# THE DOMAIN OF GEMINATION IN MALAYALAM

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### 1. Introduction

In recent years 'non-linear phonologies' (see e.g. Van der Hulst and Smith, 1982) have shown a renewed interest in the description and representation of the domain of phonological phenomena. Autosegmental analyses of a number of languages, for instance, have examined issues such as the 'boundedness' and 'directionality' of 'autosegmental spreading' (Goldsmith, 1976). So Clements' (1976) discussion of vowel harmony systems draws particular attention to what are termed characteristics of 'unboundedness', wherein a particular harmonising feature 'spreads' to all vowels, but only within a particular domain, and 'bidirectionality', wherein the harmonising feature of, say, the 'root' spreads in 'both directions' to encompass prefixes and suffixes.

Within autosegmental, and lately metrical theory (Van der Hulst and Smith 1982), considerable intellectual effort has been directed towards resolving competing representations of the *domain* of phonological entities. However, one problematic aspect of all recent non-linear approaches, is the impoverished nature of the phonetic observations on which they are based; routinely we find little more than a broad (phonemic) transcription. Such practices make it extremely difficult to assess seriously the arguments and claims about phonological domain. In this paper we will concentrate on the issue of *domain* through an examination of the phonetic detail attendant on 'gemination' in Malayalam. Gemination has been employed as a construct in the phonological analyses of many languages (Carnochan 1957, Clements 1986, Mohanan 1982, Nayar 1972, Palmer 1957), and the representation of geminate consonants has recently been explored in a number of non-linear analyses (e.g. Clements 1976, Mohanan 1984). However, regardless of the frameworks within which gemination has been treated, and the many languages for which it has been posited as a phonological unit or process, the accounts share one important

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characteristic - the phonetic exponents of gemination are described as having extremely limited domain: they are assumed to be found at a particular consonantal place in utterance (cf. however, Carnochan 1957 and Palmer 1957). In other words, gemination is typically seen to have implications for utterance in terms of duration, manner or place of articulation at a particular point in utterance.

Mohanan (1984), for instance, derives certain (phonetically) long nasals, which he terms geminates, by means of two phonological rules. The first is a rule of 'homorganic nasal assimilation' (1984:583), the second a rule which 'changes voiced stops to nasals after nasals':

*Anunaasikaatiprasaram* ('spreading of nasality')
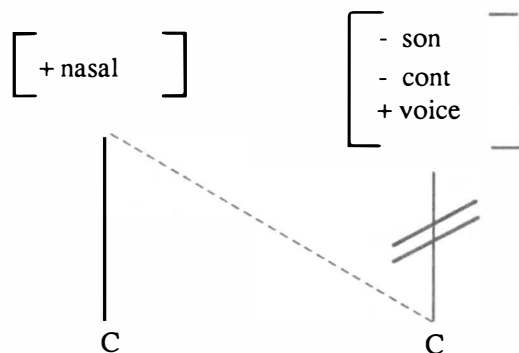


(Mohanan 1984:584)

By means of these two rules, the form *panni* ('pig') (Mohanan's representation) is derived from an underlying structure of the form /paNḍi/.

Whatever criticisms may be leveled at the analysis itself, one point should be clear: gemination and its exponents are seen as having implications for a particular consonantal place in utterance and nowhere else.

For Nayar (1972) too, though his work is within a different theory (Firthian prosodic analysis), gemination/non-gemination is seen as being punctually located in utterance:

> Those of g stated in the transitive forms of such verbs include a longvoiceless tense plosive articulation...
>
> (1972:216)

> ...the exponents of g include non-syllabic junctional element statable before non-past suffixes and implying phonetically a long voiceless tense velar plosive articulation... in the past forms... implying a long voiceless tense dental plosive.
>
> (1972:219)

To this point, we have not paid serious attention to the possible meanings that 'gemination' might have. But even superficial perusal of the literature we have cited serves to indicate that linguists approach the discussion of 'gemination' with varying degrees of sophistication. For some, 'gemination' is simply a way of dealing with 'long consonants'. For others, more

interestingly, gemination and non-gemination are phonological categories set up to deal with grammatical function, having a range of phonetic exponents which need not necessarily involve 'length'. Carnochan (1957) puts the case succinctly:

