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Satisfying the Minimal Size of Banjarese Prefixes through Vowel Lengthening and Glottal Insertion

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Abstract

This article aims to analyse the minimal size of Banjarese prefixes, a language native to people in South Kalimantan. In written form, most prefixes exist in the open syllable form, though there are some that exist in the closed syllable form. Data gathered through a word list method has shown that Banjarese prefixes seem to take the same form, which is monosyllabic bimoraic. This size is satisfied through two different processes, namely vowel lengthening and glottal insertion. Vowel lengthening happens when a prefix is followed by a root with an initial consonant segment. On the other hand, glottal insertion happens when a prefix is followed by a root with an initial vowel segment. Since most Banjarese prefixes are open syllables, a sequence of adjacent vowels (one from the prefix and one from the root) known as vowel hiatus will emerge. In order to overcome this vowel hiatus, a glottal segment is inserted between these two vowels. From this analysis, it is shown that Banjarese is one of the languages that applies size restrictions to its prefixes. Stem-affix complementarity is also being shown by this language when the way minimal size is satisfied is determined by the initial segment of the root. This study is hoped to add some value to the previous studies as well as become a pioneer for upcoming studies.

Keywords: Banjarese Prefixes, Minimal Size, Vowel Lengthening, Vowel Hiatus, Glottal Insertion.

Introduction

According to Ningsih (2018), Banjarese is a traditional language with distinct characteristics for its speakers, serving as a symbol of the identity of the indigenous people of South Kalimantan, which has been passed down through generations as their local language. Despite originating from Kalimantan, the Banjarese community nowadays can now be found in various locations, both in Indonesia and Malaysia. According to Adelaar (1985:2), Banjarese is one of the languages used by Dempwolff for the reconstruction of Proto Malayo-Polynesian, a branch of the Austronesian language family, along with Minangkabau, Standard Malay, Middle Malay, Iban, and Jakartanese. Proto-Malayo-Polynesian is also currently considered a primary branch of Austronesian, with no identifiably closer relationship with any linguistic

subgroup in the homeland (Blust 2014; Ross 2005). As part of the Austronesian languages, Banjarese does have a rich inventory of affixes that are added to roots to form the words of the language.

In this paper, we will be discussing more about the minimal size of Banjarese affixes, focussing on the prefixes. Based on the work of Akhmad Humaidi et al. (2017) and Yayuk (2017), all of the Banjarese prefixes are assumed to be open syllables. Below are some examples of Banjarese prefixes, according to Yayuk (2017):

(1) Open Syllable Prefixes in Banjarese (Yayuk, 2017)

	Prefixation	**Example**	
(i)	/ka-/	[ka-lima]	‘fifth’
(ii)	/pa-/	[pa-makan]	‘eater’
(iii)	/ma-/	[ma-ŋuniŋ]	‘yellowing’
(iv)	/di-/	[di-tʃatuʔ]	‘being hit by’
(v)	/sa-/	[sa-uma]	‘same mother’
(vi)	/ta-/	[ta-hambur]	‘scattered’

However, according to Hapip, Kawi, and Noor (1981), there are some prefixes that are capable of existing as a closed syllable, which are the maN- and paN- prefixes. Below are some examples of how these two prefixes could exist in a word:

(2) Closed Syllable Prefixes in Banjarese (Hapip, Kawi and Noor, 1981)

	Prefixation	**Example**	
(i)	/maN-/	[mam-baŋu]	‘selling water’
		[man-jukuŋ]	‘crafting a boat’
(ii)	/paN-/	[paŋ-gawi]	‘person who like to work’
		[pan-tʃatuʔ]	‘tool to beat something’

According to Benjamin (2009), in Malay, the associated nasal mutation, *-N-*, of the initial consonant of the verb root is usually treated as a trivial consequence of the *me-* prefixation and is very common in colloquial Malay as an independent formative in its own right. However, he also claimed that almost all modern grammarians of Malay and Indonesian treat *me-* and *-N-* as parts of a single prefix (*meN-*) that generates a nasal mutation in the initial consonant of the verb stem. In that case, the *maN-* and *paN-* prefixes should also be treated as a single prefix, making Banjarese one of the languages to have two sizes of prefixes. However, is it true that this language's prefixes can exist in two different sizes? In order to answer this question, we need to delve into a claim made by some scholars, such as McCarthy and Prince (1994), Walker (2000), Downing (2006), and Urbanzyk (2006), regarding the size restriction in affixes. These scholars claim that there are restrictions on the size of affixes, and this is evident in many languages, as discussed in the literature review below.

