THE DEVELOPMENT OF FINAL */-as/ IN PRE-VEDIC

by

CALEY CHARLES SMITH

(Under the Direction of JARED KLEIN)

ABSTRACT

Perhaps the most widely represented sandhi variant of final ending */-as/ in Sanskrit is [-ō]. In this thesis I shall attempt to motivate this ending, based on a combination of sound law and analogy. The evidence of such forms as *edʰí* 'be!' [2ⁿᵈ SG. ACT. IMP.] from *as-dʰí and *mánobʰis* 'with minds' [INST. PL.] from *manas-bʰis suggests that in word-internal position that */-as/ developed into [-ē] and [-ō] preceding a voiced dental and labial respectively. There is evidence of three distinct phases where what has begun as word-internal sandhi becomes syntactically restricted word-external sandhi, and finally this word-external sandhi loses its syntactic restriction. Finally, the generalization of [-ō] at the expense of [-ē] is a product of the polyvalence of [-ē] from Pre-Vedic */ay/ as an ending in numerous categories of both the noun and the verb whereas [-ō] from Pre-Vedic */-aw/ was limited to the vocative singular of u-stems.

INDEX WORDS: SANSKRIT, SANDHI, PHONOTACTICS, PRE-VEDIC

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1. INTRODUCTION

Perhaps the most widely represented external sandhi variant of final underlying */-as/ in Sanskrit is -o [ō], which appears whenever the following word begins with a voiced consonant. In this thesis i shall to motivate this ending, based on a classical diachronic scenario involving primary sound change followed by secondary analogical extension. The evidence of forms such as *edʰí* 'be!' [2nd SG. ACT. IMP.] from *as-dhí and *mánobʰis* 'with minds' [INST. PL.] from *manas-bʰi*s suggests* that in word-internal position *as yields [ē] (via *[ay]) before a dental consonant and [ō] (via *[aw]) before a labial consonant. Since Sanskrit, and Indo-European, usually shows regressive assimilation of voicing in obstruent clusters (cf. *mattum* 'to exhilarate oneself' from *mad-tum and *avākṣam* 'I conveyed' from *e-wēǵʰ-s-ṃ), it may be perceived that the intermediate stages of the forms cited above were *az-dʰi and *manaz-bʰis, respectively. Consequently, the critical stages of the derivation of *edʰí* and *mánobʰis* involve a change of *[az] to *[ay] and *[aw] before a dental and labial respectively.

If we proceed on the basis of the widely held assumption that rules of external sandhi represented generalizations of rules of internal sandhi across word boundaries, then the generalization of [-ō] at the expense of [-ē] presents a problem. According to frequency statistics provided by Whitney (1889:26) for all Sanskrit sounds, dental consonants outnumbered labial consonants by a factor of 3:2. One might expect therefore, all other things being equal, that [-ē] would have been a more likely choice than [-ō] for analogical extension. We will show, however, that grammatical factors fostered the

promotion of [-ō] over [-ē]: specifically, the polyvalence of [-ē] as an ending in numerous

categories of both the noun and the verb whereas [-ō] was limited to the vocative singular

of u-stems. The equally important contributions of this thesis will be to motivate the

somewhat non-intuitive phonological developments of *[az] to *[ay] and *[aw] before a

dental and labial respectively and to place these developments in the broader context of

possible phonological developments before other classes of consonants (velar, palatal,

etc.) as well as before voiceless consonants at the various places of articulation

I propose to account for the internal sandhi development *[az] becoming [-ē]

preceding a voiced dental by positing a sound change in pre-Vedic whereby *[z] merged

with a similar voiced continuant phoneme, /y/. Because /y/ and [z] share the features

[+cont], [+voice], and [coronal]. Similarly, I propose that *[az] developed into [-ō]

preceding a voiced labial. The phoneme */s/ surfaced as *[β] preceding a voiced labial,

and this allophone [β] merged with the phoneme most similar to it, the voiced continuant

phoneme /w/. The monophthongization of diphthongs in Indic then produced the

outcomes [ē] preceding a voiced dental and [ō] preceding a voiced labial. There is

evidence of three distinct phases where what begins as word-internal sandhi becomes

syntactically restricted word-external sandhi, and finally this word-external sandhi loses

its syntactic restriction.

STAGE 1	word-internal	constituent-internal
STAGE 2	word-external	constituent-internal
STAGE 3	word-external	constituent-external

While the full range of possible constituent types is unknown, there is certainly evidence

of GEN.-NOM. pairs, compound words, and nouns with adverbial complements. The

ultimate dominance of [-ō] in external sandhi in Vedic to the virtual extinction of [-ē] is

the result of a morphological generalization on the part of speakers in a language where

final [-ē] from */-ay/ was abundant and hopelessly polyvalent in the inflection of many

paradigms, while final [-ō] from */-aw/ was rare. Thus, confusion would be minimized

were a speaker to have consistently selected [-ō] over [-ē].

2. A BRIEF SUMMARY OF MODERN SCHOLARSHIP

Whitney (1889)

Previous inquiry into the nature of sandhi [-ō] has been largely descriptive. Whitney gives the distribution of [-ō] and includes a series of tokens where [-ō] is expected and instead [-ar] surfaces, which is essentially a recapitulation of the Prātiśākʰya's and does not attempt to be explanatory in any respect. Neither of these illustrates the historical fact that these forms are /-ar/ forms originally that have become [aḥ] secondarily. Because they were never /-as/ forms, they wouldn't develop into [-ō] through the same sound change.