> I require gemination and non-gemination as phonological terms, not as.phonetic nor as grammatical terms. They correlate with (1) grammatical processes...
> Gemination and non-gemination are not a matter of centi-seconds, they do not occur in utterance, but are invented and stated as part of the structure by the investigator.
> (1957:149)

In his analysis of Malayalam, Nayar sets up the categories of gemination and non-gemination to deal with certain kinds of patternings in verb stems. Malayalam has a number of verb stems which can function both transitively and intransitively (cf. Asher 1966 on Tamil). One difference between the transitive and intransitive forms is said to be that the transitive forms have, at a particular place, geminate consonants, which intransitive forms do not, e.g.

| | | |
|---|---|---|
| swing | *a:ṭi* | (past, intransitive) |
| | *a:ṭṭi* | (past, transitive) |
| lift | *poṅṅi* | (past, intransitive) |
| | *pokki* | (past, transitive) |

(Nayar 1972:210-214)

Mohanan, in his discussion of the same verbal phenomena (1982:132), also recognises 'gemination' and geminate consonants. However, for Mohanan, the category 'gemination' is crucially about the occurrence of 'long consonants'. Thus, whereas Nayar treats a *range* of consonantal patternings and relationships in the transitive verbs under the rubric of 'gemination' (e.g. *t ~ tt, ŋ ~ kk*), Mohanan *only* employs the term for forms which have *long* consonants. In addition, Mohanan sets up rules such as 'denasalisation' (1982:132), separately from gemination, to deal with relationships like *ŋ ~ kk,* while at the same time using gemination to refer to long consonants which occur in nouns, even though the array of long consonant types in nouns is different from those occurring in the transitive/intransitive verb forms. There are good reasons for prefering the analysis proposed by Nayar over that of Mohanan, as will become apparent later.

We turn now to our principal aims in this study, specifically we will show:

(1) that the phonetic features attendant on 'gemination' are long-domain, that is, they are not restricted to one single (consonantal) place in utterance and are syntagmatically implicative.

(2) that the distinctions between the geminate/non-geminate forms involve both 'segmental' and 'suprasegmental' features.

(3) that the phonetic detail of the 'long domain' features in the verbal forms provides a motivation for treating consonant alterations such as a *t ~ tt* and *ŋ ~ kk* in a unitary way.

(4) that while there are good reasons to keep 'long consonants' in transitive/intransitive verbs apart from those in nouns in analysis, an understanding of long consonants in nouns helps explicate some 'odd' phonetic aspects of the verbal forms.

It is not our aim in this paper to give an exhaustive phonological account of the verbal or nominal systems in Malayalam. Rather, we are concerned to show that close attention to the phonetic detail of utterance can reveal unsuspected systematicities which may oblige us to reformulate our ideas about the *domain* over which phonological phenomena are deemed to operate.

## 2. Analysis

We begin our detailed consideration of the phonetic exponents of 'gemination' in Malayalam verb forms with the following material. The impressionistic records are of utterances having the form, 'It Xed', 'He Xed it', 'He Xed Y' and 'Y Xed':

(1)  'it decreased'

(1)  'he decreased it'

(2)  'it increased'

(2)  'he increased it'

(3)  'it went inside'

(3)  'he inserted it'

(4)  'the price increased'

(4)  'he increased the price'

(5)  'the leaf went inside'

(5)  'he inserted the leaf'

(6)  'the pot broke'

'he broke the pot'   ạɣəñ̂ | k̰⁻aḷˌəm̂ | uᵈd̰ę̇·t̨ȼ

(7)  'the leaf folded'   ḷĩ̯ə | m̰ʌɾṭ̯æ̈ŋ̥ g̰ĩ̯

'he folded the leaf'   ꞕạ v ə̰ñ̂ | ḷ ĩ̯ə | m̰̄·a̯ɾ ɛ̰̇k̰⁻į̇

('geminate consonants' are asterisked)

