



Fortuna, Marcin. 2022. A phonological solution to allomorphy in Georgian nominal inflection. *Glossa: a journal of general linguistics* 7(1), pp. 1–29. DOI: <https://doi.org/10.16995/glossa.5820>



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A phonological solution to allomorphy in Georgian nominal inflection

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Georgian features three patterns of nominal inflection, which are dependent on the structure of the stem. The stem can be consonantal, vocalic truncating, and vocalic non-truncating, with the consequences for the shape of the inflectional suffixes. However, variants of each individual case suffix differ across the three stem types in unique ways, with no single pattern being used for more than one grammatical case. This could suggest a solution based on traditional allomorph selection from a predefined list of stored forms. The paper argues, however, that a phonological explanation of the pattern is possible when rich autosegmental representations are employed. The analysis is couched within the CVCV model of phonology (Scheer 2004).

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1 Introduction

Georgian features three types of nominal stems: consonantal (ending in a consonant, e.g. *k'ats*- 'man'), vocalic truncating (ending in a vowel which gets truncated in inflection, e.g. *mama* 'father', cf. *mami*s 'father, gen.sg.'), and vocalic non-truncating (ending in a stable vowel, which does not get truncated, e.g. *bu* 'owl', cf. *bu*s 'owl, gen.sg.'), see e.g. Fähnrich (2012: 587–92). Each of these types displays its own pattern of inflection. The three patterns are quite similar to each other, to the extent that it is sometimes assumed that “[e]ssentially only one declensional pattern, distinguishing seven cases, exists for all nouns in Georgian, but there are slight variations” (Hewitt 1995: 33). However, the differences displayed by the three stem types are unique for each and every case ending. There is no common theme involved in the generation of the exponents for individual grammatical cases, and the relation between, for example, the ergative ending of the consonant-final stems and non-truncating vowel-final stems is different than the relation between the genitive ending of these two stem types. Thus, it is not possible to formulate a single phonological rule responsible for the variation in inflection. What contributes even more to the complexity of the pattern is a) the existence of ‘short’ and ‘long’ ending variants for some of the endings; b) stem modifications triggered by concatenation of some of the endings.

These observations could lead us to assume a non-phonological explanation of the patterns and propose traditional allomorph selection. Different case suffix variants would map onto different underlying representations.¹ However, a natural (and undesirable) corollary of this approach would be to recognize arbitrary class features. The point of departure for our investigation is the assumption that grammar does not include arbitrary diacritics, with all of the linguistic phenomena making use of the vocabulary specific for the module at hand.

In this article it will be argued that there is no allomorphy (defined as allomorph selection) in the Georgian nominal inflection at all. Each nominal case ending has only one underlier, with the surface alternations being dependent on phonological computation applying to highly diverse and distinct representations.

The paper follows the direction of research advocated in Scheer (2016), Faust and Lampitelli (2016), Ulfsbjorninn (2016; 2020), Lampitelli (2017), Newell (2017), or Faust et al. (2018), who argue that a great deal of phenomena labelled as “phonologically-conditioned allomorphy” can be accounted for in phonology by resorting to rich autosegmental structures. It employs the framework of CVCV (Lowenstamm 1996, Scheer 2004), but with some important modifications concerning the status of Final Empty Nuclei (FEN), vowel ~ zero alternations and the nature of association lines.

2 Georgian nominal inflectional paradigms

Georgian nouns are inflected according to seven grammatical cases: nominative, ergative, dative, genitive, instrumental, adverbial, and vocative. The exponence of each grammatical case is relatively stable, with some minor differences caused by the structure of the stem. Each stem can

¹ See Paster (2014) for an informative survey of the phenomenon of allomorphy.

be classified as consonantal (ending in a consonant), vocalic truncating (ending in a vowel which undergoes truncation in some contexts), and vocalic non-truncating (ending in a stable vowel).

The tables in this section present full inflectional paradigms of Georgian nouns in the singular, followed by comments (if relevant).²

2.1 Consonantal stems

	Singular endings	<i>k'atsi</i> 'man', <i>tavi</i> 'head'	<i>mutseli</i> 'stomach', <i>ak'vani</i> 'cradle' (with syncope)	<i>mindori</i> 'field', <i>niori</i> 'garlic' (with vowel > v change)
Nominative	-i	<i>k'ats-i</i> , <i>tav-i</i>	<i>mutsel-i</i> , <i>ak'van-i</i>	<i>mindor-i</i> , <i>nior-i</i>
Ergative	-ma	<i>k'ats-ma</i> , <i>tav-ma</i>	<i>mutsel-ma</i> , <i>ak'van-ma</i>	<i>mindor-ma</i> , <i>nior-ma</i>
Dative	-s(a)	<i>k'ats-s(a)</i> , <i>tav-s(a)</i>	<i>mutsel-s(a)</i> , <i>ak'van-s(a)</i>	<i>mindor-s(a)</i> , <i>nior-s(a)</i>
Genitive	-is(a)	<i>k'ats-is(a)</i> , <i>tav-is(a)</i>	<i>mutsel-is(a)</i> , <i>ak'van-is(a)</i>	<i>mindvr-is(a)</i> , <i>nivr-is(a)</i>
Instrumental	-it(a)	<i>k'ats-it(a)</i> , <i>tav-it(a)</i>	<i>mutsel-it(a)</i> , <i>ak'van-it(a)</i>	<i>mindvr-it(a)</i> , <i>nivr-it(a)</i>
Adverbial	-ad(a)	<i>k'ats-ad(a)</i> , <i>tav-ad(a)</i>	<i>mutsel-ad(a)</i> , <i>ak'van-ad(a)</i>	<i>mindvr-ad(a)</i> , <i>nivr-ad(a)</i>
Vocative	-o	<i>k'ats-o!</i> <i>tav-o!</i>	<i>mutsel-o!</i> <i>ak'van-o!</i>	<i>mindor-o!</i> <i>nior-o!</i>

Table 1: Declension of consonantal stems.

Table 1 contains an overview of the inflection of Georgian consonantal stems. What may puzzle the reader is the presence of a parenthesised (*a*) in the dative, genitive, instrumental, and adverbial ending. This is due to these endings having two forms available: the short form (without *-a*) and the long form (with *-a*). The usage of both forms is determined by the post-lexical context. For instance, long forms are used before the conjunction *da* 'and' (examples from Hewitt 1995: 34):

- (1) **k'ats-sa da kal-s**
man-DAT and woman-DAT
'to the man and the woman'
- (2) **tbilis-isa da kutais-is silamaze**
Tbilisi-GEN and Kutaisi-GEN beauty(NOM)
'the beauty of Tbilisi and Kutaisi'

² Since Georgian grapho-phonemic correspondences are very regular, all Georgian examples in the article use the national system of romanization for Georgian, adopted in 2002 by State Department of Geodesy and Cartography of Georgia and the Institute of Linguistics, Georgian Academy of Sciences (rather than IPA).

A long form of the genitive ending is also used when the genitive is placed after its head noun:

- (3) **silamaze kutais-isa**
 beauty(NOM) Kutaisi-GEN
 ‘the beauty of Kutaisi’

A precise characterisation of the morphosyntactic conditions which favour long forms of nominal inflection transcends beyond the limits of this paper, but the representational side of the dichotomy will be addressed. It is noteworthy that the presence of a long form does not interact with any other effects handled in this article.

Another notable feature of some lexical items with consonant-final stems is vowel syncope or vowel reduction to *v* taking place in three cases: genitive, instrumental, and adverbial. Both phenomena are attributable to the presence of a vowel to the right (*i* of the genitive and instrumental ending, *a* of the adverbial suffix), but not just any vowel will act like this – the vowel *i* of the nominative exponent or *o* of the vocative ending do not trigger any of these processes.