Observing the minimal size of Banjarese affixes will enable us to understand the morphological structure of this language. It will also provide insights into the morphological structures of other languages, revealing patterns and rules governing how affixes interact

with base words. In addition, it will provide evidence to differentiate Banjarese from other similar languages, such as Malay and Indonesian. Despite being in the same language family, there are features that distinguish Banjarese from other languages. One such feature is the way this language satisfies the minimal size of its affixes.

Literature Review

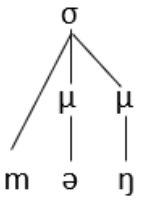
The study of word minimality has been crucial in helping us better understand a certain language. A language is stipulated to have a minimum number of moras, syllables, or feet in order to form well-formed words (Paster, 2006:159). The same applies to the language's affixes. According to McCarthy and Prince (1994), Walker (2000), Downing (2006), and Urbanzyk (2006), there are restrictions on the size of affixes. In Mandarin, for example, affixes should be at most one syllable (Lin, 1993). Below are some examples of suffixation in Mandarin:

(3) Suffixation in Mandarin (Lin, 1993)

	Stem	***zi*- Suffixation**	
(i)	/pi/	[py^{o}u]	‘nose’
(ii)	/şa/	[şɔ]	‘silly, stupid person’
(ii)	/in/	[iŋ]	‘silver’
	Stem	***er*- Suffixation**	
(i)	/xwa/	[xwar]	‘talk’
(ii)	/phay/	[phar]	‘cards’
(iii)	/kən/	[kər]	‘tree root’

In Malay, the canonical shape of affixes is postulated to be monosyllabic bimoraic (Syed Jaafar, 2011). Below is how Syed Jaafar (2011) illustrates the canonical shape of Malay prefixes:

(4) Canonical Shape for Malay Prefixes: /məŋ-/ (Syed Jaafar, 2011)



The above illustration depicts the structure of Malay prefixes that end with consonants such as *məŋ-, pəŋ-, bər-,* and *tər-.* Malay does, however, contain an open syllable prefix such as *di-* in which it does not contain a coda consonant as it ends with a vowel. In order to achieve the monosyllabic bimoraic size, Ahmad (2000), claims that the vowel will undergo vowel lengthening to satisfy the needs. Both Mandarin and Malay have indicated that size restrictions are applied to the affixes.

However, Gouskova (2021), argues that there are only few solid cases where affixes are strictly subject to a maximum size limit. According to her, affixes may be phonologized differently depending on the manner of attachment and compositionality. This can be

observed in English, where Class II prefixes are minimally heavy syllables but have light syllable counterparts when analyzed as Class I, as shown below:

(5) Prefixes Size Dependence on Class in English (McCarthy and Prince, 1999)

	Prefixation	**Class I**	**Class II**
(i)	/pro-/	[pro-integration]	[produce]
(ii)	/re-/	[re-target]	[reduce]
(iii)	/de-/	[de-segregation]	[deduce]

Gouskova (2021), also argues that for a morpheme to be treated as an affix, it needs to be small enough. Conversely, if an affix is large, it should be treated as a phonological word of its own. This is illustrated by the case of Fijian. According to Dixon (1988), monomoraic functional morphemes are parsed as affixes, whereas longer functional morphemes are treated as phonological words. The diagnostic for this distinction is stress: it shifts to the penultimate mora in the transitive form (6a), while the forms in (6b) exhibit two equally strong stresses. However, there is an exception for pronominal or possessive suffixes. Dixon (1988) notes that these suffixes do not form separate phonological words, regardless of their syllable count, as shown below:

(6) Affixation in Fijian (Dixon, 1988)

