Retroflexion of /l/ in Modern Greek dialects: the case of Aperathou (Naxos) dialect

Kalomoira Nikolou[1], Angelos Lengeris[2] & Maria Xefteri[3]
University of the Aegean[1], University of Thessaloniki[2], University of Athens[3]

1. Introduction

Aperathou dialect (henceforth ApN) is spoken in the north-eastern part of the island of Naxos, one of the islands that constitute the Cyclades island group in the Aegean Sea. The dialect exhibits an intriguing combination of both Cycladic and (western and eastern) Cretan linguistic features at all levels of grammar (Sigalas 1949; Oikonomidis 1952; Zevgolis 1998; Xefteri 2009), leading many dialectologists to assume that there is a Cretan-Cycladic linguistic unity (Newton 1972; Kontossopoulos 2000).

According to previous impressionistic descriptions of the ApN dialect, among the phonological features that resemble the Cretan dialect are (a) the extreme palatalization and (af)frication of velar consonants before the front vowels /i/ and /e/ (Zevgolis 1937, 1956, 1998; Sigalas 1949; Oikonomidis 1952; Kontossopoulos 2000; Xefteri 2009) and (b) the lenition of /t/ and /d/ to /θ/ and /ð/, respectively (Zevgolis 1937, 1956, 1998; Oikonomidis 1952; Xefteri 2009). In this paper, we examine yet another phonological feature of the dialect, specifically the retroflexion of the lateral /l/ before the [+back] vowels /a, o, u/. In this context, the lateral /l/ has a rhotic allophone, namely a retroflex approximant [ɻ]. The retroflex allophone is found in the north-eastern part of Naxos, more specifically in the villages Aperathou (Apiranthos), Danakos, and Triakatha/Moutsouna (Chatzidakis 1905; Zevgolis 1937, 1998; Sigalas 1949; Oikonomidis 1952). In traditional dialectal work, the retroflex allophone has generally been referred to as the 'thick velar [l]' (Sigalas 1949; Oikonomidis 1952) or as a 'type of a rhotic sound' (Zevgolis 1937, 1998; Kontossopoulos 2000). Recent sociolinguistic work by Xefteri (2009, 2010, 2011) shows that the retroflex pronunciation constitutes the most typical and well-recognized feature of the ApN dialect, distinguishing it from other varieties spoken in Naxos.

Although very frequent in linguistic varieties such as American English, the retroflex approximant [ɻ] is a very uncommon sound in Europe only found in some Irish English and Dutch dialects (see Sebregts 2014). The retroflex approximant does not occur in Standard Modern Greek (SMG). SMG as well as Greek dialects have a rhotic phoneme, which is mostly realized as a tap [ɾ] and occasionally as an approximant [ɹ] with varying places of articulation depending on context, prosodic position and speaker (Arvaniti 2007; Baltazani 2005; Baltazani & Nicolaidis 2012, 2013; Nicolaidis 2001; Nicolaidis & Baltazani 2011, 2013). The rhotic [ɾ] is found in free variation with the lateral /l/ in Modern Greek varieties including SMG, a process known as delateralization, but this happens only in syllable coda position; e.g. [a.ðel.fós] ~ [a.ðeɾ.fós] 'brother' (see Newton 1972).

Apart from surfacing in ApN, the retroflex allophone [ɻ] is also attested in central and western Crete with the villages of Anogeia and Sfakia being most frequently cited in the literature as having it in their systems (Pangalos 1955; Kontossopoulos 1972, 2000; Newton 1972; Trudgill & Mansfield 1994; Kappa & Vergis 2011; Vergis 2012). In a recent experimental study, Lengeris et al. (2014) reported that the western Cretan retroflex allophone differs from the standard [l] pronunciation in terms of first (F1) and third (F3) formant frequencies.

The present study examines the allophonic realization of the lateral approximant /l/ as a retroflex approximant [ɻ] in the ApN dialect with the goals of (a) determining the phonological environments which favor its occurrence, e.g. following vowel, syllable and word position, stressed *vs* unstressed syllable, (b) comparing the acoustic characteristics of the retroflex allophone with the standard [l]

pronunciation in the dialect, and (c) comparing the acoustic characteristics of the retroflex ApN allophone with the Cretan one.