2.2 Vocalic stems (truncating)

	Singular endings	<i>mama</i> ‘father’, <i>tkha</i> ‘goat’ (trunc. - <i>a</i>)	<i>mtvare</i> ‘moon’, <i>bage</i> ‘lip’ (trunc. - <i>e</i>)	<i>kveq’ana</i> ‘country’, <i>karkhana</i> ‘factory’ (trunc. + syncope)
Nominative	-∅	<i>mama</i> , <i>tkha</i>	<i>mtvare</i> , <i>bage</i>	<i>kveq’ana</i> , <i>karkhana</i>
Ergative	- <i>m</i>	<i>mama-m</i> , <i>tkha-m</i>	<i>mtvare-m</i> , <i>bage-m</i>	<i>kveq’ana-m</i> , <i>karkhana-m</i>
Dative	- <i>s(a)</i>	<i>mama-s(a)</i> , <i>tkha-s(a)</i>	<i>mtvare-s(a)</i> , <i>bage-s(a)</i>	<i>kveq’ana-s(a)</i> , <i>karkhana-s(a)</i>
Genitive	trunc. - <i>is(a)</i>	<i>mam∅-is(a)</i> , <i>tkh∅-is(a)</i>	<i>mtvar∅-is(a)</i> , <i>bag∅-is(a)</i>	<i>kveq’∅n∅-is(a)</i> , <i>karkh∅n∅-is(a)</i>
Instrumental	trunc. - <i>it(a)</i>	<i>mam∅-it(a)</i> , <i>tkh∅-it(a)</i>	<i>mtvar∅-it(a)</i> , <i>bag∅-it(a)</i>	<i>kveq’∅n∅-it(a)</i> , <i>karkh∅n∅-it(a)</i>
Adverbial	- <i>(a)d(a)</i>	<i>mam∅-ad(a)</i> , <i>tkh∅-ad(a)</i>	<i>mtvare-d(a)</i> , <i>bage-d(a)</i>	<i>kveq’∅n-ad(a)</i> , <i>karkh∅n-ad(a)</i>
Vocative	- <i>v/o/∅</i>	<i>mama(-v)!</i> <i>tkha(-v/o)!</i>	<i>mtvare(-v)!</i> <i>bage(-v)!</i>	<i>kveq’ana(-v)!</i> <i>karkhana(-v)!</i>

Table 2: Declension of truncating vocalic stems.

The endings found in vocalic truncating stems are slightly different from the ones found in consonantal stems (see **Table 2**). The nominative ending is empty, the ergative is devoid of its

post-consonantal vowel, and the adverbial of its pre-consonantal vowel in some contexts.³ The vocative ending is the consonant *v*, the vowel *o*, or the vocative exponent is silent.

2.3 Vocalic stems (non-truncating)

	Vowel final stem (non-truncating)	<i>ts'q'aro</i> 'spring', <i>bu</i> 'owl'
Nominative	-∅	<i>ts'q'aro</i> , <i>bu</i>
Ergative	- <i>m</i>	<i>ts'q'aro-m</i> , <i>bu-m</i>
Dative	- <i>s(a)</i>	<i>ts'q'aro-s(a)</i> , <i>bu-s(a)</i>
Genitive	- <i>s(a/i)</i>	<i>ts'q'aro-s(a/i)</i> , <i>bu-s(a/i)</i>
Instrumental	- <i>ti</i>	<i>ts'q'aro-ti</i> , <i>bu-ti</i>
Adverbial	- <i>d(a)</i>	<i>ts'q'aro-d(a)</i> , <i>bu-d(a)</i>
Vocative	-∅	<i>ts'q'aro!</i> <i>bu(v/o)!</i>

Table 3: Declension of non-truncating vocalic stems.

In the non-truncating vocalic category, even more differences from the consonantal stems emerge. Crucially, all endings either start with a consonant, or are empty (see **Table 3**). The instrumental ending transfers the vocalic melody to the postconsonantal position. The genitive ending becomes homophonous with the dative ending.

For ease of reference, **Table 4** recapitulates all the relevant inflectional endings, including information on syncope (sync.) and truncation (trunc.).

	Consonant	Truncating vowel	Non-truncating vowel
Nominative	- <i>i</i>	-∅	-∅
Ergative	- <i>ma</i>	- <i>m</i>	- <i>m</i>
Dative	- <i>s(a)</i>	- <i>s(a)</i>	- <i>s(a)</i>
Genitive	(sync.) - <i>is(a)</i>	(sync.) trunc. - <i>is(a)</i>	- <i>s(a/i)</i>
Instrumental	(sync.) - <i>it(a)</i>	(sync.) trunc. - <i>it(a)</i>	- <i>ti</i>
Adverbial	(sync.) - <i>ad(a)</i>	- <i>d(a)</i> / (sync.) trunc. - <i>ad(a)</i>	- <i>d(a)</i>
Vocative	- <i>o</i>	-∅/ <i>o/v</i>	-∅/ <i>o/v</i>

Table 4: Georgian nominal inflection in the singular.

³ It is feasible to interpret such sequences as *mamad(a)* 'father, adv.sg.' both as *mam* + *ad(a)* and *mama* + *d(a)*. Truncating stems with -*e* consistently preserve -*e* in the adverbial case (e.g. *mtvareda*, 'moon, adv.sg.'), which points towards the latter solution, but syncope taking place in truncating stems with -*a* suggests that the [a] comes from the suffix, rather than the stem (otherwise syncope could be expected in the nominative). In this paper, it is assumed that the suffixal origin of the *a* vowel evidenced by syncope in such forms as *karkhØnad(a)* justifies postulating the same structure for forms like *mamad(a)*, which do not display syncope.

On the basis of **Table 4**, the following observations can be formulated:

- a) all grammatical cases except dative display variation across different stem types
- b) the differences between stem-specific forms run along different lines for each case ending (no single pattern is replicated)
- c) on top of the stem-specific diversification, four of the seven cases (dative, genitive, instrumental, adverbial) can be realised by either the short form or the long form
- d) in three cases (genitive, instrumental, adverbial) concatenation may cause syncope of the vowel preceding the suffix

All of these phenomena deserve a principled explanation and such will be offered in the sections to follow.

3 Theoretical background

The theoretical model adopted in this article is CVCV, a variant of Government Phonology advocated by Lowenstamm (1996) and Scheer (2004). The aim of this section is to introduce the reader to the model's view of constituent structure and its repertoire of computational tools, as well as to indicate the few departures from the standard assumptions which were made in the analytic part of the paper.

3.1 Constituent structure in CVCV

The default shape of a lexical representation of a morpheme in CVCV involves two tiers: CV skeleton and melody, with association lines linking melodies with their slots. However, it is also customary for linguists to propose representations involving units of only one of these tiers, such as empty CV-slots and floating melodies. It naturally follows from the auto-segmental approach, which has always stressed the independence of each auto-segmental tier and has not imposed any *a priori* restrictions on the shape of lexical representations (Goldsmith 1976; Zimmermann 2017; Faust et al. 2018).

We assume that a representation can have one of the shapes presented in **Figure 1**.

A well-formed lexical representation can consist of (a) a CV-slot with associated melody; (b) an empty CV-slot; (c) a floating melody with no skeletal slot; (d) a CV-slot with floating melody, but without an association line; (e) a floating melody with an association line; (f) a CV-slot with an association line (or two), but without melody.

Options (a-c) are probably easy to accept for all proponents of the auto-segmental theory, since they reflect the aforementioned independence of each tier. Option (d) has been convincingly argued by Ulfsbjorninn (2016: 13–15) to be fully viable. Option (e) may seem less customary, but in later sections it will be argued that a distinction between a melody with and without an association line at the level of lexical representation is necessary and helps us solve many a

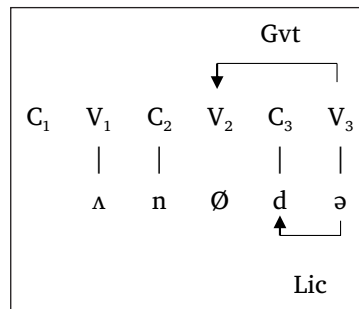


Figure 2: English *under* in CVCV.

