

# Where does complexity come from?

## A case study of Georgian consonant clusters

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mts'vrtneli

mk'vleli

brdyvna

prtskvna

brdzaneba

grgvinva

k'rtola

marts'q'vi

sit'q'va

vertsxli

In Georgian complexity (consonant clustering) is attested stem- initially, stem- finally, word-medially and word-finally (only in derived forms).

## **A relative nature of the “complexity” issue:**

Bush 1997: ...”there is a trade-off between the number of syllables and the length of consonant clusters”.

## **How do we account for the phonotactic structure of a language?**

- a) A domain problem**  
**Where do phonotactic constraints hold?**
- b) A constituency problem**  
**What are the principles governing co-occurrence restrictions (if any)**

# Empirical observation

## Word-edge phenomenon

Cross-linguistically complexity (consonant clustering ) is attested at word-edges.

The question is: why?

Butskhrikidze (2002) argues that this type of phonological complexity is largely due to morphological complexity. It is the result of prefix-stem/stem-suffix merger, lexicalization process happening over a long period of time in a language, e.g. a case of /m/- in Georgian).

# Stem/word as the domain for phonotactic generalizations

- Core/true/genuine phonotactic regularities of a language are found within the stem/word domain.
- In Butskhrikidze (2002), chapter 2, I argue that phonological principles: SSP, OCP, SCL , etc. operate within these domains.

Various types of OCP effects, including constraints on place of articulation and manner of articulation, are attested in Proto-Semitic roots). Krupa's (1971) study reports the existence of the OCP constraint on place of articulation within the lexical morpheme in Polynesian languages. Zubkova (1990). Zubkova's data support the claim that The SSP and SCL principles refer to a single phenomenon, which is a characteristic feature of the lexical morpheme/word, not of the syllable.

# 4 possible reasons of surface complexity

- Rich prefixal and suffixal morphology (both inflectional and derivational). Lexicalization process, morphemes sometimes violating integrity of a root, e.g. a case of metathesis), etc.
- Existence of complex segments (labialized segments  $k^w$ ,  $g^w$ , etc., harmonic groups)
- Optional sonorants, e.g. optional /r/ and /l/ in clusters (maybe in certain contexts having phonetic syllabicity)
- A distinct ‘word’ prosody

## Prefixes contributing to complexity

Unlike suffixes, prefixes have certain phonological autonomy cross-linguistically. Languages tolerate prefix-stem sequences even if they violate phonotactic regularities of the language. (many examples from Butskhrikidze 2002).

The sonorant *m* is the only consonant that can precede any consonant in Georgian. To restate this observation, there are no co-occurrence restrictions in the sequence /m/ + C.

CC	mparveli	'patron'
CCC	mk'lavi	'arm'
	mtvare	'moon'
CCCC	msxvili	'thick'
CCCCC	msxvrevva	'breaking'

Butskhrikidze (2015) argues that /m/ in /m/ + C sequences is a prefix. Thus, *m* and C belong to different morphemes. Consequently /m/ + C sequences do not form true clusters.

Butskhrikidze, M. (2015). The status of /m/ in /m/ + C clusters in Georgian. *Typological Investigations VII*. Dedicated to the memory of Irine Melikishvili, Ilia state University, G. Tsereteli Institute of Oriental Studies, pp.123-140.



# Suffixes contributing to complexity

root	present tense, 3.SG	infinitival form	
xar	xr-av-s (>/xar-av-s/)	xvr-a (>/xar-av-a/)	‘to gnaw’
xan	xn-av-s	xvn-a	‘to plough’
k'al	k'l-av-s	k'vl-a	‘to kill’
k'ar	k'r-av-s	k'vr-a	‘to tie’
sxal	sxl-av-s	sxvl-a	‘to chop off’
jer	jr-av-s	jvr-a	‘to move’
tr	tr-ob-a ‘to drink-INF’	da-tvr-a	‘id.-PAST’
kar	u-k'r-av-s	da-k'vr-a	‘to play, e.g. on

Butskhrikidze, M. & J.M. van de Weijer (2001). v-Metathesis in Modern Georgian. *Surface syllable structure and segment sequencing*, edited by E.V. Hume, N.S.H. Smith & J.M. van de Weijer. *HIL Occasional Papers* 4, 91-101. Holland Institute of Generative Linguistics, Leiden.

