [r] following lexical words (like *tuna*) to FINAL-C, which requires a PwD to end in a consonant. In contrast, a function word (such as *gonna*) is not subject to FINAL-C, since in English function words attach directly to the phonological phrase, much like the Makassarese, Selayarese, and Konjo phrasal clitics.¹²

(45) Intrusive [r] at PwD boundary (McCarthy 1993)

	FINAL-C	DEP(C)
/tuna is/		
a. tuna } is	*!	
☞ b. tuna r } is		*
/gonna eat/		
☞ a. gonna eat }		
b. gonna r eat }		*!

¹²The requirement that the lefthand context of r-intrusion must contain one of the vowels [ə,a,ɔ] stems from the fact that other English vowels are diphthongal ([ij, ej, uw, ow]) and therefore contain their own consonantal elements. In McCarthy’s analysis, [r] is inserted; however, Gick (1999) argues that schwa actually contains an underlying consonantal gesture which is normally attenuated in final position; see Broselow 2005 for further discussion.

The sole exceptions to the prohibition on intrusive [r] at the right edge of a functional category involve cases in which FNC appears at the right edge of a phonological phrase:

(46) Intrusive [r] after FNC

I said I was gonna [r], and I did.

This fact is consistent with the analysis of intrusive [r] as appearing at the end of PWd, since Selkirk's constraint ALIGN (PPH, R, PWD, R) ensures that the right edge of a phonological phrase will also be the right edge of a prosodic word:

(47) Intrusive [r] at PPh/PWd boundary

/gonna, and.../	CODA-COND	FINAL-C	DEP(C)
a. gonna}, and		*!	
☞ b. gonna r}, and			*

3.3.2. η-Gemination

We now return to Konjo η-gemination, which we will argue is quite similar to English [r] intrusion. For intrusive [r] to appear, two conditions must be met: a phonological condition (flanking vowels) and a prosodic condition (PWd edge). Konjo η-gemination is subject to similar conditions.

Note first that Konjo geminates, like English intrusive [r], occur only intervocalically. This follows from the assumption (Hayes 1989) that geminate consonants represent a single feature matrix linked to two prosodic positions, coda and onset. Since Konjo limits both onsets and codas to a single consonant, the only possible position for a geminate is between two vowels.

Second, recall that η-gemination applies in preclitic contexts, but not to velar nasals followed by a true suffix. As we have seen, the preclitic context corresponds to the right edge of a prosodic word. Gemination permits the PWd to end in a consonant, while still allowing the consonant to serve as onset to the following vowel. Thus, FINAL-C accounts naturally for gemination before clitics, so long as FINAL-C and ONSET outrank the constraint that forbids a lexical singleton from being realized as a geminate. FINAL-C is in turn outranked by DEP(C), making gemination the only option for satisfying both FINAL-C and ONSET. The ranking of DEP(C) over FINAL-C is necessary to prevent the Makassarese pattern, illustrated by the realization of /botol/ as [botoloʔ] 'bottle' discussed in 2.5.2.

Following Hayes (1989), we assume that geminates represent a single consonant linked to two prosodic positions, both coda and onset. Assuming that coda (but not onset) consonants are dominated by a mora, the realization of an underlying singleton as geminate can be prevented by MORAFaITH (Broselow, Chen, and Huffman 1997):

- (48) MORAFaITH: If the number of moras linked to $S_i = n$ and $S_i \mathcal{R} S_o$, then the number of moras linked to $S_o = n$. (A segment linked to n moras in the input must be linked to n moras in the output.)

A violation of MORAFaITH is incurred each time an underlyingly nonmoraic segment is assigned to coda position.¹³ This constraint therefore favors the syllabification of a single intervocalic consonant as onset to the following vowel, rather than as a geminate linked to both coda and onset positions.

