A case for stress as empty CVs: glide epenthesis in Moksha

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Abstract

In Strict CV, a lateral autosegmental approach to phonology, stress has received an appropriately local incarnation – empty CV slots (Larsen 1998). Empty CVs are also taken to represent morphemic boundaries (Scheer 2012). If Strict CV phonology is on the right track in assuming empty CVs to represent boundaries, we expect various domain- and boundary-sensitive phenomena to correlate in a way that is attributable to the CVs' presence, and they do (see, for instance, Scheer (2012) on the attribution of often co-occuring left-edge effects to initial CVs and Enguehard (2015) about the influence of morphosyntactic boundaries on stress in Old Norse). This paper is dedicated to another piece of evidence that supports the above mentioned correlation – the interaction between stress and glide epenthesis in Moksha, where glides appear between /i u/ an schwa-initial suffixes in all nouns but the monosyllabic ones. The ostensibly syllable-counting rule of glide epenthesis is linked to the representation of stress as length and given an explanation without abandoning locality.

Keywords: stress, vowel length, Strict CV phonology, glide epenthesis, vowel-glide alternations, Moksha

1 Introduction

Strict CV is a lateral autosegmental approach to phonology (Kaye, Lowenstamm & Vergnaud 1990, Scheer 2012), which has a special way of treating morphosyntactic boundaries. Aside from the procedural boundaries provided by the cyclicity of derivation (see Chomsky (2000) on the latest model of cyclic derivation – the phase theory), there is a representational incarnation of boundaries – the CV-slot – an empty skeletal unit. Since the empty CV is a genuinely phonological entity and not a mere diacritic to be referred to by boundary-sensitive rules when necessary, it is supposed to produce side effects wherever it is present. The effects of the initial (boundary) CV have been summarised include restrictions on initial clusters, strength of initial consonants and deletion of the first vowel of the word (Scheer 2012).

Stress has been observed to produce analogous effects. Larsen (1998) discusses the interaction that tonic lengthening, raddoppiamento sintattico (lengthening of word-initial consonants) have with stress and suggests an explanation that rests on the representation of stress as an empty CV inserted after the stressed syllable. What unifies the analyses of the two phenomena is proper government (PG) – one of the fundamental mechanisms of Government phonology and Strict CV. Since PG affects the empty CV responsible for stress no less than any other CV in the phonological representation, it is an elegant way to account for several patterns at once. Enguehard (2015) makes a similar point about Old Norse, where the stress-encoding CVs coincide with the boundary ones. The implications of this analysis are even stronger: not only are stress CVs visible to other phonological processes, but boundaries and stress can be represented by the exact same entity.

This paper presents another piece of data that illustrates the influence of the empty CV representing stress, which comes from intervocalic glide epenthesis in Moksha. At the same time, I give a local reanalysis to a rule that seems, on the first glance, to refer to syllable count. The paper is laid out as follows: Section 2 introduces the data and summarises the patterns of behaviour of suffixes that start with schwa, /a/ and /u i/, as well as the stress placement in Moksha. Section 3 contains the proposed analysis of the glide insertion as spreading of short vowels and the corollary accounts of other phenomena reviewed in connection to the glide insertion during the exposition of the data. Section 4 concludes the paper.

2 Data

Moksha is a Mordvinic language that belongs to the Uralic language family and is spoken in Mordovia, a republic located in the European part of Russia. The primary sources of data for the present study are the Moksha corpus, Kukhto's (2018) chapter on Moksha phonology and Kozlov & Kozlov's (2018) chapter on morphophonology. If not stated otherwise, the examples come from the corpus. A practical transcription adopted from Toldova & Kholodilova (2018) is used throughout the paper; the IPA correspondence table is provided in the appendix.

There is a rule in Moksha that is described by Kozlov & Kozlov (2018) as an glide insertion occurring after all bases ending in /u/ or /i/ before vowel-initial suffixes. The curious proviso is that this rule does not apply after monosyllabic bases. Also, the glide insertion rule is different for suffixes that start with an unreduced vowel, that is, /a/, because no suffixes in Moksha start with any vowel other than schwa or /a/. In what follows I will describe the patterns distinctly for the schwa-inital and /a/-initial suffixes, contrasting the two, and the behaviour of suffixes that starts with /u i/ and exhibit a vowel-glide alternation, which I consider an important supplement to the data on the glide epenthesis.