Wackernagel and Debrunner (1896)

The development of */as/ is treated by Wackernagel and Debrunner in their *Altindische Grammatik, Band I: Lautlehre*. Based on forms like *edʰi* <*azdʰi <*as-dʰi, it is understood that */as/> *[az] > [ē] at morphological boundaries. Wackernagel and Debrunner understood that a development similar to this one must have taken place in the hapax *sū́re duhitā́* 'daughter of the sun,' where *sū́ro duhitā* would be expected. They knew that [-ē] and [-ō] must have been in competition. What they couldn't discern was what phonological process had generated an [-ē] and [-ō] in the first place and what the original distribution of the two must have been. Wackernagel and Debrunner mention that Bartholomae believed the pitch accent may be involved in producing an [-ē] or an [-ō]. Bartholomae, however, had no suggestion on how this might be, and ultimately his

suggestion seems purely speculative.

Allen (1962)

Allen provides the standard model, which is both more accurate and explanatory than previous scholarly attempts at understanding the development of Sanskrit phonotactics. Allen writes that, if a voiced consonant follows after the word boundary, then the */-as/ was voiced to *[-az]. Subsequently, all voiced frication was lost from the language; to preserve the metrical weight of the syllable an epenthetic [y] or [w] was inserted at the end of the syllable. Allen doesn't explain what mechanism selected [y] or [w], but somehow a leveling occurs in favor of the [w]. It is this [w] which forms the diphthong [aw] which then monophthongizes to [-ō]. This model is particularly convincing because it explains a possible motivation for such a sound change in terms of prosodic faithfulness. The choice of which glide to insert, however, is not clear from any phonological standpoint. In addition, the statement "all voiced frication is lost" is too strong, and evidence against it exists within the RUKI rule.

The RUKI rule is the name given to the development of /s/ to [ṣ] following [r, u, k, i]. Now, consider the development of /s/ into [r] when the preceding segment is [+high] and the following segment is [+voice]. In the context of the RUKI rule, the preceding [+high] feature is associated with the raising of the dorsal part of the tongue for [u] and [k] and the front part of the tongue for [i] and [r]. In all cases, this high feature results in the tip of the tongue being further back in the oral tract than the dental place of articulation where [s] would be produced. While it is obvious why this is so for [u], a back vowel; [k], a velar consonant; and [i], produced at the palate; [r] requires that one

consider carefully the acoustic properties of a trilled phone. The trill requires relaxation

of the tongue and more space to move than the small aperture that a normal continuant

would require. Thus, even a dental or alveolar trill is likely to be articulated further back

in the oral tract. This preceding [+high] feature produces a retroflexed allophone of /s/,

[ṣ], and when the following segment is voiced, the result would be *[ẓ]. This phone

shares with [r] the features [+voice] and [+cont.] and must have become associated with

the phoneme /r/ in much the same way rhotacism occurred in Latin. This re-identification

of a voiced fricative as being a form of /r/ rather than /s/ explains the origin of sandhi

forms like *agnír* 'fire' quite nicely. If all voiced frication had been deleted without an

intermediate stage where voiced frication was allophonically permissible, then *agnír*

would be unexplained. Allen uses the epenthesis of [y] or [w] because he assumes the

deletion of all voiced frication, rather than the development of phonetic [z] into phonemic

/y/. Allen doesn't posit a loss of *[ẓ] and an epenthesis of [r] but rather asks where [y]

came from following the deletion of [z]; in fact, in both cases what has occurred is a

phonemic redistribution.

The existence of a *[z] in Pre-Vedic is supported by cross-linguistic data as well.

In fact, according to Ohala (1983), cross-linguistically a language is more likely to have

voiced frication further forward in the vocal tract. Consider the relative rarity of a voiced

velar fricative. In cross-linguistics studies it is highly likely that a language which possess

a voiced velar fricative possesses a voiced labial fricative. This is in part due to the

complex aerodynamics of producing voiced frication. Continuous air flow is involved,

but at air pressures low enough to prevent the full opening of the glottis, which would

cause devoicing. In velar fricatives the volume of air involved is smaller because the

blockage of the air is further back in the oral track. A smaller volume is more likely to have higher pressure, as the two are inversely related. This is the very reason that [k] has the greatest burst of any stop and [p] the smallest. A voiced fricative such as [v] or [β] involves a much larger chamber of air because the blockage occurs at the lips. Because the cheeks can expand, a speaker can control the air pressure, making the mechanics of voiced frication much more flexible. Thus [v] and [β] are very common phones cross-linguistically, and the voiced velar fricative [ɣ] is rare. Allen argues that /s/ became *[ẓ] which became [r]. Because *[ẓ] is further back in the oral tract than *[z], it is cross-linguistically very likely that if Pre-Vedic had the former, it also had the latter.

Zwicky (1965)

There are generally few attempts at providing a real nuanced phonetic model for the change of *[-az] to [-ō]. Zwicky, in his unpublished dissertation, mentions briefly that *[-as] becomes *[-az] preceding a voiced segment across a word boundary, and that this *[-az] becomes *[-aw]. Then, when *[-aw] monophthongizes, the result is [-ō]. His voicing of [-s] to [-z] is perfectly reasonable, as is [-ō] as an output of the monophthongization of an input *[-aw]. I find the mysterious development of [-z] to [-w], however, untenable because there is no phonetic motivation for [-z] to become [-w]. An unmotivated change of [z] to [w] is unconvincing because [z] and [w] differ by too many features to be the product of some perceptual error. Consider the phonetic properties of the phones in question. The glide [w] involves dorsal articulation of the tongue in addition to lip rounding, while [z] involves apical or laminal articulation and no rounding of the lips. Granted, [z] and [w] are both voiced continuants, but the similarities

end there. The question of linguistic motivation must be asked: why would [z] be heard as [w] by the listener? Or, why would a [z] be pronounced as [w] by a speaker, especially when there are so many alternative candidates which have many more features in common? Zwicky's analysis doesn't adequately explain how [z] becomes [w], and I shall demonstrate that this [z] does not become [w] and that [w] does not develop from this [z].