“The status of the sonorant /v/ in Georgian”. The talk presented on the conference: *Language, History and Cultural identities in the Caucasus*. 18 June 2005. Malmö, Sweden.

# What is the constituency of long consonant sequences?

The same transparency of long consonant sequences is observed in the following generalisation, suggested by Gvinadze (1970).

- (60) I    /b p p' m/  
II    /r/  
III   /d t t' j c c' ĵ č č' z s ž š/  
IV   /g k k' ɣ x χ'/  
V    /v/  
VI   /r l m n/

One consonant from each set can combine in the strict order given and form maximally a six-member cluster, e.g. /brdyvna/ 'to fight', /prckvna/ 'to peel'. Any set can be skipped, but the order between the sets should be respected.

The **Principle of Resolvability** (PR), proposed by Hjelmslev (1936), states:

**In general, longer consonant sequences contain shorter ones as partial sequences.**

Typological studies on consonant sequences suggest the following generalisation:

“... all languages exhibit the following property: if clusters of  $n$  Cs are possible syllable-initially, then clusters of  $n-1$  Cs are also possible syllable-initially, and if clusters of  $n$  Cs are possible syllable-finally, then clusters of  $n-1$  Cs are also possible finally” (Blevins 1995:217; see also Greenberg 1978).

*Consonant sequences beginning with /b/*

	CC	CCC	CCCC	CCCCC
a) Stop + stop	bg –	– –	<b>bdyv</b> –	bdyv bdyv bdyv
b) Stop + affricate	bj bč'	bjγ	<b>bc'k'</b>	
c) Stop + fricative	by – bz bž	byv byl		
d) Stop + sonorant	bn br	brg brk' brj brt' brm	<b>brč'χ'</b>	brč'χ'v

# Sequences or complex segments?

- Are consonants in clusters sequences of consonants or are they any complex segments.
- Empirical data violating PR rises questions concerning the existence of complex segments in Georgian.

Harmonic clusters in Georgian consist of two obstruents, the first of which is a coronal or a labial and the second of which is a dorsal.<sup>1</sup> The obstruents share all voicing characteristics (see Chapter 3).

(1) Type A (C + stop)

[+voi]	[-voi]	[glott]
bg	pk	p'k'
dg	tk	t'k'
jg	ck	c'k'
ǰg	čk	č'k'
zg	sk	
žg	šk	

Type B (C + fricative)

[+voi]	[-voi]	[glott]
by	px	p'χ'
dy	tx	t'χ'
jy	cx	c'χ'
ǰy	čx	č'χ'
zy	sx	
žy	šx	

- (54) a) *Stem-initial position*
- |           |         |
|-----------|---------|
| pkvil-i   | ‘flour’ |
| t’k’bil-i | ‘sweet’ |
| dye       | ‘day’   |
| čxir-i    | ‘stick’ |
| cxvir-i   | ‘nose’  |
- b) *Stem-final position*
- |            |              |
|------------|--------------|
| ortkl-i    | ‘steam’      |
| marc’χ’v-i | ‘strawberry’ |
| čončx-i    | ‘skeleton’   |
| otx-i      | ‘four’       |
| vepxv-i    | ‘tiger’      |

Harmonic clusters are the only obstruent sequences to appear in stem-final position. No other type of obstruent sequence is attested in this position (Vogt 1961, Deprez 1988).



Phonological processes affect both members of a harmonic cluster, i.e. in case one consonant of a harmonic cluster change, the other member also changes, such that the processes shown below, for instance, are not attested (Dzidzishvili 1966).

