

On the Origin of Coda Voicing in Lezgian

Author(s): Alan Chi Lun Yu

Proceedings of the Twenty-Sixth Annual Meeting of the Berkeley Linguistics Society: General Session and Parasession on Aspect (2000), pp. 349-360

Please see “How to cite” in the online sidebar for full citation information.

Please contact BLS regarding any further use of this work. BLS retains copyright for both print and screen forms of the publication. BLS may be contacted via <http://linguistics.berkeley.edu/bls/>.

The Annual Proceedings of the Berkeley Linguistics Society is published online via [eLanguage](#), the Linguistic Society of America's digital publishing platform.

On the Origin of Coda Voicing in Lezgian *

ALAN CHI LUN YU

University of California, Berkeley

0. Introduction

In Lezgian, a Nakho-Daghestanian language spoken in southern Daghestan and northern Azerbaijan in the eastern Caucasus, unaspirated voiceless obstruents and ejectives are voiced in coda position in monosyllabic nouns. This 'coda-voicing' pattern is typologically unexpected and phonetically unnatural. In this paper, I will present an account of the historical development of the coda voicing, illustrating that the synchronic coda-voicing pattern is a result of a series of phonetically natural sound changes. Following that, I will briefly discuss some implications of the laryngeal alternation in Lezgian.

1. Data

1.1. Background

All synchronic data presented in this paper, unless specified otherwise, are drawn from Haspelmath 1993. The consonant inventory of Lezgian is given in (1).

(1) Consonant inventory (54 members)

b	d				g	g ^w			
p ^h	t ^h	t ^{hw}	ts ^h	ts ^{hw}	tʃ ^h	k ^h	k ^{hw}	q ^h	q ^{hw}
p	t	t ^w	ts	ts ^w	tʃ	k	k ^w	q	q ^w
p'	t'	t' ^w	ts'	ts' ^w	tʃ'	k'	k' ^w	q'	q' ^w
	l		z	z ^w	ʒ		ʁ	ʁ ^w	
f	r		s	s ^w	ʃ	x	χ	χ ^w	
m	n								
w					j			h	?

* I would like to thank Johanna Nichols for sharing her data and insights with me. I am also grateful to Andrew Garrett, Sharon Inkelas, and Larry Hyman for discussions and comments. Any errors are of course my own. This paper is based upon work supported under a National Science Foundation Graduate Research Fellowship. Any opinions, findings, conclusions, or recommendations expressed herein are those of the author and do not necessarily reflect the views of the National Science Foundation.

1.2. Word-final unaspirated voicing in monosyllabic nouns

Haspelmath (1993) reports that voiceless unaspirated stops become voiced in word-final position in certain monosyllabic nouns. Some examples are shown in (2), with the relevant segments printed in boldface. This pattern was also observed by Trubetzkoy in 1931. The voiceless unaspirated stops surface as voiceless unaspirated intervocalically and when followed by an /r/ (2e).

(2) Underlying word-final unaspirated voiceless stops in monosyllabic nouns

a.	tʃeb	tʃep-edi	day	c.	leg ^w	lek ^w -e	wash tub
	pab	pap-a	wife		tseg ^w	tsek ^w -re	ant
	jab	jap-u	ear		rug	ruk ^w -adi	dust
b.	rad	rat-uni	intestine	d.	juɤ	juq-ar	day
	gad	gat-u	summer		myɤ	myq-y	bridge
	ɤed	ɤet-re	star; fish		naɤ ^w	naq ^w -adi	tear
e.	laz	lats-adi	kaolin				
	mez	mets-i	tongue				
	warz	warts-ar	month, moon				

However, further investigation reveals that the voicing of voiceless unaspirated stops also occurs in the pre-consonantal position as shown (3). The only exception where voiceless unaspirated stops are not voiced in pre-consonant position is when the suffix is an approximant (4).

(3) Underlying voiceless stops as voiced in coda position.

xeb	xeb -mal	'animal-cattle'	vs.	xp -er	'sheep-PL'
qab	qab -mab	'boxes and similar things'	vs.	qap -uni	'box-OBL'
juɤ	juɤ -di	'all day'	vs.	juq -ar	'day-PL'
gad	gad -di	'all summer'	vs.	gat -u	'summer-OBL'

(4) tseg^w tsek^w-re 'ant-OBL'
 warz wats-ra¹ 'moon/month-OBL'

1.3. Word-final ejectives voicing in monosyllabic nouns

Haspelmath (1993) also observes that underlying ejectives become voiced word-finally in a number of monosyllabic nouns whose initial consonants are also ejectives (5). Note that a very recent development in Lezgian has syncopated some of the high vowels.