	Stem	**Suffixation**
(a)	Monomoraic suffixes	
	(i) /rámbe/ ‘kick’	[rambé-**ta**] ‘kick-TRANSITIVE’
	(ii) /luá/ (vomit on)	[luá-**ða**] ‘vomit on-TRANSITIVE’
(b)	Longer morphemes	
	(i) /réʔi/ (rejoice)	[réʔi # **táʔi**] ‘rejoice at-PASSIVE’
	(ii) /tàlanóa/ (relate)	[tàlanóa # **taʔína**] ‘relate-TRANSITIVE’
(c)	Possessive suffixes are all word-internal	
	(i) /liŋá/ (arm)	[liŋá-ŋgu] ‘my arm’
		[liŋá-mu] ‘2_{SG} arm’
		[liŋá-nra] ‘3_{PL} arm’
		[liŋà-nratóu] ‘3_{PAUCAL} arm’

Unlike Mandarin and Malay, which impose size restrictions on affixes, English and Fijian allow their affixes to vary in size. In some languages, the size of the root can influence the structure of the affixes. This phenomenon is known as “phonologically conditioned suppletive allomorphy” or PCSA. PCSA refers to patterns where allomorphs, which cannot be phonologically derived from a single underlying form, exhibit a phonologically conditioned distribution (Inkelas, 2014). For example, in Spanish, the nominalizing suffixes *-ez* and *-eza* are distributed based on the syllable count of the stem. According to Aranovich et al. (2005), the suffix *-ez* is used when the citation form of the corresponding adjective has three or more syllables, while *-eza* is used when the adjective has one or two syllables, as illustrated below:

(7) Suffixation in Spanish (Aranovich et al., 2005)

	Stem	**Suffixation**	
(i)	/rigido/	[rigid-ez]	‘rigid’
(ii)	/estupido/	[estupi-ez]	‘stupid’
(iii)	/vil/	[vil-eza]	‘vile’
(iv)	/real/	[real-eza]	‘royal, regal’

New Zealand Maori is another example of stem-affix complementarity that could be driven by the root minimality. In this language, the form of inceptive prefix is *kaa-* if it is followed by monosyllabic or disyllabic stems where both syllables are short while *ka-* elsewhere (Biggs, 1961). PCSA can also be found in Qafar, an Afroasiatic language belonging to the Cushitic branch. According to Hayward (1998), the indefinite genitive suffix exhibits PCSA that may be driven in part by word minimality considerations. Three conditions were put forward by Hayward (1998) regarding this phenomenon. As seen in the examples below, masculine stems those that are monosyllabic and consonant-final will take the *-ti* suffix (as in 8i). Those that are polysyllabic and consonant-final undergo no segmental changes, though stems that bear lexical accents are de-accented in the indefinite genitive (as in 8ii and 8iii). On the other hand, those that are polysyllabic and vowel-final undergo de-accentuation and have their final vowel replaced by /i/ (as in 8iv).

(8) Suffixation in Qafar (Hayward, 1998)

	Stem	**Suffixation**	
(i)	/ħan/ ‘milk’	[ħan-**tí** dala]	‘a milk gourd’
(ii)	/áʕan/ ‘frog’	[aʕán iba]	‘a frog’s leg(s)’
(iii)	/danan/ ‘donkey’	[danán iba]	‘a donkey’s leg(s)’
(iv)	/kúta/ ‘dog’	[kut-**í** ɖagor]	‘a dog’s fur’

Spanish, New Zealand Māori, and Qafar are examples of languages where the size of the affixes is influenced by the size of the root. Phonologically conditioned suppletive allomorphy (PCSA) can also be observed in Banjarese. However, unlike the previously discussed languages, the size of Banjarese affixes is not determined by the size of the root. Instead, minimal affix size is achieved through modifications based on the initial segment of the root. Two methods for achieving minimal affix size in Banjarese are vowel lengthening and glottal insertion. This article will further explore these two processes.

Research Methodology

This study was conducted through a qualitative approach, a form of social action that stresses the way people interpret and make sense of their experiences to understand the social reality of individuals (Zohrabi, 2013). According to Mohajan (2018), this approach makes use of interviews, diaries, journals, classroom observations and immersions, and open-ended questionnaires to obtain, analyse, and interpret the data content analysis of visual and textual materials and oral history. Hence, since the aim of this study is to determine the minimal size of Banjarese prefixes, this kind of approach seems appropriate to be used.