The phenomenon of η-gemination indicates that MORAFaITH is outranked by constraint(s) favoring gemination. The following tableau illustrates the role of FINAL-C and ONSET in triggering η-gemination:

(49) No η-gemination before suffix; η-gemination before clitic

	DEP-C	FINAL-C	ONSET	MORAFaITH
/diŋiŋ-i/ (TR) 'make cold'				
☞ a. diŋi.ŋ-i}		*		
b. diŋiŋ.ŋ -i}		*		*!
c. diŋi.ŋ-i?}	*!			
/diŋiŋ=i/ (ABS) 'he/she/it is cold'				
a. diŋi.}ŋ=i		*!		
☞ b. diŋiŋ.}ŋ=i				*
c. diŋiŋ.}=i			*!	*

If gemination is motivated by the mandate that prosodic words should end in a consonant, we would expect that all words ending in velar nasals, not only those followed by a clitic, should be subject to η-gemination, so long as there is a following vowel to supply the correct phonological context. As Friberg and Friberg (1991) point out, this is indeed the case. Their example below, in which the first member of a phrase containing two lexical items exhibits η-gemination, establishes that the presence of a clitic is not required for η-gemination:

(50) η-Gemination in V#V Context (Friberg and Friberg 1991)

- a. bájuŋ 'ingredients'
- b. útaŋ 'vegetables'
- c. bájuŋŋ útaŋ 'vegetable makings'

We conclude, then, that Konjo η-gemination, like the appearance of final glottal stop in Makassarese epenthetic words and the appearance of intrusive [r] in English, can be ascribed to a constraint requiring the right edges of PWD to be consonantal. While this constraint is

¹³For reasons discussed in section 3.4.2, we assume that geminate consonants share a mora with the preceding vowel, rather than projecting a new mora. Therefore, MORAFaITH, rather than DEP(MORA), is required to block gemination.

ranked below DEP(C) in Konjo, thereby preventing addition of a new consonant, it is ranked above the constraint preventing gemination of a lexical single consonant. Thus gemination is a valid strategy for ensuring C-finality in PWds, so long as the phonological context supports a geminate. The next question to consider is why gemination is restricted to final velar nasals.

3.3.3. Restriction of η-Gemination to Velar Nasals

In all three languages under consideration, words may end in a vowel, a velar nasal, or a glottal stop. In section 2.5 we saw that the three languages evidence an alternation between velar and glottal stops: generally, [k] appears in onset and [ʔ] in coda, though in Selayarese and Konjo, a PWd-final glottal stop is retained even before a vowel-initial clitic:

- (51) Konjo k ~ ʔ
- | | | |
|-------------------|------------------|--------------|
| a. Final position | háj <i>ʔ</i> } | ‘good’ |
| b. Before suffix | haj <i>k</i> -i} | ‘make good’ |
| c. Before clitic | háj <i>ʔ</i> }=i | ‘he is good’ |

In section 2.5.1, we analyzed the retention of the glottal stop in preclitic position as an effect of an Output-Output constraint demanding identity in place between the consonants contained in the surface exponents of the same morphosyntactic word. This Output-Output constraint can account for the failure of glottal stop to geminate in preclitic position (51c), the same position where a velar nasal is realized as geminate. Recall that glottal stops may undergo A-gemination, and that the geminate realization of glottal stop is [kk]:

- (52) A-gemination
- | | |
|---------------------|-----------------------|
| lúmpa <i>ʔ</i> } | ‘jump’ |
| lumpá <i>kk</i> -i} | ‘jump on (something)’ |

If η-gemination of PWd-final consonants were extended to affect PWd-final glottal stops, such stops would necessarily be realized as geminate [k], violating the constraint requiring place identity between the base form and the preclitic form. The ranking of this O-O constraint above FINAL-C blocks gemination, as illustrated in the following tableau:

(53) PwD-edge gemination blocked with final [ʔ]

	O-OIDENT (CPLACE)	*[ʔ]ONSET	FINAL-C	ONSET	MORAFaITH
/hajiʔ=i/ good=ABS '3 rd is good'	base: [hájiʔ]				
☞ a. há.jiʔ.} = i				*	*
b. há.ji.} = ʔi		*!	*		
c. há.ji.}k = i	*!		*		
d. há.jik.}k = i	*!				*
e. ha.jiʔ.}ʔ = i		*!			*

The option of realizing glottal stop as either single or geminate [k](nc,d) is closed off by the output-output constraint. The gemination of glottal stop (e) is blocked by the constraint forbidding glottal onsets, which also rules out (b), in which single glottal stop surfaces in onset position. These facts therefore allow us to determine the relative ranking of ONSET and *[ʔ]ONSET (discussed above). Ranking ONSET above *[ʔ]ONSET would incorrectly choose the output with geminate glottal stop:

