

Phonetics and Phonology of Cypriot Geminate in Spontaneous Speech *

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The analysis of spontaneous speech in Cypriot Greek reveals considerable variability in duration of consonants. Consonants preserve a contrast in duration under the same phonological conditions, which should therefore be regarded as a phonological opposition rather than the effect of phonetic factors. It is also argued that spontaneous Cypriot speech shows considerable influence from Standard Modern Greek, which accounts for additional variation in the duration and articulation of consonants.

1 INTRODUCTION

The so-called “geminate” are one of the most well studied subjects in Greek dialectology. Modern Greek dialects are sometimes divided in linguistic studies into two major groups: “geminating” and “non-geminating”. Among geminating dialects are those of the South-eastern group, including Cypriot, Dodecanese, Chios and Greek dialects of Southern Italy. There seem to be no traces of gemination to the West of the Greek-speaking area, in the dialects of Santorini, Myconos, Euboia and in mainland Greece (Newton 1968: 18).

2 PREVIOUS STUDIES OF CYPRIOT GEMINATES

According to the existing descriptions, geminate or long consonants¹ occur both in word-initial and word medial position in contrast to short ones. All consonants except /z/, /ʒ/ and /j/ exhibit length contrast. Apart from greater duration long consonants are also described as tenser than the short ones; long stops are completely voiceless and aspirated (Newton 1972: 33-34).

While long and short consonants may occur in the same context, there is only a very limited number of attested minimal pairs, members of which often are different parts of speech: [m^lil:a] ‘fat’ – [m^lila] ‘apples’, [p^l:efti] ‘falls’ – [p^lefti] ‘Thursday’, [k^lota] ‘hen’ – [k^lot:a] ‘knock-IMP’ (Newton 1972a, Tserdanelis & Arvaniti 2001). Kondossopoulos (1973: 101) even suggests that there is no real phonological opposition between short and long consonants and pronouncing long consonants too short never results in misunderstanding.

Malikouti-Drachman (1987) suggested that all Cypriot long consonants are monosegmental, but with two slots on the skeletal tier, since they share rules which affect the melodic tier with singletons (e.g. affrication/palatalization before front vowels) and rules which affect the skeletal tier with consonants clusters (e.g. deletion of the preceding nasals). This analysis of geminate as two timing slots dominated by single root node was also adopted by Muller (2002).

A number of experimental studies on Cypriot geminate were conducted by Arvaniti (2001a, b) and Arvaniti & Tserdanelis (2000), Tserdanelis & Arvaniti (2001).

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¹ Both terms are used in prior works.

They found that geminates are consistently longer than single consonants. This distinction was also preserved for various speaking rates: Arvaniti (2001a) showed that there was no overlap between the durations of geminates spoken at fast rate and singletons spoken at normal rate. However in many cases long consonants showed greater variability in duration than short consonants. Tserdanelis & Arvaniti (2001) also looked at the influence of long and short consonant on adjacent segments and found that although there was a tendency for preceding vowels to be shorter before geminates than before singleton consonants, this effect was not consistent.

3 METHODOLOGY AND DATA

The present study is based on a series of interviews recorded in Cyprus from three speakers of Cypriot Greek. All speakers were men of the same age group (over 70 years old) and had similar educational and social background (primary/secondary school, manual workers or farmers). All recordings were made in an informal setting. The speakers were asked about subjects in which they were intimately involved, such as their childhood, school, family, first job etc. As far as possible the interviewer tried not to intervene in the conversation, so that most of recordings are a spontaneous monologue.

Auditory impressionistic analysis showed that all three speakers employed both regional and standard forms in their monologues. In Cypriot Greek, where for some features it was clear whether the speaker had chosen regional or Standard forms (use of velars or affricates before front vowels, consonant clusters arising from consonant+/j/ sequences), regional pronunciation was used in about 70% of all cases.