Kobayashi (2004)

Finally, the most recent phonological treatment of Sanskrit is that of Kobayashi. He examines many fascinating features of Indic phonology, but on the issue concerning us he says only that Indic /-az/ goes to /-ē/ or /-ō/ under uncertain, possibly dialectal, conditions.

3. THE DENTAL OUTCOME

In Sanskrit the evidence that voiced fricatives became re-associated with a similar sonorant is strongest for the phone [z]. Sanskrit preserves the most primordial STAGE 1 relationship at word internal morpheme boundaries with the forms ed^hi "be!" from *az-d^{h}i, and *sedúr* 'she/he/it sat' [3rd PL. PERF. ACT. IND.] from *sa-zd-úr, compare Young Avestan 3rd sg. perf. act. opt. *hazdiiāt* [3rd SG. PERF. ACT. OPT.], where the root *sad* 'sit' in zero grade becomes *zd. The form *mṇz-d^{h}eh$_1$, which gives Gāthic Avestan *mazdā* and Vedic *med^{h}ā́* 'wisdom', demonstrates a similar phonetic outcome at a morpheme boundary. To these examples we may also add Mitanni name inscriptions such as *Bi-ir-iama-aš-da,* which must be *Priyamazd^{h}a,* cognate with Vedic *priyamed^{h}a* 'whose wisdom is dear'*,* because Mitanni inscriptions are preserved in cuneiform which would use the same character <š> to signify [z] or [ž]. The cuneiform of Old Akkadian show signs of a merger of [s] and [š], and this ambiguity is manifest in both Hittite and Mitanni writing conventions. In both Hittie and Mittani cuneiform voiceless fricatives [s] and [š] would be represented with digraph <šš> while voiced fricatives [z] or [ž] would be represented with a single character <š>. Thus, *Bi-ir-iama-aš-da* clearly shows that after the breakup of Indic and Iranian there existed a Pre-Vedic */s/ that developed into [z] and existed for some period of time in Indic. In the case of *mṇz-d^{h}eh$_1$, however, the boundary exists between two free roots in a compound word. In fact, *med^{h}ā́* could be construed as evidence for either STAGE 1 or STAGE 2. Because the reduplicated syllable is a bound morpheme, the syntactic connection between free roots *mṇz and *d^{h}eh$_1$ is

arguably looser than that between *sa- and *-zd- of *sedúr*. Normally in Sanskrit, [ē] is the product of the monophthongization of *ay. The apical or laminal articulation of the tongue associated with [z] would make its nearest sonorant [y]; this assimilation would feed [az] into the monophthongization of diphthongs and produce the phonetic sequence */-as/ > *[-az] > /-ay/ > [-ē].

Direct evidence of [-ē] in STAGE 2, word-external sandhi between two words that form a constituent, is far rarer in Vedic; Ṛg Veda 1.34.5 attests *sū́re duhitā́* "sun's daughter' in which sandhi is preserved between a genitive-nominative pair. Regardless of the paucity of [-ē], I posit the assimilation of [z] to [y] to be the true historical state of affairs which has been obfuscated by morphological leveling which I shall address later.

Aside from *sū́re duhitā́,* Sanskrit attests no STAGE 3 [-ē]; however, in the eastern Prākrits of Ardhamāgadhī and Māgadhī the [ē] outcome survives, but it is relegated to a very specific grammatical position. The *putte* 'son' [NOM. SG. MASC.] is the equivalent of Sanskrit *putro* from *putras. While the sandhi of Sanskrit behaves like a phonotactic phenomenon, in these Middle Indic dialects the endings become grammatically distributed. The [-ē] becomes the outcome associated only with the NOM.SG. of a-stems, perhaps because the a-stem has an iconic [ē] in its oblique plurals which other stem types lack. Elsewhere, the [-ō] is generalized as is seen in the Māgadhī n-stem GEN. SG. MASC. *lañño* < *rajñas and the Ardhamāgadhī s-stem NOM. SG. NTR. *maṇo* < *manas.

4. THE LABIAL OUTCOME

Just as [z] merges with /y/ at a morpheme boundary , as seen in *edʰi,* so [β] merges with /w/ at morpheme boundaries under parallel conditions. The phone [β] lacks the dorsal articulation of [w], however, the two phones share the features of [+labial]. Suffice it to say, the pronunciation of the two phones is already close, and, within the history of Sanskrit, /w/ undergoes frication and develops into [v] . An exact parallel to *sedúr* is unattested. It is clear, however, that *sedúr* has become morphologically fixed, functioning as a pattern for the remaking of weak stems of perfects to CaC roots, such as *pedur* , an analogical remaking of *pa-bd-ur. This marker of the weak stem of the perfect has become grammatical and no longer phonotactic in any way. In the singular, the stem has a full grade in perfect formations, but in the plural the weak stem has been remade: to *sasāda* 's/he sat' there is *sedur* 'they sat'*,* to *papāda* 's/he went' there is *pedur* 'they went'*,* and to *tatāpa* 's/he became hot' there is *tepur* 'they became hot'.