2. Methodology

2.1 Dialectal speakers and speech elicitation

Six speakers of the dialect (3 female and 3 male) with a mean age of 81 years (range = 77-88 years) were recorded conversing freely with a native speaker of the dialect. All speakers were permanent inhabitants of Aperathou village and had received basic education. Male speakers were occupied with emery mining, stock raising, agriculture and building construction and female speakers with household. None of the informants had spent a period of more than six months away from his/her village. Each conversation revolved around informants' hobbies, work, family and village and lasted approximately thirty minutes.

2.2 Acoustic analysis

Acoustic analysis was performed in PRAAT (Boersma & Weenink 2008). The duration of [l], [ɻ] (in cases where /l/ was realized as a retroflex) and /ɾ/ (duration of closure) was measured from spectrograms, from the onset to the offset of periodic energy in F2. The F1, F2 and F3 formant frequencies were measured at the centre of [l] and [ɻ] (in cases where /l/ was realized as a retroflex).

3. Results

3.1 Frequencies and environments

Table 1 shows the number of the allophonic realizations of underlying /l/ and /ɾ/ by speakers of the ApN dialect (collapsed across gender since there were no gender-induced differences in our results). Focusing on the realizations of underlying /l/, there were 92 standard [l] and 144 dialectal [ɻ] realizations. From the 92 standard [l] realizations only 8 occurred before back vowels /a, o, u/; in this environment, speakers predominantly preferred the dialectal [ɻ] over the standard realization (144 times *vs* 8 times). As expected, the 144 dialectal realizations never occurred before front vowels /i, e/ and their use was restricted only before back vowels /a, o, u/. Speakers of the ApN dialect therefore showed an extensive use of the retroflex allophone before back vowels.

	Underlying /l/		**Underlying /ɾ/**
Context	Alveolar lateral approx. [l]	Retroflex approx. [ɻ]	Alveolar tap /ɾ/
_i	24	0	34
_e	60	0	18
_a	6	93	55
_o	2	41	22
_u	0	10	2
Total	**92**	**144**	**131**

***Table 1**: Allophonic realizations of underlying /l/ and /ɾ/ by speakers of the ApN dialect as a function of the following vowel.*

With respect to its phonological distribution, the retroflex allophone [ɻ] occurred in prevocalic (CV) and intervocalic (VCV) position within the word. Looking at the data in more detail, the retroflex allophone occurred in word-initial (1a, e), word-medial (1d) and word-final position (1b, c), in stressed (1c, e) and unstressed syllables (1a, b, d), as well as in consonant clusters (1e), as can be seen in the following examples drawn from our corpus:

(1)		**SMG**	**ApN**	**Gloss**	**Speaker**
	a.	[lu.kú.mi]	[ɻu.kú.mi]	'Turkish delight'	(F1)
	b.	[kó.ka.la]	[kó.ka.ɻa]	'bones'	(M3)
	c.	[mɲa.ló]	[mɲa.ɻó]	'mind'	(M3)
	d.	[po.li.lo.ɣó]	[po.li.ɻo.ɣó]	'talk too much'	(F1)
	e.	[ɣlá.stɾa]	[ɣɻá.stɾa]	'flower pot'	(F1)

However, when the underlying lateral /l/ occurred in syllable coda position, the picture was different. As shown in (2), the process of retroflexion was blocked in postvocalic (VC) positions. In this environment, laterals conformed to the delateralization[1] process that applies to SMG too and were realized as [ɾ], which is also reflected in orthography, e.g. *κάρτσα* [kár.tsa] 'sock'. The examples in (2c-e) are taken from our corpus while complementary data in (2a, b) are taken from written dialectal sources (Oikonomidis 1952: 223; Newton 1972: 112).

(2)		**SMG**	**ApN**	**Gloss**
	a.	[vól.ta]	[vór.ta]	'stroll'
	b.	[kál.tsa]	[kár.tsa]	'sock'
	c.	[kól.pos]	[kór.pos]	'stroke'
	d.	[vál.te]	[e.vár.te]	'put:2.PL.IMP'
	e.	[á.ɣal.ma]	[á.ɣaɾ.ma]	'statue'

Based on the above, it is safe to assume that the emergence of retroflexion in the ApN dialect through the assimilatory influence of a following back vowel context is position-dependent.[2] It has been claimed that, based on phonetic (articulatory) criteria, retroflex consonants are typologically marked (Hamann 2003)[3] and hence their occurrence is restricted to certain salient (prominent) positions within the word, i.e. in syllable onsets rather than in syllable codas (Steriade 1995). In other words, syllable codas do not license the retroflex approximant because they are less prominent (non-privileged) compared to other syllable positions. This is typically discussed under the heading of *positional privilege* and is documented in many languages for many different positions of privilege (see Steriade 1995; Beckman 1997, 1998). This blocking of retroflexion in the ApN dialect can therefore be seen as a case of positional neutralization, which explains why an unmarked segment, in this case the rhotic tap [ɾ], occurs in syllable coda position.