(54) Incorrect ranking

	O-OIDENT (CPLACE)	ONSET	FINAL-C	*[ʔ]ONSET	MORAFaITH
/hajiʔ=i/ '3 rd is good' (ABS clitic)	base: [hájiʔ]				
a. há.jiʔ.} = i		*!			*
b. há.ji.} = ʔi			*!	*	
c. há.ji.}k = i	*!		*		
d. há.jik.}k = i	*!				*
☞ e. ha.jiʔ.}ʔ = i				*	*

As the tableau below shows, the earlier ranking in (53) is consistent with the presuffix context as well as the preclitic context:

No Gemination of [ʔ]

	O-OIDENT (CPLACE)	*[ʔ]ONSET	FINAL-C	ONSET	MORAFaITH
(55) /hajiʔ-i/ 'make good' (TR)					
a. ha.ji.ʔ-i}		*!	*		
☞ b. ha.ji.k-i}			*		
c. ha.jiʔ.-i}			*	*!	*
d. ha.jik.k-i}			*		*!
e. hajiʔ.ʔ-i}		*!	*		*
(56) /hajiʔ=i/ '3 rd is good' (ABS clitic)	base: [hajiʔ]				
☞ a. há.jiʔ.} = i				*	*
b. há.ji.} = ʔi		*!	*		
c. há.ji.}k = i	*!		*		
d. há.jik.}k = i	*!				*
e. há.jiʔ.}ʔ = i		*!			*

Gemination is blocked in preclitic forms by the combination of the Output-Output constraint and the constraint forbidding glottal onsets. In presuffix forms, where the Output-Output constraint is irrelevant, gemination is blocked by MORAFaITH, which favors syllabifying the stem-final consonant solely as an onset.

However, we saw in section 3.1 that gemination can occur in presuffixal contexts, illustrated by alternations such as *lúmpaʔ* 'jump' vs. *lumpákk-i* 'jump on.' For older speakers, this gemination is limited to contexts in which the stem-final consonant is preceded by [a]. This gemination will not be blocked by the Output-Output constraint, as the transitivity suffix *-i* of *lumpákk-i* forms part of the morphosyntactic word, and the base form 'jump, intransitive' is not in a correspondence relation with the derived form 'jump, transitive.' But MORAFaITH, which rules out (nd) *hajikk-i*, is not decisive in *lumpákk-i* and must therefore be outranked by some constraint which forces gemination in this context. We turn now to closer consideration of A-gemination.

3.4. A-Gemination: Anchor Effect

3.4.1. Motivation for A-Gemination

As outlined in section 3.1, A-gemination occurs in stem-final consonants which precede a suffix within the same prosodic word (and which also, for some speakers, follow [a]):

(57) A-gemination

- a. táraŋ} ‘sharp’
 - b. taráŋŋ-i} ‘make (something) sharp’
- sharp-TR*

We argue that A-gemination occurs in response to ANCHOR-R(STEM,SYLLABLE), which requires the right edge of a stem to correspond to the right edge of a syllable. Recall that McCarthy and Prince (1994) have argued that such a constraint operates in Makassarese to force insertion of a glottal stop at the right edges of stems ending in epenthetic vowels but not those ending in lexical vowel (e.g., *botolo?* ‘bottle’ from stem /botol/, but *lompo* ‘big’ (**lompo?*) from stem /lompo/). We repeat the constraint below:

(58) ANCHOR-R(STEM,SYLLABLE): The right edge of a stem should coincide with the right edge of a syllable (McCarthy and Prince 1994).