Evidence for the allophonic assimilation of */-s/ to [-β] preceding voiced labials is found in the DAT/ABL. PL. and INST. PL. of s-stems. The Sanskrit form *mánobʰis* is the output of the addition of the ending *-bʰis* to the s-stem *manas* 'mind'. This assimilation may be interpreted as reflecting either STAGE 1 or STAGE 2. If *-bʰis* was an ending like *-dʰi,* then it demonstrates a word-internal phonotactic relationship. If, however, [bʰis] was a post-positional element, suffixed rather late, then *mánobʰis* may be capturing STAGE 2. The comparative data from Avestan suggests exactly that. Gāthic has the form *manə̄biš*; the vowel [ə̄] would be expected word finally, not here where [z] would be permissible.

The Gāthic example provides evidence of the relative lateness of unification of word stem and case ending in this instance. In addition, Greek attests a -φι which is not a case ending but rather a post-positional element. The post-positional /bʰis/ would still form a constituent with its noun, but a prehistoric word-boundary would have separated them phonetically: /manas#bʰis/ assimilates to [manaβ#bʰis]. This phonetic form is phonologically reanalyzed as /manaw#bʰis/, which in turn surfaces as [manō#bʰis] following the monophthongization of diphthongs.

The development of word-final [-ō] from *-as preceding a labial is the most straightforward of the sources of sandhi final [-ō] preceding a voiced segment. The normal sandhi [-ō] is manifestly the STAGE 3 word-external case which has now been extended to the environment where [-ē] was original due to a morphological leveling motivated by the paucity of other words with endings in [-ō] and the overabundance of those ending in [-ē].

5. THE VELAR AND PALATAL OUTCOMES

On the outcome of */-as/ preceding a velar, I can say very little. In Vedic, there is no archaic form similar to that of */-as/ preceding a dental (*sū́re duhitā́)* or preceding a labial (*mánobʰis*) that I am presently aware of. I can say that cross-linguistically data there are countless examples of the development of voiced velars into the sonorant [w]. English has no dearth of words such as *bough* in which a Proto-Germanic *[ɣ] developed into [w] but the old spelling was retained. Similarly the velarized sonorant [ł] in Polish developed into a [w] as seen in the name of the well known linguist Kuryłowicz which is pronounced [kuriwoviʧ]. Therefore, while I have no direct evidence from Vedic Sanskrit which would allow me to predict the development of a [ɣ], should it have existed there is a great probability it would have developed into [w] and fallen together with the outcome of */-as/ preceding a labial. It should be noted that the Prātiśākhya's cite a voiceless velar allophone of /s/ preceding a voiceless velar. Whether or not this voiceless velar fricative [x] had a voiced counterpart [ɣ], we can only speculate.

There is a similar state of affairs for */-as/ preceding a palatal. Because there is an independent phoneme /ś/, it is not necessary to look to the Prātiśākʰya's as we might for [x]. When preceding a voiceless palatal, /s/ becomes [ś]. The search for an allophone *[ź] from */s/ is complicated by the development of the Proto-Indo-European palatal series in Sanskrit. Proto-Indo-European stops *[ḱ, ǵ, ǵʰ/ develop into Proto-Indo-Iranian affricates *[ć, j́, j́ʰ/, but, in Pre-Vedic, *[j́, j́ʰ/ lose continuancy and become palatal stops */j, jʰ/. By Vedic */jʰ/ has lost its supraglottal occlusion, and the outcome for the palatal series is

/ś, j, ɦ/. Because /j/ is not a fricative, it is not involved in allophonic relationships with other fricatives. In sandhi /t/ or /d/ can become [č] when preceding a voiceless palatal or [ǰ] when preceding a voiced palatal. Whether this indicates that */-as/ would become */-aź/ and then */-aǰ/ prehistorically is purely speculative. There is no evidence to support this claim whatesoever. If the change of *[ź] to [ǰ] had already occurred, perhaps *[ź] developed into [y] since they are both palatal. There is ample cross-linguistic evidence in support of a change of [ǰ] to [ź], but the opposite is rarer. A third possibility is that *[ź] may have merged with *[ẓ]. Once again, there is evidence for the behavior of *[ź] which is the product of Proto-Indo-European *[ǵ], but this should not be confused with a hypothetical *[ź] from */s/. Of this, I can only say that the sandhi outcome of */-as/ preceding /j/ is like its sandhi outcome preceding any voiced segment: [-ō]. In the case of */-as/ preceding a velar or palatal, we cannot even claim that the outcome would be uniform and must rely purely on cross-linguistic speculation.

6. THE RETROFLEX OUTCOME REVISITED

An underlying representation such as /agnis/ would almost never surface as such; represented in the development of /s/ to [r] is a combination of the same regressive assimilation of voicing which produces the allophones [β, z] and progressive assimilation of tongue articulation, where retroflection is produced by the [+high] feature of the preceding phone moving the tongue further back in the oral tract. That is, the retroflex spirant [ṣ] is the allophone of /s/ which appears following the phones [r, u, k, i] and preceding a [-voice] segment; the apical trill [r] is the allophone of /s/ which appears following the phones [r, u, k, i] and preceding a [+voice] segment. This development, then, can show the same stages of syntactic distribution as [-ō] and [-ē].