The pattern of variation of duration was analyzed for the sonorant /l/ and for the voiceless stops /p/, /t/, /k/. These consonants were chosen because during the auditory analysis /l/ showed the highest percentage of tokens labelled as “long”, while for stops variation in duration was also accompanied by other features such as aspiration, which is a very prominent Cypriot feature and not common in other Greek dialects.

The tokens for further measurements were chosen so that they represented the existing variation and at the same time allowed comparison between different tokens under similar conditions.

Therefore most consonants labelled as “geminates” (i. e. aspirated stops or those showing notably greater duration) were included. If a word containing a “geminate” consonant occurred more than once, all of its occurrences were chosen for further analysis. They were complemented by a comparable sample of tokens, which did not show such features. The second set of tokens was chosen from the consonants that occurred in similar contexts (in terms of adjacent vowels and stress pattern), to exclude variation due to phonetic factors.

As most of the “geminate” consonants occurred in intervocalic position with only 5 examples of “geminate” consonants preceded or followed by another consonant, the geminates in consonant clusters were not included in the study. Although the data included “long” consonants at the beginning of a lexical unit (e.g. [p^hefto] ‘I sleep’, [l^hio] ‘little’), in all cases they were preceded by the word-final vowel of the preceding word (mainly pronouns or articles). There were no examples of “long” consonants after a pause or syntactic boundary. Therefore word-initial geminates will not be discussed separately.

To exclude the effect of prepausal lengthening, consonants that occurred in the last syllable of the utterance were excluded from further analysis. Consonants that occurred in words perceived as “strongly emphasized” were also discarded to exclude the possible effect of emphasis.

4 INSTRUMENTAL ANALYSIS OF CONSONANT DURATIONS

The instrumental analysis of durations of /l/ (147 tokens), /p/, /t/ and /k/ (74 tokens) showed great variability in duration for all these consonants (21 ms to 191 ms for /l/ and 32 ms to 224 ms for stops). Although both for /l/ and for stops it is possible to speak about bimodal distribution of their durations, contrary to the results from controlled speech experiments, consonants identified through auditory analysis as short or long showed considerable overlap in their duration. This poses a problem of objective criteria to distinguish between long and short consonants, if such a distinction indeed exists and is not just a matter of durational variability or variation under specific phonological conditions.

Consonants were identified as long in only about 1% of cases of stops and 10% of cases of /l/. Although in this kind of auditory analysis errors are quite probable, the very small percentage of consonants labelled as long suggests that their frequency is much lower than the frequency of short consonants.

At the same time most consonants labelled as long tended to occur in a limited number of words, which generally corresponded to words listed in previous studies as containing geminate/long consonants. These included words spelled in standard orthography with both double and single consonants. Many of these words showed substantial variability in the duration of the consonant in question; however, the limited number of occurrences does not allow any conclusion to be drawn as to whether consonants are less often shortened in words where longer duration is also reflected in spelling. Some of these words only occur in Cypriot dialect, but most of them are widely used both in Cyprus and in mainland Greece. All words were common colloquial words related to everyday life, crafts and agriculture (the full list of words is given in the Appendix). Considerable variability of duration of stops in these words was also accompanied by other phonetic features, namely phonetically long stops were aspirated, while short stops were often lenited.

Longer /l/'s were also attested at the juncture between articles and nouns, where they arise from the sequence /n/ + /l/. However there was no difference in duration or other features between the consonants within or across a morpheme boundary.

The data did not contain words which would only be distinguished by "long" or "short" consonant. Such a minimal pair would be needed to establish that Cypriot Greek has contrastive consonant length. The only example in support of this hypothesis is variation in the duration of /l/ in the verb /val:'o/ 'I put', which was associated with the distinction between present and aorist stem.

Let us now examine whether this variability in duration could result from factors other than gemination, such as stress pattern, speaking rate, emphasis or phonological context or it can be better explained by introducing the distinction between geminates and singletons.