(5) q'eb	q'ep'-ini	cradle	tʃ'ib	tʃ'p'-er	span
t'ab	t'ap'-uni	block, log	q'yd	q'hyt'-yz	winter
t'ub	t ^{hw} p'-u	finger	ts'ib	ts ^h p'-er	pot
t'ib	t ^h p'-er	owl	ts'ig	ts ^h k'-er	middle

¹ The 'r' in CVrC stem is deleted when an r-initial suffix is attached.

On the Origin of Coda Voicing in Lezgian

One example is found where the underlying ejective become voiced in the coda position. This is shown in (6).

- (6) q'yɗ q'yɗ-di 'all winter' vs. q^hyt'-yz 'in the winter'

1.4. Two problems

The fact that coda unaspirated obstruents and ejectives should become voiced is highly unusual. Typologically, word-final and pre-consonantal positions in general are among the most common place for voicing neutralization. However, the contrast between voiced and voiceless segments usually neutralizes toward voicelessness. This tendency has been corroborated by numerous phonetic studies, showing that voicing is generally more difficult to perceive and produce in coda position (see Steriade 1997 and references therein). In fact, in her seminal work on the phonetics and phonology of laryngeal contrast, Steriade (1997) postulates the scale of voicing perceptibility according to contexts, as shown in (7). She bases this scale on evidence from previous phonetic research and her survey on the typology of the contexts in which voicing neutralization generally occurs. The triangle sign \triangleright indicates that voicing in one context is more perceptible than in the context to its right.

- (7) Scale of obstruent voicing perceptibility according to context

V__[+son] \triangleright V__# \triangleright V__[-son] \triangleright {[-son__[-son], [-son__#], #__[-son]}

According to this approach, which she dubbed Licensing by Cue, preconsonantal and final positions are among the worst contexts for the perception of voicing. Thus, in many languages, the voicing contrast is suspended in precisely these positions. In most instances, the only laryngeal specification allowed in preconsonantal and final positions is the lack of voicing. Yet, what I find in Lezgian is exactly the opposite of this scenario.

To complicate the problem even more, in final position, there are four types of laryngeal contrast. Some examples of final voiced stops are given in (8), final ejectives in (9), final voiceless aspirated in (10) and final voiceless unaspirated in (11).

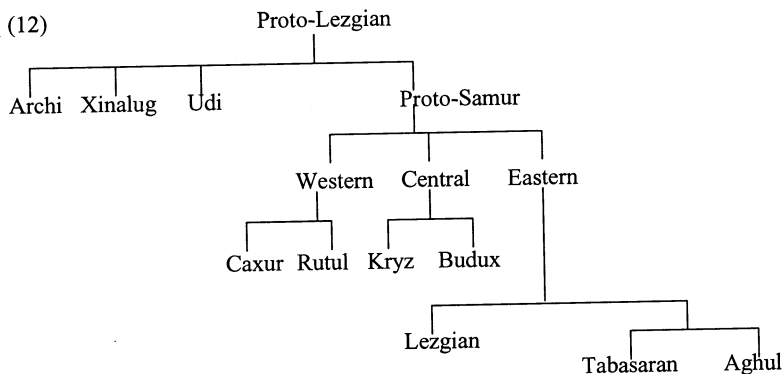
- | | |
|---|--|
| <p>(8) Final voiced stops</p> <p>k'yɗ nine</p> <p>daɾ mountain</p> <p>biʒ illegitimate child</p> <p>tʃ'iʒ bee</p> <p>dad taste</p> | <p>(10) Final voiceless aspirated stops</p> <p>k^hat^h bitch</p> <p>lak^h bed (in the garden)</p> <p>nek^h milk</p> <p>net^h louse</p> <p>peq^h crow</p> |
| <p>(9) Final ejectives</p> <p>jak'^w axe</p> <p>kits' dog</p> <p>k'uk' peak</p> <p>k'wat' lump, ball</p> | <p>(11) Final voiceless unaspirated stops</p> <p>dust friend</p> <p>waxt time</p> <p>myχts barn</p> |

Note that the final voiceless unaspirated obstruents in (11) are all preceded by fricatives. Voiceless unaspirated obstruents do not surface alone in final positions in Lezgian.