The outcome [r], as previously discussed, is developed from *[ẓ], and there must have been some prehistoric form *agniẓ from which *agnír* is descended. Parallel to the conditions which cause the development of /s/ to [ṣ], a phone *[ẓ] developing into [r] makes it abundantly clear why *[ẓ] would be identified by speakers with [y] rather than [r]. A trill requires space in the mouth for a column of air to flap the tip of the tongue through its range of motion, and, at its zenith, this range of motion includes the apical articulation which is a feature of retroflex phones. The link between /r/ and retroflection is illustrated by the many relationships between the two in Sanskrit: /s/ can develop retroflexion under the effects of [r, u, k, i] and /n/ becomes [ṇ] in assimilation to a preceding [r], which need not ever be contiguous. Retroflexion of the dental stops occurs due to progressive assimilation to a preceding voiceless retroflex fricative, as in *tiṣṭʰati*

from *ti-stʰa-t-i. Another example of a relationship between the trill /r/ and retroflexion can be found in the word *Roma,* employed by European Gypsies to refer to their people, which has developed from a tribal/caste name *Ḍomba.* Even within the ancient grammatical traditions of Sanskrit the phoneme /r/ is categorized as implicitly retroflex. In the devanāgarī system of characters are listed in order of glottal proximity within their class. Oral stops begin with the velars [k, kʰ, g, gʰ, ŋ], then proceed to the palatals [c, cʰ, j, jʰ, ń]. Next come the retroflex stops [ṭ, ṭʰ, ḍ, ḍʰ, ṇ] and the dentals [t, tʰ, d, dʰ, n]. Finally, furthest from the glottis, the labials [p, pʰ, b, bʰ, m]. The sonorants, which come next, would begin with the velars, but there are none. Instead the order of *akṣaras* is [y], [r], [l], and [v]. Clearly, [y] is palatal, [l] dental, and [v] labial. The character for [r] occupies the same relative position as the retroflex stops.

Both the development of [s] to retroflex [ṣ] by influence of apical coronal trill [r] and the development of retroflex [ẓ] into apical coronal trill [r] betray a key similarity: the tip of the tongue is deeper in the oral tract than in the production of [y]. While [y] has a palatal articulation with the front of the tongue, the tip of the tongue is closer to that of dental [z].

The development of the English apical trill into its modern retroflex form supports a cross-linguistic link between this /r/ and retroflexion. It is easy to envision this development, as it is most likely the same final step as is seen in rhotacism in Latin (cf. *corpus, corporis)* and Germanic (cf. English *was, were).* While anticipatory assimilation explains the place of articulation of the voiced allophones of /s/, the voicing itself occurs only within constituents in Pre-Vedic causing the voiceless fricatives to become voiced sonorants.

Let us briefly consider the distribution of [ṣ], and how it occurs in each STAGE. There is ample evidence of [ṣ] occurring word-internally (Ṛg Veda 1.32.10a *atiṣṭʰantī́nām* 'of the ones not standing') as well as word-externally constituent-internally for a verb and its preverb (Ṛg Veda 1.128.1e *ní ṣadad* 'he sat down'). An independent phoneme /ṣ/ outside of sandhi contexts is limited to certain words, such as *ṣáṭ* 'six' and *ṣá̄ṭ* 'victorious.' The STAGE 3 [ṣ] becomes the normal outcome for /-s/ following a [+high] segment and preceding [t⁽ʰ⁾] regardless of syntax. In Ṛg Veda 10.162.02cd *agníṣ ṭám... níṣ kravyā́dam anīnaśat* 'Agni destroyed that flesh-eater', subject *agníṣ* and direct object *ṭám* do not form a syntactic constituent, yet retroflexion progresses on a purely phonotactic basis. For [r], there is evidence of STAGE 1 word-internal constituent-internal development (Ṛg Veda 1.32.6a *durmáda*), STAGE 2 word-external constituent-internal development (Ṛg Veda 1.80.2c *nír adbʰyó*, Ṛg Veda 1.85.9c *nír apā́m*, and Ṛg Veda 1.103.2a *nír apáḥ*), and STAGE 3, where the normal development of [-ṣ] preceding any voiced segment is [r] (Ṛg Veda 1.72.1c *agnír bʰuvad*), regardless of syntax.

7. ANTICIPATORY ALLOPHONY WITHIN CONSTITUENTS

Given the likelihood that there once existed a voiced counterpart [ẓ], of otherwise identical features to [ṣ], it is reasonable to assume the existence of other voiced fricatives which existed alongside their voiceless allophonic counterparts and which anticipated the place of articulation of the following segment when two words formed a constituent. Because the earliest attested Indic does not have an independent phonemic class of voiced fricatives, these allophones were at one point pronounced by speakers unaware that the allophones were anything other than /s/, and, subsequent to the loss of identity with /s/, these allophone were simply understood by speakers as being identical to various sonorants. That is, the phones would no longer be associated by the speaker with the phoneme /s/, but re-phonemicized as whatever sonorant the phone most resembled. Sonorants as a class already share [+cont] and [+voice] with any voiced spirant phone. The development of the voiced fricative [ẓ] into a sonorant [r] provides a window into the development of other voiced allophones.

When the first segment of the following word is a voiced labial and the vowel preceding /s/ is [-high], then */s/ is realized as [β]. Similarly, when the first segment of the following word is a voiced coronal and the vowel preceding /s/ is [-high], then /s/ is realized as [z]. In both cases the anticipation of articulation blocks the realization of /s/ as [ḥ]. The [-high] feature of the preceding segment is a critical factor in enabling the regressive assimilation of /s/ to the following voiced segment, because if the preceding segment is [+high] (viz [u, k, i] the outcomes of /s/ is [r] regardless of the place of

articulation of the following voiced segment.

