Lezgian leaps:
Long feet, saltation, and the absence of coda voicing

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1 Introduction

Lezgian (Nakh-Dagestanian, Azerbaijan & Dagestan) is notable for a peculiar alternation between long voiced and simple voiceless stops.

(1) Lezgian alternations between D: and T

	Abs. singular	*plural*	
(a)	ˈjeb:	je.ˈper	'string'
(b)	ˈgad:	ga.ˈtar	'summer'
(c)	ˈpag^{w}:	pa.ˈk^{w}ar	'side, rib'

Is this a contra-typological case of word-final or coda voicing? (Yu, 2004; Blevins, 2006)

In this talk:

- discuss metrical influences on contrast distributions
- reinforce problem of typological contradiction in foot-restricted T
- revise assumptions about markedness in the oral stop series
- demonstrate problem of saltation in D: → T mapping
- import *MAP solution to saltation

2 Distribution of oral stops

Surface forms in Lezgian exhibit five varieties of oral stops:

- plain voiceless stops (T)
- aspirated voiceless stops (T^{h})
- ejective stops (T')
- plain voiced stops (D)
- long voiced stops (D:)

Haspelmath (1993), lists only the first four, phonetic investigation in Yu (2004) revealed the predictable length contrast in voicing.

2.1 Restrictions

T^h, T', and D contrast in all positions[1], while the occurrence of T and D: is more restricted.

(2) Surface distribution of Lezgian oral stops by metrical and syllabic position.

Syllable	Position	T	T^h	T'	D	D:
$(\underline{\sigma}\acute{\sigma})\sigma$	Onset	✓	✓	✓	✓	-
	Coda	-	✓	✓	?	✓
$(\sigma\underline{\acute{\sigma}})\sigma$	Onset	✓	✓	✓	✓	-
	Coda	-	✓	✓	✓	✓
$(\sigma\acute{\sigma})\underline{\sigma}$	Onset	-	✓	✓	✓	-
	Coda	-	✓	✓	✓	-

T and D: are not permitted outside of Lezgian's single foot, a typically left-aligned iamb (Ozburn & Kochetov, 2018).

(3) Lezgian foot structure and stress

(a)	(ˈqab:)	summer.ABS	$(\acute{\sigma})$
(b)	(ʃy.ˈʃe)	glass.ABS	$(\sigma\acute{\sigma})$
(c)	(ʧi.ˈne.)rug	hawk	$(\sigma\acute{\sigma})\sigma$
(d)	(in.ˈsan.)ri.k^haj	about.people[2]	$(\sigma\acute{\sigma})\sigma\sigma$

T and D: are in complementary distribution by syllabic position, and affixation triggers stem-final alternations.

(4) Coda D: and onset T alternate

	Abs. singular	*plural*	
(a)	ˈjeb:	je.ˈper	'string'
(b)	ˈgad:	ga.ˈtar	'summer'
(c)	ˈpag^w:	pa.ˈk^{w}ar	'side, rib'

(5) T in complex onsets

Abs. singular	*Erg. sg.*	
ˈtseg^w:	tse.ˈk^{w}re	'ant'

(6) D: in internal codas

	Abs. singular	*Abs. sg. + '-all'*	
(a)	ˈgad:	gad:.ˈdi	'summer' (Yu, 2004)
	Erg. sg.	*Abs. sg. + '-similar.group'*	
(b)	qa.ˈpu.ni	qab:.ˈmab	'box' (Yu, 2004)

[1] I cannot find certain evidence of D as opposed to D: in the coda of a footed unstressed syllable. All cases measured by Yu (2004) were D:, and no other data makes any distinction. I (riskily) presume these cases exist.

To form some preliminary generalizations:

(7) METRICAL LICENSING: In Lezgian, T and D: are only permitted within the foot.

(8) ALLOPHONY: T and D: have the same UR and surface alternately in onsets and codas respectively.

2.2 Meter and the oral stops

The generalization that Lezgian has an expanded stop series within a metrically strong area is in accordance with general properties of metrically strong positions.

It's even more striking that lengthening occurs only in the foot, given argued pressures to maximize segmental content in the foot (Hall, 1999; Bye & de Lacy, 2008).

3 Richness of the base and restrictions on T

PROBLEM: To analyze the D: ⇔ T alternation as 'coda voicing' stipulates a counter-typological constraint *VOICELESSCODA. Recall that we usually see *VOICEDCODA and coda devoicing.

3.1 Kiparsky vs. RotB

To circumvent, Kiparsky (2004, 2006) proposes a specific derivation for the alternating stops, where D: is licensed by lengthening pressures in the iamb, and then restrictions on onsets map D: to T in onset position.