2.1 Schwa-initial suffixes

The glide epenthesis before schwa-initial suffixes inserts /v/ after /u/ (1) and /j/ after /i/ (4).[1] After consonant-final bases the suffixal schwa is retained (3, 6). There is no epenthesis after the unreduced vowels /a o e ɛ/ (2, 5).

(1) jožu + əl' → jožuv-əl'
'(3SG was) smart-IPF'
(Kozlov & Kozlov 2018: p. 42)

(2) ava + əl' → ava-l'
'(3SG was a) woman-IPF'

(3) ruz + əl' → ruzəl'
'(3SG was) Russian-IPF'

(4) t'ɛči + ən' → t'ɛčij-ən'
'today-GEN'

(5) ava + ən' → ava-n'
'woman-GEN'

(6) ruz + ən' → ruzən'
'Russian-GEN'

As already mentioned, no epenthesis happens with monosyllabic bases, verbal or nominal (7–9).

(7) ši + ən' → ši-n'
'day-GEN'

(8) mu + əms → mu-ms
'find-INF'

(9) vi + əms → vi-ms
'bring-INF'

The behaviour of glides in between /u i/ and suffixal schwa is summarised in Table 1 below. A# corresponds to the unreduced vowels /a o e ɛ/.

[1] The part of the gloss in parentheses is not a part of the actual translation and serves to indicate that these forms are used as nominal predicates. The epenthetic /v/ and /j/ will be referred to as glides for the sake of simplicity, despite /v/ not being a glide.

	C#	A#	u#	i#
monosyllabic	ən’	n’	n’	n’
polysyllabic			vən’	jən’

Table 1: Suffix *ən’* ‘GEN’ with different kinds of bases

It is important to note that the glide insertion is not synchronically productive, that is, it does not affect loanwords. The default strategy is to treat /u i/ exactly like other vowels: to drop the schwa altogether (10–12). The syllable count is of no importance with loanwords.

(10) žuri + ən’ → žuri-n’
‘jury-GEN’

(11) soči + ən’ → soči-n’
‘Sochi-GEN’
(Kozlov & Kozlov 2018: p. 42)

(12) li + ən’ → li-n’
‘Li-GEN’
(online fieldwork)

Epenthesis of glides is not restricted to schwa-initial suffixes, but behaves differently with the /a/-initial ones. Since there are no suffixes in the Moksha language that strart with /o ɛ e/, no other unreduced vowels can be investigated in the suffix-initial position.

2.2 /a/-initial suffixes

Suffixes that begin with /a/ cause glide epenthesis when attached to /u i/-final bases, as exemplifies in (13–14). They are agreement markers *-an* ‘1SG’ and *-at* ‘2SG’ that can mark both verbal and nominal predicates (Kholodilova 2018, Toldova 2018).

(13) jožu + an → jožuvan
‘(I am) smart-1SG’

(14) vidi + an → vidijan
‘(I am) a sower-1SG’

The peculiar property of the /a/-initial suffixes is that in monosyllabic bases ending in /u i/, no matter which vowel it is, /j/ is inserted at all times (15–16).

(15) mu + an → mujan
‘(I) find-1SG’

(16) li + an → lijan
‘(I) fly-1SG’

Final /a ɛ/ coalesce with the suffix’s vowel; as for the rest of the unreduced vowels – /e o/ – Kozlov & Kozlov (2018) do not specify, only describing the phenomenon of ‘a-coalescence’ with /a/ and /ɛ/ in base-final positions (17–18).

(17) jaka + at → jakat
‘(you) go-2SG’

(18) at’ɛ + an → at’an
‘(I am) an old man-1SG’

Monosyllabic bases are different here again – in single-syllable bases ending with /a/, no a-coalescence occurs and /j/ is inserted (19–20).

(19) sa + an → sajan
‘(I) come-1SG’
(Kozlov & Kozlov 2018: p. 57)

(20) šna + an → šnajan
‘(I) praise-1SG’

The pattern is summarised in Table 2.

