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Categorical and gradient laryngeal harmony in Lezgian

Lezgian (Nakh-Daghestanian) has a complex 4-way laryngeal contrast in stops/affricates (1). These segments interact both locally and at a distance (Trubetzkoy 1931; Talibov 1980; Haspelmath 1995; Yu 2004).

(1) Lezgian laryngeal contrasts in stops/affricates (cf. Trubetzkoy 1931; Talibov 1980)

T’	TT	T^h	D
/p’ t’ ʦ’ ʧ’ k’ q’/	/pp tt tʦ tʧ kk qq/	/p^h t^h $ʦ^h$ $ʧ^h$ k^h q^h/	/b d (z) (ʒ) g (ʁ)/
(fortis) ejective	fortis vls. (unasp.)	lenis vls. (asp.)	(lenis) vd.
[+tense, +cg, -voi]	[+tense, -cg, -voi]	[-tense, -cg, -voi]	[-tense, -cg, +voi]

Our recent examination of long-distance assimilatory alternations (Ozburn & Kochetov 2013) established that they involve assimilation of derived fortis voiceless stops/affricates to ejectives, resulting in agreement in [+constricted glottis] (2a). These patterns are masked by the fact that the consonants targeted by harmony are underlyingly voiced, and become fortis voiceless through an independent process of pretonic strengthening (2b). Neither surface voiced stops nor lenis voiceless stops participate in harmony (2c).

(2) Long-distance assimilatory laryngeal alternation, pretonic strengthening, and no harmony

a.	/**t’**a**b**-uni/	[**t’**a**p’**úni] (via [**t’**a**pp**uni])	‘lie’ (erg. sg.)
	/**q’**eb-ini/	[**q’**e**p’**íni] (via [**q’**e**pp**íni])	‘cradle’ (erg. sg.)
	/**k’**ar-**d**i/	[**k’**ar**ʦ’**í] (via [**k’**ar**tʦ**í])	‘stick’ (erg. sg.)
	/**q’**ew-**d**i/	[**q’**ew**ʦ’**í] (via [**q’**ew**tʦ**í])	‘2nd wife’ (erg. sg.)
b.	/ra**b**-uni/	[ra**pp**úni]	‘needle’ (erg. sg.)
	/wan-**d**i/	[wan-**tʦ**í]	‘voice’ (erg. sg.)
c.	/ne**k’**-e-**d**i/	[ne**k’**é**d**i]	‘milk’ (erg. sg.)
	/**q’**ar-a-**d**i/	[**q’**ará**d**i]	‘dirt’ (erg. sg.)
	/**k’**^{w}a**ʧ**^{h}-er/	[**k’**^{w}a**ʧ**^{h}ér]	‘foot’ (abs.pl.)

We analyzed Lezgian ejective harmony as a case of *Agreement by Correspondence* (*ABC*: Hansson 2001; Rose & Walker 2004), so that agreement in [+cg] is established between segments that are featurally similar, with both being [+tense, -voice] (3).

(3) Similarity scale for [±cg]: contrastive pairs and feature differences

more similar … *more different*

T’-T’	>	**T’-TT**	>	**T’-KK**	>	T’-T^h	>	T’-D	>	T’-K^h	>	T’-G
--		[cg]		[cg, Place]		[cg, tense]		[cg, tense, voi]		[cg, tense, Pl]		[cg, voi, t., Pl]

In this paper, we explore implications of this analysis to the Lezgian lexicon. Previous cross-linguistic surveys of consonant harmony have shown that assimilatory alternations tend to imply assimilatory morpheme structure constraints of the same kind (Hansson 2001), and these in turn could be part of broader stochastic lexical patterns (e.g. Brown 2008). Our detailed analysis of 383 roots from Talibov & Gadzhiev’s (1966) dictionary revealed long-distance assimilatory co-occurrence restrictions operating on both gradient and categorical levels (4). In general, non-adjacent stops or affricates within a root tend to belong to the same laryngeal series at levels significantly above chance. That is, mono-morphemic forms of the shape T’V(C)K’(V), T^hV(C)K^h(V), and DV(C)G(V) are significantly over-represented, while forms with the shape T’V(C)K^h(V), T’V(C)G(V), etc. are often under-represented (CVCV: χ^2= 144.57, p<0.001;

CVCCV: χ^2= 131.26, p<0.001). Importantly, our analysis also revealed a categorical restriction on disyllabic roots with two fortis stops having the opposite values of [cg]. That is, the forms T'V(C)KKV and TTV(C)K'V (apart from one loanword) are unattested, while the forms T'V(C)K'V and TTV(C)KKV are quite common (5).

(4) Observed/Expected values for (a) CVCV (n=227) and (b) CVCCV (n=156) roots

a.

C1/C2	**KK**	**K'**	K^h	G
TT	2.97	0.05	0.74	0.87
T'	0.00	2.24	1.00	0.58
T^h	0.53	0.00	3.38	1.08
D	0.20	1.17	0.61	1.38

b.

C1/C2	**KK**	**K'**	K^h	G
TT	1.96	0.00	0.63	1.14
T'	0.00	3.96	0.00	0.24
T^h	0.28	0.26	5.40	0.65
D	1.14	0.54	0.55	1.27

(5)	[**k'**a**p'**ál]	'gathering'	*[**k'**a**pp**ál], *[**kk**a**p'**ál]
	[**q'**e**q'**él]	'type of plant'	*[**q'**e**qq**él], *[**qq**e**q'**él]
	[**tt**a**pp**án]	'false'	*[**tt**a**p'**án], *[**t'**a**pp**án]
	[**qq**a**tts**ú]	'green'	*[**qq**a**ts'**ú], *[**q'**a**tts**ú]

The partially categorical and partially gradient lexical patterns that we uncovered are consistent with the similarity-based analysis of long-distance alternations presented above. This fact suggests that *ABC* constraints on laryngeal features are operating in the Lezgian lexicon as a whole. Moreover, the alternations are just a subset of broader harmonic patterns, involving the most similar segments that interact categorically. At the same time, these findings pose a problem for the traditional Optimality-Theoretic implementation of the *ABC* model, which is well-suited to capturing categorical lexical patterns but fails in accounting for gradience. We suggest that one possible way of capturing both is to employ *Harmonic Grammar* with weighted constraints (Smolensky & Legendre 2006; cf. Coetzee & Pater 2008, Brown 2008).

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