In the example in **Figure 2**, the empty nucleus V_2 remains empty thanks to the government provided by V_3 , i.e. the next nucleus in the row. The only situation in which an empty nucleus can remain ungoverned by another nucleus is when it is placed at the end of a domain (e.g. a word) – then it acquires the status of a FEN (Final Empty Nucleus) and is parametrically governed in languages allowing consonant-final words.

The other lateral force exercised by V_3 is licensing, which in this case targets the consonant [d] in C_3 and is responsible for its relative strength (effectively predicting that a post-coda consonant will typically resist lenition, unlike the coda, which never receives licensing).⁵

It is also a matter of parametric setting if FENs are laterally enabled, i.e. if they can govern and license.

3.3 Vowel ~ zero alternations

Government is also a force responsible for the presence of vowel ~ zero alternations in such cases as *simple* ['sɪmpəl] vs. *simpler* ['sɪmpələ]. It is assumed that the alternating vowel is floating in the lexical representation and gets associated when it is ungoverned (i.e. when the following nucleus is unable to govern it, which typically means that it is empty). Consider the CVCV representations for the Latin forms *pater* 'father, nom.sg.' and *patris* 'gen.sg.' in **Figure 3**, where the presence of [e] is clearly dependent on the presence of a full vowel in the following V-slot.

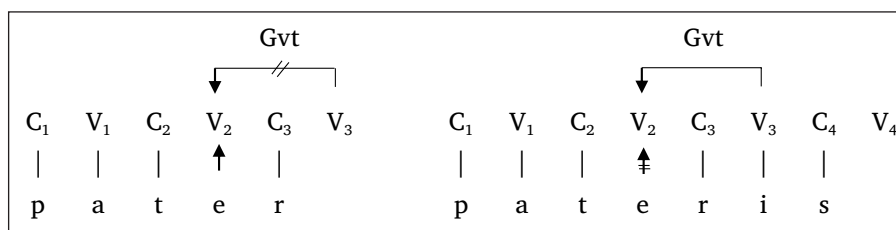


Figure 3: Vowel~zero alternations in Latin *pater* 'father'.

⁵ For more information on the workings of the lateral forces in CVCV in the context of consonantal strength (and many other phenomena) see Scheer & Ziková (2010).

The rule of thumb in CVCV is the following:

- a) Contentful nuclei can govern nuclei hosting a floating melody
- b) Empty nuclei can never govern nuclei hosting a floating melody

These assumptions are correct for most of the data featuring vowel ~ zero alternations, but there is a set of data which is not amenable for this kind of analysis: the alternations found in modern Slavic languages and involving sequences of more than one alternating vowel (the so-called *yers*). For instance, it is quite common in Modern Polish and Modern Czech to have two or three alternating vowels in a row. Consider the following data from Polish (the alternating vowels are underlined>:

(4)	<i>pies</i> [pʲɛs]	<i>psa</i> [pʲɔsa]	‘dog’ nom.sg. / gen.sg.
	<i>pie<u>ś</u>ek</i> [pʲɛ <u>ś</u> ɛk],	<i>pie<u>ś</u>ka</i> [pʲɛ <u>ś</u> ɔka]	‘dog, dim.’ nom.sg. / gen.sg.
	*[p <u>ś</u> ɛk]		
	<i>pie<u>ś</u>eczek</i> [pʲɛ <u>ś</u> ɛt <u>ś</u> ɛk],	<i>pie<u>ś</u>eczka</i>	‘dog, double dim.’ nom.sg. / gen.sg.
	*[pʲɛ <u>ś</u> ɔt <u>ś</u> ɛk]	[pʲɛ <u>ś</u> ɛt <u>ś</u> ɔka], *[pʲɔ <u>ś</u> ɛt <u>ś</u> ka]	

The situation which can be observed in Polish points towards an apparent violation of the aforementioned rule of thumb: *some* phonetically expressed nuclei cannot govern. Otherwise, the expected double diminutive forms of ‘dog’ would be *[pʲɛśɔtśɛk] (nom.sg.) and *[pʲɔśɛtśka] (gen.sg.). Importantly, the nuclei which fail to govern alternating nuclei are also alternating nuclei themselves.

The modern Slavic data are explained by positing the existence of two patterns of vowel alternations: Havlík and Lower (Scheer 2004: 560–564). The former pattern is based on the rule of thumb: all contentful nuclei (including alternating nuclei) can govern other nuclei. In the latter pattern, however, alternating nuclei (*yers*) do not govern preceding nuclei. This distinction seems to be reducible to a parameter setting: *yers* can govern other alternating nuclei (parameter ON) or they cannot (parameter OFF).

This solution appears to be widely accepted by the CVCV community, nevertheless it is puzzling why the Lower pattern has been identified only in modern Slavic languages. For a parameter setting to be considered universal, it would be much more convincing to demonstrate its existence in multiple, preferably unrelated languages. In this paper, it will be argued that non-governing *yer* vowels actually exist beyond modern Slavic and postulating them can help us explain some problematic aspects of vowel ~ zero alternations, even though without recourse to examples involving multiple instances of such a vowel in a row.

3.4 Final Empty Nuclei (FEN)

Another important concept in the repertoire is the notion of Final Empty Nuclei (FEN). In light of the mechanism outlined above, there arises a question about the ECP of the last vocalic slot in

words ending in a consonant. It is standardly assumed in CVCV that these nuclei are *parametrically* governed. If the rightmost nucleus of a given morphosyntactic domain is empty, it receives a FEN status when computation begins. It is also a matter of a parametric setting whether this empty nucleus is a lateral actor, i.e. if it can govern and license (Scheer & Ziková 2010).

However, within this paper we will adopt a slightly different stance on the status of FENs. Following Fortuna (2015; 2016), it will be assumed that the rightmost empty nuclei can be marked as FEN (Final Empty Nuclei) at the level of the lexical representation of a morpheme. According to Fortuna (2015: 120–121 and 2016: 263–264), FEN is a status which can be lexically ascribed to a nucleus in the lexicon and which stays visible throughout the derivation.

Please note that FEN in this regard is not a diacritic, nor is it a new type of nucleus in the theory (or, like an anonymous reviewer suggested, a ‘feature’ which could cause ‘FEN spreading’). The crux of the innovation is that:

- a) The ECP of the rightmost empty nucleus can be satisfied at the level of lexical representation
- b) The lateral actorship of the rightmost empty nucleus can be determined at the level of lexical representation.

These lexical specifications effectively take precedence over the parametric settings decided for the system in question. The fact that *some* morphemes can have lexically specified information, which is otherwise decided by a parameter, or by some regular derivation, should not come as a surprise. For example, it is quite common to propose for languages which have a transparent stress assignment pattern that the apparently irregular stress of some lexical items is due to lexical marking.

It could also be argued that to postulate lexical ECP satisfaction and/or lexically defined lateral actorship, one would not need the notion of FEN. Any nucleus in the string could be marked this way. However, we assume that this is clearly unacceptable – we maintain that the only situation in which an empty nucleus is able to govern and license, or when it can be governed without the assistance of another nucleus, is when it is *at the right edge*. There is no departure from this fundamental insight. Nonetheless, in the traditional CVCV approach, it is always the right edge of a domain (where domains are defined morphosyntactically). In our approach, it is also the right edge of a lexical representation. The proposal still incorporates the view that the phonology of edges is special and calls for special tools and treatments, not found word-internally. This is also why we still make use of the term FEN – they are *still Final Empty Nuclei*, after all, and we want to emphasise it in this paper.

With such a repertoire of representational tools at our disposal, it will be demonstrated how all of the variants of the nominal inflectional endings in Georgian can be derived from single underlying forms, with very little room left for allomorphy in the traditional sense, i.e. for allomorph selection.

4 Georgian nominal stems in CVCV

The three traditionally defined classes of Georgian nouns can be easily and directly mapped onto representations of three different types in CVCV.

Consonantal stems have a non-conspicuous representation with an empty V-slot at the right edge (Figure 4).