[1] Although /l/ retroflexion is attested only in the ApN dialect, the application of the delaterization process in syllable coda position also occurs in all varieties spoken in Naxos island (for examples see Imellos 1963; Probonas 1968).

[2] For an alternative account of delateralization and retroflexion of the alveolar lateral /l/ in Cretan dialect see Kappa & Vergis (2011). According to their analysis /l/ delateralization and retroflexion is not dependent on the prosodic position, but is instead licenced-by-cue and may be viewed as an enhancement of perceptual salience.

[3] According to Hamann (2003: 4) 'the markedness of a segmental class is often explained phonetically by its articulatory complexity: a segmental class is marked because it is more difficult to articulate compared to a class that it is easier to articulate. Applying this articulatory grounding of markedness to the class of retroflexes, it can be stated that retroflexes are more marked than apical alveolars (or dentals), since retroflexes involve a raising and displacement of the tongue tip towards the post-alveolar region, whereas an apical alveolar involves only a tongue tip raising. The articulatory complexity can hence account for the restricted occurrence of the retroflex class'.

3.2 Acoustic analysis

Figure 1 displays the mean duration (in seconds) of the standard [l] and the dialectal [ɻ] realization of /l/ in the ApN dialect. The mean duration of the rhotic [ɾ] is also given for comparison. The standard and the dialectal realization did not differ in terms of duration (0.052 sec *vs* 0.054 sec respectively), p > 0.05. In addition, both the standard and the dialectal realization were significantly longer than [ɾ] (0.25 sec), p < 0.01.

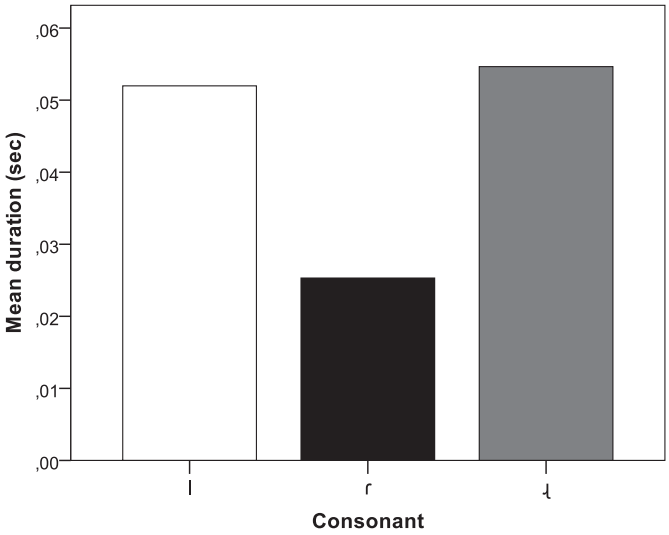

Figure 1: *Mean duration (sec) of [l], [ɻ] and [ɾ] in the ApN dialect.*

Figures 2-4 display the F1-F3 frequencies (Hz) for the standard [l] and the dialectal [ɻ] realization of /l/ by speakers of the ApN dialect. The dialectal realization had a higher F1 than the standard one (578 Hz *vs* 502 Hz respectively), $p < 0.01$ (Figure 2). In terms of F2, there was no difference between the standard [l] and the dialectal [ɻ] realization (1710 Hz *vs* 1652 Hz respectively), $p > 0.05$ (Figure 3). Finally, the dialectal realization had a lower F3 than the standard realization (2212 Hz *vs* 2531 Hz respectively), $p < 0.01$ (Figure 4). The results therefore confirmed that the standard and the dialectal allophone differed in terms of F1 and F3 frequencies. The difference in F3 between [l] and [ɻ] is particularly important because this lowering of F3 contributes to the perception of 'rhoticity' (see e.g. Ladefoged 2003; Lindau 1985).

