Non-local laryngeal alternations in Lezgian: An Agreement by Correspondence analysis
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Lezgian (Nakh-Daghestanian) has a complex 4-way laryngeal contrast of stops/affricates (1) which interact locally and at a distance. Local alternations and positional restrictions on laryngeal features have been previously investigated (Trubetzkoy 1931; Haspelmath 1995; Yu 2004; Chitoran & Babaliyeva 2007) and are relatively well understood. Among these are the processes that refer to stress (which in polysyllabic words falls on the second syllable): voiced stops strengthen to plain fortis before stressed vowels (2a), and plain fortis stops are avoided in posttonic contexts (2b). Less known are Lezgian long-distance alternations that apply in derived CVC-root nouns, assimilating underlying root-final or suffix-initial voiced stops to agree with root-initial ejectives (3ab) (Talibov 1980; Haspelmath 1995). Peculiarly, the targets of this harmony are limited to voiced stops that undergo pretonic strengthening (and affrication before /i/). Other stops, and voiced stops in other contexts, do not alternate (3c). This selective application of the process, together with its apparent stress-sensitivity and progressive directionality, make the Lezgian laryngeal harmony typologically aberrant and seemingly incompatible with the standard approach to consonant harmony – Agreement by Correspondence (Hansson 2001; Rose & Walker 2004).

In this paper, we show that Lezgian long-distance assimilatory alternations cease to be problematic when we consider statistical patterns across the lexicon and their interaction with positional restrictions on laryngeal contrasts.

Our detailed analysis of the Lezgian lexicon (based on Talibov & Gadzhiev 1966) revealed long-distance assimilatory cooccurrence restrictions operating on both gradient and categorical levels. 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, forms of the types T’V(C)K’(V), T^4V(C)K^4(V), and DV(C)G(V) are significantly over-represented, while forms of the types T’V(C)K^4(V), T’V(C)G(V), etc. are under-represented. Moreover, the tendency for laryngeal harmony is higher among stops that agree in place than those that disagree (e.g. T’VT’V vs. T’VK’V), resulting in many cases of complete identity. While such probabilistic tendencies are an interesting area for future research, the present analysis focuses on cooccurrences that are categorical. Importantly, our analysis revealed no instances of disyllabic roots with two fortis stops that disagree in the feature [constricted glottis]. That is, the forms T’V(C)KKV and TTV(C)K’V are unattested, while the forms T’V(C)K’V and TTV(C)KKV are quite common. We suggest that the same categorical restriction on fortis stops is also operating in derived disyllabic contexts, giving a semblance of voiced-ejective alternations (3). The left-to-right directionality of the process and its apparent prosodic sensitivity are conditioned by an independent factor – the stress-specific distribution of plain fortis stops (2) (cf. Talibov 1980).

To account for Lezgian long-distance laryngeal alternations, we adopt the standard CORR-C↔C and IDENT-CC constraints of the Agreement by Correspondence approach (Hansson 2001; Rose & Walker 2004), combined with the independently motivated positional strengthening and weakening constraints (*[-fortis]/V[+str] and *[+fortis]/V[+str]). The ranking of the correspondence constraints is based on a similarity scale (4), where segments differing in fewer laryngeal (and place) features are considered more similar. The consonants that are minimally different – ejective and plain fortis stops – are forced to correspond by a highly ranked CORR-C↔C(cg) constraint, and therefore they must agree in [cg]. The same does not apply, at least not categorically, to the less similar pairs of ejectives with lenis aspirated and voiced stops. The proposed rankings thus adequately account for patterns of laryngeal alternations, as illustrated in the tableau in (5). Moreover, the approach predicts that laryngeal agreement may go hand in hand with agreement in other features, such as place, which is indeed the case in Lezgian (6).

In sum, the seemingly typologically aberrant patterns of Lezgian long-distance laryngeal alternations are shown to arise from simple interactions of Agreement by Correspondence constraints operating in the lexicon and from positional constraints on laryngeal features.
(1) Lezgian laryngeal contrasts in stops/affricates (cf. Trubetzkoy 1931; Talibov 1980)

<table>
<thead>
<tr>
<th>[p’ t’ ts’ g’ k’ q’/ (T’)]</th>
<th>/pp tt ts tʃ k₃ q₃/ (TT)</th>
<th>/p’ t’ ts’ g’ k’ q’/ (T’³)</th>
<th>/b d (z) (3) g (s)/ (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[+fortis, +cg, -voi]</td>
<td>[+fortis, -cg, -voi]</td>
<td>[-fortis, -cg, -voi]</td>
<td>[-fortis, -cg, +voi]</td>
</tr>
</tbody>
</table>

(2) Pretonic strengthening and posttonic weakening

a. /rab-Uni/ [rappúni] ‘needle’ (ergative) *[rabúni] cf. [rab] (absolutive)
   /muq-Ar/ [mukkár] ‘nest’ (plural) *[muqár] cf. [muq] (singular)
b. /kk-U-RED/ [kkuq] ‘burn’ (imperative) *[kkukk] cf. /q’-U-RED/ [q’uq’] ‘drink’ (imper.)
   [rab] ‘needle’ *[rapp]; [ryq’] ‘ashes’ *[ryqq]; [nyk’] ‘small bird’ *[nyqq]

(3) Long-distance harmonic alternations and non-application of harmony

a. harmony I /’t’ab-Uni/ [t’ap’úni] ‘lie’ (erg.) cf. [t’ab] (abs.) (see 2a)
   /q’eb-Uni/ [q’ep’ini] ‘cradle’ (erg.) cf. [q’eb] (abs.)
b. harmony II /’k’ar-di/ [’k’ar-t’s’i] ‘cradle’ (erg.) cf. /par-di/ [ppar-tts’i] ‘load’ (erg.)
   /q’ew-di/ [q’ew-t’s’i] ‘2nd wife’ (erg.) cf. /wan-di/ [wan-tts’i] ‘voice’ (erg.)
c. no harmony /’nek’-aʃ’-Ar/ [’nek’-aʃ’-ér] ‘foot’ (pl.) /’byrq’-A’s/ [’byrq’-et’] ‘blind person’

(4) Similarity scale for [constricted glottis]

Contrast: T’-T’ > T’-TT > T’-KK > T’-T³ > T’-D > T’-K³ > T’-G
Difference: -- [cg] [eg, Pl] [cg, fortis] [cg, fortis, voi] [cg, fortis, Pl] [cg, voi, fortis, Pl]

(5) An analysis of harmony in [t’ap’úni] ‘lie’ (erg.) (some details omitted)

<table>
<thead>
<tr>
<th>/’t’ab-Uni/</th>
<th>IDENT (cg)</th>
<th>*-[fortis]/[+str]</th>
<th>IDENT-CC(cg)</th>
<th>CORR- T’↔T’</th>
<th>CORR- T’↔KK</th>
<th>IDENT (voi)</th>
<th>IDENT (cg)</th>
<th>IDENT (T’↔G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. t’ab,úni</td>
<td>!</td>
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<td>b. t’app,úni</td>
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<td>c. t’app,úni</td>
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<td>d. t’app,úni</td>
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<td>e. tt,app,úni</td>
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(6) Coronal and dorsal place harmony

a. [ʧ’ar’ti] /ʧ’ar-di/ ‘hair’ (erg.) *[ʧ’arts’i]; [tʧ’ar’ti] /tʧar-di/ ‘paper’ (erg.) *[tʧ’arts’i]
b. [k’erq’et’] ‘piece of wood’ *[k’erq’et’]; [qanqqúʃ] ‘empty’ *[qqankúʃ]

References