4.1 Variation as an effect of phonetic factors

The data sample for the instrumental analysis included words where consonants impressionistically labelled as "long" and "short" occurred in the same phonological context (i.e. same quality of the preceding and following vowel quality and position of stress) (such as /al:'a/ 'but' vs. /kal'a/ 'good', /an'ot:eros/ 'higher' vs. /t'otes/ 'then', etc.). This allowed the effect of the phonological context on the variability in duration to be tested. Of course, due to the nature of the data it was not possible to compare consonantal duration in these words under exactly the same conditions in terms of speaking rate or position in the sentence.

The effect of intrinsic duration was found insufficient to account for the variation, as all consonants showed a similar bimodal distribution in their duration. The analysis of average durations of different consonants confirmed the general tendency for coronals to be the shortest. The duration of /t/ was significantly shorter than the duration of /p/ and /k/ (82 ms vs. 105, Kruskal-Wallis nonparametric test, $p < 0.01$). The difference between /p/ and /k/ was not significant. The same ranking was found in the duration of closure: /t/ showed the shortest duration of closure (56 ms), while the difference between /p/ and /k/ (69 ms and 73 ms) was insignificant.

If variation in duration were a result of interaction between stress pattern and the influence of adjacent vowels, we would expect all words where the consonant in question occurs in similar phonological context to exhibit similar variation. Yet this was not the case and some words showed greater variability than others.

Speaking rate is more difficult to control; however, the fact that words with “long” and “short” consonants often co-occurred within the same sentence or even followed each other and still preserved the difference in consonant duration suggests that this variation cannot be attributed to changes in the speaking rate only. Furthermore, previous studies of Cypriot Greek and other languages have found that changes in speaking rate affect both vowels and consonants. Therefore, if durational differences resulted from changes in speaking rate, we might expect greater duration of vowels adjacent to longer consonants. Yet there was no difference in variation of vowel duration between two groups of words.

Emphasis, which can also affect segment duration, has not yet been studied for Cypriot Greek; therefore, there are no established criteria that could be used to label syntactic constituents as emphasized. However some cases of strong emphasis identified impressionistically show that not all emphasized words have long consonants and not all words with long consonants are perceived as emphasized. Thus the observed variability cannot be solely attributed to emphasis on the given word. The data did not contain clear cases of “spontaneous gemination” under emphasis. That is there were no examples, when a word that usually is pronounced with short consonant would be pronounced with long consonant. However some words that were pronounced with long consonants only occurred once and therefore it is impossible to determine whether the geminate forms part of its phonological representation or was due to emphasis. Since none of these words was perceived as emphasized, at this stage they were not distinguished from other cases.

Thus the variation in duration of Cypriot Greek consonants could not be explained on phonetic grounds, which suggests that it may be linked to a phonological distinction, as suggested by the bimodal distribution of durations.

4.2 Variation as a result of a phonological opposition between “short” and “long” consonants

Analysis of duration suggested dividing all consonants in question into two groups:

- (1) Phonetically long consonants, occurring morpheme-internally in specific words or across a morpheme-boundary as a result of assimilation.
- (2) Phonetically short consonants, occurring morpheme-internally in the vast majority of words.

Not surprisingly some tokens departed from the general pattern, including unusually short consonants in words that normally have long consonants or unusually

long consonants in words where the consonant in question is normally short. These cases will be discussed separately later.

I will first look at the first two groups. Consonants in these groups showed a significant difference in duration (Mann-Whitney U test $p < 0.001$) and clearly a bimodal distribution. The average duration of short /l/ was 54 ms and 117 ms for long /l/. The average durations of short and long stops were 50 ms vs. 164 ms respectively.