Assuming that geminate consonants are ambisyllabic, gemination permits a stem-final consonant before a vowel-initial suffix to satisfy both ONSET and ANCHOR-R. We postpone the effect of preceding vowel context to section 3.4.2., considering at this point the prosodic conditioning of A-gemination. The following tableau illustrates the role of Anchor-R in inducing gemination of presuffixal velar nasal:

(59) A-gemination

/taraŋ - i/ ‘make sharp’ (TR suffix)	ONSET	ANCHOR-R(STEM,SYLL)	MORAFaITH
$\begin{array}{c} \sigma \quad \sigma \\ \wedge \quad \wedge \\ \text{a. ta ra } \eta \text{ - i} \end{array}$			*
$\begin{array}{c} \sigma \quad \sigma \\ \wedge \quad \wedge \\ \text{b. ta r a } \eta \text{ - i} \end{array}$		*!	
$\begin{array}{c} \sigma \quad \sigma \\ \wedge \quad \\ \text{c. ta ra } \eta \text{ - i} \end{array}$	*!		*

If untrammelled by other constraints, ANCHOR-R should cause any stem-final consonant in prevocalic position to be geminate, regardless of whether the following vowel is contained in a suffix or a clitic. However, stem-final glottal stops geminate only before true suffixes, even though the consonant is, of course, stem-final in the preclitic position as well:

- (60) Stem /lumpaʔ/ ‘jump’
- a. gemination before true suffix
 lumpákk-i} ‘jump (on something)’
jump-TR
- b. no gemination before clitic
 lúmpaʔ}=a ‘I jump’
jump=1st ABS

We argued above that gemination of glottal stops in preclitic position is blocked by the Output-Output constraint requiring all consonants in the preclitic form to have the same place specification as their correspondents in the isolation form. Ranked above ANCHOR-R(STEM, SYLL), the Output-Output constraint will block gemination before clitics, but not before suffixes, because the correspondence relationship holds between the base form and the preclitic form, but not between the base and the presuffixal form, which constitute separate words with separate sets of morphosyntactic features.

The remaining consonants that may occur in stem-final position are [r,l,s]. Like glottal stop, these consonants geminate before true suffixes but not before clitics:

- (61) Stem /ajar/ ‘teach’ (Friberg and Friberg 1991)
- a. A-gemination before suffix
 jáko} ajárr-i}=ʔi ‘don’t teach him’
 neg *teach*-TR=prohibitivizer
- b. No A-gemination before clitic
 aŋŋ-ájara}=i ‘he teaches’
 TR- *teach*=i 3rd ABS

The failure of stem-final [r,l,s] to geminate before a following epenthetic vowel, as in (61b), is puzzling. In a form like aŋŋ-ájara}=i ‘he teaches’ the following vowel provides a context in which stem-final [r] could geminate.

We cannot appeal here to an Output-Output constraint to block gemination (as we did with final glottal stops). However, there is a difference between [r,l,s]-final stems and those ending in velar nasal or glottal stop: the anomalous stress induced by vowel epenthesis. The foot structures of the relevant forms (with foot edges marked by parentheses) are as follows:

- (62) a. a(járr-i)} ‘teach (someone)’
 b. aŋŋ-(ája)ra}=i ‘he teaches’ (*ájar)ra}=i

Note that in (62a), the geminate [r] is contained within a foot. What is needed to rule out gemination of [r,l,s] before an epenthetic vowel, as in (62b), is a constraint that forbids syllable association lines from crossing the right edge of a foot. We appeal here to the family of constraints proposed by Itô and Mester (1994, 1999) demanding that the edges of prosodic constituents be ‘crisp’:

- (63) CRISPEGE-RIGHT(FOOT): Any segment contained within a foot is linked only to syllables contained exclusively within that foot.

Ranked above ANCHOR-R(STEM, SYLLABLE), the CRISPEGE(FOOT) constraint will prevent gemination of [r,l,s] before an epenthetic vowel.

Note that η-gemination may produce violations of CrispEdge, as in (*díŋiŋ*)η-i ‘it is cold’. This is not surprising, as we have argued that η-gemination and A-gemination reflect two independent constraints: η-gemination is a response to FINAL-C, which demands that prosodic words end in a consonant, while A-gemination is a response to ANCHOR-R(STEM,SYLLABLE), which demands that the final segment of a stem be syllable-final. The ranking FINAL-C, ONSET >> CRISPEGE-R(FOOT) >> ANCHOR-R(STEM,SYLLABLE) allows η-gemination, but not A-gemination, to create non-crisp edges:

