Gemination in Malayalam compounds is morphological and bounded by prosodic structure - *Katie McCann (Universität Leipzig) & Jochen Trommer (Universität Leipzig)*

Main Claim: Gemination in Malayalam compounds can be accounted for within a single phonological stratum by assuming that gemination is triggered by an allomorphic linking element which is realised as a floating mora and bounded by prosodic structure. **Data:** Malayalam, as described by Mohanan (1982, 1986), has different processes of gemination once a compound structure is formed. Either the final vowel of the first stem is lengthened when the second stem is of [SANSKRIT] origin, see (1a), or a consonant is geminated when the second stems is of [DRAVIDIAN] origin, see (1b). Further, consonant gemination is blocked once the two stems appear in a co-compound (Mohanan 1986) (also called *dvandva* in Sanskrit literature). Compare the minimal pair in (1b) and (1c). In (1b), the stems form a modifier+head structure (a subcompound or *tatpuruṣas*) and /p/ is geminated. Conversely, in (1c), the stems form a head+head structure (a co-compound) and /p/ remains a singleton consonant.

(1) a. [jakṣ i: paːɖam] jakṣi-paːɖam demoness-foot$_{[SANSKRIT]}$ 'demoness' foot' (subcompound)

b. [peʈʈi pp aṯṯaːjaŋŋalə] peʈʈi-paṯṯaːjam-kaɭ box-grainbin$_{[DRAVID]}$-PL 'grainbins used as boxes' (subcompound)

c. [peʈʈi p aṯṯaːjaŋŋalə] peʈʈi-paṯṯaːjam-kaɭ box-grainbin$_{[DRAVID]}$-PL 'boxes and grainbins' (co−compound)

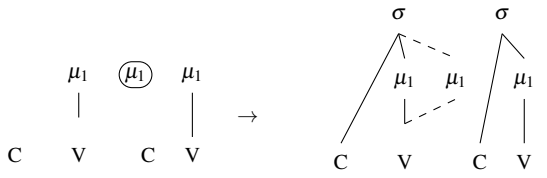
These complex interactions between Morphology and Phonology have led to a previous analysis by Mohanan (1986) who proposes that subcompounding and co-compounding are part of separate strata due to their different phonological behaviour. Further, to account for the embedding of co-compounds in subcompounds and vice-versa Mohanan introduces a looping mechanism. This loop ensures that after undergoing the Morphology and Phonology of a stratum the grammar can loop back to a previous stratum and undergo an additional round of this stratum's Morphology and Phonology. **Analysis:** We propose that there is neither a need to posit an excess number of strata nor a need for a loop to account for the Morphology and Phonology of compounding in Malayalam. Instead, all compounding applies in a single stratum. We argue that gemination in compounds is not a phonological process sensitive to morphological information as proposed by Mohanan. Rather it is the realisation of an allomorphic linking element (LE) whose phonological form is a floating mora. Linking elements in compounds are found in a number of languages, such as German (Aronoff & Fuhrhop 2002 a.o.) or Basque (Labrune 2014). In Malayalam, the linking element has allomorphic variants which are sensitive to the origin of a second stem in a compound, see (2). The allomorphy derives the difference between vowel lengthening in (1a) and consonant gemination in (1b). To conceptualise this, we utilise strength in Phonology. A strong moraic allomorph is "vocalic", see (2a), a weak moraic allomorph is "consonantal", see (2b). To model this difference in strength we employ gradiant symbolic representations (Smolensky & Goldrick 2016, Rosen 2016).

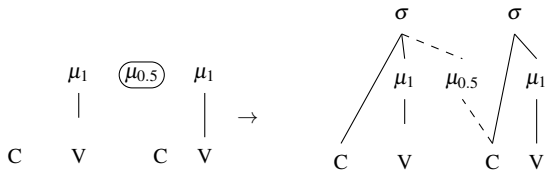
(2) a. $\mu_1 \leftrightarrow$ LE / N_1 __ N_2[SANSKRIT]

b. $\mu_{0.5} \leftrightarrow$ LE / N_1 __ N_2[DRAVIDIAN]