The fact that there was a certain overlap in the durations for long and short consonants raises the question of arbitrariness of division. However the distribution of consonants between these two groups is also supported by other factors apart from duration. The contrast in duration of stops is accompanied by other phonetic features, namely long consonants are aspirated and voiceless, while short consonants are voiced and do not have complete closure. This distinction allows most stops to be classified as short or long on the basis of clear, objective criteria. The difference in duration between aspirated and unaspirated consonants is mainly due to the duration of the voice onset time (VOT) with VOT for aspirated consonants being considerably longer than for unaspirated (23 ms vs. 64 ms, Mann-Whitney U $p < 0.001$). The duration of closure of aspirated consonants was also a little greater than for unaspirated (88 ms vs. 73 ms, Mann-Whitney U $p = 0.03$). However, there was greater overlap between the durations of closure for aspirated and unaspirated consonants than between VOT, which shows that the duration of closure is less variable.

Although it is hardly possible to establish a clear breakpoint in the continuum of durations for /l/, where no other phonetic features were found apart from differences in duration, the division of consonants into long and short revealed a number of significant correlations between the duration of /l/ and adjacent vowels specific to each of these groups. Thus the duration of the preceding vowels was inversely correlated with the duration of short /l/, while for long /l/ this correlation was positive, thus the timing strategies for long and short /l/ were different. Notably no difference was found in the duration of vowels preceding long or short consonants.

These findings support the results of previous studies, where long consonants were also found to show greater duration and aspiration in case of stops. Contrary to Arvaniti & Tserdanelis (2000) my data also showed consistent lenition of short stops, which were frequently pronounced as voiced fricatives.

Most of the words which contained long consonants in my data have also already been characterized in previous studies as such, which shows that there is consistent use of long consonants in certain morphemes across different studies.

4.3 Consonants which showed deviations in their duration

There was also a considerable number of consonants (25% of /l/ tokens and 30% of stops) the identification of which as “long” or “short” is more problematic. These are consonants which occur in words that in other cases had long consonants; however, the duration of the consonants in these words sometimes is either between average duration of short and long consonants or even as short as short consonants.

The duration of the /l/ tokens from this group showed no correlation with the duration of either of the adjacent vowels. Other phonetic features of stops related to consonant length also suggest the unclear status of some consonants. Stops in this group were voiceless and had complete closure like long consonants; however, they were not aspirated and showed significantly shorter average duration of closure (58 ms vs. 89 ms for aspirated stops, Mann-Whitney U test $p < 0.01$), which corresponded to the average duration of lenited stops. Unaspirated voiceless stops occurred in words with both “short” and “long” consonants.

This variation can be attributed to two main reasons. First of all, if long consonants are in fact consonant clusters and not segments distinguished by quantity, they may be expected to show greater overlap in duration with single segments, because quantity in this case is not a distinctive feature. This process can also be described as phonetic shortening of consonant clusters, which is likely to occur in spontaneous speech. If these consonants are indeed shortened consonant clusters, this explains why they preserve some of the features shared with geminate feature (for example full closure and lack of voicing) and at the same time share some features with singletons (lack of aspiration). Thus first this variation can be explained as variation in phonetic realization of consonant clusters.

It might also be regarded as variation at the phonological level and attributed to the influence of Standard Modern Greek, which does not allow sequences of two identical consonants. In this case simplification of geminate clusters can be analyzed either in terms of constraints on distribution as avoidance of disallowed clusters or in terms of different constraints on syllable structure in Cypriot and Standard Modern Greek.

Notably the percentage of consonants that could not be classified as geminates or singletons corresponds to the percentage of Standard forms attested by other features. However at the present stage of research it is hardly possible to separate the effect of phonetic variation from the result of influence of Standard Modern Greek. This was also suggested by Newton (1983: 56) who also noticed that variation in Cypriot speech could arise both as “dialect-switching” and effect of tempo and argued that it was not possible to distinguish between these two processes.

APPENDIX

Words that were pronounced with geminates in the data sample used for instrumental analysis.