	C#	A#	u#	i#
monosyllabic	an	jan	jan	jan
polysyllabic		n	van	

Table 2: Suffix *an* 'NPST.1SG' with different kinds of bases

2.3 Suffixes starting with /u i/

There is one more phenomenon that is relevant to the glide insertion problem. Those are several suffixes in Moksha that start with a high vowel or consist of /u i/ alone, for instance, *-i/j* 'NPST.3SG' and *-u/v/i* 'LAT' (Kozlov & Kozlov 2018). As evident from my exposition of these morphemes, they alternate between the vowel and the glide, the lative case marker having an additional variant that appears after palatalised consonants. The distribution of these variants is similar: the glide comes after vowels, the vowel – after consonants; see (21–23) for the 3SG agreement marker and (24–25) for the lative.

(21) jaka-j 'go-3SG'

(22) šam-i 'empty-3SG'

(23) magazin-u
'shop-LAT'

(24) vir'-i
'forest-LAT'

(25) lavka-v
'shop-LAT' (Kozlov & Kozlov 2018: p. 52)

The examples in (21–25) show that it is not out of the ordinary for /u i/ in Moksha to alternate with the corresponding glides. The glide insertion is not the only process where these alternations are observable, hence an analysis that can handle the /u i/-suffixes pattern on par with the glide insertion is preferable.

2.4 Stress in Moksha

This section describes the stress pattern in Moksha, which is only at first glance unrelated to the glide insertion. However, as will be shown later, it likely is of great importance.

The Moksha stress is conditioned by vowel quality (Kukhto 2018). Syllables can be divided into *heavy* (featuring /a ɛ e o/ as nuclei) and *light* (featuring /u i ə/). The stress is borne by the leftmost heavy syllable (26–27), or, in words without heavy syllables, by the leftmost light one (28).[2]

(26) 't'ɛd'ɛ
'mother'

(27) ku'vaka
'long'

(28) 'kijə
'who' (Kukhto 2018: p. 34)

Apart from schwa, the light vowels are precisely those that trigger glide insertion base-finally, unless the word is monosyllabic. In other words, what triggers glide insertion are base-final unstressed light vowels. I will now demonstrate where this generalisation can go, assuming that 'heaviness' and 'lightness' of syllables, as well as stress, are underlyingly vowel length.

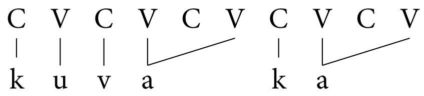
3 Glide epenthesis is conditioned by stress

I claim that the heavy vowels /a o ɛ e/ and the stressed light vowels /u i ə/ are long; in Strict CV terms, they are associated to two CV slots. The stress falls on the leftmost long vowel, and where there are no long vowels, an empty CV is inserted to the right of the leftmost vowel so that it is lengthened. This assumption makes the vowels that do not participate in the glide insertion, that is, heavy vowels and the stressed base-final ones (i.e. light vowels in monosyllabic bases) into a natural class: they share a property

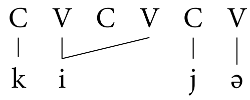
[2] I will continue to refer to the vowels that constitute the nuclei of heavy and light syllables heavy and light respectively.

of being long. The phonological representations of two different bases – with and without a heavy vowel – are presented in (29) and (30) respectively.

(29) [ku'vaka]

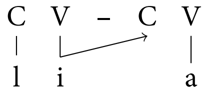


(30) ['kijə]

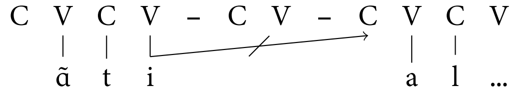


The mechanism of glide insertion proceeds similarly to the account of the glide insertion in French proposed by Scheer (2012) and exemplified in (31)–(32). The appearance of a glide in between the prefix and the base is hindered by an interfering CV boundary, over which association of the vowel to the base's initial C is not possible. One of the affixes provides a CV boundary, whereas the other does not, therefore it is only the latter case where the glide epenthesis happens (Scheer 2012: p. 154).