C ₁	V ₁	C ₂	V ₂
t	a	v	∅

Figure 4: Representation of the root *tav*- ‘head’.

Truncating vocalic stems host the truncating vowel in the representation, but they lack the association line in the stem-final V-slot (Figure 5).

C ₁	V ₁	C ₂	V ₂
m	a	m	a

Figure 5: Representation of the root *mam*- ‘father’.

Finally, the non-truncating vocalic stems feature a stable link between the melody and the last V-slot (Figure 6).

C ₁	V ₁	C ₂	V ₂	C ₃	V ₃
ts’	∅	q’	a	r	o

Figure 6: Representation of the root *ts’q’aro* ‘spring’.

The crucial assertion is that there is no ‘class diacritic’ involved in the distinction, with all relevant properties being encoded in the last V-slot of the lexical item.

5 Georgian nominal inflection in CVCV

We assume the representation of each case ending to have a specific and unique shape, which is by definition much richer than just an alphabetic character, and will be responsible for its

phonological patterning. The endings will be discussed in the traditional order, as presented in the paradigms in Section 1.

5.1 Nominative

The nominative case manifests itself in two ways on the surface: as an *-i* ending or as $-\emptyset$ (zero). The former is used after consonantal stems in the singular and in all regular plurals, following the plural *-eb* suffix. It is proposed that the lexical representation consists solely of a floating melody without an accompanying skeletal unit (**Figure 7**).

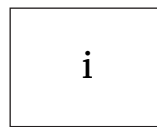


Figure 7: Representation of the nominative ending.

The floating melody can be seamlessly integrated into any representation which terminates in an empty nucleus, as we can see in **Figure 8**.

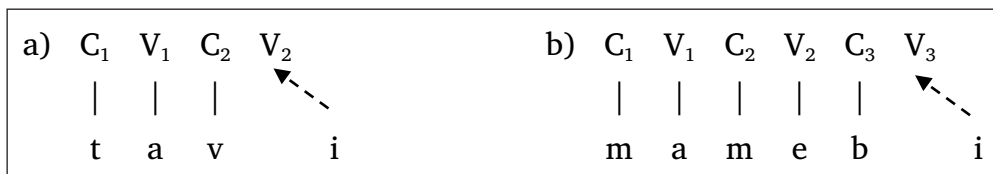


Figure 8: Integration of the nominative ending *-i* with consonantal stems.

Hence the surfacing *-i* ending in consonantal stems and in all plurals.

However, with vocalic stems the nominative ending does not dock onto the stem and remains unassociated. This is true for both truncating and non-truncating stems. In non-truncating stems (such as *ts'q'aro* 'spring') a floating vowel cannot override a lexically pre-existing association line. In a truncating stem, however, there is no association line in the lexicon at all. Yet it is still the floating stem vowel that gets associated rather than the concatenated nominative ending. Why so? It is proposed that this case is resolved by locality considerations (see e.g. Nevins 2010). Since locality is not always formally defined in autosegmental phonology, we propose the following formalization:

(5) *Principle of Locality:*

When two floating vowels compete for insertion and there is no *lexical* association line, the piece of melody which is *closer* to the skeletal slot under discussion gets associated.

Closeness is defined as relative distance between the skeletal slot and a melody. The melody which floats lexically in the position under the skeletal slot will be by definition *closer* than any melody coming from a concatenated morpheme.⁶

This is why *mam(a) + i* surfaces as *mama* rather than as **mami* (see **Figure 9**).

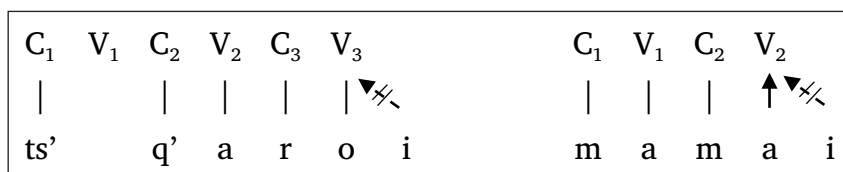


Figure 9: Lack of integration of the nom. ending *-i* with vocalic stems.

Another relevant aspect of the nominative *-i* ending is that it does not cause the syncope of the stem vowel (e.g. *mutseli* ‘stomach, nom.sg.’, *ak’vani* ‘cradle, nom.sg.’), unlike the genitive (*mutsoḷis* ‘stomach, gen.sg.’, *ak’voni* ‘cradle, gen.sg.’), even though it may seem that the conditions for government are met (as illustrated in **Figure 10**).

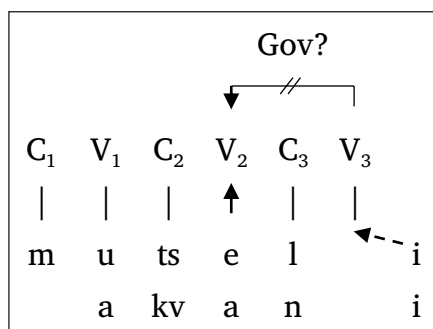


Figure 10: Lack of syncope in the nominative.

To account for these data, the nominative ending is assumed to be a non-governing vowel, i.e. a vowel of the same kind as Modern Polish and Modern Czech *yer* vowels. As already argued in section 3.3, it was an unwelcome result for the theory to identify the ‘Lower’ pattern for only a handful of (closely related) languages. This cast some doubt on the government-based account of vowel ~ zero alternations and on the assumption that ‘Lower’ and ‘Havlík’ are actually reducible to the parameter on the governing potential on yers. But in fact, to the best of the author’s knowledge, there has been no systematic attempt to search for alternations of the Georgian type, where one vowel-initial suffix causes syncope (e.g. genitive) and another does not (nominative).

⁶ As pointed out by an anonymous reviewer, the ultimate effects caused by the Principle of Locality are comparable with the effects of stem faithfulness.

Please note that there is no need to see a sequence of multiple alternating vowels to test the hypothesis. To identify the ‘Lower’ pattern, it may suffice to identify a context in which syncope is expected, but it fails to apply. In other words, the following conditions should be met:

- (6) a) there is independent evidence that a given nucleus contains a floating melody (rather than a lexically associated vowel)
 b) conditions for government are met (i.e. the nucleus following the nucleus with a floating melody is phonetically expressed)
 c) syncope does not take place

This is exactly what we observe in the Georgian nominative, with the evidence for the floating melody coming from syncope in the genitive, instrumental, and adverbial cases. By analogy, the *yer* status can also be ascribed to the vocative case ending and to the truncating vowels of the truncating stems. More extended argumentation for the *yer*-based analysis of these Georgian vowels can be found in Section 6.

5.2 Ergative

The ergative ending surfaces as *-m* (after vowels, including truncating vowels) or as *-ma* (after consonantal stems). The proposed representation for this ending is presented in **Figure 11**.

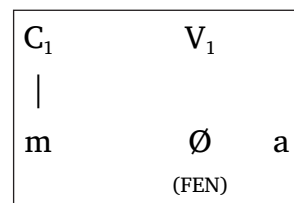


Figure 11: Representation of the ergative ending.

The representation consists of the consonant /m/ lexically associated with its skeletal position, followed by an empty nucleus lexically marked as a FEN (see Fortuna 2015: 120–121 and 2016: 263–264 for a source of this proposal) and a piece of floating melody. The FEN has its ECP lexically satisfied, which entails that there is no inherent motivation for the floating vowel to get associated.⁷

⁷ For clarity and in order to connect this example to the discussion in Section 3.4., it will be reiterated that the only thing that lexical marking as FEN means in this context is that its ECP is already satisfied. To express the same insight, we could replace it with e.g. a [+gvt] marker, which would potentially make the proposal less ambiguous and still produce the same result. However, we resort to the term FEN to emphasise that there is no similar marking possible *within* the lexical representation. Still, *finality* is the key property of the empty nucleus to be governed this way.