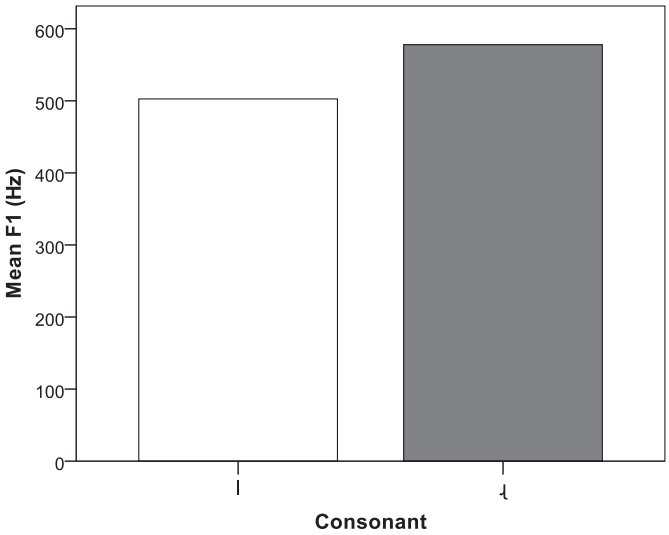

Figure 2: *Mean F1 (Hz) of /l/ and [ɻ] in the ApN dialect.*

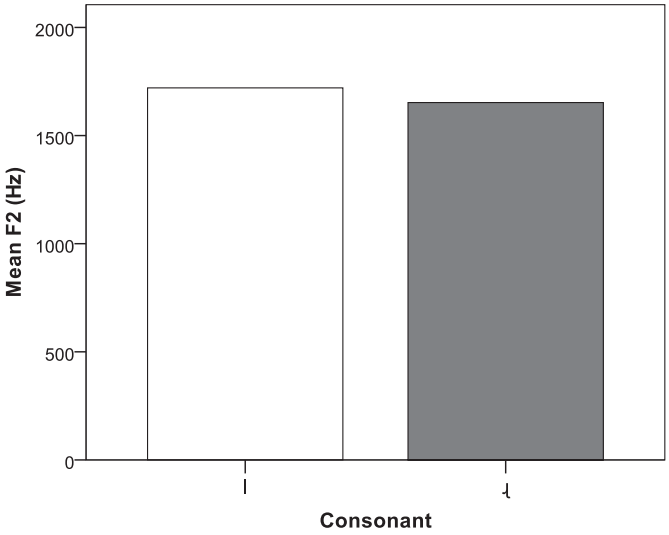

Figure 3: *Mean F2 (Hz) of /l/ and [ɻ] in the ApN dialect.*

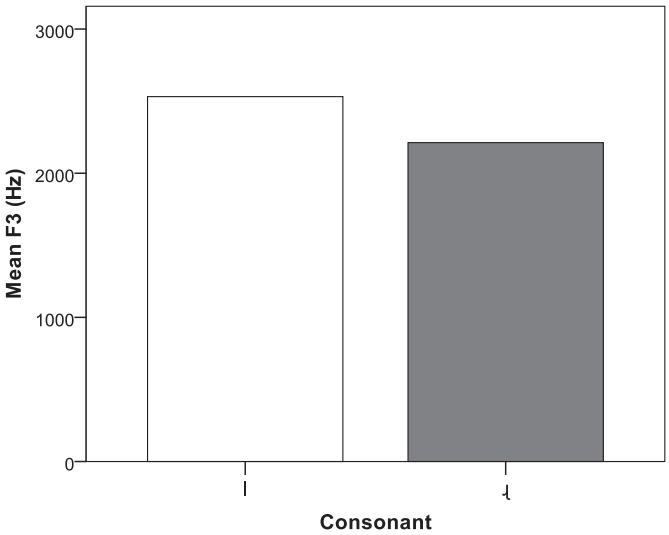

Figure 4: *Mean F3 (Hz) of /l/ and [ɻ] in the ApN dialect.*

3.3 A comparison of the ApN and the Cretan retroflex allophone

As mentioned in the introduction, Lengeris et al. (2014) examined the phonetics and phonology of the western Cretan retroflex allophone. Given the similarities between the ApN and the Cretan dialect, it is worth comparing the results of the two studies. Table 2 shows the frequencies of the realizations of the underlying /l/ and /ɾ/, as they appear in western Crete, reported in Lengeris et al. (2014) (data from 5 male speakers). When compared to the results of the current study (see 3.1, Table 1), it can be seen that in both dialects the retroflex allophone occurs exclusively before back vowels. One important difference between the two dialects is that the use of retroflexion is much more extended in the ApN dialect. Out of 150 instances, where the underlying /l/ appeared before back vowels /a, o, u/ in our corpus, the retroflex approximant was used 144 times (96% of instances) and the standard alveolar approximant was used only 6 times (4% of instances). Out of 104 instances where the underlying /l/ appeared before back vowels in the corpus collected by Lengeris et al. (2014), the retroflex approximant was used 60 times (58% of instances) and the standard alveolar approximant was used 44 times (42% of instances).

	Underlying /l/		**Underlying /ɾ/**
Context	Alveolar lateral approx. [l]	Retroflex approx. [ɻ]	Alveolar tap [ɾ]
_i	36	0	48
_e	57	0	27
_a	32	36	71
_o	8	19	40
_u	4	5	4
Total	**137**	**60**	**190**

Table 2: *Allophonic realizations of underlying /l/ and /ɾ/ produced by speakers of the western Cretan dialect as a function of the following vowel (from Lengeris et al. 2014).*

Although a direct comparison of the two studies in terms of the acoustics of the retroflex allophone is not possible, it seems that the retroflex allophone manifests itself similarly in the two dialects. Its duration was 0.54 sec in the ApN dialect *vs* 0.56 sec in the western Cretan dialect. As for the F1-F3 formant frequencies, the F1 was 578 Hz *vs* 496 Hz, the F2 was 1652 Hz *vs* 1401 Hz, and the F3 was 2212 Hz *vs* 1979 Hz in the two dialects, respectively. Note that, since half of the speakers in our study were women, whose formant frequencies are higher than men due to their proportionately shorter vocal tracts, we expect the means for F1-F3 to be higher than those reported by Lengeris et al. (2014), who recorded only male speakers of the western Cretan dialect.