(31) lia [li-j-a]

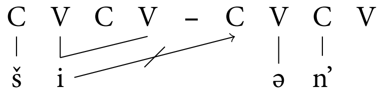


(32) anti-alcoolique [ãti-alkoolik]

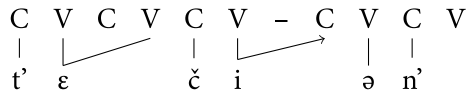


In Moksha, the source of the extra CV is stress or length: both long vowels and stressed vowels cannot associate to the empty C of the suffix due to the vowel's inability to associate to a third slot, so the glide insertion is ruled out (33–34). The restriction on triple association, or extra-long segments, as pointed out by an anonymous reviewer, is widely attested and may be universal (Chekayri & Scheer 2004, Enguehard 2018). The glide insertion is thus the result of /u i/ spreading onto the initial C of the suffix.

(33) ši + ən' → [ši-n']



(34) t'ɛči + ən' → [t'ɛčij-ən']



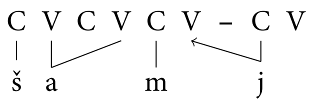
The schwa disappears after long vowels and stays after consonants, be it base-final consonants or glides that appear after spreading. I suggest that schwa is deleted rather via coalescence with the long vowel than as a result of some vowel-zero alternation, because, should there be a vowel-zero alternation, we would expect the schwa to disappear after C# as well.

I now turn to two other previously described phenomena: (a) the vowel-glide alternation in /u i/-suffixes; (b) /j/-insertion in between monosyllabic bases with a heavy syllable and an /a/-initial suffix.

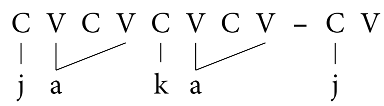
3.1 /u i/-suffixes are consonants

I argue that a similar analysis based on of /u i/ associating to two slots (C and V) can be pursued for the /u i/-initial suffixes, albeit with a change in representations: the /u i/ of these suffixes are better conceived of as underlying consonants. They surface as vowels when there is a base-final empty V to associate to (35) and as consonants, if the V is taken (36).

(35) [šam-i]



(36) [jaka-j]



This claim is motivated by the fact that in Strict CV, the universal syllable structure is CV, that is, every syllabic unit ends in a V-slot, empty or filled. Suppose the initial /u i/ of some suffix is a genuine vowel. If it is floating, it would only surface after consonants, which is not true to the data. With the vowel associated, the analysis gets in conflict with the behaviour of another alternating suffix *u/əv* ‘PASS’, which occurs as *-(ə)v* before and/or after vowels (37–38) and is in free variation between *-u* and *-əv* in between consonants (39).

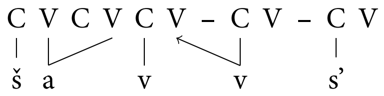
(37) sa-v-an
‘come-PASS-NPST.1SG’
(Kukhto 2018: p. 23)

(38) uč-əv-ə
‘wait-PASS-CN’
(Kozlov & Kozlov 2018: p. 48)

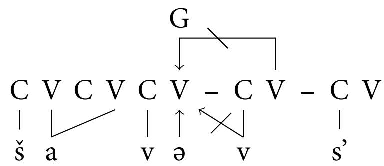
(39) šav-əv-s’ šav-u-s’
‘kill-PASS-PST.3SG’
(Kozlov & Kozlov 2018: p. 60)

Should its underlying representation be *-u*, its shapeshifting in the presence of vowels would require reassociating it to a C-slot so as to free up a V-slot for the next vowel to associate to. With the suffix as a consonant, on the other hand, the analysis is more elegant and capable of capturing the variation between *-u* and *-əv* in between consonants: either there is association to the free base-final V (40) or not (41).[3]

(40) [šav-u-s’]



(41) [šav-əv-s’]



Such are the /u i/-initial suffixes: while alternating between vowels and glides like the bases that are subject to glide insertion, the latter diverge from the former in their underlying representation: glide insertion happens to base-final vowels (/u i/), but the vowel-glide alternation happens to suffix-initial consonants (/v j/). One may wonder whether glides are really absent from the representations of the bases subject to glide epenthesis, from which comes a possible objection to my account of this phenomenon.