The vowel /a/ will be associated in only one case: when the *preceding* nucleus requires V-to-V government and the floating vowel can prevent the formation of a word-final cluster. This will be true for cases in which the base ends in a consonant (i.e. an empty nucleus), for example *tav-ma* ‘head, erg.sg.’, *mutsel-ma* ‘stomach, erg.sg.’ (Figure 12).⁸

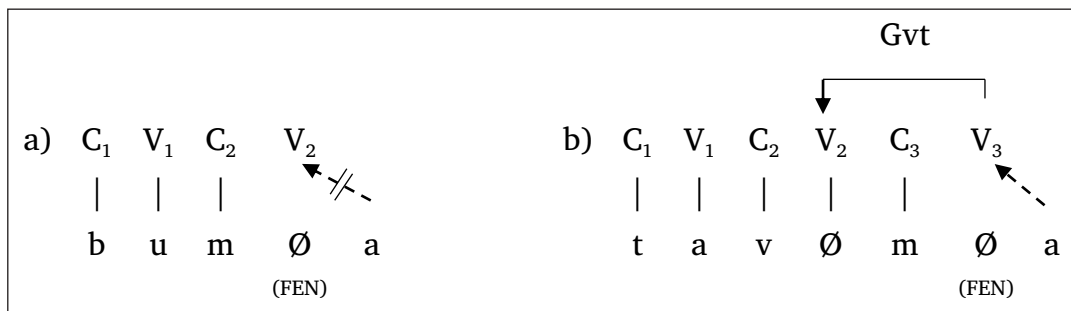


Figure 12: Integration of the ergative ending.

5.3 Dative

The Georgian dative is the least complicated case ending, with just one surface form: *s*. Its representation is proposed in Figure 13.

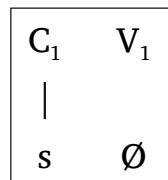


Figure 13: Representation of the dative ending.

This representation is trivially concatenated into any base, not exerting any influence on its phonology. Importantly, it never causes ECP violation – consonant clusters at the right edge are grammatical due to strong lateral capabilities of FENs in Georgian (in this case, not necessarily lexically marked FENs).

5.4 Genitive and instrumental

The genitive and instrumental endings are very ‘intrusive’ endings in Georgian: their concatenation usually has a significant effect on the base. Since there are only few differences

⁸ Of course, Georgian is known for its large consonant clusters and lack of association would still not make the structure ungrammatical. Nevertheless, if a floating melody is available, we may assume that the system enforces association to arrive at a less marked structure.

between these two endings (i.e. the consonantal melody *s* vs. *t* and the presence of the vowel *i* in the instrumental ending in non-truncating vocalic stems), they will be handled in the same subsection.

The assumed representation for the genitive and instrumental suffixes is presented in **Figure 14**.



Figure 14: Representation of the genitive and instrumental ending.

The representation consists of a floating melody *i* (which is accompanied by *its own association line*), a consonant *s* or *t* linked to its skeletal position, and an empty V-slot to the right. Nevertheless, there is a fundamental difference between the two V-slots – the instrumental ending contains a regular empty nucleus, whereas the genitive empty nucleus is marked as a FEN in the lexicon.

Let us analyse how these inflectional endings interact with different bases:

a. consonantal stems:

When the genitive/instrumental ending is concatenated to a consonantal stem, the floating melody docks onto the empty nucleus. The lexically extant association line is easily integrated with the structures of the stem (**Figure 15**).

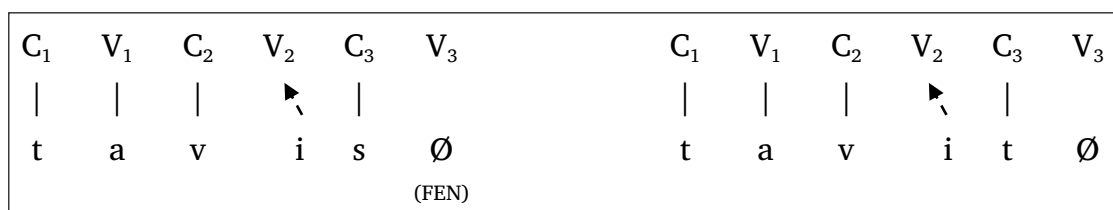


Figure 15: Consonantal stems with a genitive/instrumental ending.

The base *tav-* yields the genitive form *tavis* and the instrumental form *tavit* after concatenation. These forms differ, however, in the source of government for the empty nucleus of the ending: it is lexically predetermined in the former and phonological in the latter.

b. vocalic stems (truncating):

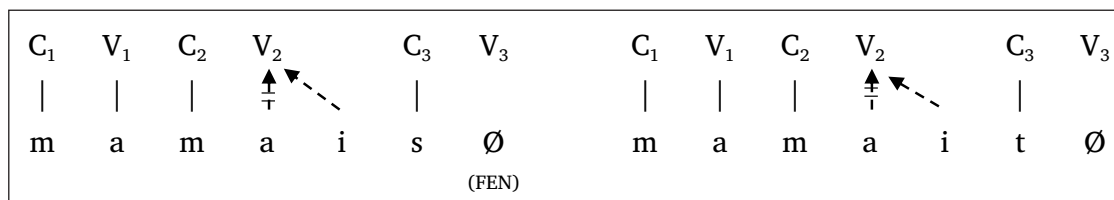


Figure 16: Truncating vocalic stems with the genitive/instrumental ending.

When the genitive ending follows a stem with a floating vowel, the /i/ of the ending always wins the competition for association (**Figure 16**). This is because of the lexically present association line – in this case, the line does not have to be created *ex nihilo*. The situation is thus in stark contrast with the nominative ending, where no association line was present lexically and the association of the right melody had to be resolved by locality. Like in consonantal stems, the rightmost nucleus is mute.

c. vocalic stems (non-truncating)

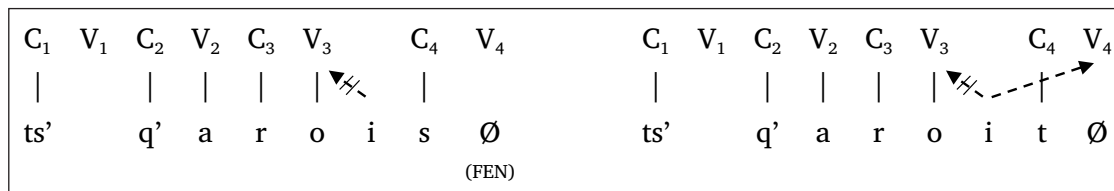


Figure 17: Non-truncating vocalic stems with the genitive/instrumental ending.

Non-truncating stems appear to be immutable even by suffixes with association lines. When the final vowel of the stem is firmly associated with its V-slot, no reassociation takes place after concatenation. In the example in **Figure 17**, neither the genitive nor the instrumental ending is able to influence the stem-final stable vowel.

These two cases differ, however, in the fate of the floating melody. In the genitive, the empty nucleus is lexically governed, with its ECP satisfied and no need for an operation which would cause vocalisation. But the empty nucleus of the instrumental suffix does not have such a privilege. Hence, it attracts the floating *i* with its association line. The output is *ts'q'aros* in the genitive, but *ts'q'aroti* in the instrumental (however, see Section 5.7. for a discussion of the extended genitive).

The vowel of the genitive and instrumental endings is also a governing vowel which is able to silence a floating melody in a preceding nucleus. For a representation of relevant examples, see **Figure 18**.

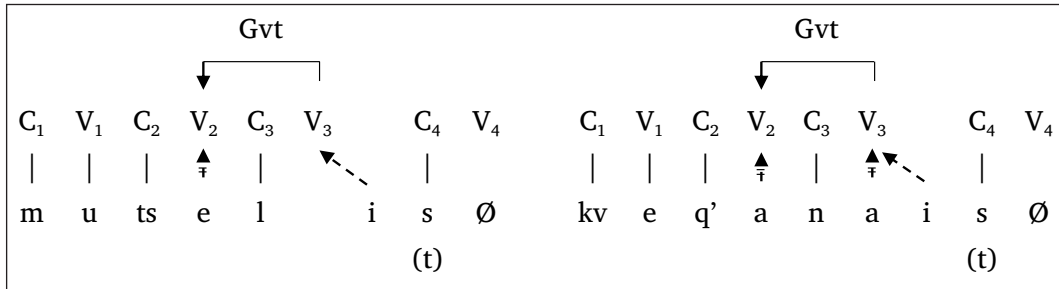


Figure 18: Consonantal stems with the gen./instr. ending and vowel-zero alternations.

