Standard Georgian

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Georgian is a Kartvelian (South Caucasian) language spoken by 4 to 5 million people in the Republic of Georgia, with small diaspora communities spread out in a few republics of the former Soviet Union, Iran, and Turkey. Shanidze (1973) distinguishes six groups of Georgian dialects: Dasavluri (Imeruli, Guruli, Rachuli, Lechkhumuri); Ingilouri; Kartlur-Kakhuri (Kartluri, Kakhuri, Javakhuri, Meskhuri, Kizikuri); Mtiulur-Pshauri (Mtiulur-Gudamakruli, Pshauri); Pkhouri (Khevsuruli, Mokheuri, Tushuri); and Samkhret-Dasavluri (Acharuli, Imerkheuli). The Kartluri dialect is considered the basis of standard or literary Georgian. It is spoken in Kartli, an eastern Georgian province where Tbilisi, the Georgian capital, is located. Standard literary Georgian is discussed here. One male speaker from Tbilisi (the second author) was consulted for all the data presented in the illustration.

The modern Georgian script (known as Mkhedruli) has been in use since the 11th century. The oldest version of the script, called Asomtavruli, dates back to the fourth century. There is a one-to-one correspondence between the alphabetic symbols and phonemic sounds of Georgian.

Consonants

There are 28 phonemic consonants in Standard Georgian, as shown in the chart below.

	Bilabial	Labio-dental	Dental	Alveolar	Post-alveolar	Velar	Uvular	Glottal
Plosive	pʰ p’ b		tʰ t’ d			kʰ k’ g	q’	
Affricate				ts ts’ dz	tʃ tʃ’ dʒ			
Nasal	m			n				
Tap/Trill				ɾ/r				
Fricative		v		s z	ʃ ʒ	x ɣ		h
Lateral approximant				l				

The following near-minimal sets (to be read vertically) exemplify the important phonemic contrasts among Georgian consonants. For accompanying recordings, all words were pronounced in the carrier sentence /sit’q’vɑ/ X /dɑvts’ɛrɛ/ ‘I wrote the word X’.

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IPA	Georgian	Gloss	IPA	Georgian	Gloss
pʰuri	ფური	cow	ruxi	რუხი	gray
p’uri	პური	bread	dukʰani	დუქანი	shop
burtʰi	ბურთი	ball	kʰali	ქალი	woman
tʰalxi	თალხი	black	kʰari	ქარი	wind
t’alaxi	ტალახი	mud	vardi	ვარდი	rose
dalakʰi	დალაქი	barber	sardapʰi	სარდაფი	cellar
kʰudi	ქუდი	hat; cap	zari	ზარი	bell
k’udi	კუდი	tail	ʃari	შარი	quibbling
guda	გუდა	leather bag	ʒami	ჟამი	time
tsɛri	ცერი	thumb	xari	ხარი	bull
ts’ɛrɔ	წერო	crane	xutʰi	ხუთი	five
dzɛra	ძერა	falcon	ɣaribi	ღარიბი	poor
tʃixi	ჩიხი	impasse	q’alibi	ყალიბი	mold; cast
tʃ’ikʰa	ჭიქა	cup	q’utʰi	ყუთი	box
dʒikʰi	ჯიქი	panther	q’ava	ყავა	coffee
nɛla	ნელა	slowly	q’vavili	ყვავილი	flower
mɛla	მელა	fox	hava	ჰავა	climate
ludi	ლუდი	beer			

The uvular ‘stop’

The articulation of the uvular consonant is somewhat controversial. It has been variously transcribed as both [q’] and [χ’], most likely because its articulation (as the only uvular phoneme in Georgian) varies among speakers. The confusion between stop and fricative is also linked to diachronic and dialectological factors. Diachronic evidence suggests that Proto-Kartvelian had both an ejective and a plain uvular stop (Klimov 1998). The old plain uvular stop **q* is realized as a posterior fricative in contemporary Georgian (we shall accept it as a velar for the moment and discuss our reasoning in Section 2.2). The old ejective uvular stop **q’* is now realized as any one of the segments [q’ qˈˠ χ’ ʔ], as will be demonstrated in this section. Hence, the Common Kartvelian root **q’el-* ‘neck’ is now something like [χ’ɛl] or [q’ɛl], etc. in modern Georgian and the root **qel-* ‘arm’ is now realized [xɛl]. Since a velar fricative also existed in Proto-Kartvelian (and has remained unchanged in the modern languages), the non-ejective uvular stop is now merged with the ‘new’ velar fricative, resulting in homonymous pairs like modern Georgian [xɛrxi] ‘skill’ and ‘saw’ from Old Georgian **qerxi* and **xerxi*, respectively (Vogt 1961). Butskhrikidze (2002: 80) observes that the opposition between non-ejective [q] and [x] persists in some mountainous dialects of Georgian like Khevsuruli. Likewise, in Svan, a Kartvelian sister language spoken in Northwestern Georgia, all three phonemes /q q’ x/ coexist, e.g. *qä-l* ‘length of two outstretched arms’, *q’l-* ‘neck’, and *xp’-* ‘break smash’ (Klimov 1998: 334, 238, 327).