Given the fact that voiceless unaspirated obstruents and ejectives are generally allowed in final positions, it is puzzling that the coda-voicing pattern only occurs in nouns that are monosyllabic. For the remainder of this paper, I will explain how the coda voicing alternation arose in the historical phonology of Lezgian. I will also attempt to explain why only monosyllabic nouns acquired this peculiar laryngeal alternation.

2. Historical excursus

Before we dive into the discussion of the development of coda voicing in Lezgian, one must first understand the affiliation of Lezgian within the Lezgian language family. The internal structure of the Lezgian family, reproduced from Schulze 1994, is given below (12).



In this section, I will argue that coda voicing did not originate from one single phonetic sound change. In fact, it will be argued that there was no coda voicing in Lezgian historical phonology at all. The historical origin of the synchronic coda voicing is in fact the result of a series of phonetically motivated sound changes. The ensuing synchronic alternation is a matter of telescoping.

2.1. Coda unaspirated voicing explained

(13) provides the correspondences for three words (i.e. water, tongue, and moon) in fifteen Lezgian languages and dialects. The data is a slightly expanded version of a comparative Nakh-Daghestian cognate database compiled by Prof. Johanna Nichols. The additional data comes from Standard Lezgian, which is based on the lowland Gune dialect. The original database, in turn, consists of sixty-four cognate sets extended from a pre-compiled word lists from Giginishvili 1977 and Bokarev 1981. Of the sixty-four cognate sets, three of them are relevant to our present discussion and are given in (13). I have also reconstructed the quasi-Pre-Lezgian forms for each of the words. They are only 'quasi-reconstructed' because a systematic reconstruction is not possible with the limited data available. The quasi-Proto-Nakh Daghestian reconstruction by Prof. Nichols for each of these forms is also provided at the bottom of each of the cognate set columns.

On the Origin of Coda Voicing in Lezgian

(13) Three cognate sets from fourteen Lezgian languages and their reconstructed forms

	a. 'water'		b. 'tongue'		c. 'moon'	
Lezgian. Gune	jad	jat-ar	mez	mec-ar	warz	
Lezgian. Axtyn	jad	jat ^h -ar	mez	mec ^h -ar	warz	waz-r-, warc ^h -
N. Tabassaran	shaj	shitt-i	mildzi	mildz-ar	wadza	
S. Tabassaran	shid	shtt-u	meldz	meldz-ar	waz	
Agul. Burschag	sher	shir-ar	mez	mez-ar	waz	
Agul. Richa	xed	xitt-ar	mez	mez-ar		
Agul. Burkixan	xer	xer-ar				
Agul. Fite	xid	xitt-ar				
Rutul	xed	xed-byr	miz	miz-byr	waz	
Tsaxur	xjan	--	miz	miz-ee-r	waz	wuz-
Kryz	xd	xd-ri	mez	mez-ri	vz	vuz-
Budux	xd	xd-ri	mz	mez/mz-ri	vz	
Archi	llhan	--	mac	mac-mul	bac	boc-
Udi	xe	--	muz	muz-ur-ux		
Xinalug	xu	xyn-	mic'	mic'-yrdyr	vac'	
Pre-Lezgian	*xVd		*madz		*badzVr	
P-ND	*llhin		*madz		*badzVr	

Recall that there are no voiced affricates in Lezgian. Historical affricates are the voiced fricatives in present day Lezgian. As shown by the cognate sets above, only three main groups of languages, namely, Tabassaran, Agul, and Lezgian, display some form of root-final obstruent alternation. In the case of Lezgian, a root-final voiced obstruent alternates with its voiceless counterpart intervocalically. Notice that the intervocalic voiceless obstruent is unaspirated in Standard Lezgian, but aspirated in the Axtyn variant. There is independent reason to believe that the Standard dialect reflects a more conservative variant than the Axtyn dialect. In Tabassaran, root-final voiced stops, but not affricates, become voiceless geminates in the intervocalic position. This alternation is more transparently illustrated in S. Tabassaran (e.g., *shid* 'water' > *shtt-u* 'water-PL'). The final voiced stop in the first N. Tabassaran example (i.e., *shaj* 'water-SG') has apparently lenited to some sort of an approximant. A similar alternation can be observed in the Agul languages.

