

Length in Kannada alveolar and retroflex laterals: A preliminary acoustic study

Alexei Kochetov
University of Toronto

Background. Kannada, a Dravidian language spoken in South India, exhibits a robust singleton-geminate contrast in intervocalic position. The contrast involves stops, affricates, fricatives, nasals, rhotics, and laterals of various places of articulation, including retroflexes and dentals/alveolars (1). Previous descriptive phonetic accounts have noted that Kannada geminate consonants are about twice as long as singletons (Schiffman, 1983). It is not clear, however, whether and how the realization of the contrast differs depending on the place and manner of articulation. Furthermore, while geminates in Kannada tend to occur after short vowels, it is not known whether the duration of this vowel is different from the short vowel before a singleton, as has been observed for many languages (Maddieson, 1985, among others).

Goal and predictions. The goal of this study is to conduct a preliminary acoustic phonetic investigation of the singleton-geminate contrast in Kannada focusing on the durational characteristics of laterals – alveolars /l-/l:/ and retroflexes /ɭ-/ɭ:/. This set of contrasts is interesting because the geminate-singleton differences are likely to be modulated by place differences. Retroflexes are known to be produced by a fast forward movement of the tongue tip during the closure (Narayanan et al., 1999), and therefore are expected to be shorter than the corresponding alveolars, which involve a spatially stable tongue tip closure. This would presumably result in a 4-way durational contrast: /l:/ > /ɭ:/ > /l/ > /ɭ/.

Method. Ten male native speakers of Kannada in their 20s were recorded in Mysore, India reading a word list with singleton and geminate laterals, including the near-minimal set in Table 1. Each word was produced 3 times. Data for one of the speakers was discarded due to the overly careful pronunciation of some of the target words. Duration measurements of the laterals and the preceding vowels were made in *Praat* (Boersma, 2001), based on waveforms and spectrograms. Repeated measures ANOVAs with the factors Length (singleton vs. geminate) and Place (alveolar vs. retroflex) were used to investigate significant differences in duration of the laterals and preceding vowels.

Results. The results for consonant duration revealed a main effect of Length ($F(1,9) = 120.864$, $p < .001$), with geminate laterals being, as expected, longer than their singleton counterparts. There was also a main effect of Place ($F(1,8) = 26.904$, $p = .001$), indicating that retroflexes were shorter than alveolars. The interaction of Place and Length was not significant ($F(1,8) = .104$, $p = .755$). As shown in Figure 1a, the duration was the longest for /l:/ (182 ms, SD 24 ms) and the shortest for /ɭ/ (57 ms, SD 17 ms); the values for /ɭ:/ and /l/ were in between (160 ms, SD 31 ms; 82 ms, SD 13 ms, respectively). Altogether, this gave the geminate-to-singleton ratio of 2.22 for alveolar laterals and 2.81 for retroflexes. The results for preceding vowel duration showed a main effect of Place ($F(1,8) = 8.185$, $p = .021$), indicative of longer vowels before retroflexes. The factor Length did not reach the significance level ($F(1,8) = 4.120$, $p = .077$), while showing on average shorter vowel duration before geminates (by 9 ms; see Figure 1b). An examination of individual results revealed that pre-geminate vowel shortening was exhibited by 5 out of 9 speakers, with the others showing no clear vowel duration differences.

Discussion. This study confirms the robust phonetic realization of length in Kannada laterals. The difference between geminate and singleton laterals, however, is greater than previously described (Schiffman, 1983), although comparable to sonorant length contrasts in other languages (Aoyama & Reid, 2006). As predicted, retroflexes were found to be shorter than alveolars, due to the dynamic nature of their articulation and a tendency to flapping (Narayanan et al., 1999). In fact, the forward movement of the tongue in our data was evident in the increasing F3 during the retroflex closure (more gradual for /ɭ:/ than for /ɭ/). Altogether, this resulted in the predicted 4-way durational distinction in laterals. The preceding vowel duration results were not consistent across the speakers, with more than half of them shortening the vowel before geminates. This tendency is reminiscent of previous findings for some other languages with geminate contrasts (Maddieson,

1985). To what extent the current results laterals can be extended to other manners and places of articulation is a question for further research.

(1) Examples of the singleton-geminate contrast in Kannada (from Upadhyaya, 1972)

kaṭe	‘story’	kaṭ:e	‘donkey’
giḍa	‘plant’	giḍ:a	‘short’
maga	‘son’	mag:a	‘handloom’
beṇe	‘peg’	beṇ:e	‘butter’
bele	‘price’	bel:a	‘jaggery’
kuḷa	‘party’	kuḷ:a	‘short person (masc.)’

Table 1. Kannada words used in the study.

alveolar singleton		alveolar geminate		retroflex singleton		retroflex geminate	
ಬಲಿ	bali	ವೆಲ್ಲೆ	pal:i	ಬಳಿ	baḷi	ಬಳ್ಳಿ	baḷ:i
	‘victim’		‘lizard’		‘side’		‘creeper’

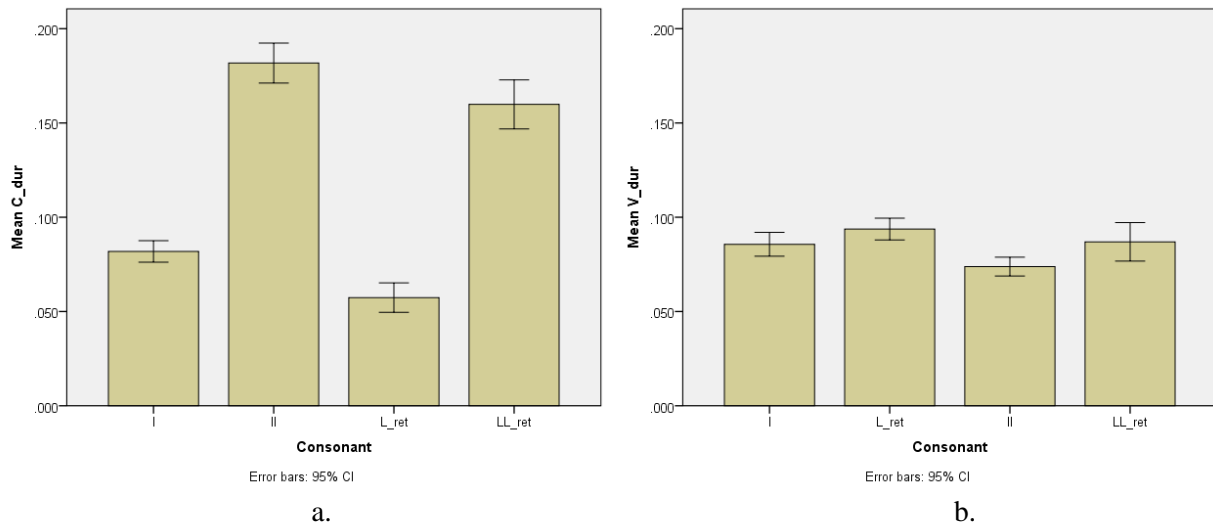


Figure 1. Mean duration (in seconds) of (a) the lateral closure and (b) the preceding vowel by consonant: /l/, /l:/ (II), /l/ (L_ret), and /l:/ (LL_ret), averaged over 9 speakers.

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