In our recordings of Standard Georgian, we found that [q’ qˈˠ χ’ ʔ] occur as allophones of /q’/, apparently in free variation. From one recording to the next, the same word could be pronounced by the same speaker as a uvular stop with a strong burst, a burst plus a fricative, a uvular fricative alone, or a glottal stop. For example, figure 1 shows spectrograms of the

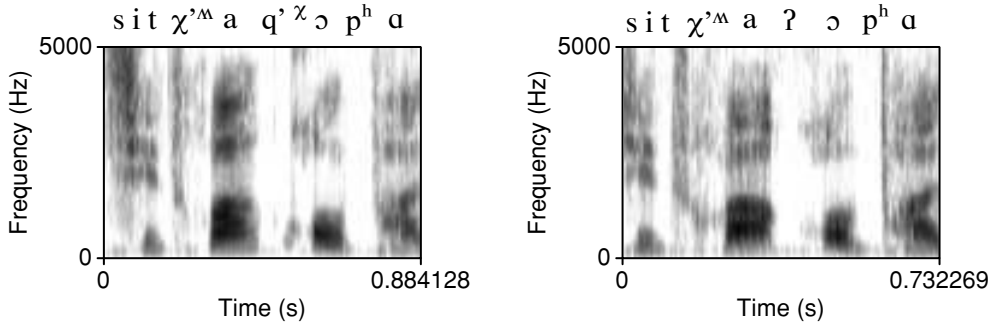

Figure 1 Two recordings of the word /q'opa/ 'being, existence' demonstrating different phonetic realizations of /q'/. Observe the faint burst for [q'] on the left and the absence of such a burst on the right.

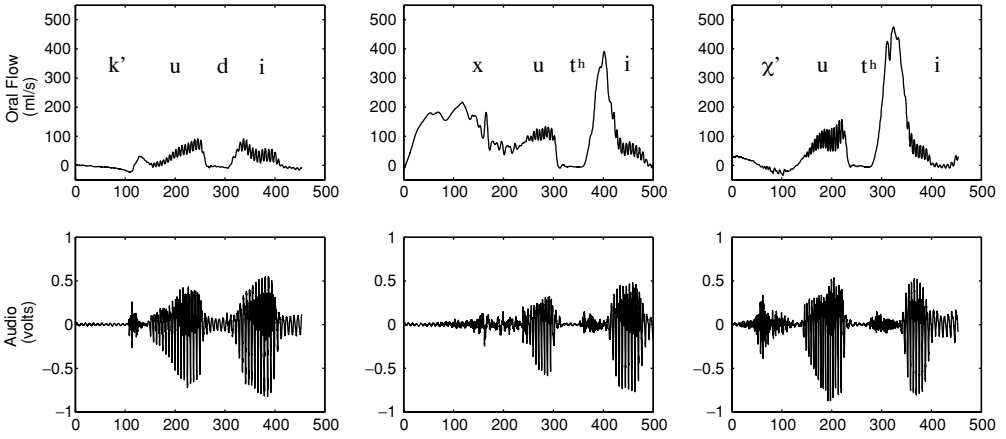

Figure 2 Oral flow and audio signals for /k'udi/ 'tail', /xuti/ 'five', and /q'uti/ 'box'. The oral release of /k'/ is visible as a relatively small peak in both the audio and aerodynamic signals. /x/ is characterized by a high degree of flow centered at around 100 ml/s. /q'/ is unlike either /k'/ or /x/: there are no prominent peaks in air flow at onset despite relatively high amplitude noise in the audio signal, suggesting low-flow frication.

same word, /q'ɔpɑ/ 'being, existence', recorded in the same frame sentence on two separate occasions.