/_#[-voiced]	/_#[+voiced]	Preceding Height	Following Place
ɸ	β	[-high]_#	_#[+labial]
s	z	[-high]_#	_#[+coronal]
ṣ	ẓ	[+high]_#	n/a

I have listed certain features as relevant: preceding height and following place of articulation, but this is somewhat misleading. The phoneme /s/ remains faithful to its manner, namely [+cont], and this is its highest ranked constraint. Faithfulness to the height of the preceding vowel is ranked lower, faithfulness to [place] is ranked lower still, and faithfulness to [voice] is the lowest ranked constraint. What this means is that final /s/ can only produce fricative allophones. It remains voiceless unless the following segment is voiced and loses oral obstruction unless the following segment has oral obstruction. If the preceding vowel is [-high] this oral obstruction will manifest as labial frication, unless the following segment has coronal articulation of the tongue, in which case it manifests as coronal frication. The tip of the tongue will point forward, unless the preceding segment is [+high] in which case the tongue tip undergoes the apical gesture of retroflexion. Finally, because I posit that these allophones originally developed between two words, there is no need to address the hypothetical *in pausa* environment within this tableau.

<center>Final */-s/ Within A Constituent</center>

1. Don't Change Manner
2. Don't Let Place = [anterior] When Preceding Segment is [high]
3. Don't Let Place = [labial] When the Following Segment is [coronal]
4. Don't Let Place = [coronal] When Following Segment is [labial]
5. Don't Let Glottal State = [-voice] When Following Segment is [+voice]

The Proto-Indo-European phonemic inventory was impoverished of fricatives: apart from /s/ there are none. In Pre-Vedic the phonemic inventory of fricatives is minimal: Pre-Vedic /w/ had not yet undergone frication to /v/, Proto-Indo-European */ǵʰ/ had developed into Pre-Vedic */jʰ/ but theoretically had not yet undergone supraglottal deocclusion to /ɦ/. Thus there existed no voiced fricative as an independent phoneme; the only voiced continuants in the inventory were the sonorants /y/, /w/, and /r/ or /l/, depending on dialect. The only fricatives were the voiceless continuant phonemes /s/ and /ś/ and extremely rare instances of phonemic /ṣ/ such as ṣáṭ 'six' or ṣá̄ṭ 'victorious'. Furthermore, there is allophonic play between these three phonemes in sandhi, where /s/ might surface as [ś] preceding a palatal or as [ṣ] preceding a retroflex, indicating that the natural class of voiceless fricatives existed to some extent in an overlapping allophonic continuum. It seems valid, then, to consider the most marked feature of /s/ to be its frication, and it is the uniqueness and rarity of frication in the earliest attested Indic that would make such a phoneme stand out in the speaker's mind against the backdrop of stops and sonorants. This must have been the original state of affairs that produced the allophones described in Prātiśākʰya texts: fidelity to voiceless continuancy allowing place to be environmentally conditioned between a preverb and a verb or genitive and its

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nominative; voiced allophones were produced as a by-product. That is, counter to the normal word-final devoicing in Vedic, final voicing was wholly contextual within a constituent. Perhaps de-voicing became used less as a marker of a word-boundary than as a syntactic boundary which would mark the end of a constituent. Whatever its origin, the anticipatory assimilation of voicing became generalized outside of its original syntactic context.

Most of the voiceless continuant allophones remained associated with the original phoneme /s/ in the case of sandhi variation and in certain word-internal environments as well. Consider the case of *usrā* 'cow' or *tisras* 'three' where the normal development of /s/ to [ṣ] is blocked. The height of the [u] or [i] vowel must have produced [ṣ], but the presence of the following /r/ blocks this development, and so the original phonetic value /s/ is restored. The status of /s/ as the primary home for voiceless frication does not mandate that these assimilations occur prior to the development of */k̑/ to /ś/. Notice that final /s/ preceding a voiceless palatal becomes [ś]; it is identified as a member of the independent phoneme /ś/ because it anticipates the place of articulation of the next segment; but, put another way, /s/, /ś/, and /ṣ/ are the only voiceless continuants for which devanāgarī has a set of *akṣaras* or characters. The earliest attested Indic has a number of independent phonemes that are both voiced and continuant, so that each voiced allophone is re-identified as an allophone of whichever sonorant is most similar in it place of articulation.

8. COROLLARY EVIDENCE FROM THE Prātiśākʰya CORPUS

The Prātiśākʰyas provide data whose validity is often questioned. There are, however, several reasons why their comments on the state of their language should be taken at face value. A tendency towards perfectionism and systemicity is the reason the Prātiśākʰyas' accounts are discredited. The most famous example of this is the creation of a character for long vocalic [l]. This phone is assigned a character, but it doesn't actually appear anywhere in the language. Beside the short vocalic [r̥], however, there exists a long vocalic [r̥̄]. Therefore, the authors of the Prātiśākʰyas are thought to have reasoned analogically that along with a short vocalic [l̥] there must exist a long vocalic [l̥̄]. Because of this artificial creation of a character for the sake of symmetrical systemicity, the Prātiśākʰyas were unfairly dismissed by the scholarship of the 19ᵗʰ century; but these texts preserve a great deal of linguistic data and deserve careful consideration.

