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*Minimality and onsetless syllables in Zinza**

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A dispreference for onsetless syllables is often manifested by processes of consonant insertion or vowel deletion which eliminate onsetless syllables, and it is sometimes manifested by disallowing prosodic distinctions which onsetful syllables make, e.g. onsetless syllables may resist bearing tone or stress. This paper investigates the interaction between minimality and the structure of onsetless syllables in the Bantu language Zinza, documenting a previously unobserved onsetless effect which is partially conditioned by minimality. In Zinza, word-initial vowels of disyllables are lengthened, so /o-ljá/ becomes [óó-lja] 'you eat' (compare [o-líma] 'you cultivate' and [bá-lja] 'they eat', with no lengthening). These facts test previous theories of onsetless effects (Downing 1993, 1998, Odden 1995, Orie 2000). I argue that a special representation of onsetless syllables is not warranted, and does not explain this pattern of lengthening. A constraint against word-initial short onsetless syllables interacting with word minimality suffices to explain this lengthening.

While it is well known that onsetless syllables often undergo phonological processes which change them so that they are no longer onsetless (sometimes by insertion of a consonant to provide an onset, or by deletion or desyllabification of the vowel), there are other processes which do not eliminate the onsetless syllable in any obvious way. A number of studies, including Davis (1988), Downing (1993, 1998), Odden (1995) and Orie (2000), have documented these side-effect properties of onsetless syllables. An example of such a side-effect, seen in (1), is that in Alyawarra Aranda (Downing 1998): stress normally falls on the first syllable, but if that syllable is onsetless, stress goes to the second syllable.

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(1) a.	ˈkwatja	'water'	ˈrinha	'him, her, it (ACC)'
	ˈparriːka	'fence'	ˈŋajakwa	'hungry'
b.	aˈt̪a	'I (ERG)'	iːlˈpa	'ear'
	iːlˈpila	'in/with the ear'	arˈrakiɽa	'mouth'

Onsetless syllables may also resist bearing tone; in Kikerewe (Odden 1995), the subject prefix is generally H-toned in the conditional tense (2a), but if the prefix is onsetless, as in (2b), the following syllable realises the H. In these examples, the post-shift position of H is underlined; the H tone which follows is derived by a process of bounded rightward H spread.

(2) a.	βá-ká-ʧuuma	'if they jump'
	kí-ká-ʧuuma	'if it (CL 7) jumps'
	tú-ká-ʧuuma	'if we jump'
	βí-ká-ʧuuma	'if they (CL 8) jump'
b.	ŋ-ká-ʧúuma	'if I jump'
	a-ká-ʧúuma	'if he jumps'
	o-ká-ʧúuma	'if you jump'
	e-ká-ʧúuma	'if it (CL 9) jumps'

Onsetless syllables also figure into atypical positioning of reduplicants in a number of languages, as discussed by Downing (1998).

This paper investigates the interaction between onsetlessness and word minimality in Zinza, and contributes to typology by presenting an undocumented onsetless effect, vowel lengthening. Zinza exhibits a peculiar lengthening of initial vowels in what would otherwise be VCV words, where /o-ljá/ becomes [óó-lja] 'you eat'.[1] The problem is explaining lengthening in [óólja] when there is none in [bá-lja] 'they eat'. These facts test previous theories of onsetless side-effects, some of which attribute a special degenerate status to onsetless syllables, and one of which, the extraprosodicity solution, endows a canonical syllable with an unusual relationship to the phonological word. I argue that the syllable-representational solutions do not account for these data, but an extraprosodicity account provides part of the solution, and a specific constraint against short onsetless syllables to drive extraprosodicity provides the remainder of the solution.

1 The problem

In Zinza, onsetless syllables only appear after pause, and their length is predictable: they are VV in disyllabic words, and V in longer words. One instance of minimality-driven vowel lengthening involves alternations in the so-called augment (Hyman & Katamba 1993), a morpheme which precedes a noun's class prefix – like all Bantu languages, Zinza nouns

[1] Zinza data are given in a pre-surface transcription that abstracts away from allophonic variations between [β] and [b] or [ŋ] and [n].

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are assigned to conventionally numbered classes – and the augment is realised as a non-high copy of the vowel in the class prefix, or as [e] before the prefixes of classes 9 and 10, which contain just a nasal, as shown in (3). Under morphosyntactic conditions related to definiteness, the augment is omitted, for instance when the noun is modified by a wh-word.