The tokens are presented with surrounding phonetic material (in this case the preceding word [sit'χ'ʷa] 'word') to ensure that the allophonic difference is not obscured: /q'/ is realized in the left-hand utterance as [q'ˠ] and on the right-hand as [ʔ]. Notice (on the left) the single, faint, vertical line indicative of the burst for [q']. The transient stop burst appears slightly more than midway through the signal and is followed by aperiodic high-frequency energy indicative of a fricative offset. By comparison, on the left there is no stop burst and the frication is quieter. The unifying phonetic feature of these diverse realizations is most likely the laryngealization of neighboring vowels, as is evident in both examples of /ɔ/ in figure 1.

Unfortunately, uvular phonemes cannot be compared in Georgian, since there are no phonemic contrasts at the uvular place of articulation. Therefore, one may wonder whether the ejectivity of /q'/ is in fact phonemic. To add some clarity to the problem, we present a brief look at the aerodynamics of the consonant in word-initial position (see figure 2). Recordings

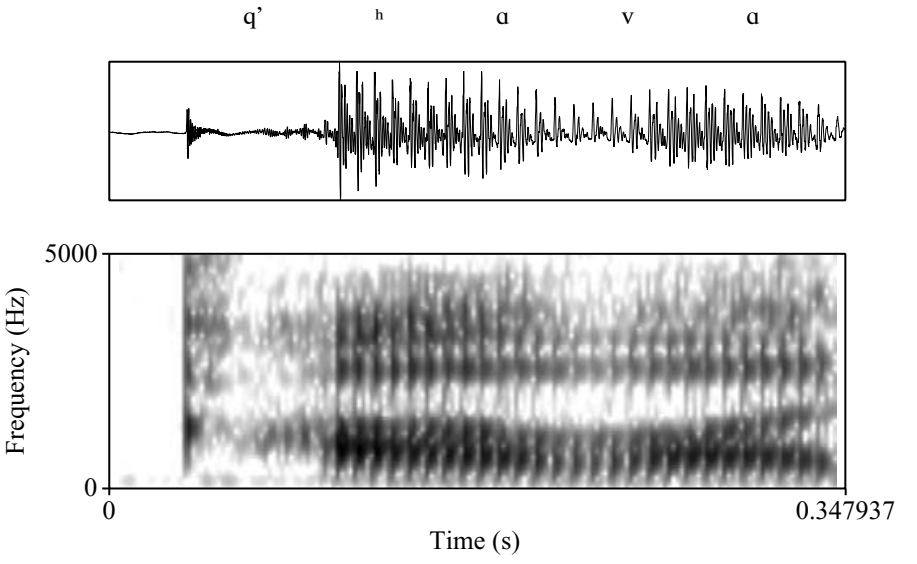

Figure 3 There is no doubt as to the plosive character of the uvular segment in this token. It is pronounced as a prototypical ejective stop with a strong burst and relatively little immediate aspiration in the word /qʼɑvɑ/ ‘coffee’.

were made using a circumferentially-vented pneumotach air mask, manufactured by Scicon R&D, and a Glottal Enterprises PTL-1 transducer (Rothenberg 1977).

Based on this data, it is difficult to characterize the uvular segment /q’/ as a stop, since there is no oral flow peak (not even an attenuated one, as at the release of /k’/). However, the consonant’s low air flow is not indicative of a fricative, either. During this token of /q’/ there is presumably no substantial pressure build-up to cause a sudden burst of air at release, despite the fact that there is an abrupt change in acoustic amplitude (greater, in fact, than that produced during /k’/ or /x/). Oral air flow during /x/ is much greater than it is during /q’/. There are three tiny spikes in air flow occurring at 100 ms in the uvular token, suggesting something like a trill. Further aerodynamic and acoustic research is needed to accurately categorize the sound, which surfaced in other (non-aerodynamic) recordings with a high-amplitude burst that characterizes prototypical stops (see figure 3).