(64) η-gemination applies despite CRISPEGE

/díŋiŋ = i (3 rd ABS)/ ‘it is cold’	FINAL-C	ONSET	CRISPEGE-R (FOOT)	ANCHOR-R (STEM,SYLL)	MORA FAITH
a. (díŋiŋ)}= i		*!			
☞ b. (díŋiŋ)}η= i			*		*
c. (díŋi)}η= i	*!			*	

(65) A-gemination is blocked by CRISPEGE

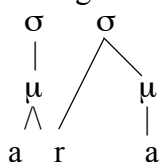
/ájar = i (3 rd ABS)/ ‘he teaches’	FINAL-C	ONSET	CRISPEGE-R (FOOT)	ANCHOR-R (STEM,SYLL)	MORA FAITH
☞ a. (ája)ra}= i	*	*		*	
b. (ájar)ra}= i	*	*	*!		*

Underlying geminates (such as the [mm] in *jámmara* ‘dirty’) are preserved by MORAFaITH, but these geminates do not occur at the right edge of a foot. Given the overwhelming consistency of penultimate stress, the only position in which a foot may be followed by another (nonclitic) syllable is in epenthetic forms, where gemination is never found.

3.4.2. Restriction of A-gemination to Post-[a] Context

While Konjo speakers seem to have generalized A-gemination to other vocalic contexts, we still must explain why Friberg and Friberg’s older speakers restricted presuffixal gemination to post-[a] contexts. Crucial to understanding this restriction on A-gemination is the fact that [a] is the only one of Konjo’s five vowels ([i,e,a,o,u]) for which Friberg and Friberg note a distinct pre-geminate allophone; they describe [a] as a schwa before nasal geminates, and what they describe as a raised [a] before other geminates. We assume that the pregeminate [a] represents a reduced vowel. We further assume that for speakers who geminate only after [a], the relevant restriction is that geminates may be derived only if they are preceded by a reduced vowel. To account for this restriction, we propose that geminate consonants in Konjo share a mora with a preceding vowel, rather than occupying their own mora:

(66) Mora-sharing structure for geminates



The option of geminates sharing a mora with a preceding vowel was proposed by Broselow, Chen, and Huffman (1997) for Malayalam geminates, and indeed for all coda consonants that do not add weight to the syllable with which they are affiliated. Broselow, Chen, and Huffman propose two constraints, NOCMORA (The head of a mora must be a vowel) and NOSHAREDMORA (Moras should be linked to single segments), which favor monomoraic VC rimes and bimoraic VC rimes, respectively. Broselow, Chen, and Huffman also posit constraints restricting the types of segments that can participate in the mora sharing relation. For Konjo, high-ranking NOCMORA would force all coda consonants to share a mora with a preceding vowel (consistent with the weight equivalence of CV and CVC syllables). Additional constraints forbidding reduction of any vowel other than [a] and forbidding nonreduced vowels to share a mora with a consonant would restrict gemination to the post-[a] context:

(67)

- a. IDENTFEATUREV[-LOW]: The output correspondent of a nonlow vowel must be identical with its input correspondent.
- b. *[FULLV-C]MORA: A nonreduced vowel may not share a mora with a consonant.

The ranking for those speakers who permit presuffixal gemination only after [a] would be as illustrated in the following two tableaux:

(68) Presuffix gemination restricted to [a] (older speakers)

	FINAL-C	ONSET	NO C MORA	IDENTV [-LOW]	*[FULLV-C] MORA	ANCHOR-R (STEM,SYLL)
☞ a. diŋi.ŋ-i}	*					*
$\begin{array}{c} \sigma \quad \sigma \\ \quad \\ \mu\mu \quad \mu \\ \quad / \end{array}$ b. diŋ iŋ-i}	*		*!			
$\begin{array}{c} \sigma \quad \sigma \\ \quad \\ \mu \quad \mu \\ \quad / \end{array}$ c. diŋ Iŋ-i}	*			*!		
$\begin{array}{c} \sigma \quad \sigma \\ \quad \\ \mu \quad \mu \\ \quad / \end{array}$ d. diŋ iŋ-i}	*				*!	