After docking onto the stem-final V-slot, the suffix melody becomes a fully capable lateral actor and effectively governs the floating *e* in *mutsØlis/mutsØlit* and the floating *a* in *kveq'Ønis/kveq'Ønit*.

Slightly different behaviour can be observed in consonantal stems with a floating *o*, such as *mindori* 'field' (**Figure 19**). After the vocalic slot of *o* is governed, its melody gets dissociated and attaches to the preceding consonant, labialising it and creating a segment with double articulation. The output is *mindvris/mindvrit*.

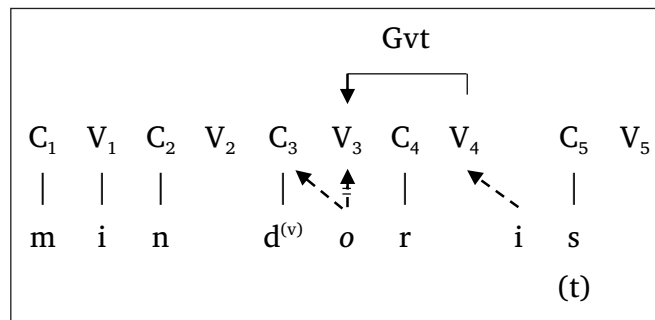


Figure 19: Consonantal stems with vowel > v change.

It is customary to consider Georgian /v/ as a secondary articulation (or a 'defective segment'), considering that its pronunciation oscillates between [v], [w], and [ϕ] (Butskhrikidze 2002: 93). This analysis is strengthened by the fact that there are melodic limitations on the labialisation. The process does not take place when either of the consonants flanking the syncopated vowel is labial: *sap'oni* 'soap, nom.sg.' ~ *sap'nis* 'soap, gen.sg.' (**sap'vnis*), *dighomi* (toponym, nom.sg.) ~ *dighmis* 'gen.sg.' (**dighvmis*) (Butskhrikidze 2002: 95).

5.5 Adverbial

The adverbial ending *-(a)d* bears some resemblance to the genitive and instrumental ending in its phonological behaviour, with the suffix vowel being a governor, but it (unexpectedly) displays variable behaviour with respect to various types of the truncating stems.

Figure 20 illustrates the representation proposed for the adverbial suffix.

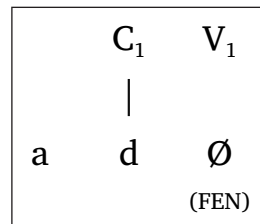


Figure 20: Representation of the adverbial ending.

The suffix consists of the floating melody *a* and a CV-slot with firmly attached *d* and a FEN.

With the consonantal stems, the *a* melody simply docks onto the empty V-slot (e.g. *tav-ad* ‘head, adv.sg.’). In non-truncating vocalic stems, the melody is left out and, because of the FEN status of the final V, not reassociated (**Figure 21**).

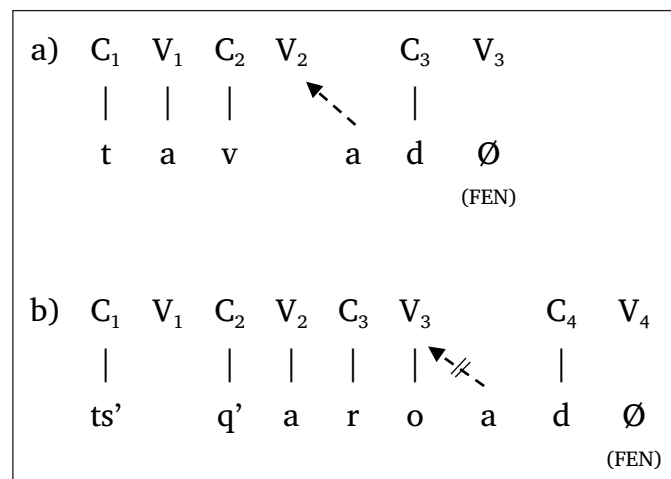


Figure 21: Integration of the adverbial ending with consonantal and vocalic non-truncating stems.

In the vocalic truncating stems, there appears some unexpected variation. The melody fails to dock onto a truncating stem with *-e*, e.g. *mtvared* ‘moon, adv.sg.’, but it docks onto a truncating stem with *-a*, e.g. *kveq'Ønad* ‘country, adv.sg.’ (**Figure 22**).

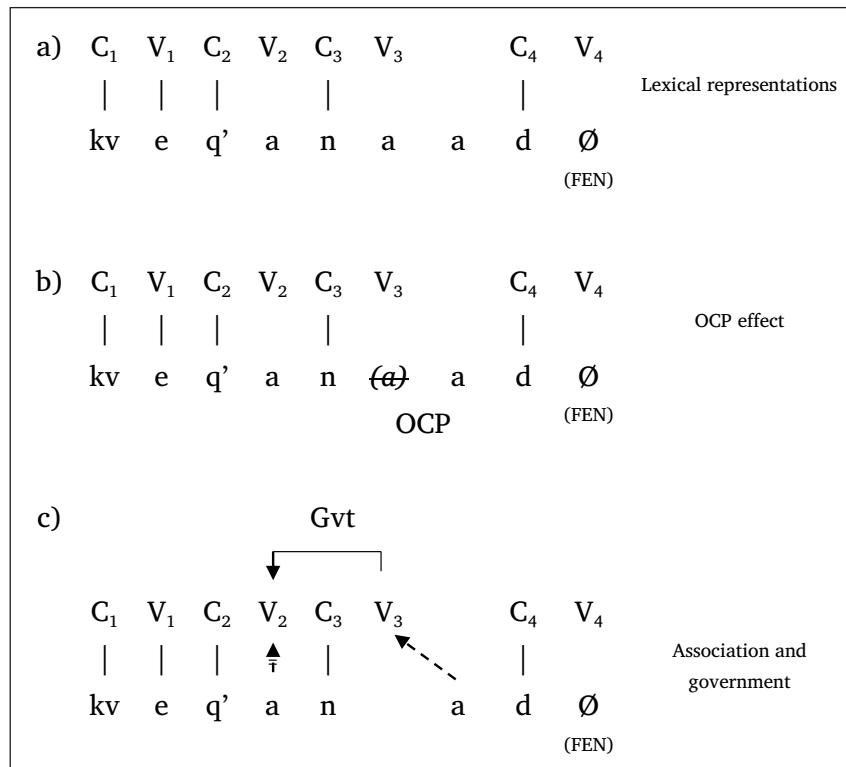


Figure 24: Derivation of *kveq'nad* 'country, adv.sg.'

It needs to be assumed that the OCP effect, operating on the melodic level, takes place after concatenation, but before association, hence it effectively bleeds the expected association of the truncating vowel. The two vowels never enter into competition, so the Principle of Locality is observed.

5.6 Vocative

The vocative ending manifests itself as either *o* (after consonants and in some contexts after vowels), as *v* (in some other contexts after vowels), or as a lack of exponent (\emptyset). In the case of vocalic realization it never causes syncope (*mutselo*/**mut slo* 'stomach, voc.sg.').

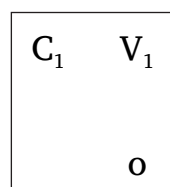


Figure 25: Representation of the vocative ending.

The representation of the vocative suffix, presented in **Figure 25**, is completely inconspicuous, with a single CV-slot hosting the vowel *o* without an association line. When concatenated to a consonantal stem, it builds a structure displayed in **Figure 26**.