For now, we conclude that the Georgian uvular consonant may range from a highly-constricted, low-flow, uvular fricative to an ejective uvular stop (with varying degrees of frication at offset) to a glottal stop. Net flow during the articulation of the fricative allophone is presumably reduced due to abduction of the vocal folds, hence the creakiness carried over to the following vowel. We propose a comprehensive study in which the air flow characteristics of /q x k^h k’/ are carefully measured in medial position in order to ensure that the variation seen in figures 1, 2, and 3 is not merely an artifact of their word-initial position (e.g. Pike 1947).

The velar fricative

As mentioned earlier, the place of articulation for the back fricative is also the subject of debate. Various authors treat it as a velar (Vogt 1971, Shanidze 1973) while others recommend its classification as a uvular (Žgent’i 1956, Fähnrich 1987, Aronson 1997, Hewitt 2005). Butskhrikidze (2002: 77) uses the IPA symbol for a uvular [χ] and later (on page 87) the velar [x] for the same sound. This is probably indicative of inter-speaker variation, compounded by the fact that there is no true phonemic distinction between uvular and velar fricatives in Georgian. When the phonetic uvular fricative occurs it is evidently glottalized, thus

introducing another (possibly confounding) variable into the comparison. We believe tokens in the present illustration are characteristically velar, and so employ [x] in the phoneme chart and transcriptions.

To affirm this intuition experimentally, we also undertook a brief investigation of whether vowels surrounding this fricative and the known velar [kʰ] might give some better clue as to the fricative's place of articulation. It has been hypothesized that vowels adjacent to posterior consonants will show more evidence of laryngealization than vowels adjacent to less posterior consonants (McCarthy 1994). It is not clear that such a distinction must hold between uvulars and velars, as the distance between the two places is small. However, accepting the hypothesis at face value, one might logically expect the vowels surrounding the Georgian posterior fricative to be creakier than the vowels surrounding the velar stop (if the fricative is indeed more posterior than the stop).

Accordingly, nonsense syllables of the type /ikʰi/ and /ixi/ were recorded in a frame sentence. Fifty tokens were recorded, balanced for all five vowels in both V1 and V2 positions, then repeated (N = 100). At last, a measure of local jitter (a common measure of creak) was taken for both V1 and V2 (Gordon & Ladefoged 2001, Boersma & Weenink 2003). The difference in local jitter between the two articulations /kʰ/ and /x/ was insignificant ($p > 0.05$) for both V1 and V2, suggesting that (if one expects vowels near a uvular to be creakier than those near a velar), /x/ is likely velar for the present speaker of Georgian.

It may be that there is some synchronic tension between the variant realization of /q'/ as a glottalized uvular fricative and the variant realization of /x/ as a non-glottalized uvular fricative. If there were a case in which both [χ'] and [χ] occurred in the speech of a single speaker, it seems reasonable to imagine that increased glottalization of the former would serve to perceptually enhance that distinction.

Characterization of stops and affricates

Wysocki (2003) observes that VOT and burst amplitude generally differentiate initial voiced and voiceless stops in Georgian, but the values for voiceless and ejective consonants overlap. She concludes that noise quality following oral release and voice quality of the subsequent vowel are the most reliable indicators of stop type. For our brief illustration of Georgian stop types, we provide aerodynamic data relating to the issue.

Figure 4 depicts the audio waveform and oral air flow (ml/s) for a near-minimal triplet where C1 = [t' tʰ d]. We found that each stop type constitutes a unique air flow regime. For the ejective, the air flow spike is roughly symmetrical, beginning and ending at 0 ml/s. Air has escaped from the space between the closed glottis and recently-opened velar stricture, but this is of course a much smaller volume of air than that which can potentially exit the lungs and pass through the open glottis (cf. the voiceless token). During Georgian ejectives, it appears that the glottis remains closed while the air leaves the compressed space between oral constriction and the larynx. It opens again only once the air has escaped from the compressed space and flow has fallen to 0 ml/s. In other words, a glottal stop has occurred. When the vocal folds open again, air flow must build up from this zero point. This is demonstrated during the production of [t'] in figure 4.

By contrast, the air flow spikes for the aspirated and voiced consonants in figure 4 are not as symmetrical because the glottis was not closed at the moment the oral seal was broken. Air flow is relatively high for the voiceless consonant (approximately 900 ml/s). After the release of the voiceless consonant, the vocal folds are spread wide enough for air to flow freely. The aperture is gradually diminished, however, until the moment of voice onset. Resistance is high throughout the voiced articulation, meaning that the air flow spike has a smaller maximum value (approximately 375 ml/s), although it is greater than the spike characterizing ejective oral flow. Our observation of other tokens yields similar generalizations, but precise quantitative analysis will be necessary to provide all the details.

