On characterizing Sanskrit gemination

In Sanskrit, various postvocalic consonant clusters are affected by gemination. Contemporary Indian grammarians describe the phenomenon as a two-fold process as follows (Whitney 1889; Wackernagel 1896; Varma 1929; Renou 1975; Cardona ms., 2003). First, consonants other than *r* or *ḥ* followed by another consonant are geminated as in *cakra-* 'wheel' > *cakkra-* and *sapta-* 'seven' > *sappta-*. Second, consonants that follow *r* or *ḥ* are geminated, as in *artʰa-* 'purpose' > *arttʰa-* and *ɟiḥma-* 'oblique' > *ɟiḥmma-*. In addition to these two major rules, there are subsidiary processes and prohibitions, and different dialects show different variations, which may deviate from the rules just mentioned. While evidence for the phenomenon comes from contemporaneous phonetic treatises, manuscript and inscriptional evidence, and later developments in Middle Indo-Aryan, the process is known for the bewildering array of variations and some extreme cases of gemination are cited in the relevant literature such as *pārṣṣṇṇjā* 'with the heel' (< *pārṣṇjā*) (Cardona ms.).

Earlier studies beginning with Varma (1929) have analyzed the process in terms of syllable structure, according to which gemination attains a more preferred syllable structure or results from resyllabification (also Hock 1974, 1991a, 1991b; Vennemann 1988; Vaux 1992; Cho 1999; Kobayashi 2001, 2004; Calabrese 2009). However, syllabification in these analyses is not necessarily supported by the phonetic treatises. In addition, gemination may lead to marked syllable structure such as that involving onset clusters of two distinct stops (e.g. *sapta-* > *sappta-*). As such, while Sanskrit gemination has been generally treated as a uniform process, it resists a straightforward analysis.

In addition, Sanskrit gemination is typologically unique. That is, gemination is most common in intervocalic position (Thurgood 1993; Kraehenmann 2011), but Sanskrit gemintation as has been illustrated normally does not affect intervocalic single consonants. It is also not one of the four types of gemination in Blevins's (2004) list of geminate evolution that includes lengthening under stress, expressive gemination, boundary lengthening, and reinterpretation of an obstruent voicing contrast. While other Indo-European languages such as West Germanic, Old Norse, and Italian show gemination of consonants before liquids and/or glides (Hock 1974; Vennemann 1988), Sanskrit gemination is much more extensive as shown above.

This paper claims that, instead of a single uniform process, Sanskrit gemination consists of at least two major gemination processes as exposited by native grammarians and, depending on the dialects, several minor ones. Moreover, more than one factor motivates gemination as a whole. Although there are variations, Sanskrit gemination occurs most extensively in the position adjacent to *r*, especially after *r*, which is itself never affected by gemination. The target of the process is most frequently oral stops, less often nasal stops, and least likely fricatives. Thus, gemination is typically lengthening of the oral closure or, more broadly, stricture. Possible motivations behind this lengthening are partly alleviation of tension of transition between two consonants and partly fortition in the strong position, while syllable structure is not likely to be the motivation common to the entire process as earlier analyses suggest. The common denominator of the various gemination processes is lengthening of the entire consonant clusters, which is also observed with alternative developments of consonant clusters in Sanskrit such as those involving overlapping of some of the properties of the two adjacent consonants e.g. *rukma-* 'what is bright' > *rukk̄ma-* and *kṛṣṇa-* 'black' > *kṛṣṭṇa-* (Cardona ms.; Suzuki In press). Variations, extensiveness, heterogeneity of Sanskrit gemination follow from phonetic rather than phonological nature of the phenomenon, multiple origin, and multiple motivation.