No constraint on T?

To make this work we'll need to minimally have markedness constraints that prevent long onsets. We should also have a constraint that makes sure unattested long voiceless stops are not observed. This is generally counter-typological (usually D: ⇒ T:), but sometimes observed (e.g. Somali). We should also consider relevant faithfulness.

(9) a. *LONGVL assigns a violation for every long voiceless stop.
b. *LONGONS assigns a violation for every long stop within an onset.
c. ID[VCE] assigns a violation for every segment in the output which does not match in voice with its corresponding segment in the input.
d. ID[LEN] assigns a violation for every segment in the output which does not match in voice with its corresponding segment in the input.

(10) Formalizing the Kiparsky solution

/qab:-uni/	*LONGVL	*LONGONS	ID[VCE]	ID[LEN]
☞ a. (qa.ˈpu.)ni			*	*
b. (qa.ˈp:u.)ni	* W	* W	L	L
c. (qa.ˈb:u.)ni		* W	L	L

Not too fast! RotB creates a problem.

- Positional markedness allows D: input to surface faithfully in the iamb.
- To prevent D: from surfacing outside of iamb, we need a general markedness constraint against it.

(11) a. MESTR(LEN, WD) assigns a violation for every unlengthened stop within the word head (head foot).

b. *LONG assigns a violation for every long stop.

(12) Blocking D: outside the foot[3]

/ʧinerug:/	*LONGVL	*LONGONS	MESTR	*LONG	ID[VCE]	ID[LEN]
☞ a. (ʧi.ˈne.)rug			*		*	*
b. (ʧi.ˈne.)rug:			*	* W	L	L

- Note that I'm not controlling the voicing of the shortened segment yet - it actually won't work out. More on this in the next section.
- **To prevent T from surfacing outside of iamb onsets, we need a general markedness constraint against it.**

(13) We need more to block T outside the foot

/ʧineruk/	*LONGVL	*LONGONS	MESTR	*LONG	ID[VCE]	ID[LEN]
☞ a. (ʧi.ˈne.)rug			*		*	
💣 b. *(ʧi.ˈne.)ruk			*		L	

(14) *T assigns a violation for every voiceless stop.

(15) *T fixes things up

/ʧineruk/	*LONGVL	*LONGONS	MESTR	*LONG	*T	ID[VCE]	ID[LEN]
☞ a. (ʧi.ˈne.)rug			*			*	
b. *(ʧi.ˈne.)ruk			*		* W	L	

PROBLEM REMAINS: We can't avoid T being marked.

3.2 Accepting the markedness of T

NEW SOLUTION: We might not have to commit to T being universally unmarked.

OPTION 1: Vaux & Samuels (2005) argue that, at least in two-way systems of T - T^h, T^h is the unmarked member.

- maximally unmarked stops are unspecified, and can receive [spread glottis] (aspiration) for free
- T^h has a longer VOT lag than T (and D), depends on less precise timing
- To contrast with D and T^h, T must be particularly precise in VOT timing

[3]Note that, in keeping with the literature on Lezgian, I'm considering [ʧ] a stop.

- phonological evidence, e.g. English T^h in elsewhere positions [4]

In a larger series T - T^h - T' - D - Dː, can we argue T is more marked than T^h, T', and D?

- Let's keep T^h as maximally unmarked
- D may be less marked by virtue of less VOT precision
- How to make ejectivity unmarked? Hm.

OPTION 2: Alternately, we might turn to **dispersion theory**, where inventories are evaluated against meta-constraints on their perceptability (Flemming, 2017).

- distinctiveness constraints ranked relative to MAXIMIZECONTRASTS will prefer contrasts in a language which differ in easy-to-perceive ways
- e.g. *D–T penalizes a language which allows words which only differ in oral stop voicing
- Perhaps T is generally ruled out by reasonable high-ranked constraints like *T–T^h, but permitted in the foot by a special $\text{MAXIMIZECONTRASTS}_{\text{FT}}$.

HESITATION: Do we really want to enrich our phonology with constraints over inventories? Isn't that regular CON's job?

INTERIM CONCLUSION: One way or another, it's possible that T isn't really unmarked here, and we wouldn't have to worry about constraining it.

4 Dː to T as Saltation

In the Kiparsky proposal outlined above, we need to map Dː to T in onset position without mapping D to T.

Can we do it?