Haji Omar (2008) defines the world list (or lexicon) method as a list of a language's lexicon (generally sorted by frequency of occurrence either by levels or as a ranked list) within some given text corpus, serving the purpose of vocabulary acquisition. An informant is required to answer every word prepared on the list. The list should contain familiar words that are frequently used in the community. According to Vaux and Cooper (1999), the word lists used in dialect surveys typically include words for farm implements, natural phenomena, household items, and culture-specific concepts. These kinds of words were found to be incredibly successful in eliciting both interest and useful vocabulary from non-urban informants.

A set of Banjarese lexicals in the form of base words were given to the respondents. The respondents then were asked to state the derived word formed once the base word receives a number of prefixes. The list was created based on a Banjarese dictionary known as Kamus Bahasa Banjar Dialek Hulu-Indonesia that was published in South Kalimantan, Indonesia (Sugono, 2008). Imadduddin (2016) stated that the Banjarese people are known to be native people in some of the South Kalimantan provinces. Due to this statement, the words listed inside this dictionary are deemed to be more original due to the fact that this dictionary was published in the area where the native speakers are. This dictionary also provided each word with its own derived word(s), hence, further simplified the process of collecting data for this study while allowing a comparison to be made between the new data and the existing one in the dictionary.

Results and Discussion

Although most Banjarese prefixes appear as monosyllabic and monomoraic in written form, their oral counterparts actually reflect a minimal size of monosyllabic and bimoraic. The data indicate that many of these prefixes undergo phonological changes to achieve this minimal size. This study's results demonstrate that Banjarese prefixes are subject to a size restriction similar to those in Mandarin and Malay. According to Blust (2013:265), the bimoraic requirement for monosyllabic bases is more commonly observed in content morphemes than in function words, as the latter often cliticize to adjacent content morphemes to form part of a larger phonological word. However, in Banjarese, monosyllabic prefixes that function as functors also adhere to the same bimoraic requirement.

Vowel Lengthening

Vowel lengthening in Banjarese prefixes occurs when the initial segment of the root is consonant. The monosyllable monomoraic prefixes will go through a vowel lengthening process, whereby the second mora will be filled with a vowel segment identical to the first one. This situation coincides with Blust's (2013:265) claim stating that in many Austronesian languages, vowels in monosyllables are automatically lengthened. In Banjarese contact, vowel lengthening is used to fulfil the minimal size requirement of a prefix. Below are some data indicating the occurrence of vowel lengthening:

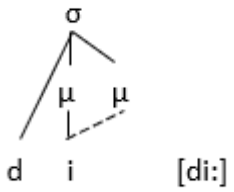
(9) Vowel Lengthening in Banjarese Prefixes

	Root	**Prefixation**	**Output**
(i)	/rumah/ 'house'	/ba-rumah/	[ba:-rumah] 'having a house'

(ii)	/tariʔ/ ‘pull’	/ta-tariʔ/	[ta:-tariʔ] ‘accidentally pull’
(iii)	/padah/ ‘tell’	/di-padah/	[di:-padah] ‘being told’
(iv)	/bulan/ ‘month’	/sa-bulan/	[sa:-bulan] ‘one month’
(v)	/sariʔ/ ‘scold’	/ka-sariʔ/	[ka:-sariʔ] ‘angering’

Vowel lengthening also occurs in Malay. Although the canonical form of Malay prefixes is mostly monosyllabic bimoraic, there are some prefixes that appear in the size of monosyllabic monomoraic, such as di- (Syed Jaafar, 2011). The same solution was proposed by the scholar in order to satisfy this minimal number of prefixes. Vowel lengthening will provide another mora in order for the prefix morpheme to achieve a minimal size. Below is how this monosyllabic bimoraic size can be achieved in both Malay and Banjarese:

(10) Monosyllabic Bimoraic Size Satisfaction in Malay and Banjarese (Syed Jaafar, 2011)

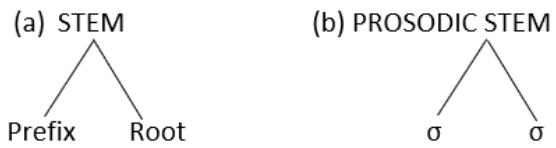


The vowel lengthening process with the prefix-root boundary can be accounted for through an Optimality Theory analysis. Since this study concerns prefixation, it is worth discussing the analysis that was done by Downing (2006) regarding this morphological problem. As claimed by Downing (2006), stems that contain a prefix and root must satisfy a constraint known as MORPHEME-SYLLABLE CORRELATION that can be defined formally as follows:

(11) **MORPHEME-SYLLABLE CORRELATION** (Adapted from Russell, 1997:121, cited in Downing, 2006: 120)
Each morpheme prefix and root contains exactly one syllable.