Consider next the segments of each of these cognate sets (the relevant segments are boldfaced here for ease of reference), it is self-evident that the proto-Lezgian form for each of these words must contain a final voiced obstruent. This can be most clearly illustrated by the cognate set for the word 'tongue'. The reconstructed quasi-Proto-Nakh Daghestanian form for 'tongue' is **madz*. Crucially, the final obstruent is a voiced dental affricate. A similar reconstruction is posited for the word 'moon'. The final obstruent, again, is a voiced affricate. The reconstruction for 'water' is a bit more complicated. The Proto-Nakh Daghestanian reconstructed form for 'water' is **llhin*. However, the Pre-Lezgian reconstructed form is likely to be **xVd*, which has a final voiced dental stop. Although I cannot provide a complete reconstruction of all forms found to display the coda voicing alternation, given the evidence presented thus far, it is plausible to

suffixes that only attach to monosyllabic roots are plural and ergative suffixes. The significance of this will become apparent in the next sections. As for the stress-neutral suffixes, they are almost all inflectional suffixes (e.g. local cases, tense and mood suffixes, etc.). Given the fact that the placement of stress can be partially determined by the property of individual suffixes and that the location of stress is crucial to our understanding of the pretonic gemination phenomenon, it is, therefore, of paramount importance that the types of suffixes nominal roots generally admit and their respective stress properties are understood.

2.1.2.2. Nominal Inflectional Morphology in Lezgian

Nouns in Lezgian can appear alone with no overt suffixes when they are in the absolutive case. The plural morpheme is suffixed directly to the nominal stem. With the exception of the ergative case marking, all other case markings must apply onto the *oblique stem*. The oblique stem comprises of the bare nominal stem plus the ergative case suffix. Thus, in order to understand the interaction between the final obstruent of nouns in Lezgian with the nominal suffixes, one only need to consider two inflectional categories: plurality and oblique stem formations.

2.1.2.2.1. Plurality

In Lezgian, the default plural suffix is the stress-neutral *-ar*. However, this suffix applies mostly to polysyllabic nouns (16).

- | | | | |
|------|----------|-------------|-----------|
| (16) | muh man | muh man-ar | 'guest' |
| | bal k'an | bal k'an-ar | 'horses' |
| | pen zer | pen zer-ar | 'windows' |

Most monosyllabic nouns that end in a consonant form their plural by suffixing the stress-attracting *-Ar*, which surfaces variably as *-ar* or *-er* as determined by palatal vowel harmony (17).

- | | | | | | | |
|------|-----|--------|---------|-----|--------|---------|
| (17) | tar | tar-ar | 'tree' | rib | rip-er | 'awl' |
| | tum | tum-ar | 'tails' | pel | pel-er | 'hands' |

This pattern also applies to many, but not all, monosyllabic loanwords, e.g. *park-^lar* 'parks', *fil-^ler* 'elephants'.

2.1.2.2.2. Case marking

As mentioned earlier, the absolutive case is normally morphologically unmarked. The ergative case is marked by one of the five different types of ergative suffixes. All other cases (e.g. genitive, dative...etc.), however, are formed by the addition of suffixes onto the stem-plus-ergative complex, commonly referred to as the oblique stem or the stem augment. The oblique stem is formed with one of the following ten affixes (18).

bear inherent stress. The story on the origin of all the stress-attracting suffixes, however, is actually more complicated than can be explicated here without bringing our present discussion too far afield. Thus, I shall postpone that discussion to future occasions.

2.2. Coda ejective voicing

So far I have only concerned with the coda unaspirated voicing pattern. I have yet to account for the other coda voicing alternation, that is, coda ejective voicing. I argue that these coda ejectives were also historically voiced. Thus, they underwent the same 'intervocalic devoicing' process. Yet, how could one account for the final ejectives? To answer that, we must reexamine the data. The tokens that participate in coda ejective voicing are given here again in (20).

(20)	q'eb	q'ep'-ini	cradle	tʃ'ib	tʃ ^h p'-er	span
	t'ab	t'ap'-uni	block, log	q'yd	q ^h yt'-yz	winter
	t'ub	t ^{hw} p'-u	finger	ts'ib	ts ^h p'-er	pot
	t'ib	t ^h p'-er	owl	ts'ig	ts ^h k'-er	middle

Note that all of these stems contain an initial ejective. It is plausible then to hypothesize that the intervocalic voiceless unaspirated stop assimilated to the preceding ejective. This ejection spreading process was apparently only applicable to voiceless unaspirated obstruents. Word-final voiced obstruents do not turn into ejective obstruents. This is likely due to the fact that voiceless unaspirated obstruents are acoustically more similar to ejectives than to voiced obstruents. If sound change is the result of misperception, as argued by Ohala and many others (cf., Ohala 1983), it is not surprising that voiceless unaspirated stops would be misinterpreted as ejectives in the appropriate environment.