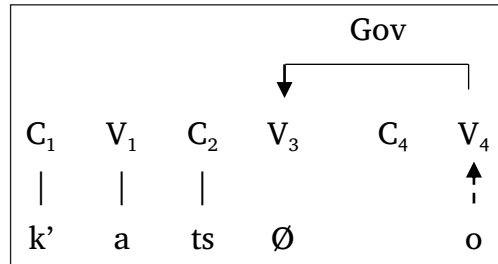


Figure 26: Integration of the vocative ending with a consonantal stem.

The vowel of the suffix governs the empty nucleus of the stem, creating a bisyllabic form *k'atso* ‘man, voc.sg.’.

The behaviour of vocalic stems is more complicated. Reference grammars differ in their depiction of the vocative in this context. The most common variant in stems ending in *a* or *e* is consonantal *v*. According to Fähnrich (2012: 589), only monosyllabic vocalic stems display the vocalic variant of the suffix (e.g. *dao* ‘sister, voc.sg.’, alongside *dav*). Polysyllabic nouns take *v* or a zero suffix, with a significant preference for the former. In non-truncating vocalic stems, which end in *o* or *u*, there is a similar bias towards a vocalic ending in monosyllables (e.g. *rk'oo* ‘acorn, voc.sg.’, *k'uo* ‘turtle, voc.sg.’, alongside *rk'ov*, *k'uv*), whereas polysyllables also oscillate between *v* and zero. Aronson (1990: 147) also states that monosyllables choose between *-o* and *-v*, and polysyllables between *-v* and zero, although he does not distinguish between different stem types. Hewitt’s (1995: 40–41) account is relatively similar, albeit less nuanced: he asserts that *o*-stems typically do not display any vocative exponent nowadays (although he presents optional *-v* in his inflection table), and he has only the vocalic variant for monosyllabic *u*-stems (*ruo* ‘stream, voc.sg.’) and only the consonantal one for polysyllables (*jujuv* ‘breast, voc.sg.’).

Literature review appears to converge on one point: on all accounts, monosyllables tend to prefer the vocalic variant *-o*, which, according to reference grammars, is not feasible for the polysyllables. Nonetheless, polysyllabic forms with *-o* following *a* or *e* seem to be attested too, for example *mamao* ‘father, voc.sg.’, *mtvareo* ‘moon, voc.sg.’ and *kveq'anao* ‘country, voc.sg.’, as evidenced by cursory searches in *The Georgian National Corpus* (Gippert, Meurer & Tandashvili 2011).⁹

⁹ The standard Georgian name for the Lord’s Prayer is *mamao chveno* ‘Our Father’.

Regardless of the complex distributional facts, we still assume one representation for the vocative suffix (see **Figure 27**).

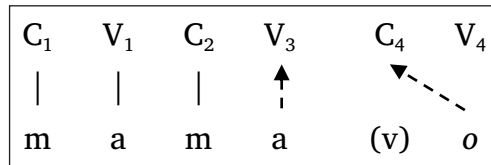


Figure 27: Integration of the vocative ending with the vocalic stems.

In the case of a truncating vocalic stem, such as *mam*- ‘father’, the first observation is that the vocative suffix does not prevent the stem-final floating vowel from association – *a* is pronounced. The same is true for monosyllabic words taking the vocalic variant, e.g. *dao* ‘sister, voc.sg.’. It means that the ending is not able to govern a nucleus hosting a floating vowel (but, apparently, it can still govern an empty nucleus in *k’ats-o*). This follows from the fact that the vocative suffix is a floating vowel, i.e. a *yer* in our extended view on vowel ~ zero alternations and is devoid of the capability to govern an alternation site.

It is assumed that the alternation between *-o* and *-v* results from the presence of an optional process of melody transfer from the vocalic slot to the preceding consonantal one. The application of the process is dependent on a variety of factors. In the case of monosyllables, the process is much less likely to occur probably due to metrical issues: there is a preference for a bisyllabic foot over a monosyllable. In the case of polysyllables, however, hiatus avoidance seems to be more relevant for most speakers, who realize the morpheme consonantly or as zero. Finally, the higher likelihood of the zero realization in stems ending with *-o* and *-u* than in those ending in *-a* and *-e* can be attributed to the roundedness of these vowels, which makes it difficult for them to coexist with another rounded/labial element. Nevertheless, this does not have to entail that such sequences as [ov/uv] are impossible in Georgian. They are actually attested, e.g. in *gluvi* ‘smooth’, in which [u] and [v] are firmly linked with their skeletal slots. Please note that in the case of the vocative suffix we are dealing with a segment which is underlyingly floating and this is what we are assuming for all speakers. The subsequent process of association can be influenced, or even controlled, by phonological factors of various sorts: melodic or prosodic. This influence can be even extended to extralinguistic phenomena (pragmatic and social).

5.7 The long forms

So far, we have been only considering short forms of each nominal case ending and disregarded the long forms. In this subsection we will endeavour to propose an explanation for the long forms as well, at least on the phonological side of the phenomenon.

As signalled in 1.1., long forms are available for four grammatical cases: dative, genitive, instrumental, and adverbial, with their occurrence being determined by the post-lexical context. Please note that the availability of the empty nucleus for association also matters: the instrumental form of the non-truncating stem does not have a long variant.

A successful account of the long forms should be able to explain all these facts. The explanation proposed in this section will be only a point of departure for closer scrutiny – further research is clearly necessary.

We assume that the vowel *a* which characterizes all long forms is part of the lexical representation of each of the relevant case endings. However, it is not made available for computation at the lexical level. Only at later cycles does this snippet of melody enter computation.

According to our assumption, concatenation of each case ending (in its base, i.e. short, form) triggers spell-out. The relations described in the previous subsections are established and the right short forms are derived. Subsequently, at later cycles (i.e. post-lexically), the melody *a* becomes available, but it can be only associated in the following situation:

- a) There is an empty nucleus available for association
- b) The noun is placed in one of the environments triggering the use of a long form

Assuming D’Alessandro and Scheer’s Modular PIC (2015), we may speculate that the environments where the long form is found are spell-out triggering contexts, i.e. phases in Georgian.

We assume a sequence of events for the derivation of the long form in the phrase *k’ats-sa da kal-s* ‘to the man and the woman’ as presented in **Figure 28**.

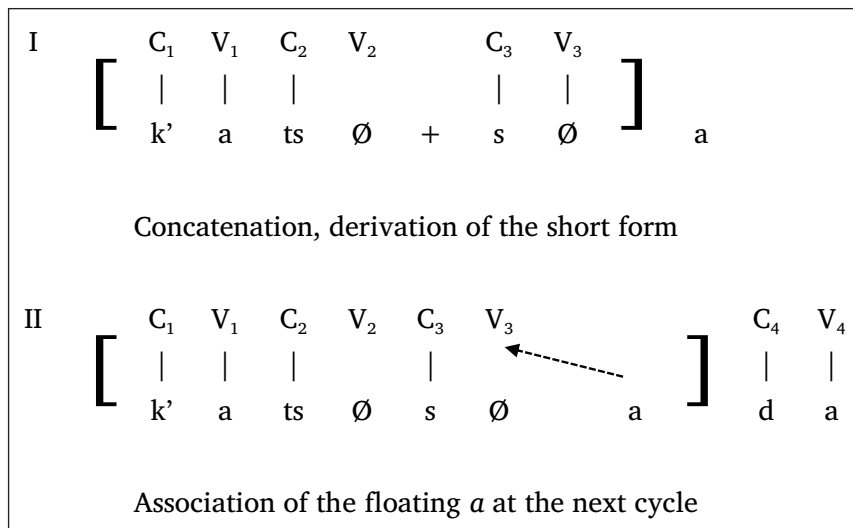


Figure 28: Derivation of the long form of the dative ending.