Consider the methodological difference between the creation of an unnecessary orthographical convention and the misrepresentation of the actual phonetic realities of those Indic dialects actually spoken by authors of the Prātiśākʰyas. Notice that the Prātiśākʰyas do not report any instances of long [l̥̄], which would be the equivalent of falsifying data on the phonetic features of their language. That is to say, they have created a system which honors the possibility of a long [l̥̄], but they do not attempt to insert one into the language. In addition, consider that Sanskrit lacks a phone [z] and devanāgarī lacks a character for such a phone. Were the Prātiśākʰyas truly guilty of altering their language data to create more symmetry, then it would not be unreasonable to assume that

such an orthographical character would have been created as the voiced version of [s]. There are no reported tokens that bear the long [l̥̄] nor is there an akṣara for [z] to be found anywhere.

What is the true nature of this urge to systematize? The function of the Prātiśākʰyas is not linguistic inquiry, but rather to provide a guide to the proper pronunciation of the Vedic texts of their schools. The Vedas, of course, are an oral tradition, and it is clear that the Prātiśākʰyas began life no differently. Imagine a linguistic textbook which must be memorized first to be studied. Perhaps some of what seems to be an active ambition to systematize is merely the surface appearance of a tendency towards symmetry and mnemonic techniques not uncommon in orally transmitted texts.

Another attack on the credibility of the Prātiśākʰyas is that they often disagree as to the precise pronunciations of *visarjanīya* or *visarga*. However, the presence of disagreement seems more likely to indicate that there is some phonetic reality to the situation, namely that of dialectal variation or allophony. AVPr. *2.40 visarjanīyasya parasthāno 'ghoṣe* 'before a voiceless consonant *visarga* has the place of articulation of the following sound.' Notice that in the chart below those Prātiśākʰyas that accept an [s] preceding a [t] also accept these other phones preceding different voiceless stops. Those Prātiśākʰyas that do not believe this also do not accept [-s] preceding [t-].

ETYMOLOGICAL s BEFORE	1	2	3	4	5	6	7	8
	k	*c*	*ṭ*	*t*	*p*	*ś*	*ṣ*	*s*
AVPr.	ẖ	ś	ṣ	s	ḫ	ś	ṣ	s
RVPr. (1)	ẖ	ś	ṣ	s	ḫ	ś	ṣ	s
TPr.	ẖ	ś	ṣ	s	ḫ	ś	ṣ	s
TPr. Ag. Val. Pl.Pl.	ḥ	ḥ	ḥ	ḥ	ḥ	ḥ	ḥ	ḥ
TPr. accord. to some	ḥ	ḥ	ḥ	ḥ	ḥ	ś	ṣ	s
VPr. Śākaṭ.	ẖ	(ś)	(ṣ)	(s)	ḫ	ś	ṣ	s
VPr. Śākalya	ḥ	ḥ	ḥ	ḥ	ḥ	ḥ	ḥ	ḥ
RVPr. (2)	ḥ	(ḥ, ś)	(ḥ, ṣ)	(ḥ, s)	ḥ	ḥ	ḥ	ḥ
TOTAL ALTERNATION	ẖ/ḥ	ś/ḥ	ṣ/ḥ	s/ḥ	ḫ/ḥ	ś/ḥ	ṣ/ḥ	s/ḥ

(Fry 1941: 196)

If each Prātiśākʰya attests its own dialect of Sanskrit, under the comparative method it is the theory of Sanskrit with many allophones of /s/ which wins out. The Prātiśākʰyas that deny the existence of these assimilations may have had [ḥ] generalized in all environments while those that attempt to describe these voiceless allophones may have captured the phenomenon right before a generalization. That is, the development of [ḥ] may have been spreading non-uniformly at the time of the composition of the various Prātiśākʰya texts. On this basis, Fry argues that visarga represents a class rather than a phone. The presence of bi-forms such as *manaḥsu* and *manassu* supports this hypothesis: that to the speaker of Sanskrit, additional specification of the place of articulation of such a phone is unnecessary as it is supplied by context, much in the same way nasal anticipatory assimilation works in English. A speaker of English may produce [Impʊt] from /Inpʊt/ because nasalization is the only marked feature of the phoneme /n/ in that position. The claim that the assimilation of visarga to the following place of articulation is merely a grammarian's fiction is also weakened by evidence of similar phenomena cross-linguistically. Consider the English word "human" [śjumən]. The average English

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speaker does not make a distinction between the allophone of <h> pronounced as [ś] in this word and its most frequent allophone [h].

A final note: the allophonic variations such as *jihvāmūlīya* [x] and *upadhmānīya* [ɸ] described by the Prātiśākʰyas are preserved in the Paippalāda Atharva Veda manuscript from Kashmir. If there was a generalization in favor of visarga, it would make sense that these changes would radiate from the center of the Vedic-speaking community, and that speakers on the fringe, such as those in Kashmir, would retain archaisms longer.

9. ARMENIAN: VOICED FRICATIVES BECOME SONORANTS

The development of a voiced fricative into a sonorant is not unheard of elsewhere in Indo-European. In fact, there is a development in Armenian of voiceless fricatives to voiced fricatives and then voiced sonorants which has many similarities to the development of of /s/ to [z] to /y/ in Sanskrit. It is traditionally believed that the Proto-Indo-European voiceless stops became voiceless aspirates at some point in Proto-Armenian based on their development in word-initial position. Winter proposes, however, that these voiceless stops */p, t, k/ became instead */f, θ, x/. When they preceded a vowel or a resonant in non-initial position, voiced allophones of these voiceless fricative phonemes developed. Subsequently, the voiced allophones in question were re-identified as belonging to a different phonemic set, becoming whichever sonorant shares the most features with the phone in question. In Winter's scenario, Proto-Indo-European *t becomes Proto-Armenian *θ, which itself becomes *δ intervocalically. This *δ becomes [y] when a front vowel follows, as in NOM.SG. *ph₂tēr > *haδir > *hayir > [hayr]. When a non-front vowel or sonorant follows the outcome is [w] as in GEN.SG. *ph₂tros > *haδroh > *haδr >[hawr].