Žgent'i (1956) found that foreign listeners tended to falsely categorize Georgian voiced obstruents as either voiceless or glottalized due to a relatively 'low degree of voicing' on the

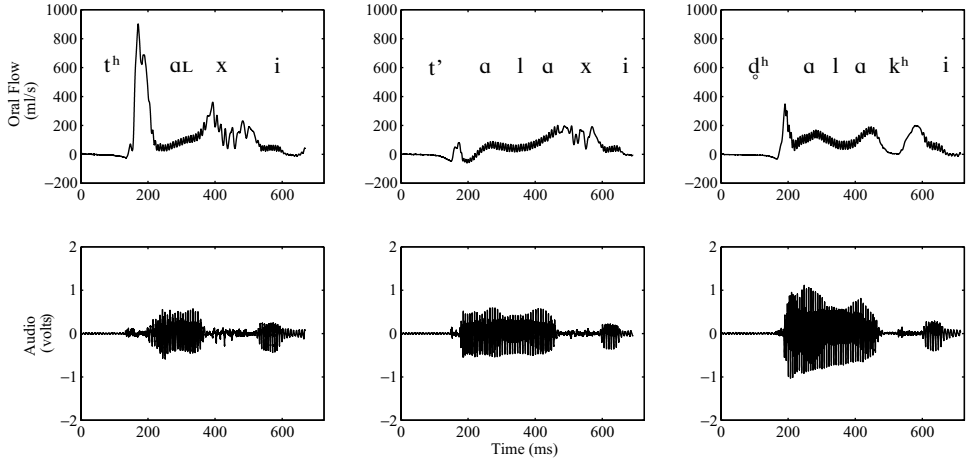

Figure 4 Oral flow and audio signals for /talxi/ 'black', /t'alaxi/ 'mud', and /dalaki/ barber. Note the significant aspiration on the voiceless stop, the relatively minor aspiration on the ejective stop, and the slight aspiration (375 ml/s) of the voiced stop.

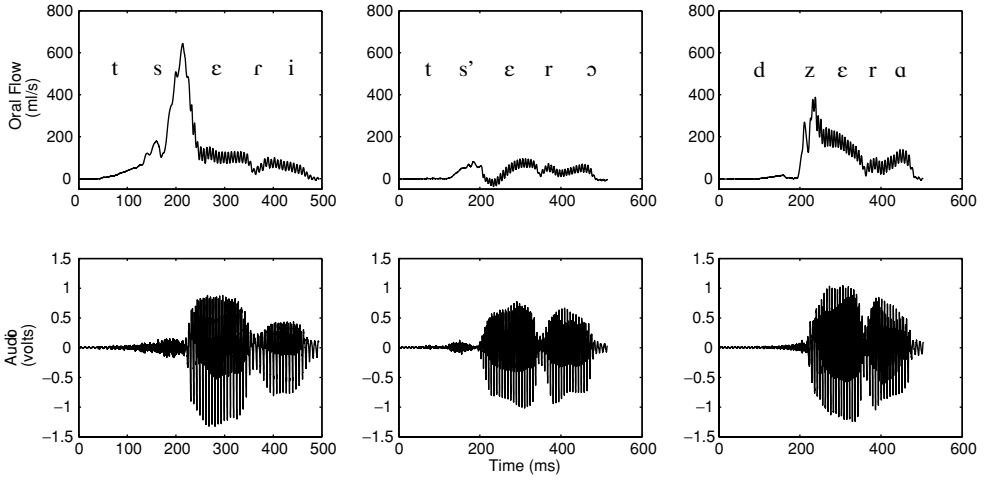

Figure 5 Oral flow and audio signals for /tseri/ 'thumb', /ts'ero/ 'crane', and /dzera/ 'falcon'. Note the extreme reduction in air flow at the terminus of the ejective affricate. Also, the rhotic segments in /ts'ero/ and /dzera/ appear to be two-tap trills, suggesting free variation in intervocalic environments.

nominally voiced stops, sparking some speculation that the stops may best be categorized in terms of aspiration instead of voicing (Butskhrikidze 2002: 85). Our evidence suggests that aspiration is a significant factor in differentiating the Georgian stops and, in the absence of distinctive voicing differences, may be the primary perceptual cue.