At the first presented cycle, the short dative form *k'ats-s* 'the man' is derived. The ending gets linearised, but the whole chunk is not frozen for further computation yet. This is how it can be available for the association of floating *a* in a coordinated structure (i.e. in the position before the conjunction *da* 'and').

In non-truncating vocalic stems however, the floating *a* cannot be associated with the vocalic slot, since it was occupied by *i* at the previous cycle (Figure 29).

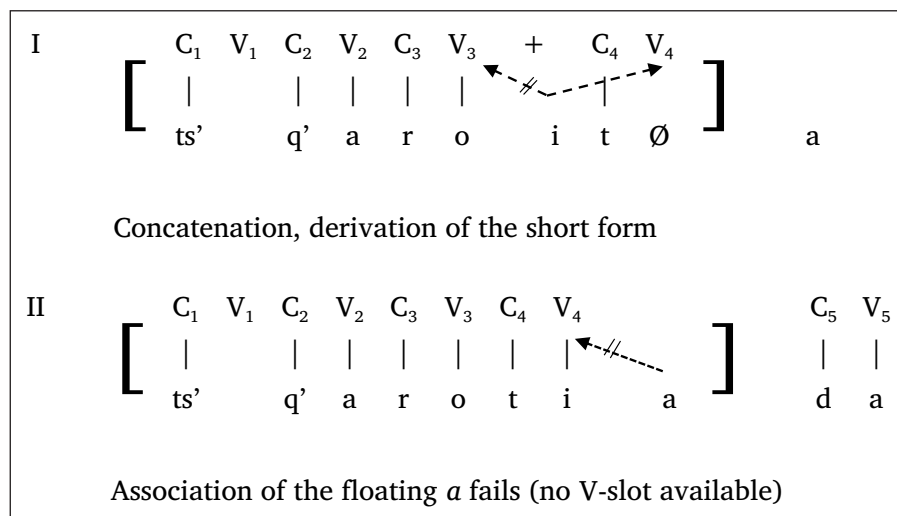


Figure 29: Lack of a long form of the instrumental ending after non-truncating vocalic stems.

This way, we can explain the extra vowel of the long form appearing in consonantal and vocalic truncating stems, but not in vocalic non-truncating stems.

Lastly, in some of the postlexical contexts which license the extended genitive, the ending for non-truncating vocalic stems is *-si*, rather than *-sa*: *ts'q'arosi* 'spring, gen.sg.'. This situation bears resemblance to the presence of [i] in the instrumental case, which blocks the association of [a]. It can be assumed that, at least for some speakers, some of the extended genitive contexts trigger association of the [i] belonging to the suffix with the suffix-final FEN. This process effectively bleeds the association of [a].

6 'Lower' pattern in Georgian – discussion

Postulating that Georgian possesses nuclei which are not capable of governing alternation sites definitely begs a number of questions. The aim of this section is to argue for the soundness of this analysis and to provide some theoretical discussion.

First, assuming the existence of a phonetically expressed vowel which cannot govern another nucleus *does not* weaken the theory. It rather corroborates the Lower pattern by demonstrating

its broader application (not limited to one language family). It is just the criteria for their identification that should be probably softened. This, however, may stir some controversy. Obviously, to be fair to the hitherto entertained definition of *yer* vowels, it would be desirable to witness that the *-i* suffix itself alternates with zero. Understandably, it has always been assumed that “[t]he only way to identify a vowel as a yer is to see that it alternates with zero” (Scheer 2019: 212). This is not possible to demonstrate for *-i* in the same way as it is for Polish *-(e)k*, i.e. by manipulating its right-side environment, due to the trivial fact that case suffixes are the word-final element, hence no other morpheme can be concatenated to their right to effectively prove or disprove the claim.

Nonetheless, please note that in our account the *-i* suffix *is* floating and it fails to associate in some contexts. The same is true for the other vowels assumed here to be non-governors. This is also a kind of vowel-zero alternation, with the important difference being the lack of dependence on government relations, but with the floating nature of the yer preserved. Hence, it can still be maintained that only floating vowels may lack the ability to govern alternation sites – full, lexically associated nuclei are always fully capable lateral actors.

Second, from the typological point of view it is important to emphasise that such rich and transparent data for vowel-zero alternations as offered by Polish and Czech may be difficult to obtain elsewhere. The Polish/Czech pattern of ‘double diminutives’, in which the same diminutive suffix *-(e)k* can occur twice in a row and then be followed by a vocalic suffix, is typologically quite rare. Finding similar contexts in other languages may be challenging, since it would need to involve concatenation of multiple morphemes containing alternating vowels. Many such creations, even if to some extent acceptable, could feel ‘forced’ or unnatural. Hence, identification of the ‘Lower’ pattern in a language different than modern Slavic languages was hindered.

Another issue that may have been noticed by an attentive reader is that we also made use of floating vowels which are laterally enabled, such as the genitive and instrumental ending. This means that within the same language Havlík and Lower patterns may co-exist – the lateral actorship of a floating vowel is determined individually for each nucleus, rather than across the board as a parameter.¹⁰ In fact, to postulate the existence of a word-final non-governing vowel, i.e. a *yer* of the Lower pattern, one needs some evidence that it fails to govern an alternation site. This evidence comes from the existence of positive examples with syncope – it is the syncope in e.g. the genitive case (*akʹvØnis* ‘cradle, gen.sg.’) that gives us right to assume that [a] which surfaces in e.g. the dative case (*akʹvans* ‘cradle, dat.sg.’) is a floating vowel, and opens up

¹⁰ Of course, this argument would not hold if the genitive/instrumental/adverbial ending were analysed as non-floating – if they were assumed to be firmly linked to their V-slots, their lateral capabilities would not be a question.

the possibility to speculate why the vowel is not syncopated in the nominative (*ak'vani* 'cradle, nom.sg.').

On top of these assumptions, it could be worthwhile to test the possibility of connecting lateral actorship of floating vowels with the presence of an underlying association line. Our analysis points towards this direction – the 'Lower' vowels of the nominative and vocative ending and of the truncating stems were analysed as not having an underlying association line, whereas the genitive and instrumental endings had them. Crucially, these decisions were made independently of the syncope-related facts. The only syncope-inducing ending which was analysed as lacking an association line is the adverbial suffix, which at the present stage escapes the generalization. However, this line of reasoning seems to be a promising path for future research.

7 Conclusion

The article demonstrated that all Georgian nominal inflection can be easily accounted for without a recourse to allomorphy, if complex autosegmental representations are assumed. The non-homogeneous nature of the differences exhibited by specific case endings in the environment of the three stem types is no longer problematic. Instead, it becomes a natural corollary of the idiosyncratic shapes which both the stems and the case suffixes have underlyingly.

The paper is also intended to be a contribution to the theory of CVCV. It has been postulated that a lexical representation can host one of the following constructs (not commonly accepted by the CVCV community):

- a) A nucleus marked as a FEN at the right edge of a morpheme and retaining the FEN status throughout derivation
- b) An association line connected with a melody, but with no predefined syllabic space.

Apart from this, it was argued that the 'Lower' pattern of vowel ~ zero alternations is actually more common than usually assumed and that some of the Georgian vowels are reminiscent of the Modern Polish and Czech *yers*: they are not able to govern the preceding alternation site. To be able to accept this proposal, it is necessary to relax the criteria for the postulation of the *yer* status – it can be ascribed to word-final vowels, which themselves do not alternate with zero due to the trivial fact of their word-final position.

All three proposals were argued to serve an explanatory objective and to be responsible for the specific patterns observed in Georgian nominal inflection. It remains to be seen if it is possible to prove their relevance on the basis of data from other languages.

Abbreviations

adv. = adverbial, dat. = dative, dim. = diminutive, erg. = ergative, gen. = genitive, instr. = instrumental, nom. = nominative, pl. = plural, sg. = singular, sync. = syncope, trunc. = truncation, voc. = vocative

Acknowledgements

The author would like to thank the three anonymous reviewers for their very helpful and thought-provoking comments.

Competing interests

The author has no competing interests to declare.

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