4.1 An attempt

(16) D harmonically bounds T

/qabː-uni/	*LONGVL	*LONGONS	MESTR(LEN,WD)	ID[VCE]	ID[LEN]
☞ a. (qa.ˈpu.)ni			**	*	*
💣 b. (qa.ˈbu.)ni			**	L	*
c. (qa.ˈpːu.)ni	* W	* W	* L	*	L
d. (qa.ˈbːu.)ni		* W	* L	L	L

What if T is meant to be underlying?

[4] that is, it surfaces when other specific rules, e.g. flapping, don't apply

(17) Underlying T surfaces in onset

/qap-uni/	*LongVl	*LongOns	MeStr(len,wd)	Id[vce]	Id[len]
☞ a. (qa.ˈpu.)ni			**		
b. (qa.ˈbu.)ni			**	* W	
c. (qa.ˈpːu.)ni	* W	* W	* L		* W
d. (qa.ˈbːu.)ni		* W	* L	* W	* W

(18) Underlying T to Dː in coda

/qap/	*LongVl	*LongOns	MeStr(len,wd)	Id[vce]	Id[len]
☞ a. (ˈqabː)			*	*	*
b. (ˈqapː)	* W		*	L	*
c. (ˈqab)			** W	*	L
d. (ˈqap)			** W	L	L

(19) $\text{mek}^{\text{h}}\text{teb}$ 'school'

(20) But underlying D to Dː in coda too :(

/mek^{h}teb/	*LongVl	*LongOns	MeStr(len,wd)	Id[vce]	Id[len]
☞ a. (mek^{h}.ˈteb)			***		
💣 b. (mek^{h}.ˈtebː)			** L		* W

Problem: No, we can't do it.

4.2 Saltation and the *Map family

Lass (1997) coins the term "saltation" for this opaque interaction where a segment seems to change to a second by leaping over a third in between which remains unaffected, after the Latin root for jump. Here, Dː leaps over D on the way to T.

Hayes & White (2015) argues that saltation might be best accounted for through the addition of *Map constraints.

- "*Map(x, y) assesses a violation to a candidate if a segment belonging to natural class x in the input is mapped to a corresponding segment in natural class y in the output." (Hayes & White, 2015, p. 289)
- All learners begin with longer distance *Maps (e.g. *Map(Dː,T)) outranking shorter distance ones (e.g. *Map(Dː,D)), a la M ≫ F
- But, with the right evidence, long-distance *Maps can be reranked lower to allow specific longer changes to open up while the shorter changes are still individually marked
- Note how this resembles comparative markedness solutions to similar problems

4.3 Applying the *Map solution

(21) a. *(Map)(Dː,D) assigns one violation for every segment belonging to class Dː in the input which is mapped to a corresponding segment belong to class D in the output.

b. *(MAP)(D:,T) assigns one violation for every segment belonging to class D: in the input which is mapped to a corresponding segment belong to class D in the output.

(22) *(D:,D) breaks harmonic bounding

/qab:-uni/	*LGVL	*LGONS	MESTR	ID[VCE]	ID[LEN]	*(D:,D)	*(D:,T)
☞ a. (qa.ˈpu.)ni			**	*	*		*
b. (qa.ˈbu.)ni			**	L	*	* W	L
c. (qa.ˈp:u.)ni	* W	* W	* L	*	L		L
d. (qa.ˈb:u.)ni		* W	* L	L	L		

(23) *(D:,D) ≫ ID[VCE]; *(D:,D) ≫ *(D:,T); *LGVL or *LGONS ≫ *(D:,T)

(24) *(MAP)(D, D:) assigns one violation for every segment belonging to class D in the input which is mapped to a corresponding segment belong to class D: in the output.

(25) *(D, D:) allows D to remain faithful despite length pressure

/mek^{h}teb/	*LGVL	*LGONS	MESTR	ID[VCE]	ID[LEN]	*(D, D:)
☞ a. (mek^{h}.ˈteb)			***			
b. (mek^{h}.ˈteb:)			** L		* W	* W

(26) *(D, D:) ≫ MESTR

(PARTIAL) SUCCESS!

5 Conclusions

An account of Lezgian stop distributions and alternations faces two main obstacles in potential typological contradiction and saltation.

There's strong potential that the typology problem is not as bad as it appears, as T is not the universally unmarked segment it is often wrongfully mistaken to be.

Saltation can be overcome by the addition to CON of a family of *MAP constraints.

In absence of these obstacles, we can see that this stop alternation can be accounted for by simple inventory markedness and positional markedness combined with a constraint like MESTR - the latter being the primary cause of the foot-internal/foot-external differences we see in stop behavior.

In future work, I hope to explore how MESTR might account for other metrically-driven alternations in the language, like apparent syncope in the footed unstressed syllable.

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