On the basis of recurrent patterns, Malayalam can be seen to be an SOV language, and the dotted lines in the records serve to delimit certain stretches corresponding to the subject, object (where present) and verb:

| Subject | (Object) | Verb |
|---------|----------|------|

A number of points merit comment:

(1)  the transitive forms do not all have consonantal portions which are longer than the equivalent portions in the intransitive forms.  They may have, but this too may vary somewhat across repeated versions of the same expression.  In part the 'length' of the 'long/geminate consonants' is dependent on the features of the preceding vocalic portion: if this portion is $\check{v}$ then the 'geminate' tends to be noticeably long; if the vocalic portion is $\bar{v}$ then the 'geminate' is routinely *not* noticeably long.  (This can be compared with Firth's remarks on Tamil, 1934:iii-iv).

(2)  there is a relatively straightforward relationship between the non-geminate and geminate consonantal portions.  They are similar with respect to their place of articulation, but whereas all the non-geminates display voice, the geminates display voicelessness.  All the geminate consonantal portions display a period of complete occlusion of the vocal tract with co-incident velic closure and pulmonic pressure build up behind the oral occlusion.

However, these impressionistic records offer evidence that whatever patternings may be discerned here, these 'geminate' transitive forms are not different simply by virtue of a particular consonantal portion at one place in structure.  Focussing for the moment solely on the verb stems that the transitive and intransitive forms may differ *at least* in terms of:

(a)  rhythmic quantity (and length).
(b)  phonation.
(c)  consonantal resonance.
(d)  vocalic resonance.
(e)  tenseness/laxness of overall articulatory setting.
(f)  patterns of variability in utterance.

(a) Rhythmic quantity.

The rhythmic and length differences between the pairs of utterances are primarily to be found in the syllable preceding and the syllable following the 'geminate' consonants. In the transitive geminate forms the relative rhythmic quantities of these syllabls is 'equal-equal' (cf. Abercrombie 1965). In the intransitive non-geminate forms, where the vocalic part of the first of these syllables is $\breve{V}$, the relative quantities of these syllables is 'short-long'.

There are regular and systematic differences, too, between the pairs of utterances in those cases where the verb stem is C-initial. These portions in the transitive forms are always noticeably longer in duration than those in the intransitive forms.

(b) Phonation.

The transitive and intransitive verbs differ with respect to their overall phonatory quality. The intransitive verb forms are often produced with lax phonation and breathiness, which is maximal on the final syllable. In the transitive forms there was consistent phonatory tightness, creak, and often a total absence of vibration accompanying the utterance final syllable.

(c) Consonantal resonance.

In our impressionistic listening we find it necessary to distinguish a number of (secondary) cavity resonances co-incident with consonantal portions. These are symbolised:

$$\text{ç   ç   č   č   č   ꞔ   ꞔ}$$

Inspection of the impressionistic records shows that all the consonantal portions in the transitive forms differ from those in the intransitive forms in terms of their resonance characteristics. Consonantal portions in transitive forms are *always* clear in resonance (and may be fronter in their place of articulation) than their intransitive congeners. So, for instance, the initial consonantal portion of the verb stem in (3) is post-velar in the transitive form, but noticeably pre-velar in the intransitive form. it will be seen that the initial consonantal portion with bilabiality and nasality in the transitive expressions (6 and 7) is *darker* than that in the intransitive forms. We offer an account for this observation below.

(d) Vocalic resonance.

Just as the consonantal portions differ in resonance across the transitive/intransitive forms, so do the vocalic portions. In general terms the vocalic portions of the intransitive verb forms are closer than those in their transitive counterparts, so we find, for instance:

(1)     ɷ   æ   ʉ   /   ʉ   ɛ   ʮ

(2)     ö   ɨ   /   ʉᶣ   ɩ

(3)     ɛ:   ɨ   /   e̥ꝺ   ɨ

Notice too that the vocalic portions in the intransitive forms tend to be less peripheral than those in the transitive forms. In addition, if the vocalic portion immediately preceding the 'geminate consonant' is V then in the transitive form there is a noticeable fronting off-glide into

the following consonantal portion, e.g. (2) and (3) - no such off-glides were observed in the intransitive forms. However, in verbs where the 'geminate consonant' is retroflex, the preceding vocalic portion of intransitive forms displays noticeable retroflex colouring (symbolised with a superscript ɽ in our records). We suspect that this tongue body configuration may be present from the *beginning* of such intransitive verb forms - on occasion we find the colouring discernible in the aspiration phase of initial plosives.