2.3. Nouns with non-alternating final voiced obstruents

In the previous sections, I have illustrated a historical explanation for the synchronic coda-voicing alternation. However, recall that in section 1.1 I have seen nouns with final voiced consonants that do not show a voiceless counterpart in the intervocalic environment. A complete explanation of the coda voicing must also be able to explain away these apparent counter-examples. These non-alternating forms are considered problematic because the historical account presented above predicts that all monosyllabic nouns with final voiced consonant would have a voiceless allophone in intervocalic position.

Upon a close examination, I discovered that these non-alternating nouns fall into one of the following three categories: borrowings from Turkic or Arabic sources (21a), numerals (21b) and borrowings from unknown sources (21c).

(21)	a.	dad	dad-uni	taste	[Turkic <i>tat</i>]				
		daɤ	daɤ-uni	mountain	[Turkic <i>day</i>]				
		biʒ	biʒ-uni	illegitimate child	[Turkic <i>pis</i>]				
	b.	wad		five		c.	tʃ'iʒ	tʃ'iʒ-re	bee
		qad		twenty			mirg	mirg-i	deer
		k'yɔd		nine			mag	mag-re	nest
							p'uz	p'uz-a	lip
							zarb	zarb-uni	quickness

Lezgian, as mentioned above, is spoken in southern Dagestan and in north Azerbaijan. It is not surprising to see massive borrowings from the neighboring Turkic language, Azeri. The Arabic borrowings could potentially come from two sources: Azeri and Ottoman Turkish, which have a lot of Arabic loanwords, or Arabic itself since Dagestan was conquered by the Arabs in the 7th and the 8th centuries. It is the result of the massive lexical borrowing from the Turkic and Arabic sources that the once productive 'intervocalic devoicing' alternation became a subregularity in the language as a whole. As for the numerals in (21b), it should be noted that the final *-d* was historically a gender marker. The final *-d* only surfaces when the numeral is used alone, which means that the final *-d* would never occur in the pretonic position, thus pretonic gemination is not expected.

The last source of non-alternating final voiced obstruents is yet to be determined. It is conceivable that the words in (21c) are borrowings from neighboring related Lezgian languages, since they are in very close contact with each other. This last category is admittedly *ad hoc*, but given the compelling evidence that the intervocalic devoicing process was once prevalent in the pre-Lezgian lexicon, it is more plausible to relegate these exceptions to other sources than to reevaluate the 'intervocalic devoicing' process completely.

4.1. Implications

As I mentioned in the introduction, there are two main theories on modeling LN. Under the rubric of Licensing by Cue (henceforth, LBC), Steriade (1997) argues that constraints on the distribution of laryngeal features should make direct reference to perceptual and articulatory factors. In the case of voicing neutralization, she postulates a scale of voicing perceptibility according to context based on evidence from previous phonetic research and her survey on the typology of the contexts in which voicing neutralization generally occurs. The perceptibility scale is reproduced in (22). The sign \triangleright indicates that voicing in one context is more perceptible than in the context to its right.

(22) Scale of obstruent voicing perceptibility according to context

$$V_ [+son] \triangleright V_ \# \triangleright V_ [-son] \triangleright \{[-son_ [-son]], [-son_ \#], \# _ [-son]\}$$

Steriadē further postulates that constraints in phonology should be the direct projection of the perceptibility scale. Thus, in the case of the distribution of voicing, the constraint ranking in (23) is posited.

- (23) Constraints on the distribution of voicing:
- * α voice / [-son]__[-son], [-son]__#, #__[-son]
 - * α voice / V__[-son]
 - * α voice / V__#
 - * α voice/ V__[+son]
- ↓

Each of the constraints in (24) corresponds to each of the contexts occupying a distinct position on the perceptibility scale. According to Steriadē, '[t]he constraints are universally ranked in the order of inverse perceptibility: the lower the context is on the perceptibility scale, the higher ranked the corresponding *[α voice]/X_Y constraint'.