(3) *class*	N	'which N'	
1	o-muu-ntu	muu-ntú ʧi	'person'
2	a-baa-ntu	baa-ntú ʧi	'people'
3	o-mu-ljaango	mu-ljaangó ʧi	'door'
4	e-mi-ljaango	mi-ljaangó ʧi	'doors'
6	a-ma-baanga	ma-baangá ʧi	'hills'
7	e-ʧi-tooke	ʧi-tooké ʧi	'banana'
8	e-bi-tooke	bi-tooké ʧi	'bananas'
9	e-m-bogo	m-bogó ʧi	'buffalo'
10	e-m-bogo	m-bogó ʧi	'buffaloes'

In the class 5 examples of (4), there is no surface-parseable augment morpheme, which would be [e-], since the class prefix /i-/ begins with a vowel and the language has no V + V sequences at all – otherwise, we predict *[eihuli] ([eihuri] is the word for 'egg' in related Runyankore). The corresponding plurals, in class 6 marked with the prefix /ma-/, do have the augment on the surface.

(4) N	'which N'	
i-tagato	i-tagató ʧi	'temperature (CL 5)'
a-ma-tagato	ma-tagató ʧi	'temperatures (CL 6)'
i-huli	i-hulí ʧi	'egg (CL 5)'
a-ma-huli	ma-hulí ʧi	'eggs (CL 6)'

Additionally, class 5 nouns with vowel-initial stems select a different allomorph of the class 5 prefix, /li-/, as in [eliina] 'hole' with the prefix allomorph [li-] before the stem /-ina/, and such nouns have the predicted augment on the surface.

When the augment is attached to a monosyllabic class 9 noun in (5a), or when the class 5 prefix is attached to a monosyllabic stem in (5b), the prefix has a long vowel.

(5)	*class*	N	
a.	9	ee-n-te	'cow'
	9	éé-m-bwa	'dog'
	9	ee-n-zu	'house'
b.	5	ii-po	'maize'
	5	íí-hwa	'thorn'

The property which unites the augment of (5a) and the class 5 prefix of (5b) is that they are composed of just a V, and in such examples a VCV word would otherwise result. But there are no VCV words in the language. Note that an onset consonant is sufficient to block vowel lengthening in the disyllables of (6), so there is no lengthening in [ʧíbá].

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(6) *class*	N	'which N'	
7	e-ʧí-ba	ʧíbá ʧi	'bundle'
3	o-mú-bu	múbú ʧi	'mosquito'

A second context where word-initial vowels lengthen is when a verb-agreement prefix composed of just a V attaches to a monosyllabic root. The data in (7) illustrate the basic form of certain V- and CV- subject prefixes, /o-/, /mu-/, /a-/ and /ba-/.

(7) a.	o-ka-téeka	'you (SG) cooked (REMOTE)'
	o-teekíle	'you (SG) cooked (YESTERDAY)'
	o-laa-téeka	'you (SG) will cook'
b.	mu-ka-téeka	'you (PL) cooked (REMOTE)'
	mu-teekíle	'you (PL) cooked (YESTERDAY)'
	mu-laa-téeka	'you (PL) will cook'
c.	a-ka-téeka	's/he (CL 1) cooked (REMOTE)'
	a-teekíle	's/he (CL 1) cooked (YESTERDAY)'
	a-laa-téeka	's/he (CL 1) will cook'
d.	ba-ka-téeka	'they (CL 2) cooked (REMOTE)'
	ba-teekíle	'they (CL 2) cooked (YESTERDAY)'
	ba-laa-téeka	'they (CL 2) will cook'

The subject prefix attaches directly to the root in the habitual tense, which can lead to the predicted creation of VCV words. When the prefix is added to a stem which is longer than one syllable, as in (8), the prefix vowel is short.

(8) a.	o-líma	'you (SG) cultivate'
	o-libáta	'you (SG) walk'
b.	o-léeba	'you (SG) look'
	o-búútika	'you (SG) ferment cassava'
c.	a-líma	's/he (CL 1) cultivates'
	a-libáta	's/he (CL 1) walks'
d.	a-léeba	's/he (CL 1) looks'
	a-búútika	's/he (CL 1) ferments cassava'

Just in case the root is monosyllabic, as in (9), the subject prefix is lengthened.