10. MORPHOLOGICAL LEVELING

The model of Indic external sandhi which we have postulated creates a pool of possible phonological outcomes more varied than what is actually attested. The development of /s/ to [r] via [ṣ] and [ẓ] occurs in the same predictable phonological environment in Vedic as it did prehistorically, except that the independent reality of /r/ has allowed this sound change to be extended from internal to external sandhi but still in its original phonetic domain. The endings [-ō] and [-ē], however, are no longer confined to their original phonotactic distributions. In Sanskrit [-ō] is the sandhi outcome for the underlying segment /as/ preceding any voiced segment, and [-ē] is nowhere to be seen outside of *sū́re duhitā́*. The phonological developments that produced [-ō] and [-ē] are certainly Pre-Vedic. It is impossible to conclude that these developments were Proto-Indic, however, as the monophthongization of diphthongs could have occurred independently in different dialects of Indic, just as it occurred independently in Young Avestan final syllables. The development of voiced allophones of /s/ may be Pre-Indic because dialects of Middle Indic preserve the [-ē] outcome which was lost in Vedic and, therefore, could not be passed on. As far as Vedic Sanskrit is concerned, the task at hand is not merely to claim that morphological conditioning has selected [-ō] over [-ē], but also to explain why [-ō] provided a better generalized candidate than [-ē] in all environments.

Let us first survey the appearance of final [-ō] and [-ē] in Sanskrit. We must remove from consideration sources of [-ō] from underlying *-as because we are looking

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for sources of [-ō] which could have been confused by Pre-Vedic speakers with *-as. Therefore, we cannot consider the sandhi [-ō] of the NOM.SG. a-stem as being an [-ō] immediately preceding the leveling of the sandhi outcomes. We must similarly exclude the sandhi [-ō] found in the GEN/ABL.SG. and NOM/ACC/VOC.PL. of consonant stems. The NOM/ACC/VOC.SG. of the s-stem neuter is also an illicit [-ō] for this survey. Outside of the noun, the sandhi [-ō] of the 2nd person singular imperfect or aorist is also underlyingly */-as/. Because genuine [-ō] can only develop from a Indo-Iranian */-au/, the only legitimate source of final [-ō] is the VOC.SG. of u-stems (*váso* 'good'); this is the only place in Sanskrit grammar where confusion would arise from a sandhi-produced [-ō].

On the other hand, the number of inflectional forms ending in [-ē] produced from Indo-Iranian *-ay are numerous and diverse. These include, in the noun, the VOC.SG. of i-stems (*ágne* 'fire') and feminine ā-stems (*sū́nṛte* 'good lady'), the NOM/ACC.DU. of neuter a-stems (*cakré*) and of feminine ā-stems (*yóṣe*), the LOC.SG. of masculine and neuter a-stems (*devé* and *gʰṛté*), and the DAT.SG. of consonant stems (*dātré, druhé, mánase, rā́jñe*), i-stems (*agnáye*), and u-stems (*vásave*). In the verbal domain, final [-ē] is the marker of the medio-passive voice from an underlying vowel *a with the *hic et nunc* *[i~y] suffixed to it. In short, [-ē] appears in all forms of the present middle indicative and perfect middle indicative. Suffice it to say there are many inflectional endings which come from an underlying *[-ay] when compared to the scarcity of final underlying *[-aw].

In addition to these endings in [-ē], I would like to propose another potential ending in [-ē] which may have provided additional competition for sandhi [-ē] at the time

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of grammatical conditioning. I have already discussed the possibility of late unification of word stem and case suffix in Pre-Indic forms such as INST.PL. s-stem *mánobʰis*. If, in fact, this is the case, and the phonetic assimilation occurs due to syntactic constituency overcoming a word boundary, then *mánobʰis* has more in common with *sū́re duhitā́* than with *sedúr*. If *mánobʰis* is actually /manas#bʰis/, then /manas/ behaves as both the NOM.ACC.N.SG. and as an uninflected oblique plural preceding its post-position.

The late unification of the bʰ-case endings in the plural would put the sandhi-generated [-ē] in competition with these plural stems as well. The Proto-Indo-European plural *-oy is reflected in the anaphoric pronoun (*tébʰis*, *tébʰyas*), and the a-stem (*devébʰyas*). If, as *mánobʰis* suggests, there was a word boundary still present between these oblique stems and their post-positional complements, then it is reasonable to include these [-ē] forms with the other forms of final [-ē] as candidates which could be potentially confused with the sandhi-generated [-ē]. The u-stem vocative is the only regular source of final [-ō] except for a few rare noun stems *(gó-),* but there are no fewer than seven distinct nominal cases which end in [-ē]. In addition to the [-ē] which pervades the medio-passive present stem in the verbal system. It is therefore not surprising that given the choice of the two, a speaker would err on the side of [-ō] to prevent confusion. This tendency resulted in [-ō] being selected in all scenarios in Ṛg Vedic, except the formulaic looking hapax *sū́re duhitā́,* and [-ē] being selected in specific grammaticalized environments in the eastern Prākrits of Ardhamāgadhī and Māgadhī.

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