To derive the concept of strong being vocalic and weak being consonantal two violable constraints $^{*\mu_1}_{|}{}_{C}$ (=Assign a violation x when a consonant is dominated by a mora of strength y such that x=y-0.5) and $^{*\mu_{0.5}}_{|}{}_{V}$ (=Assign a violation x to every vowel that is dominated by a mora of strength y such that x=1-y) are introduced. In addition to these constraints, adding or subtracting strength to or from a mora is highly penalised by high-ranked DEPμ and MAXμ. This ensures that the strong mora realising the linking element will lead to lengthening of a vowel when the second stem is of [SANSKRIT] origin, as shown in (3). The weak mora realising the

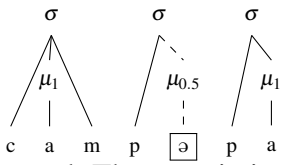
linking element when the second stem is of [DRAVIDIAN] origin in (4) will lead to consonant gemination. ə-epenthesis provides additional evidence of the floating mora realising a linking element. In Malayalam a schwa is epenthesised to break up an illicit consonant cluster, see (5). As is evident from the example in (5) schwa epenthesis bleeds consonant gemination in compounding.

(3) 

(4) 

(5) [camp ə pa:ṯram]
camp-$\mu_{0.5}$-pa:ṯram
copper-LE-vessel$_{[DRAVID]}$

This directly follows from the proposed linking element analysis. As shown in (6), the weak floating mora linking element does not associate to a consonant because it is less costly to associate to the epenthetic schwa, providing the schwa with a mora for free. This leads to a non-fatal violation of $\overset{*\mu_{0.5}}{|}$ V. The alternative would be associating the floating mora with a consonant which results in epenthesising a mora to accomodate the epenthetic schwa. This is more costly due to high ranked DEPμ.

(6) 

In co-compounds, cf. (1c), consonant gemination is never observed. The association of the floating mora in co-compounds is blocked in (1c) due to gemination being bounded by prosodic structure. In co-compounds a prosodic word boundary is parsed separating the two stems, see (7a). A positional faithfulness constraint hinders the floating mora from associating to a consonant at this edge position. In subcompounds no such boundary is parsed, see (7b).

(7) a. co-compound: ($_\omega$ ($_\omega$ N_1)($_\omega$ N_2)) b. subcompound: ($_\omega$ N_1N_2)

The prosodic structures in (7) follow from the morphosyntactic structure of the compounds. The constraint WRAP (Truckenbrodt 1999) which force XPs to be contained in a prosodic word and AL-R(head,ω) which forces heads to be right-aligned with a prosodic word lead to the additional recursive structure in co-compounds in (7a). The constraint EDGEωGEM introduces a high-ranked positional faithfulness constraint which penalises geminates at prosodic word edge positions. Indeed, the prosodic structure needed to block gemination at a prosodic word boundary also aligns with stress domains in Malayalam. Subcompounds constitute a single stress domain, with a single primary stress which follows from the single prosodic word. While co-compounds constitute multiple stress domains, with a primary stress for each stem in a compound which follows from the multiple prosodic words.

Conclusion: We have proposed an analysis of Malayalam compound gemination which does not result from multiple strata. Instead, compound gemination is a product of allomorphy enriched by gradient symbolic representations and bounded by prosodic structure. This analysis contributes to work in phonological theory which argues against accounts with the possibility of unlimited phonologies such as co-phonologies (Orgun 1996, Sande, Jenks & Inkelas 2020) or stratal accounts expanding the number of strata (Mohanan 1986, Jaker & Kiparsky 2020) and as a consequence introducing controversial concepts such as the loop (Mohanan 1986, Hargus 1988). The proposed analysis limits compound gemination to a single stratum by using well-established concepts (allomorphy and the prosodic hierarchy) as well as introducing strength in the form of gradience in Phonology.

Selected references: Aronoff & Fuhrhop. 2002. Restricting suffix combinations in German and English: Closing suffixes and the monosuffix constraint. *NLLT* 20(3). • Hargus, S. 1988. *The lexical phonology of Sekani*. Routledge. • Labrune, L. 2014. Featural linking elements in Basque compounds. *Morphology* 25(4). • Mohanan, K.P. 1986. The theory of lexical phonology. Dordrecht. • Orgun, C.O. 1996. *Sign-based morphology and phonology with special attention to Optimality Theory*. • Sande, H. et Al. 2020. Cophonologies by ph(r)ase. *NLLT* 38(4). • Smolensky, P. & Goldrick, M. 2016. Gradient symbolic representations in grammar: The case of French liaison. *Rutgers Optimality Archive*.