(9)	óó-lja	'you (SG) eat'	áá-lja	's/he (CL 1) eats'
	óó-nwa	'you (SG) drink'	áá-nwa	's/he (CL 1) drinks'
	óó-gwa	'you (SG) fall'	áá-gwa	's/he (CL 1) falls'

Note in (10) that there is no lengthening of a CV prefix before a monosyllabic root.

(10)	mú-lja	'you (PL) eat'	bá-lja	'they (CL 2) eat'
	mú-nwa	'you (PL) drink'	bá-nwa	'they (CL 2) drink'
	mú-gwa	'you (PL) fall'	bá-gwa	'they (CL 2) fall'

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A third illustration of initial vowel lengthening in disyllables comes from the imperative of verbs bearing the reflexive prefix /i-/. When attached to a stem that is disyllabic or longer (11a), the prefix has a short vowel, but when attached to a monosyllabic stem (11b), the vowel is long. In contrast, object prefixes with the syllable shape CV- exhibit no lengthening.[2]

(11)	'V yourself!'	'V them!'	
a.	í-bohe	bá-bohe	'tie'
	í-bagalile	bá-bagalile	'weed for'
b.	íí-mwe	bá-mwe	'shave'
	íí-lje	bá-lje	'eat'

2 Analysis

The question is how to analyse lengthening. Adjustments adding a mora to monomoraic words are found in some languages, such as Bengali (Cole 1990, Downing 2006), which avoids monomoraic words by vowel lengthening, e.g. /ʧa/→[ʧaː].

(12)	ʧaː	'tea'	ʧa-e	'tea-OBL'
	raːg	'anger'	rag-i	'angry'
	nɔːʈ	'dancer'	nɔʈ-i	'dancer-FEM'

Damascus Arabic (Cowell 1964) lengthens short vowels in would-be monomoraic words in (13a), minimality being computed modulo the well-known exclusion of a single final consonant. Compare (b), where the root vowel is underlyingly long, and (c), where the form is supraminimal.

(13)	*masc imp*	*fem imp*	*pl imp*	
a.	ˈsʔaːl	ˈsʔal-i	ˈsʔal-u	'ask'
	ˈwsˤaːl	ˈwsˤal-i	ˈwsˤal-u	'arrive'
	ˈʔraː	ˈʔr-iː	ˈʔr-uː	'read'
	ˈbniː	ˈbn-iː	ˈbn-uː	'build'
b.	ˈbaːn	ˈbaːn-i	ˈbaːn-u	'appear'
	ˈfiːʔ	ˈfiːʔ-i	ˈfiːʔ-u	'wake up'
c.	ˈʒarreb	ˈʒarrb-i	ˈʒarrb-u	'try'
	ˈtamm	ˈtamm-i	ˈtamm-u	'remain'

To satisfy minimality in Arabic, /sʔal/ lengthens to [sʔáːl]. It is not the purpose of this paper to survey minimality requirements or decide whether they are mediated by the foot; see Downing (2006) for discussion. Since there are no surface CVV words in Zinza, either a bimoraic or

[2] A fourth source of examples of minimality-driven lengthening involves [i]-epenthesis before NCV words, a process also motivated by minimality and mora-preservation considerations, which explains the alternation /ŋ́-dja/→[ííndja] 'I eat', compare [n-díma] 'I cultivate'. Consideration of pre-NC epenthesis is beyond the scope of this paper.

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bisyllabic minimality requirement is correct. The minimality effect has limited scope in Zinza: it triggers vowel lengthening, but does not cause monosyllables to undergo syllable epenthesis.

The conditions for vowel lengthening in Zinza are typologically puzzling. Bengali and Damascus Arabic lengthen vowels in light monosyllables, thereby avoiding submimal words, but /o-lja/ would seem to satisfy either a bisyllabic or bimoraic minimality condition. While the distribution of lengthening in Zinza is connected to minimal size, it is not the same as the canonical minimal size distribution. Since /CVCV/ words such as [túlja] emerge with no augmentation while onsetless /VCV/ words are augmented, attention must be turned to the fact that onsetless and onsetful syllables are prosodically different.