The above constraint defines that a prefix and a root must contain one syllable. Therefore, in order to satisfy this constraint, stems must at least be disyllabic, with one syllable for the prefix and one for the root. The disyllabicity minimality required by MORPHEME-SYLLABLE CORRELATION is a corollary to the constraint below, as it also formalizes the disyllabicity minimality requirement of Prosodic Stems (ibid.:123).

(12) Prosodic Stem Minimality (Downing, 2006: 124)



In the above diagram, the prefix contains one syllable. Since Downing (2006:26) predicts that all prosodic morphemes from the same morphological category should be subject to the same

size restrictions, the size is claimed to be the canonical shape of those prosodic morphemes. In this case, the prosodic morphemes refer to the affixes. This means that affixes that are not containing their own syllable violate the MORPHEME-SYLLABLE CORRELATION, while a stem that contains less than two syllables violates the PROSODIC STEM constraint. In this analysis, another rule needs to be passed down under the PROSODIC STEM constraint. In order to satisfy this constraint, a prefix size should not only be monosyllabic but also bimoraic. This constraint will be put at the highest level in the constraint hierarchy in order to ensure that the possible outcome will consist of more than two syllables.

The next constraint that should be taken into consideration is *COMPLEX^{ONS}. This constraint prevents the emergence of consonant clusters at the onset position of the output. Banjarese is one of the languages that does not allow any complex segment to exist in either the onset or coda position.

(13) ***COMPLEX^{ONS}** (Kager, 2004:97)
*[$_{\sigma}$ CC ('Onsets are simple')

The prefixation process in Banjarese requires all the segments in the prefix and root to exist in the derived form. In order to ensure this happens, the MAX-IO will be used in the analysis. The violation of MAX-IO occurs when segments are to be deleted in the derived form. This constraint can be formally defined as follows:

(14) **MAX-IO** (Kager, 2004:67)
Input segments must have output correspondents. ('No deletion')

Since vowel lengthening violates the DEP-IO constraint, it needs to be placed at the lowest level in the constraint hierarchy. This constraint militates against segments in the output that have no correspondents in the input.

(15) **DEP-IO** (Kager, 2004:68)
Output segments must have input correspondents. ('No epenthesis')

The following is an OT analysis for the prefixation process of the root /rumah/ (house) to form the derived word [ba:rumah] (having a house):

PROSODIC STEM >> *COMPLEX^{ONS} >> MAX-IO >> DEP-IO

input: /ba+rumah/	PROSODIC STEM	*COMPLEX^{ONS}	MAX-IO	DEP -IO
a. [ba.ru.mah]	*!			
b. [bru.mah]	*!	*	*	
c. ☛[ba:.ru.mah]				*!

Three candidates were introduced in the tableau above. Both, candidate (a) and (b) were eliminated due to the violation of PROSODIC STEM. Although candidate (b) consists of more than two syllables, the prefix itself does not have its own syllable because its vowel has been deleted. Candidate (a) also consists more than two syllables, yet the prosodic structure of the

prefix does not in the size of monosyllabic bimoraic as shown in (10). In addition, candidate (b) also violated MAX-IO due to the deletion of segment. The deletion of the /a/ segment in the output created a complex onset that violated the *COMPLEX^{ONS}. At the end of this analysis, candidate (c) was chosen as the optimal candidate despite of the violation of DEP-IO.

Another possible way this language can achieve bimoraic size for its prefixes is through the gemination process of the initial root segment. However, this has been proven to be an implausible solution since this language abides by the Obligatory Contour Principle (OCP) constraint, which can be defined as follows:

(16) Obligatory Contour Principle (OCP)
At the melodic level, adjacent identical elements are prohibited.