It is interesting to note how ejectivity affects the oral flow of the Georgian affricates, as well. In figure 5 we observe high oral flow at the terminus of the affricate [ts], indicative of the fricative portion of the consonant. The voiced affricate [dz] also has an appreciable peak in oral flow at its offset. Note, however, the extreme reduction in oral flow during the ejective [ts'] (approximately 75 ml/s), which, though greater than the oral flow peaks in [k'] (figure 2) and [t'] (figure 4), is still much smaller than the peak for either voiceless [ts] or modal [dz].

Sonorants

As Butskhrikidze (2002: 88) observes, in languages like Georgian which permit long consonant clusters, sonorants are often syllabic. Thus, phonetic description of these sounds may ultimately be helpful in sorting out the complex phonotactics of the language. The sonorants are /l r n m v/.

The rhotic and lateral sounds alternate in regular ways in Standard Georgian, with possibly more alternations to be discovered in other dialects. A certain nominalizing suffix has two variants, *-uri* under most circumstances and *-uli* if there is a rhotic in the base, e.g. /tʰbilisuri/ 'of Tbilisi (non-person)' but /kʰɑrtʰuli/ 'of Georgia (non-person)' (Hewitt 2005: 282). This regular dissimilation of /l/ gives further evidence of a relationship that seems to exist between laterals and rhotics in many languages (Ladefoged & Maddieson 1996: 243).

Although it has been claimed that the Georgian /r/ may be 'rolled', this does not seem to be the case for the present speaker (Hewitt 2005: 5). In our tokens, the average closure duration for an intervocalic /r/ is quite short, on the order of 20 ms, and there is little evidence for sustained trilling in the audio signal. While the two brief reductions in oral flow observed in figure 5 may be indicative of a two-strike trill, it is probably safe to say that taps, not multiple-strikes, are the pronunciation norm in Standard Georgian.

The labiodental fricative phoneme /v/ is realized as a canonical voiced labiodental fricative in most cases, e.g. [vgɾdznɔb] 'I feel', [vɑɾdi] 'rose', and [hɑvɑ] 'climate'. Before voiceless consonants /v/ is realized as [f] or [ɸ], e.g. [ftʃ'ɑm] 'I eat' and [ɸpɾtskʰvni] 'I peel'; the labiodental and bilabial realizations seem fairly unpredictable. In some cases, /v/ is deleted from this position. The fricative is also optionally dropped when it occurs in word initial position before /u/, e.g. /vuts'ɛɾ/ → [uts'ɛɾ] 'I write for someone'. Butskhrikidze (2002: 88) argues that /v/ is realized as secondary rounding on preceding obstruents, e.g. /q'vɑvili/ → [q'ʷavili] 'flower'. This is definitely the case after voiceless obstruents. However, since the off-glide is also devoiced, it is practically impossible to differentiate, e.g. (a) [sit'χ'ʷɑ] from (b) [sitχ'ɸɑ] or [sitχ'fɑ]. Forms (a) and (b) result from two competing analyses. To achieve (b), /v/ simply devoices after voiceless obstruents (variably shifting from labiodental to bilabial place in the process). To achieve (b), /v/ is realized as a secondary feature of rounding and also becomes devoiced. The secondary feature analysis seems not to apply in all post-obstruent cases. After voiced stops, e.g. /gvɛɾdi/ → [gvɛɾdi] 'side', voicing, labiodental contact, and audible frication are all evident in the realization of /v/. Moreover, the second author strongly disapproves of forms like *[gʷɛɾdi] where /v/ is realized as a frictionless off-glide of a voiced obstruent. This evidence may be problematic for Butskhrikidze's (2002) analysis of /v/ as a secondary rounding feature after obstruents, since the generalization does not apply to /v/ when it follows voiced stops.