The Zinza augment seen in (14) exhibits weakness analogous to that of Kikerewe in (2) with respect to tone, since the augment morpheme is underlyingly H-toned, but loses its H tone when it stands in an onsetless syllable. When an onset is supplied to the augment's syllable, the H tone reappears. The proclitics /ʧaa-/ and /na-/ have no H tone, as shown in (14a). When attached to a noun with the augment in (b), the fused syllable bears a H tone, despite the fact that in citation form the prefix /o-/ has no H tone in [omuuntu]. Similarly, in (c) the prefix /o-/ fuses with the preceding syllable /la/, and a H tone emerges.

(14) a.	bulemo	'Bulemo'	
	ʧaa-bulemo	'of Bulemo'	
	na-bulemo	'with Bulemo'	
b.	o-muuntu	'person'	/ó-muuntu/
	ʧ-óó-muuntu	'of a person'	
	n-óó-muuntu	'with a person'	
c.	kutéékela bulemo	'to cook for Bulemo'	
	kutéékel' óómuuntu	'to cook for a person'	

The H tone is explained on the assumption that the augment has an underlying H, which is lost just in case the vowel is onsetless on the surface.[3]

Another prosodic anomaly of onsetless syllables is that they resist lengthening before NC sequences. As in common in many Bantu languages (see Kimenyi 1979 for Kinyarwanda, Clements 1986 for Luganda, Odden 1995 for Kikerewe, among others), vowels are lengthened before an NC sequence. The examples in (15) show that the past tense prefix /-ka-/ and the subject prefix /ba-/ lengthen when the object prefix /n-/ plus a consonant-initial verb root immediately follows.

[3] The non-TBU status of onsetless syllables in Zinza is not as robust as it is in Kikerewe (Odden 1995). Zinza [ííhwa] 'thorn' from /i-hwá/ shows that H tones can, on the surface, be retracted to the penult from the final syllable, a process which is the only source of H on onsetless syllables in Kikerewe, and can also be directly assigned to word-initial position by morphologically conditioned tone assignment, resulting in imperatives [í-bohe] 'tie yourself!', [bá-bohe] 'tie them (CL 2)!'.

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(15) a-ka-mú-limila 'he cultivated for him'
a-káá-n-dimila[4] 'he cultivated for me'
ba-mu-limíla 'they cultivate for him'
baa-n-dimíla 'they cultivate for me'

The lengthening of /-ka-/ and /ba-/ in the second column is an illustration of general pre-NC lengthening. Similarly, the prefix /ha-/ stands directly before the noun class prefix and lengthens before the NC sequence composed of the noun class marker /n-/ plus the root-initial consonant.

(16) o-mu-ljaango 'door'
ha-mu-ljaango 'at the door'
haa-m-bogo 'at the buffalo'

Note in (17) that the vowels of the verbal subject prefixes /a-/ and /o-/ do not lengthen before NC.

(17) a-n-dimíla 'he cultivates for me'
o-n-dimíla 'you cultivate for me'

Similarly, the augment does not lengthen before NC in (18).

(18) e-m-bogo 'buffalo'
e-m-punu 'pig'
e-n-karaanga 'ground nut'

Three proposals have been advanced which provide a structural foundation for such restrictions on onsetless syllables. One, originating in Downing (1993), is that onsetless vowels may be moraified but are not syllabified, as in (19a), and a second, following Piggott (1995), is that they are syllabified but have no mora, as in (19b).

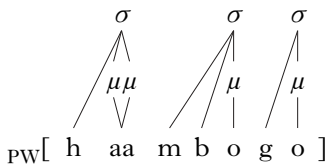
(19) a. μ b. σ
| |
o o

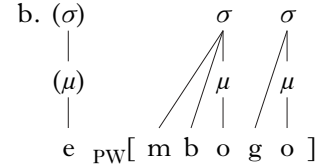
Since an onsetless syllable has an initial moraic segment, (19) addresses the problem by asserting either that they are not syllables (19a) or that their initial segment is not moraic (19b).

The extraprosodicity proposal of Downing (1998), following Inkelas (1989), holds that such syllables are outside of the phonological word (PW). The PW is a phonological analogue of the morphosyntactic 'word' (MW), and is ideally but not universally co-extensive with it. Misalignments may be governed by considerations such as minimal word-size requirements or syllable-alignment requirements. Downing's approach prevents an onsetless syllable from beginning a PW, and the contrast [haambogo] *vs.* [embogo] could be represented as (20).