The constraint above prohibits any adjacent segment from having the same feature as its neighbouring one. The application of OCP as a constraint can be seen through nasal deletion in Banjarese, as shown below:

(17) Nasal Deletion in Banjarese Prefixation

	Root	**Prefixation**	**Output**
(i)	/lapas/ ‘let go’	/maN-lapas/	[ma:-lapas] ‘letting go’
(ii)	/rahaj/ ‘expose’	/maN-rahaj/	[ma:-rahaj] ‘exposing’
(iii)	/wilaŋ/ ‘count’	/maN-wilaŋ/	[maː-wilang] ‘counting’
(iv)	/jakin/ ‘convince’	/maN-jakin-kan/	[ma:-jakin-kan] ‘convincing’
(v)	/maŋkar/ ‘hard’	/maN-maŋkar/	[maː-maŋkar] ‘hardening’
(vi)	/ŋinum/ ‘drink’	/maN-ŋinum/	[maː-ŋinum] ‘drinking’
(vii)	/nadʒat/ ‘pray’	/maN-nadʒat/	[maː-nadʒat] ‘praying’
(viii)	/ɲala/ ‘light up’	/maN-ɲala/	[maː-ɲala] ‘lighting up’
(ix)	/hadaŋ/ ‘wait’	/maN-hadaŋ/	[ma:-hadaŋ] ‘waiting’

In BL prefixation, it was not only sonorant consonants that could trigger the nasal deletion, but vowels that also had the sonorant feature could also do the same thing. Clements (1990) and Smolensky (1995) stated that the sonority feature can be determined through the Modal Sonority Hierarchy, as shown below:

(18) Modal Sonority Hierarchy (Clements, 1990; Smolensky; 1995)

vowels > glides > liquids > nasals > obstruents

higher in sonority lower in sonority

Based on the figure discussed, it appears that in the case of a sonorant cluster, the segment with lower sonority is more likely to be omitted, as opposed to the segment with higher sonority. For example, a nasal segment in the prefix is removed when it is followed by a liquid (/l/, /r/), glide (/w/, /j/, /h/), or vowel (/a/, /i/, /u/) segment. Conversely, when followed by a voiceless obstruent segment (/p/, /t/, /k/, /s/), it is this latter segment that tends to be deleted. In this analysis, OCP can formally be defined as follows:

(19) **OCP** ([+sonorant, +consonantal])
Adjacent identical [+sonorant, +consonantal] features are prohibited.

Any sequence of segments that consist of [+sonorant] and [+consonantal] will violate this constraint. This constraint will be put into the same analysis as before in order to further strengthen the claim that vowel lengthening is the best solution to achieve minimal size in Banjarese prefixes. The OCP constraint will be placed above DEP-IO in the constraint hierarchy. Below is an OT analysis for the prefixation process of the root /rumah/ (house) to form the derived word [ba:rumah] (having a house):

PROSODIC STEM >> *COMPLEX^{ONS} >> MAX-IO >> OCP >> DEP-IO

input: /ba+rumah/	PROSODIC STEM	*COMPLEX^{ONS}	MAX-IO	OCP	DEP -IO
a. [ba.ru.mah]	*!				
b. [bru.mah]		*!	*		
c. [bar.rumah]				*!	*
d. ☛[ba:.ru.mah]					*!

From the tableau above, both candidates (c) and (d) violated the DEP-IO due to segment epenthesis in order to add more mora to their prefix. However, Banjarese disallows gemination from happening within the prefix-root boundary. Hence, it is important to place the OCP above DEP-IO to eliminate candidate (c) first. The vowel lengthening has resolved the issues related to the minimal size of the Banjarese's prefixes. In this analysis, the prefix morpheme is considered to be monosyllabic bimoraic, and this size can be satisfied by a monomoraic prefix through vowel lengthening. However, vowel lengthening is not seen as the only way for the Banjarese prefixes to meet the minimal size requirement. The next subsection discusses how glottal insertion is used to overcome vowel hiatus, resulting in minimal size satisfaction for the prefixes.