(69) Presuffix gemination after [a]

/taraŋ-i/ 'make sharp'	FINAL-C	ONSET	NO C MORA	IDENTV [-LOW]	*[FULLV-C] MORA	ANCHOR-R (STEM,SYLL)
a. tara.ŋ-i}	*					*!
$\begin{array}{c} \sigma \quad \sigma \\ \quad \\ \mu\mu \quad \mu \\ \quad / \end{array}$ b. tar aŋ-i}	*		*!			
$\begin{array}{c} \sigma \quad \sigma \\ \quad \\ \mu \quad \mu \\ \quad / \end{array}$ ☞ c. tar əŋ-i}	*					
$\begin{array}{c} \sigma \quad \sigma \\ \quad \\ \mu \quad \mu \\ \quad / \end{array}$ d. tar aŋ-i}	*				*!	

The pattern whereby presuffixal gemination is restricted to post-[a] contexts while preclitic gemination applies after any vowel is accounted for by the independent rankings of the

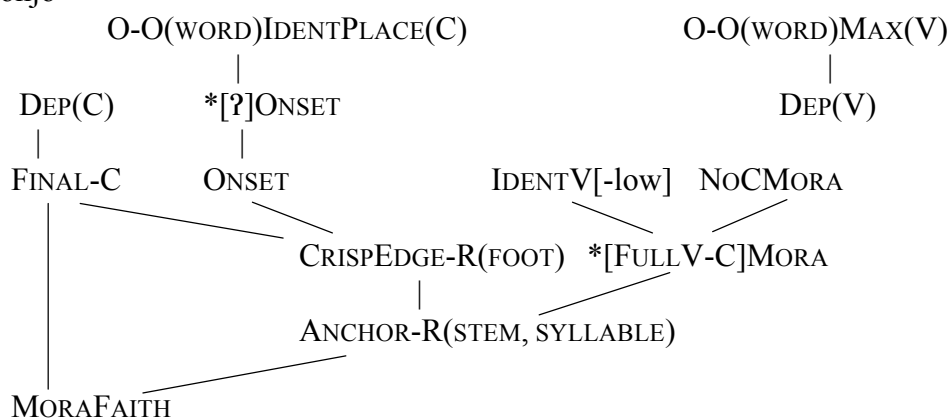
constraints triggering η-gemination and A-gemination: FINAL-C outranks the constraints that limit mora sharing to [a], while ANCHOR-R(STEM,SYLLABLE) ranks below these constraints.

(70) η-gemination

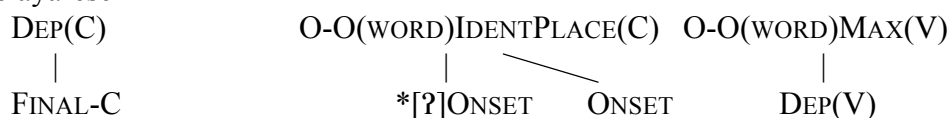
	FINAL-C	ONSET	NOCMORA	IDENTV [-LOW]	*[FULLV-C]MORA	ANCHOR-R (STEM,SYLL)
a. diŋi.}η=i	* !					*
$\begin{array}{c} \sigma \quad \sigma \\ \quad \\ \mu\mu \quad \mu \\ \quad / \quad \end{array}$						
b. diŋ iŋ} =i			*!			
$\begin{array}{c} \sigma \quad \sigma \\ \quad \\ \mu \quad \mu \\ \quad / \quad \end{array}$				*!		
c. diŋ iŋ} =i						
$\begin{array}{c} \sigma \quad \sigma \\ \quad \\ \mu \quad \mu \\ \quad / \quad \end{array}$					*	

The diagrams below summarize the rankings of the constraints discussed above:

(80) Konjo



(81) Selayarese



(82) Makassarese

ANCHOR-R(STEM, SYLLABLE)

|
FINAL-C

|
DEP(C)

*[?]ONSET ONSET

 \ /
O-O(WORD)IDENTPLACE(C)

5. Conclusion

We have seen how various phonological patterns in the Makassar languages – stress alternations, alternations in copy-vowel insertion, velar-glottal alternations, and the complex gemination patterns of Konjo – can be analyzed by assuming differences in prosodic structure between forms with true suffixes vs. forms with suffixal clitics, along with a set of constraints that enforce particular relationships between morphosyntactic and prosodic structure.

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