[4] In this form, the object prefix is underlyingly H-toned, thus /ń-/, and the H is transferred to the preceding (lengthened) vowel. There is no surface contrast between rising tone and level H, and long level H-toned vowels have a slight phonetic rise to them.

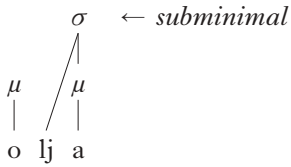
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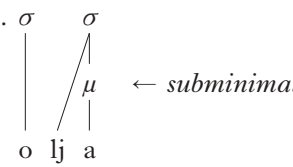
(20) a. 

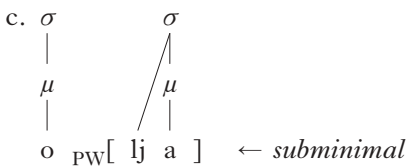
b. 

In this 'flexible PW' approach, the onsetless syllable itself may not be noteworthy, but its non-integration into the PW is. Whether initial vowels are also syllabified or moraified is not central in this approach. Without integrating the role of the PW, the degenerate syllable approaches do not provide a tenable account of Zinza, and an account that fully considers the relevance of the PW does not require non-canonical syllable representations. Even so, as I shall now show, extraprosodicity alone does not solve all of the problems of Zinza vowel length.

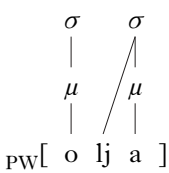
In degenerate syllable theories, a disyllabic word would be subminimal if the usual degenerate syllable representation were assigned. Would-be /o-lja/ is subminimal at the level of the syllable under the 'non-syllable' interpretation (21a), or at the level of the mora under the 'non-mora' interpretation (21b). In the flexible PW approach (21c), if the onsetless vowel is outside the PW the PW is straightforwardly subminimal.

(21) a. 

b. 

c. 

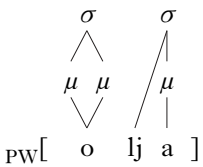
The smallest divergence from the input consistent with the strategies which yields these structures, maintaining isomorphy between MW and PW, and satisfying minimality, is the incorrect (22), with two syllables and two moras both parsed into a PW. The problem is that this minimal adjustment is the self-defeating standard syllabification of VCV, with a short vowel.

(22) 

What we must end up with is (23).

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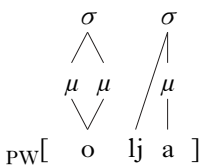
(23)



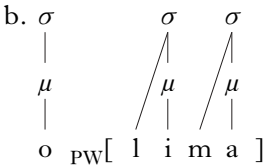
If a representation like (22) is possible in the language, the motivation for lengthening is lost.[5]

This clarifies the problem: long and short onsetless syllables behave differently. A short onsetless syllable at the beginning of the PW must be ruled out, without ruling out a long one. The problem which we face is that absolutely ruling out onsetless short vowels wrongly predicts that [olíma] is bad, and that *[oolíma], with a long vowel, should be preferable. The explanation for the asymmetry between [óólja] and [olíma] in (24) lies in how the initial vowel is integrated into the PW in these two cases – it is inside the PW in [óólja], but outside in [olíma].

(24) a.



b.



Given a constraint that prevents parsing a word-initial short vowel into the PW, degenerate syllable structure is superfluous for the lengthening problem. Interestingly, the data discussed by Downing, Odden and Orie document the prosodic weakness of word-initial vowels (e.g. resistance to tone, stress, length), but there is no evidence of an analogous effect in word-medial onsetless vowels. This is what extraprosodicity predicts: only a marginal syllable can be outside the PW.

Zinza is similar to general Aranda in Downing's (1998) analysis, where it is argued that the PW must not be vowel-initial and therefore the first syllable of er[gúma] 'cold' is outside of the PW, but minimality blocks extraprosodicity in [ílba] 'ear'. Analogously, a ban on onsetless PWs in Zinza results in the extraprosodic parse o[líma] 'you cultivate', and minimality blocks extraprosodicity in [óólja] 'you eat'. The central difference is that the motivating principle is slightly different in the two languages: in Aranda, it is a ban on PW-initial onsetless syllables, but in Zinza it is a ban on PW-initial *short* onsetless syllables.