Glottal Insertion

Glottal insertion in Banjarese could occur within the prefix-root boundary as a solution towards the vowel hiatus. The term vowel hiatus is commonly used to refer to a sequence of adjacent vowels belonging to separate syllables. In some languages, vowel hiatus is permitted

quite freely (Casali, 2011). Other languages place much stricter limits on the contexts in which heterosyllabic vowel sequences can occur, while some disallow them entirely (ibid.). Banjarese is one of the languages that disallows vowel hiatus entirely. The way this language eliminates it depends on the position of that vowel hiatus. For example, a glide formation was employed whenever the vowel hiatus occurred within the root, as shown below:

(20) Vowel Hiatus Elimination through Glide Formation in Banjarese

	Root	**Prefixation**
(i)	/baiʔ/	[ba.**j**iʔ]
		'good'
(ii)	/bauŋ/	[ba.**w**uŋ]
		'a type of fish'
(iii)	/tʃuatʃa/	[tʃu.**w**a.tʃa]
		'weather'
(iv)	/kuitan/	[ku.**w**i.tan]
		'parent'
(v)	/diam/	[di.**j**am]
		'live'
(vi)	/ɲiur/	[ɲi.**j**ur]
		'coconut'

Based on (20), a glide segment [j] was formed between the segment cluster of /ai/, /ia/, and /iu/ while [w] was formed between the segment cluster of /au/, /ua/, and /ui/. If a segment cluster consists of the same vowel segments (for example /aa/, /uu/, and /ii/), then a glottal insertion process will be emplloyed. Examples of the glottal insertion are as follows:

(21) Vowel Hiatus Elimination through Glottal Insertion in Banjarese

	Root	**Prefixation**
(i)	/maap/	[ma.**ʔ**ap]
		'apologize'
(ii)	/buuŋ/	[bu.**ʔ**uŋ]
		'taller'
(iii)	/hiih/	[hi.**ʔ**ih]
		'agreeing to something'

However, there is a slight difference when it comes to vowel hiatus at the prefix-base boundary. Unlike vowel hiatus within the root, vowel hiatus at the prefix-base boundary can only be resolved by glottal insertion, disregarding any vowel clusters. Examples are provided below:

(22) Glottal Insertion in Banjarese Prefixes

	Root	**Prefixation**	**Output**
(i)	/api/	/ba-api/	[ba**ʔ**-api]
	'fire'		'on fire'

(ii)	/ujuh/ 'tired'	/ba-ujuh/	[baʔ-ujuh] 'exhausted'
(iii)	/igut/ 'bite'	/ta-igut/	[taʔ-igut] 'accidentally bite'
(iv)	/andaʔ/ 'put'	/di-andaʔ/	[diʔ-andaʔ] 'being put'
(v)	/ikuŋ/ 'tail'	/sa-ikuŋ/	[saʔ-ikuŋ] 'one (animal)- collective nouns'

Analyses of hiatus resolution patterns within OT date from the early years of the paradigm and can be seen in the works of Rosenthall (1997), Casali (1998), Orie and Pulleyblank (1998), Senturia (1998), Causley (1999), and Bakovic (2007). Though there are some differences, most scholars shared some general components, including the existence of a constraint (which must be highly ranked) that militates against heterosyllabic adjacent vowel sequences. There is some controversy regarding the real identity of this constraint. Casali (2011) labelled this constraint as NO HIATUS and can formally be defined as below:

(23) **NO HIATUS** (Casali, 2011)
No heterosyllabic adjacent vowel sequences

Aside from that, all scholars also agreed on the possibility of constraints that can be violated by various hiatus resolutions. A vowel deletion will violate MAX-IO, while DEP-IO is violated through glottal insertion. Aside from these two, there are other resolutions being used to counter vowel hiatus, and each one may violate some constraints. For example, diphthongization, whereby both vowels are retained but syllabified into the nucleus of a single syllable, will violate NO DIPHTHONG:

(24) **NO DIPHTHONG (*DIPH)** (Casali, 2011)
No diphthongs are allowed in the output form.

On the other hand, glide formation will violate *CG and vowel elision will violate UNIFORMITY. Both constraints can be defined as follows:

(25) ***CG** (Casali, 2011)
No consonant/ glide sequences

(26) **UNIFORMITY**
Output segments may not have multiple correspondents in the input.
(No coalescence.)