3.2 Are glides floating segments?

As has been mentioned while describing the data, glide insertion is not synchronically productive, that is, it never happens in loanwords, no matter their syllable count or stress pattern (the examples are repeated below in (42–44) with stress indicated). Also, the glides that appear in glide insertion are historically recoverable (Bubrikh 1953: pp. 11–12). Finally, there is a native Moksha exception to the rule – *ksti* ‘berry’, which does cause glide insertion in spite of being monosyllabic (Kozlov & Kozlov 2018: p. 42).

(42) žu'ri + ən’ → žuri-n’
‘jury-GEN’

(43) 'soči + ən’ → soči-n’
‘Sochi-GEN’
(Kozlov & Kozlov 2018: p. 42)

(44) li + ən’ → li-n’
‘Li-GEN’
(online fieldwork)

All these considerations prompt an alternative suggestion: the glides are not a result of /u i/ spreading but the surface realisation of floating segments – /v j/. This is a possible analysis, however, merely putting the glides into the lexical representation would be equivalent to giving up on making a generalisation where it *can* be made, i.e. the bases that have and have not glides in their representation are not distributed randomly and there is a rule that controls its presence, albeit synchronically obsolete. If we do try to make a generalisation, the rule’s curious ability to count syllables is problematic for a lateral theory of phonology. So, the theoretical goal I have been pursuing is to find a *non-lexical* motivation for the distribution of the glide epenthesis within the Strict CV framework.

[3] I leave the exact Government-based mechanism of schwa insertion to future research, however, it can be noted that final empty nuclei are able to govern, since there are numerous examples of word-final clusters (for instance, *satfks* ‘success’, *lifkst* ‘smallpox’).

Finally, the rule that determines stress placement is not productive either on relatively fresh loanwords – see the examples of Russian loanwords in (45–46), which do not obey the law of stressing the leftmost heavy syllable.

(45) ˈkruška 'cup' (Kukhto 2018: p. 34)

(46) ˈkniga 'book' (Kukhto 2018: p. 34)

The analysis that links stress and glide epenthesis is therefore not incoherent: both rules are not extendable to loanwords, so the link between them is plausible. At the moment in the history of Moksha when both of them were productive, the connection that I have established might well have held.

3.3 /a/-final monosyllabic bases have floating glides

Next I am going to address the case where floating glides actually appear to be the most sensible solution – /a/-final monosyllabic bases with /a/-initial suffixes, exemplified in (47–48) repeated below, along with bases ending in /u i/ (49–50).

(47) sa + an → sajan
'come-1SG'
(Kozlov & Kozlov 2018: p. 57)

(48) šna + an → šnajan
'praise-1SG'

(49) mu + an → mujan
'find-1SG'

(50) li + an → lijan
'fly-1SG'

As previously demonstrated in Table 2, /u i/ spread before *-an* 'NPST.1SG' in polysyllabic bases, similarly to schwa-initial suffixes like *-ən*' 'GEN', whereas the /a/-final bases make the /a/ of the suffix coalesce with one of the base. All kinds of monosyllabic bases ending in vowels, however, share a strange pattern of /j/-insertion. If we take this common behaviour to be indicative of some shared property, this would be destructive to the established analysis: stressed heavy vowels, like /a/ in ˈšnajan '(I) praise-1SG', would be grouped together with unstressed light ones, like /u/ in *muˈjan* '(I) find-1SG', which is an undesirable outcome.

I contend that the /j/ inserted in between heavy vowels has nothing to do with stress. Final light vowels can only be long in monosyllabic bases with suffixes containing no heavy vowels – this is the only context where they can be stressed and therefore lengthened. Heavy vowels like /a/, on the other hand, can absolutely be base-final and stressed if there are no other heavy vowels to their left. Consider the example of such base, which is polysyllabic and contains a final stressed heavy vowel (51). No /j/-insertion occurs before *-an*.