[5] A reviewer has suggested that lengthening could be a consequence of penultimate accent: however, unlike Bantu languages such as Swahili, Zulu and Makonde with penultimate accent, syllables in Zinza independently contrast both tone and vowel length. There is no surface or abstract phonological correlate of accent, other than word-initial lengthening, which renders an accent-based account unmotivated.

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Assuming a constraint $*_{PW}[\breve{V}$, the distinction between [olíma] and [óólja] can be accounted for in OT terms as in (25).

(25) a.

o-lima	$*_{PW}[\breve{V}$	MINIMALITY	DEP-μ	ALIGN-L(PW,MW)
i. [olima]	*!			
☞ ii. o[lima]				*
iii. oo[lima]			*!	*
iv. [oolima]			*!	

b.

o-lja				
i. [olja]	*!			
ii. o[lja]		*!		*
iii. oo[lja]		*!	*	*
☞ iv. [oolja]			*	

In (25a), the first candidate, which perfectly aligns the PW to the MW, is ruled out because the PW-initial syllable has a short onsetless vowel. The consequences of the restriction imposed by $*_{PW}[\breve{V}$ are relatively minor for longer words like [olíma], since the remainder can be parsed faithfully without violating word minimality. On the other hand, for a VCV word (25b), excluding the first syllable from the PW fatally violates MINIMALITY, hence that syllable cannot be omitted. At the same time, exceptionally parsing the initial vowel into the PW as a short syllable violates $*_{PW}[\breve{V}$. The only viable repair left in that case is lengthening the vowel.

Two main conclusions are to be drawn from the facts of Zinza. First, the properties of onsetless syllable cannot be reduced to a special syllable representation. Rather (following Downing 1998), extraprosodicity triggered by a restriction against onsetless syllables at the beginning of the PW most efficiently explains vowel lengthening in connection with MINIMALITY and ONSET violations. Second, Zinza shows that the repertoire of ONSET constraints must be articulated in terms of whether the proscribed vowel is long or short.[6]

[6] Downing (1998) uses constraint conjunction, involving left-alignment of the PW with a syllable, and the ONSET constraint to represent this effect in Aranda and other languages, rather than adding a new primitive constraint. Another approach would be to triply conjoin the simple constraints ONSET, *V and PW left-alignment, or to presume a new constraint that syllables must branch. It would take this paper too far afield to fully explore the ramifications of the exact approaches that expresses that restriction: no facts in Zinza clearly make the decision as to which approach is superior.

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REFERENCES

Clements, G. N. (1986). Compensatory lengthening and consonant gemination in LuGanda. In Leo Wetzels & Engin Sezer (eds.) *Studies in compensatory lengthening*. Dordrecht: Foris. 37–77.
Cole, Jennifer Fitzpatrick (1990). The minimal word in Bengali. *WCCFL* **9**. 157–170.
Cowell, Mark W. (1964). *A reference grammar of Syrian Arabic*. Washington, D.C.: Georgetown University Press.
Davis, Stuart (1988). Syllable onsets as a factor in stress rules. *Phonology* **5**. 1–19.
Downing, Laura J. (1993). Unsyllabified vowels in Aranda. *CLS* **29:1**. 171–185.
Downing, Laura J. (1998). On the prosodic misalignment of onsetless syllables. *NLLT* **16**. 1–52.
Downing, Laura J. (2006). *Canonical forms in prosodic morphology*. Oxford: Oxford University Press.
Hyman, Larry M. & Francis X. Katamba (1993). The augment in Luganda: syntax or pragmatics? In Sam A. Mchombo (ed.) *Theoretical aspects of Bantu grammar*. Stanford: CSLI. 209–256.
Inkelas, Sharon (1989). *Prosodic constituency in the lexicon*. PhD dissertation, Stanford University.
Kimenyi, Alexandre (1979). *Studies in Kinyarwanda and Bantu phonology*. Carbondale, Ill.: Linguistic Research Inc.
Odden, David (1995). The status of onsetless syllables in Kikerewe. *OSU Working Papers in Linguistics* **47**. 89–110.
Orie, Ọlanikẹ Ọla (2000). Syllable asymmetries in comparative Yoruba phonology. *JL* **36**. 39–84.
Piggott, G. L. (1995). Epenthesis and syllable weight. *NLLT* **13**. 283–326.

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