	IPA transcription	Spelling	English
/l/	al:'a	αλλά	‘but’
	'al:aksa	άλλαξα	‘I changed’
	'al:akse	άλλαξε	‘he/she changed’
	'al:aksan	άλλαξαν	‘they changed’
	'al:os	άλλος	‘other’
	'al:i	άλλοι	‘others-MASC’
	'al:es	άλλες	‘others-FEM’
	'al:in	άλλη	‘other-FEM. ACC’
	'al:u	άλλου	‘other-MASC.GEN’
	'al:us	άλλους	‘others-MASC.ACC’
	'efkal:a	έβγαλα	‘I took out’
	efk'al:ame	βγάλαμε	‘we took out’
	'efkal:e	βγάλαμε	‘he/she took out’
	el:'aða	Ελλάδα	‘Greece’
	el:inik'is	ελληνικής	‘Greek’
	'eval:a	έβαλα	‘I put-PAST’
	v'al:amen	βάλαμε	‘we put-PAST’
	v'al:ame	βάλαμε	‘we put-PAST’

	kop ^l el:a	κοπέλα	‘girl’
	kopel: ^l uθca	-	‘children’
	kup ^l el:i	κοπέλι	‘child’
	l: ^l iyon	λίγο	‘little’
	mel: ^l ia	με λίγα	‘with little’
	metal: ^l iya	με τα λίγα	‘with the little’
	m ^l al:on	μάλλον	‘may be’
	pol: ^l a	πολλά	‘very’
	pol: ^l i	πολλοί	‘many-MASC’
	pol: ^l us	πολλούς	‘many-MASC.ACC’
	^l ul:a	ούλα	‘all’
	^l ul:es	ούλες	‘all-FEM.ACC’
	^l ul:i	ούλοι/ ούλη	‘all-MASC / ‘whole-FEM’
	^l ul:o	ούλο	‘whole-NEUTR’
	^l ul:us	ούλους	‘all-MASC.ACC’
	xal: ^l umja	χαλούμια	‘haloumi- PL.’
	Word-final /n/ +/ l/		
	stil:efkos ^l ia	στη Λευκωσία	‘in Nikosia’
	stil: ^l efkan	στη Λεύκα	‘in Lefka’
	stil:emes ^l o	στη Λεμεσό	‘in Limassol’
	til:efkos ^l ia	τη Λευκωσία	‘Nicosia-ACC’
	til: ^l isi	τη λύση	‘the solution-ACC’
	til: ^l isin	τη λύση	‘the solution-ACC’
/p/	nap: ^h efto	να πέφτω	‘I sleep-SUBJ’
	nap: ^h esi	να πέσει	‘he/she sleeps-SUBJ’
	p: ^h esame	πέσαμε	‘we slept’
	parap: ^h ez:i	παραπαίζει	‘he/she plays up’
	tsap: ^h isis	τσαπίσεις	‘you dug out’
	tsap: ^h iz:o	τσαπίζω	‘I dig out’
/t/	an ^l ot: ^h eri	ανώτεροι/ ανώτερη	‘higher-MASC.NOM.PL.’/ ‘higher-FEM.NOM.SG.’
	an ^l ot: ^h ero	ανώτερο	‘higher-NEUTR.NOM.SG’
	kallit: ^h ero	καλύτερο	‘better-NEUTR.NOM.SG’
	obr ^l it: ^h era	-	‘earlier-NEUTR.NOM.SG’
	el ^l at: ^h oma	ελάττωμα	‘shortcoming’
	tot: ^h avli	το τάβλι	‘the backgammon’
/k/	tʃak: ^h ilja	-	‘pebbles’
	ok: ^h a	η οκα	(measure of length)
	k ^l ok: ^h ines	Κοκκινες	(district in Nicosia)
	l ^l ak: ^h on	λακκον	‘pond-ACC’
	stik: ^h en	στη KEN	‘in KEN’ (name of a company)
	tenek: ^h e:s	τενεκεδες	‘tins’
	tsur ^l ak: ^h i	-	‘boy’

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