(51) juma + an → juman
'(I am) lost-1SG'

(52) šta + an → štajan
'wash-1SG'

(53) šta + s' → štas'
'wash-PST.3SG'

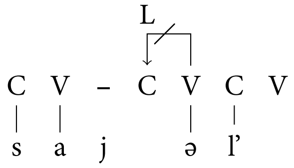
(54) iz' sa
'NEG.PST.3SG come.CN'
(Kozlov & Kozlov 2018: p. 57)

(55) sa + əl' → sal'
'come-IPF'

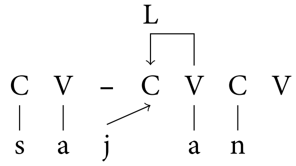
Therefore, the /j/-insertion in monosyllabic /a/-final bases can be analysed as an effect of a floating segment without detriment to any generalisations already posited. The glide only surfaces before unreduced vowels (52) and is deleted before consonants (53) and at the right edge (54). Its interaction with schwa-initial suffixes is puzzling, because both the schwa and the floating glide are deleted (55).

Since there is no option of making schwa floating as well, which would render spreading of /u i/ before schwa-initial suffixes impossible, we have to restrict the floating glide's ability to associate: it can only associate to a licensed position. Schwa cannot licence the preceding C-slot (56), whereas /a/ can (57).

(56) sa + əl’ [sa-l’]



(57) sa + an [sa-jan]



When it comes to the /j/-insertion after /u i/ in monosyllabic bases, it is likely a case of default epenthesis that prevents vowel hiatus. Unlike schwa, /a/ cannot coalesce with /u i/, so a rescue mechanism fires and a glide appears. The absence of spreading in this case is evident: it is only /j/ that can appear, not /v/, which contradicts my conclusion about the spreading of short vowels. Strangely enough, before *-an*, /u i/ are unstressed and short but do not spread – I leave this paradox aside for the time being. Note that it is an issue for the floating segments proposal as well, since one has to explain why it is /v/ that appears after /u/ in all cases but this, where the epenthetic glide is /j/ irregardless of the vowel quality.

4 Conclusion

I have proposed a novel analysis of the glide insertion in Moksha – a phenomenon of /v j/ appearing in between base-final /u i/ and schwa-initial suffixes, but only in polysyllabic bases. The rule that appears to be counting syllables, which is problematic for such a lateral phonological theory as Strict CV, receives a local explanation under two assumptions. First, I suppose that heavy vowels that attract stress are underlyingly long, and so are all stressed vowels. Since stress falls on the leftmost syllable in the absence of heavy vowels, the only bases where final light vowels can be long are monosyllabic bases. Thus the bases that participate in glide insertion form a natural class – those are short base-final vowels. The second assumption is that /u i/ can spread onto neighbouring C- or V-slots, which is corroborated by another vowel-glide alternation that happens in /u i/-initial suffixes. Short base-final vowels can spread, whereas long vowels cannot: this is prohibited by the widely attested ban on triple association. Additionally, I have reviewed other cases of epenthesis, which happen before suffixes with initial heavy /a/ and have a less straightforward explanation, constituting a problem for my central proposal about short vowels spreading to the suffix's leftmost C-slot. This challenge may be overcome via a more thorough investigation of hiatus resolution strategies in Moksha, which might override the glide insertion rules by being more synchronically productive and possibly even gradually replacing it.

Appendix

IPA correspondence table

IPA	Transcription
m	m
n̪	n
n̪ʲ	n’
p	p
b	b
t̪	t
t̪ʲ	t’
d̪	d
d̪ʲ	d’
k	k
g	g
x	x
f (ɸ)	f

IPA	Transcription
v (β)	v
s̪	s
s̪ʲ	s’
z̪	z
z̪ʲ	z’
ʃ	š
ʃʲː (ʃt͡ʃ)	šč
ʒ	ž
t͡s̪	c
t͡s̪ʲ	c’
t͡ʃ	č
ç	j̊
j	j
ɾ̥	r̥

IPA	Transcription
ɾ̥ʲ	r̥’
ɾ	r
ɾʲ	r’
ɬ̪	l̥
ɬ̪ʲ	l̥’
l̪	l
lʲ	l’
i	i
u	u
e	e
ə	ə
o	o
ɛ	ɛ
a	a

List of glossing abbreviations

1 first person
2 second person
3 third person
CN connegative
GEN genitive
INF infinitive
IPF imperfective
LAT lative case
NEG negative
NPST non-past
PASS passive
PST past
SG singular

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