(e) Tenseness/laxness.

The perceived articulatory tension settings are such that intransitive verbs are pervasively 'laxer' than transitive ones. So, for instance, where there is lip-rounding it is always closer and firmer in transitive forms; plosives in intransitive forms tend to have lax closure and noticeably lax fricative release, and may even be realised in fricatives - this never coocurs in transitive forms, where plosives always have firm closure and 'sharp', unaspirated release; 'nasals' in intransitive forms may be realised with oral strictures of open approximation with nasality - in the transitive forms they always have complete, firm oral closure.

The discussion to this point has been directed towards demonstrating that there are phonetic differences between geminate (transitive) and non-geminate (intransitive) verb stems, which have a domain beyond a single consonantal place - they encompass the whole of the verbal form. The domain of these features is not simply limited to the verb itself - this can be seen when we consider aspects of variability in repeated versions of transitive/intransitive expressions:

(f) Variability.

In the course of working with informants from many languages we regularly make observations relating to the variability which informants produce in the many repetitions which face-to-face impressionistic recording sessions demand. This variability, far from being random, often seems to be governed by factors such as the place in utterance and grammatical status of the expression being produced. In the case of the transitive/intransitive expressions, the *range* and nature of the variability which the informant produced was greater in the transitive ones. To illustrate some of this variability we have extracted from our records the different production possibilities observed at two places in utterance. These are (a) the consonantal portion from the onset of the final syllable in the verbs and (b) the intersyllabic portion of the pronominal form glossed as 'it':

| (a) | Intransitive | | Transitive |
|-----|--------------|---|------------|
| | - C - | | - C - |
| | ʈ | ɖ | ʈ |
| | ʈ *ɾ* | ɾ | ʈ |
| | ŋ· | n͡ŋ | k |
| | ɲ· | n· ̃ɾ | tɕ |

(b)          Intransitive                    Transitive

          - C -                           - C -

     õ̤ d̪̃ ɣ̃ ʁ̃ m̩̃                         ɔ̤̃  ð̃

It can be seen that all the intervocalic consonantal portions of 'it' in intransitive expressions have back of tongue raising as part of their make-up.  This patterns with the resonance characteristics described above for the intransitive verb stems.  By constrast, this same portion in transitive utterances has central or clear resonance co-incident with dental approximation, which again patterns with the overall resonance charcteristics of the (transitive) verb stems.

### 3. Phonetic observations in the lexis

In this section we examine the phonetic characteristics of some nominal forms, and show to what extent the observations pattern with those made in the verbal system, and in what ways they differ.

The following set of records are of nominal expressions of the form, 'That's an X':

(1)  a.   'that's cream'          ḁð̃ÿ | pʌ·ɾʈ̃ëɪɐ

     b.   'that's a head'         ʌð̃ɷ | ʈ'a̤lë̃ɛ̃ɐ

     c.   'that's a palm tree'    ʌð̃ÿ | ʀ'ṽ̃në̃jɐ

     d.   'that's a square'       ʌð̃ɣ | k'a̤lʌm̥Ãƛ̰

     e.a.  'that's a tin'         ɐð̃ɘ | ʀ⁻ə:ʈ⁻i̤·ɘ

     b.   'that's a mother'       ɐɋ̃ʌ | ʈ:⁻Ã̰ɫḛḭè

     c.   'that's a pig'          ʌɋ̃ɘ | ɒ·⁻Ã̰n̰:ḭjɘ̰

     d.   'that's a lie'          ɐ̰ð̃ʌ | k̰·⁻ʌɫ̰:ʌm̃ɋ̃

As with the verbal expressions we identify certain stretches corresponding to an introducer and the nominal. The two sets of nominal expressions in 1 and 2 differ from each other in a number of ways:

(a) where the first vocalic portion of the noun stem is V in 1, the rhythmic quantity of this and the following syllable with respect to the following two is short-long (v - ). In the nominals in 2 the relationship is always equal-equal (ˆ  ˆ).