Vowels

Georgian is said to have a five-vowel system. The system is illustrated by the following near-minimal pairs:

	IPA	Georgian	Gloss
i	girɑɔ	გირაო	mortgage
ɛ	gɛdi	გედი	swan
ɑ	gɑdiɑ	გადია	nursemaid
ɔ	gɔrɑ	გორა	hill
u	guda	გუდა	leather bag

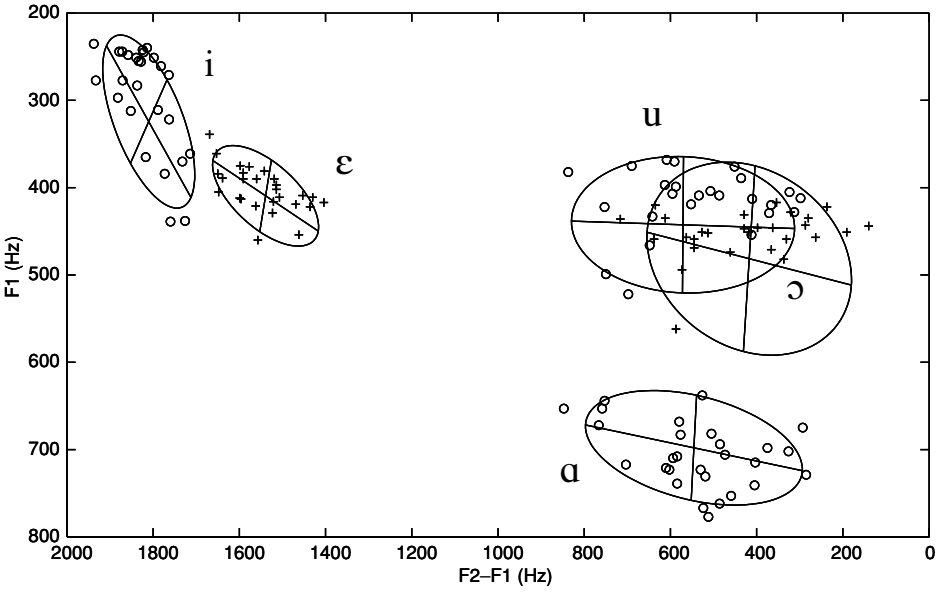

Figure 6 The five-vowel system of Georgian. Tokens were obtained from 30 nonsense VCV utterances where consonantal place of articulation and ejectivity were controlled. The utterances were produced by a male speaker.

While Akhvlediani (1949) claims that there are no tense vowels in the inventory, our auditory impression is that the high vowels [i] and [u] are in fact tense and that only [ɛ] and [ɔ] are lax. This may be a fairly recent development. The vowel [ɑ] has a fairly low F2, but does not seem rounded upon visual inspection of the lips. Length and nasalization are not relevant features of the Georgian vowel system. Adjacent vowels are disallowed in monomorphemic words, ruling out the possibility of diphthongs (Butkhrikidze 2002: 83). When adjacent vowels do occur as in [girɑɔ] 'mortgage', the vowels are heterosyllabic.

The vowel chart (figure 6) was obtained through elicitation of 30 VCV nonsense syllables, with outliers (>2 standard deviations from the mean) disregarded. The consonants in the tokens were distributed equally by place (velar, dental, labial) and by manner (ejective, voiceless). Ellipses are drawn according to the least-squares method, where axis-crossings represent the central tendency of each vowel.

Transcriptions

The phonemic transcription of 'The North Wind and the Sun' is an idealized version based on Georgian orthography. By contrast, the narrow phonetic transcription is drawn primarily from the audio recording. Two narratives were recorded, as spoken by the second author. Both versions were transcribed without access to the orthographic version by a non-native speaker of Georgian (the first author) and then compared. Inconsistencies were noted and the transcription was revised upon further study of the sound spectrograms. Of course, the transcription of only one of the narratives is presented here.

In the phonetic transcription, vowel quality and consonant clusters are represented as they sound, which presents us with some unexpected assimilations and reductions. Little is known about the way Georgian consonant clusters, much celebrated for their complexity (e.g. Butskhrikidze 2002), seem to be reduced in conversational or even read speech. The phonetic transcription gives some indication of a few processes: deletion and/or vocalization of nasals, e.g. /ʃɛtanxmdnɛn/ 'they agreed' → [ʃɛtʰaũɣmdɛn], and deletion of rhotics, e.g. /tʃɾdilɔɛtis/

'north.GEN' → [tʂtʰiloɛtʰis]. Owing to the complexity of Georgian consonant phonotactics, there are doubtless other strategies of reduction to be discovered.