4. Discussion

This study examined the phonetics and phonology of /l/ delateralization and retroflexion in the ApN dialect, a dialectal feature which is very prominent in this Cycladic variety of Modern Greek (Xefteri 2009, 2010). The results confirmed previous impressionistic descriptions that the retroflex approximant [ɻ] occurs before back vowels /a, o, u/ (Sigalas 1949; Oikonomidis 1952; Zevgolis 1937, 1998; Kontossopoulos 2000; Xefteri 2009, 2010, 2011). In addition, it was found that both male and female ApN speakers used it extensively in this context (144 retroflex [ɻ] *vs* 8 standard [l] realizations). The retroflex allophone differed from the standard one in terms of F1 (higher) and F3 (lower) which provides experimental evidence for retroflexion in the ApN dialect.

Focusing on the phonological distribution of the retroflex allophone, it appeared in word-initial, word-medial and word-final position, in stressed and unstressed syllables and in consonant clusters. Retroflexion was blocked in syllable coda position, where the lateral approximant conformed to delateralization process that applies to SMG and was realized as [ɾ] instead of [ɻ], e.g. [vóɾ.ta] ‘stroll’ instead of *[vóɻ.ta]. Following (Steriade 1995; Beckman 1997, 1998), this blocking of retroflexion in ApN can be attributed to the fact that, since syllable onsets are more prominent than syllable codas, they license the occurrence of the typologically marked retroflex allophone.

Compared to western Cretan speakers (Lengeris et al. 2014), speakers of the ApN dialect used the retroflex allophone much more often in their speech (58% *vs* 96% of the time, respectively). The acoustic characteristics of the retroflex allophone (and more importantly the relative values of the standard *vs* the dialectal allophone) were similar in the two dialects. Our results therefore provide the first experimental analysis of the ApN retroflex allophone and support a close resemblance between the dialects spoken in Aperathou Naxos and western Crete, at least as far as the use of retroflexion is concerned. Future work could experimentally compare the two dialects in terms of other phonological features they share, e.g. extreme palatalization and (af)frication of velar consonants before the front vowels and lenition of /t/ and /d/, in order to be conclusive as to the degree of resemblance between the ApN and the western Cretan dialect.

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