(b) consonantal onset of the noun stem (where present) has a considerably longer period of closure in 2 than in 1. The intersyllabic consonantal portions (Mohanan's 'geminate' consonants) in 2 are also longer in duration than in 1.

(c) in the examples where there are intersyllabic strictures of complete oral and velic closure (1a and 2a) the resonance of the consonantal gestures in the nominals is darker in 1 than in 2. Where the intersyllabic portion is a sonorant, the resonance relationship is reversed, and it is the consonantal gestures of the nominals in 2 which are darker.

(d) where the intersyllabic consonantal portion of the nominal is retroflex, the degree of retroflex colouring observed in the preceding vocalic portion is greater in the examples in 1. This observation has again been notated by a superscript ſ.

(e) the differences in the initial disyllabic portion (introducer) of the nominal expressions can be characterised in terms of overall tongue posture: those in 2 are fronter than those in 1, having relatively fronter vowel qualitites and a secondary articulation of open approximation at the hard palate for the intersyllabic dental approximant.

(f) the *range* of variability in production observed in the various consonantal gestures in the nominal expressions in 1 was comparable to that observed in the intransitive verbal expressions.

A number of the observations which we have made about these two sets of nominal expressions are similar to those made about the transitive and intransitive verbal expressions. First, the features we have discussed have domain which extends beyond the syllable or word. Second, these long domain features are of a number of different kinds, e.g. vowel and consonant qualities, phonation type and range of variability.

Although there are a number of similarities in the observations we have made for the transitive/intransitive expressions and the two sets of nominal expressions, there are sufficient differences to stop us from equating the phonology of the verbal system with that of the lexis:

(1) the nominals in 2 *always* have a long intersyllabic consonantal portion. This is not the case for the onset of the final syllable in the verbal expressions. In the verbal expressions the nasal portions observed at this place in the intransitive forms is often *longer* in duration, than the consonantal portion at the same place in the transitives.

(2) the verbal and nominal systems display different arrays of consonantal gestures at the 'long' consonant place in structure.

(3) the ɽ ~ ʈ: etc. relations in the verb forms link with the grammatical relationship of intransitivity/transitivity, the relations in the lexis are apparently abitrary although they may serve a semantic function (cf. Firth on lexical function in Tamil, 1957:49).

One observation which we have made about the nouns containing sonorants offers a possible account of an apparent anomaly in the observations we made about the verbal expressions. We commented that in those transitive expressions which contain a nasal, the secondary cavity resonance is *darker* than in the intransitive expression, although other consonantal gestures in the same (transitive) expression were *clearer*. In those nouns above which have 'geminate' nasals, there is a darker secondary resonance than in those which have co-incident *shortness* and nasality. What seems to be happening is that where a nasal occurs in a transitive verbal expression it appears with the resonance characteristics of its 'long' form in the nouns. This suggests that there may, in fact, be a rather interesting relationship to be explored between 'geminate' consonants and 'long' consonants in Malayalam.

## 4. Discussion

Although we have only dealt with a relatively small corpus, it should be clear that the nature of the observations we have been making has more important consequences for the treatment of the phenomenon of 'gemination' in general. Close attention has been paid to a number of phonetic parameters. The consequence of attending to these details leads us to the conclusion that however one treats 'gemination' in Malaylam, it cannot be carried out in terms which focus on a particular point in utterance. Of course, a statement which includes long domain features of utterance of the sort we have proposed may encounter problems when one attempts to establish the boundaries of the domains in stretches longer than those which we have been investigating.

Equally important are the implications that our treatment of 'gemination' in Malayalam has for other languages, where the phonological category 'gemination' has been proposed, and has been assumed to have punctual implications for the utterances from which it has been abstracted. We have, for instance, some evidence that 'long/geminate' consonantal phenomena in Singhalese, Korean and Damascene Arabic display similar long domain characteristics to the ones discussed here.