In this model, a phenomenon such as voicing neutralization is modeled as the interaction between faithfulness to input voicing values and the fixed hierarchy of *voice constraints aligned to the voice perceptibility scale. Steriadē implements the faithfulness to input values using the constraint *Preserve[feature]*, which demands the value of the feature in the input must be the same in the output. Thus, in the case of coda devoicing, for example, it is accounted by the constraint ranking in (24).

- (24) *voice/V__[-son] >> *voice/V__# >> Preserve [voice] >> *voice/V__[+son]

Despite the fact that this theoretical approach has the benefit of being phonetically grounded, unfortunately, it is not amenable to account for the Lezgian data. That is, according to the LBC approach, preconsonantal and final positions are among the worst contexts for the perception of voicing. Thus, in many languages, the voicing contrast is suspended in precisely these positions. In most instances, the only laryngeal specification allowed in preconsonantal and final positions is the lack of voicing. Yet, what I find in Lezgian is exactly the opposite of the scenario licensed by the LBC approach. Given the perceptual alignment and the strict and universal ranking of phonological constraints advocated by the LBC, it is impossible for the very same system that predicts coda devoicing to also admit the existence of coda voicing. The only remedy would be for the LBC framework to also permit phonological constraints that are phonetically unmotivated or even counter-phonetic. That is, there are no longer only two 'species' of the phonological constraints (i.e., constraints that are projections of perceptibility scales and faithfulness constraints such as *Preserve [voice]*) that make up the constraint inventory, as dictated by LBC. Phonetically unnatural constraints such as the $D]_{\sigma}$ constraint proposed here and the *ND constraint argued in Hyman 1999 must also be allowed in the system. Given the necessity of phonetically-unmotivated constraints in phonological systems, many researchers are questioning whether mechanisms such as LBC are needed in a theory of synchronic phonology (cf. Hale and Reiss 1998, Hyman 1999, Dolbey and Hansson (To appear), Blevins and Garrett 1998).

5. Conclusion

In sum, in this paper, I have introduced a peculiar phenomenon of coda-voicing in Lezgian. In the course of the discussion, I have demonstrated in detail first the historical development of the coda-voicing pattern in Lezgian. I argue that the synchronic coda-voicing pattern is the result of two separate sound changes: pretonic gemination and degemination. I have also provided a formal account of this pattern. I argue that the Lezgian pattern is best treated in terms of morpheme-specific co-phonologies, rather than prespecification. In the end, I also discuss some of the implications the Lezgian pattern has on phonological theories in general.

References

- Blevins, Juliette and Andrew Garrett. 1998. The origins of consonant-vowel metathesis. *Language* 74 (3):508-556.
- Bokarev, E. A. 1981. *Sravnitel'no-istoricheskaja fonetika vostochnokavkazkix jazykov*. Moscow: Nauka.
- Dolbey, Andrew and Gunnar Hansson. To appear. The source of naturalness in synchronic phonology. *CLS* 35.
- Giginejshvili, B. K. 1977. *Sravnitel'naja fonetika dagestanskix jazykov*. Tbilisi: Tbilisi University.
- Hale, Mark and Charles Reiss. 1998. "Substance abuse" and "dysfunctionalism": Current trends in phonology. *LI* 31(1).
- Haspelmath, Martin. 1993. *Lezgian grammar*. Berlin ; New York: Mouton de Gruyter.
- Hyman, Larry. 1999. The limits of phonetic determinism in phonology: *NC revisited. Paper presented at the LSA, Los Angeles.
- Ohala, John J. 1983. The origins of sound patterns in vocal tract constraints. In P. F. MacNeilage (ed.) *The Production of Speech*. New York: Springer-Verlag.
- Schulze, Wolfgang. 1984. Remarks on the case system of the Lezgian languages. *Folia Slavica* 7(1&2): 302-321.
- Schulze, Wolfgang. 1994. Udi. In Riexs Smeets (ed.) *The Indigenous Languages of the Caucasus* Vol.4 Part 2. New York: Caravan Books.
- Steriade, Donca. 1997. Phonetics in Phonology: The case of Laryngeal neutralization. Ms. UCLA. To appear in UCLA Working Papers in Phonology.
- Trubetzkoy, N. 1931. Die konsonantensysteme der Ostkaukasischen sprachen. *Caucasica* 7: 1-52.

Alan Chi Lun Yu
 1203 Dwinelle Hall
 University of California, Berkeley
 Berkeley, CA 94720-2650

aclyu@socrates.berkeley.edu