As stated before, NO HIATUS constraint need to be highly ranking in the constraint's hierarchy in order to prevent vowel hiatus from happening. It will be placed after PROSODIC STEM as it is more important for the output to consist at least two syllables. Since glottal insertion is used as vowel hiatus resolution within the prefix-root boundary, the DEP-IO constraint need to be placed at the lowest ranking. The following is an OT analysis for the prefixation process of the root /ujuh/ (tired) to form the derived word [baʔujuh] (exhausted):

PROSODIC STEM >> NO HIATUS >> MAX-IO >> NO DIPHTHONG >> *CG >> UNIFORMITY >> DEP-IO

input: /ba+ujuh/	PROSODIC STEM	NO HIATUS	MAX-IO	NO DIPHTHONG	*CG	UNIFORMITY	DEP-IO
a. [bjuh]	*!		**		*		
b. [ba.u.juh]		*!					
c. [bu.juh]			*!				
d. [bau.juh]				*!			
e. [bwu.juh]					*!		
f. [bɔ.juh]						*!	
g. ☛ [baʔ.u.juh]							*!

Seven candidates were presented in the tableau above. Candidate (a) with only one syllable has violated PROSODIC STEM and was eliminated. Next, NO HIATUS was violated by candidate (b) due to the existence of a vowel hiatus in the output. The violation of MAX-IO by candidate (c) is due to the initial vowel deletion in the root, causing this candidate to be eliminated. After that, candidate (d) was eliminated due to the violation of NO DIPHTHONG. This constraint was violated due to the existence of a vowel diphthong in the output. After that, candidate (e) was eliminated because it violates *CG due to the emergence of consonant and glide sequences. Two remaining candidates, (f) and (g), need to pass through UNIFORMITY, in which candidate (f) was eliminated, leaving candidate (g) as the sole winner.

Nasal deletion in this language also triggered glottal insertion. By referring to (18), vowel segments are considered to have a higher sonority compared to nasals, causing the nasal segments to be deleted. Below are some examples of how glottal insertion happened due to the nasal deletion process:

(27) Glottal Insertion due to Nasal Deletion in Banjarese Prefixes

	Root	**Prefixation**	**Output**
(i)	/alih/ ‘move an object’	/maN-alih/	[maʔ-alih] ‘moving an object’
(ii)	/ilaj/ ‘lift’	/maN-ilaj/	[maʔ-ilaj] ‘lifting’
(iii)	/ulah/ ‘make’	/maN-ulah/	[maʔ-ulah] ‘making’

The deletion of the nasal segment has caused a vowel hiatus to emerge, whereby the first vowel belongs to the prefix and the second one belongs to the root. In order to overcome this situation, a glottal segment was inserted within these two vowels, while at the same time filling the coda segment of the prefix. The presence of this glottal segment also provides the prefix with additional mora, making it possible to achieve the monosyllabic bimoraic size. The same OT analysis can be used to analyze the data in (27) since the outcome is the same as in (22).

Conclusion

This study claims that Banjarese's prefixes have only one minimal size, which is monosyllabic bimoraic. Although some prefixes may exist as open syllables or monosyllabic monomoraic, the speech data has indicated differently. It is implausible for prefixes with bimoraic sizes, such as maN- and paN- to undergo size reduction to create an identical size. The logical way is by allowing monomoraic prefixes such as ba-, ta-, di-, sa-, and ka- to undergo size enlargement. In order to achieve the bimoraic size, the prefixes will go through either vowel lengthening or glottal insertion, which provides the morpheme with additional mora. To simplify, vowel lengthening occurs when the initial root segment is a consonant. Another possible way to satisfy minimal size is through the gemination process. However, Banjarese is one of the languages that disallows adjacent segments to have identical features. The disallowance of gemination can be proven through the nasal deletion process of this language. Another way a prefix can achieve bimoraic size is through glottal insertion. This process happens in order to prevent a vowel hiatus from appearing in the output form. Glottal insertion commonly happens when the root that is receiving a particular prefix has an initial vowel segment. From this analysis, it is shown that Banjarese is one of the languages that applies size restrictions to its prefixes. From this analysis, it is shown that Banjarese is one of the languages that applies size restrictions to its prefixes. In addition, the way the prefixes satisfy the minimal by depending on the root initial segment also indicates the occurrence of stem-affix complementarity in language.

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