There is at least one case of an increasingly complex structure (at least from the segmental point of view) being built in the transition from the phonemic to the phonetic transcription. The realization of /mzɛ/ 'sun' as /mbzɛ/ exemplifies a so-called 'emergent stop', conditioned by the timing of nasal and fricative production in the sequence /mz/. This phenomenon has been discussed extensively by Ohala (1981, 1992, 2005) in terms of a 'mechanical' model of the vocal tract. During the articulation of nasal + fricative sequences, there is some probability that both the nasal and oral 'exit valves' will be closed simultaneously while switching from nasalization to (oral) frication. Until the stop itself becomes phonologized, there may be no way of accurately predicting when this epiphenomenon will occur in a given utterance. Accordingly, emergent stops are regarded as probabilistic phenomena in the phonetic transcription and are transcribed as they were heard and as they appear under closer examination in the spectrogram.

Orthographic version

ჩრდილოეთის ქარი და მზე კამათობდნენ თუ რომელი იყო უფრო ძლიერი. ამ დროს გაიარა ერთმა ნაბადწამოხურულმა მგზავრმა. ისინი შეთანხმდნენ უძლიერესად ეცნოთ ის, რომელიც მგზავრს პირველი მოახდევინებდა ნაბადს. ჯერ ჩრდილოეთის ქარმა დაუბერა მთელი ძალ-ღონით, მაგრამ რაც უფრო ძლიერ უბერავდა, მგზავრი მით უფრო მაგრად ეხვეოდა ნაბადში. ბოლოს ჩრდილოეთის ქარი დაცხრა. ახლა მზემ გამოაბრწყინა და დააცხუნა. მგზავრმა ნაბადი მაშინვე მოიხადა. ამრიგად, ჩრდილოეთის ქარი იძულებული გახდა ელიარებინა, რომ მათ შორს მზე უფრო ძლიერი იყო.

Phonemic transcription

tʃrdilɔɛtʰis kʰɑri da mzɛ k'amatʰɔbdnɛn tʰu ʀomɛli iq'ɔ upʰʀɔ dzliɛri. ɑm dʀɔs gaiaʀa ɛrtʰma nabadts'amɔxurulma mgzavʀma isini ʃɛtʰanxmdnɛn udzliɛʀɛsad ɛtsnɔtʰ is, ʀɔmɛlits mgzavʀs p'irvɛli mɔaxdevinebda nabads. dʒɛr tʃrdilɔɛtʰis kʰɑrma daubɛʀa mtʰɛli dzalɣɔnitʰ, magʀam ʀats upʰʀɔ dzliɛr ubɛʀavda, mgzavri mitʰ upʰʀɔ magrad ɛxveɔda nabadʃi. bɔlɔs tʃrdilɔɛtʰis kʰɑri datsxʀa. ɑxla mzɛm gamɔabrts'q'ina da daːtsxuna. mgzavʀma nabadi maʃinvɛ mɔixada. ɑmrigad, tʃrdilɔɛtʰis kʰɑri idzulɛbuli gaxda ɛɣiaʀɛbina, ʀɔm matʰ ʃɔris mzɛ upʰʀɔ dzliɛri iq'ɔ.

Phonetic transcription

tʂtʰiloɛtʰis kʰɑri da mbzɛ k'amat'ɔbdɛn tʰu ʀɔmɛli iχ'ɔ upʰʀɔ dzlieri. ɑm dʀɔs gajɛʀa ɛrtʰma nabɔts'amɔsxulma ŋgzaurma isini ʃɛtʰaũɣmdɛn udzliɛʀɛsaᵭ ɛtsnɔtʰ is, ʀɔmɛlits mgzaˑɣʀs p'irvɛli muaxᵭevineᵬᵭa nabaᵭs. dʒəˑ tʂtʰiloɛtis kʰɑrma daubɛʀa mtʰɛli dzaʟɣɔnit, magʀam ʀas upʰʀɔ dzliɛr ubɛʀavda, gzauri mitʰ upʰʀɔ magʀaᵭ ɛxveoda naᵬaᵭʃᵭ. bɔlɔs tʂiloɛtʰis kʰɑri datsxʀa. ɑxla mzɛm gamɔabrts'χ'ina da daːts'χ'una. gzaurma nabadi maʃinʷɛ mɯjxada. amərigaᵭ, tʂtʰiloɛtis kʰɑri idzulɛbuli gaxᵭa ɛɣiaʀɛbinə, ʀɔm mat ʃɔris mzɛ upʰʀɔ dzliɛri iχ'ᵮ.

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