(55)    \*dg    ↗ tg  
             ↘ dk                      \*tk    ↗ dk  
                                             ↘ tg

Thus, both members of a cluster undergo a change, e.g. the alternation *dg* ~ *tk* is attested in Old Georgian form such as *c'ardgra* ~ *c'artkra* 'introduced' (Dzidzishvili 1966:232).

Some forms containing harmonic clusters have parallel forms with another type of harmonic cluster, e.g. both *burdyuni* ~ *burt'χ'uni* 'muttering' and *bdyvriali* ~ *bč'χ'vriali* 'glitter, sparkle' are attested in Modern Georgian.

Consonant sequences other than harmonic clusters are characterised by optional /r/-insertion (Vogt 1958, Chikobava 1971, Deprez 1988).

Harmonic clusters always syllabify together intervocalically, e.g. /si.t'χ'va/ 'word', /ce.cxli/ 'fire', while other obstruent clusters are never tautosyllabic, e.g. /mar.t'i/ 'March', /bev.ri/ 'much' (Akhvlediani 1949 and Žgent'i 1956, among others). Evidence for these syllabification patterns mostly comes from native speaker intuitions.

In reduplicated forms, harmonic clusters retain their complexity, e.g. /čkar-čkara/ 'quickly', /cxel-cxeli/ 'hot'. Other types of clusters do not usually participate in reduplication. Reduplication is discussed in more detail in Chapter 5.

Harmonic clusters are found in all Kartvelian languages (i.e. Svan, Megrelian and Laz). There are many examples of correspondences of harmonic clusters between these languages.

(56)	<i>Georgian</i>	<i>Megrelian</i>	<i>Laz</i>	<i>Svan</i>	
	mat'χ'l-i	mont'χ'or	mont'k'or		'wool'
	txra	txorua	ontxoru	lištxri	'to dig'

As shown in the examples in (56), the harmonic clusters do not undergo any simplification processes, and have direct correspondences in all Kartvelian languages.

### *Hypothesis*

If a language has  $C_iC_j$  clusters, then the language will have stems of the  $C_ivC_j$  type.

The findings of the comparison were that there are no biconsonantal clusters whose members are not found within a CVC-type stem domain,<sup>30</sup> for example, Georgian does not permit stems such as  $*dVp'$ ,  $*tVj$ ,  $*t'aj$ ,  $*dVt'$ , and, consequently,  $*dp'$ ,  $*tj$ ,  $*t'j$ ,  $*dt'$  clusters are not allowed either. Notable exceptions are harmonic clusters, e.g. clusters such as  $p'k'$ ,  $p'\chi'$  and  $t'\chi'$  are attested while stems of the type  $*pV'k'$ ,  $*p'V\chi'$  and  $*t'V\chi'$  are not. This observation provides further justification for the treatment of the harmonic clusters as complex segments.

# Phonetics studies on harmonic groups

Chitoran, I. (1998). Georgian harmonic clusters: phonetic cues to phonological representation. *Phonology* **15**, 121–141.

Butskhrikidze, M. & V.J. van Heuven (2001). Georgian harmonic clusters as complex segments. A perceptual experiment. *Linguistics in the Netherlands* **18**, edited by T. van der Wouden & H. Broekhuis, 31–44. Amsterdam: John Benjamins Publishing Company.

# What do we learn from the case of Georgian consonant clusters?

- Complexity at the phonological level is related to the complexity at the morphological level.
- Not all consonant sequences can be treated as sequences of two consonants, but instead, in some instances, they can be analyzed as complex segments (e.g. harmonic groups and labialized consonants)
- **Sonorants /r/ and /l/ in clusters are often not pronounced in colloquial speech (on 23<sup>rd</sup>).**
- **Word level prosodic characteristics seem to facilitate pronunciation of clusters (on 24<sup>th</sup>)**

## **Interesting topics to be explored in future:**

- **The mechanism of the syncope process**
- **/s/ + C clusters**
- **Phonological processes sensitive to homonymy:**